NUTRITION RESEARCH IN MALAYSIA

Selected Bibliography of Published Journal Articles from (1985 -2010)

TECHNICAL WORKING GROUP ON NUTRITION RESEARCH
NATIONAL COORDINATING COMMITTEE ON FOOD AND NUTRITION
MINISTRY OF HEALTH MALAYSIA
2011

MAJLIS KESELAMATAN MAKANAN DAN PEMAKANAN KEBANGSAAN
MKMPK

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Technical Working Group on Nutrition Research
National Coordinating Committee on Food and Nutrition
Ministry of Health, Malaysia
2011

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Preface by Deputy Director-General of Health (Public Health)

Nutrition research is one of the best ways to delineate the real nutrition situation. In Malaysia, way back from 1900 to 2010, a tremendous increase of nutrition research has been published and a lot has transpired.

Therefore, it is high time for Ministry of Health Malaysia with the collaborations of local universities to make use of these findings. Program managers, researchers, funders of health programs, and others should find this bibliography useful to them in designing more effective health programs and/ or evaluate the strength and weaknesses of existing programs. It is hoped that this publication will be an addition to existing reference materials on nutrition research, and thus encourage and facilitate the effective programmes to improve nutrition among Malaysians.

Finally, I would like to thank and congratulate the Technical Working Group of Nutrition Research for the successful publication. Special thanks are also directed to all related agencies and individuals who have contributed towards the completion of this bibliography.

DR. LOKMAN HAKIM SULAIMAN
Deputy Director General of Health (Public Health) cum
Chairperson of
National Coordinating Committee for Food and Nutrition (NCCFN)
Ministry of Health, Malaysia

Acknowledgement

It is a great honour for The Technical Working Groups of Nutrition Research under the National Coordinating Committee for Food and Nutrition (NCCFN) to be mandated to compile the abstract on Malaysian nutrition research from year 1985 to 2010. This is the continuity of the earliest efforts by the Institute of Medical Research in year 1980's.

Comprehensive in terms of nutrition research category areas which were identified based on the 12 nutrition research categories, with A to L sequencing, this bibliography lists 724 entries of nutrition research in Malaysia dated from 1985 to 2010. It will be noted that some of the papers are written in Bahasa Malaysia and has been retained in this format. The author's index at the end gives a quick and valuable guide for those who are interested with the studies.

I'm glad to the successful completion of this "Nutrition Research in Malaysia - Selected Bibliography of Published Journal Articles from 1985 to 2010". I appreciate the effort and hard work of all the editorial board members toward the publication of this bibliography. My deepest appreciation goes to the following individuals and organisations for contributing towards the publication:

1. Director General of Health Malaysia
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PROF. DR. NORIMAH A. KARIM
Chief Editor

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CONTENTS

INFANT FEEDING AND COMPLEMENTARY FEEDING PRACTICES

A1 Changes in human milk vitamin E and total lipids during the first twelve days of lactation

Ali J, Kader HA, Hassan K and Arshat H

Am J Clin Nutr 43: 925-930, 1986

Our previous study showed vitamin E deficiency in newborns (69.7%) and mothers at term (85.9%) when the ratio between serum vitamin E in mg/dl and total lipids in g/dI was used as an indicator of vitamin E status. This study was conducted to determine the human milk content of vitamin E. During the first 12 days of lactation milk vitamin E levels remained almost constant (day 1, 0.68 mg/dl; day 12, 0.65 mg/dl), milk total lipid levels increased daily (day 1, 1.11 g/dl; day 12, 3.60 g/dl), and the ratio between milk vitamin E and total lipids dropped steadily (day 1, 1.3;day 12, 0.2).In spite of this drop in vitamin E status, it is unlikely that vitamin E availability will be affected in neonates, because normal neonates because normal neonates absorb milk fats well and this ability increases with age.

A2 Determinants of breastfeeding duration in Peninsular Malaysia

Awang H[1] and Salleh AL[2]

[1]Faculty of Economics and Administration, University of Malaya, Kuala Lumpur, Malaysia; [2]Faculty of Business and Accountancy, University of Malaya, Kuala Lumpur, Malaysia

Asia Pac J Public Health 12(2):102-106, 2000

The health benefits of breastfeeding to infants and mothers have been well recognised. This study applies linear regression analysis to assess the determinants of breastfeeding duration of first born using data from the Second Malaysian Family Life Survey. The proportion of women who breastfed their first child is 82 percent, of which 97 percent reported their breastfeeding duration. The distribution of breastfeeding duration has a mean of 5.7 months and a median of two months. Important determinants of breastfeeding duration include maternal age, ethnicity, period of first birth, husband's occupation and work status of the woman.

A3 Risk factors associated with low birth weight infants in the Malaysian population

Boo N Y [1], Lim SM[1], Koh KT [1], Lau KF[1], Ravindran J [2]

[1]Department of Paediatrics, International Medical University; [2]Departments of Obstetrics & Gynaecology, Hospital Tuanku Jaafar

Med J Malaysia 63(4): 306-310, 2008

This study aimed to identify the risk factors which were significantly associated with low birth weight (LBW, < 2,500g) infants among the Malaysian population. This was a case control study carried out at the Tuanku Jaafar Hospital, Seremban, Malaysia over a five month period. Cases were all infants born with birth weight less than 2,500g. Control infant were selected with the help of a random sampling table from among infants with birth weight of _ 2,500g born on the same day in the hospital. Of 3,341 live births delivered in the hospital, 422 (12.6%) were LBW infants. Logistic regression analysis showed that, after controlling for various potential confounders, the only significant risk factors associated with infants of LBW were gestational age (adjusted odds ratio [OR] = 0.6, 95% CI : 0.5, 0.6; < 0.0001), maternal pre pregnancy weight (adjusted OR =0.97, 95% CI : 2.2, 5.1; p < 0.0001), previous history of LBW infants (adjusted OR = 2.3, 95% CI : 1.4, 3.8; p = 0.001) and PIH during current pregnancy (adjusted OR = 3.3, 95% CI : 1.6, 6.6; p = 0.001). A number of potentially preventable or treatable risk factors were identified to be associated with LBW infants in Malaysia.

A4 Feeding practices of infants delivered in a district hospital during the implementation of Baby Friendly Hospital Initiative

Chan SK[1], Asirvatham CV[2]

[1]Paediatric Unit Hospital Seri Manjung; [2]Obstetrics & Gynaecology Unit, Hospital Seri Manjung

Med J Malaysia 56(1): 71-76, 2001

A study on infant feeding practices was conducted during the implementation of the Baby Friendly Hospital Initiative (BFHI) in an district hospital. The aim was to identify which population subgroups had lower breastfeeding rates at 4 months and the effect of attendance of antenatal breastfeeding education on breastfeeding practices. All infants delivered in May 1996 were followedup. 204 respondents were analyzed. This study demonstrated a higher exclusive and any breastfeeding rates at 4 months than some other studies. (48% and 76% respectively). It was found that the Malays were more likely to be breastfeeding exclusively at 4 months (72%) than the Indians (32%) and the Chinese (4%). (P < 0.01). There were more non-working mothers breastfeeding exclusively at 4 months than working mothers. (60% versus 26%). P < 0.01. Antenatal breastfeeding education in the form that was given appeared to improve breastfeeding rates at 4 months. Future efforts to promote breastfeeding should target the Chinese mothers and the working mothers.

A5 A survey of breast feeding practices in infants seen in general practice

Chia SF

Med J Malaysia 47(2):134-138, 1992

This is a study of infant feeding practices of 126 mothers. Seventy-seven mothers or 61.1% practised breast feeding. The typical breast feeding mother was more likely to be a Malay, with lower family income and residing in the rural area. The educational status of the mother was not an important factor in influencing her to breast feed. Health education on breast feeding should be intensified in schools to reinforce the implementation of the Malaysian Code of Ethics for Infant Formula Products.

PIP: During December 1990, in Malaysia, 126 mothers accompanying a child between the ages of 6 months and 2 years were interviewed; only 77 (61.1%) mothers practiced breast feeding. The breast-feeding mother was likely to be a Malay (84.2%), from a rural area (70.7%), and with lower family income (72.7%). She was likely to breast feed for 3 months (75.3%). By the age of 7 months, only 18.3% of infants were still breast fed, and 81.7% of infants received some form of nonmilk feeding. 61.8% of mothers with primary or less education breast fed, while 61.1% mothers with secondary or higher education did so. 58.8% of working mothers breast fed compared with 65,1% of housewives. Of the 106 mothers who breast fed partially or not at all, 49 complained of poor lactation for resorting to artificial feeding. Nonmilk feeding was introduced early in 44 cases while breast feeding. 14 out of 20 mothers who gave inconvenience as the reason for artificial feeding were working mothers and did not breast feed at all. 16 gave no reasons for not breast feeding. Of the 21 mothers who complained of illness, 7 were sick while breast feeding, whereas the rest complained of weakness for not breast feeding at all. More than 10 years after the introduction of the Malaysian Code of Ethics for Infant Formula Products, the 61.1% rate of breast feeding is not encouraging. The apparent lack of impact of the Code of Ethnics on the breast feeding practices may be because the Code has no legal backing for enforcement. It is restricted to expectant mothers only with regard to the distribution of samples, while providing infant formula samples to health professionals is allowed. In addition to adequate information on breast feeding, the way society views a woman's role as a mother ought to be changed. Incentives should be given to working mothers, e.g., flexi-time, job-sharing, and more home-based work. Time is not on the side of breast feeding. As Malaysia becomes more developed, urbanized, and the income level of the population rises, artificial feeding will increase.

A6 Breastfeeding at 6 months and effects on infection

Chye JK and Lim CT

Department of Paediatrics, University Hospital

Singapore Med J 39(12): 551 - 556, 1998

Aims: To examine the pattern of and the influence of some socio-demographic factors on infant milk feedings, and the protective role of breastfeeding against infections. Methods: Mothers who breastfed their infants (exclusively or partially) at 6 weeks postpartum, and who had singleton pregnancies and healthy infants at birth, were interviewed when their infants had reached 6 months of age. Results: Of the 234 mothers studied, only 31(13%) mothers were practising exclusive breastfeeding (EBF) and 133 (57%) mothers were using exclusive infant formula feeding (EIF). Solid and semi-solid foods were introduced between 4 to 6 months of life in 89% of the infants. On logistic regression analysis, mothers who were in paid employment [OR 0.25, 95% CI 0.15, 0.42] and not breast feeding at 6 weeks [OR 0.32, 95% CI 0.19, 0.54] had decreased odds of EBF. Antenatal plans to breastfeed, breast-feeding difficulties, ethnicity, level of parental education, parental ages, fathers' income, primigravida status and infants' gender were not significant co-variates. In comparison, EIF was more likely in mothers who worked, practised mixed feedings at 6 weeks and of Chinese descent. There were no significant differences in the rates of upper respiratory tract infections (URTI) or diarrhoeal illnesses between the infants who were or were not being breast-fed. Conclusions: Most mothers were unable to breastfeed their infants exclusively in the recommended first 4 to 6 months of life. Complementary changes outside the hospital and maternity services are essential in improving breastfeeding rates. Breastfeeding does not appear to confer significant protection to either URTI or gastrointestinal tract infections.

A7 Breastfeeding practices among mothers in an urban polyclinic

CK Siah, H Yadav

Department of Social and Preventive Medicine, Kuala Lumpur

Med J Malaysia 57(2): 188-193, 2002

A cross sectional descriptive study on breast feeding practices in an urban clinic was conducted among 136 mothers aged between 21-49 years who were interviewed using a questionnaire. Malays constituted 61% of the respondents. Chinese 22.8% and Indians 16.2%. Majority of these were working mothers and although the initiation of breastfeeding was high (99.3%), exclusive breastfeeding was only 12.5%. A large proportion (33.8%) stopped prior to 3 months. Majority of the Chinese mothers (61.3%) stopped before 3 months as compared to the Indian

(40.9%) and Malay (21.7%) mothers ($p < 0.001$). Mean age of introducing complementary foods at 3 months is below the accepted age of 4 to 6 months for weaning. Ever-breast feeding rate is high in this urban setting but more efforts are needed to effect a higher rate of exclusive breastfeeding and longer duration of breastfeeding.

A8 Reversal of the decline in breastfeeding in Peninsular Malaysia? Ethnic and educational differentials and data quality issues

DaVanzo J, Sine J, Peterson C, Haaga J.

RAND, Santa Monica, California 90407.

Soc Biol. 41(1-2): 61-67, 1994

Data from the First and Second Malaysian Family Life Surveys in 1976 and 1988, respectively, are analyzed to examine long-term trends in breastfeeding in Peninsular Malaysia, educational and ethnic differences therein, and the quality of retrospective data on infant feeding. The steady decrease between the mid-1950's and mid-1970's in breastfeeding was reversed to become a nearly monotonic increase since 1975. Part of the change is attributable to the changing composition of the Malaysian population. Over time, the percentages of births to subgroups with higher rates of breastfeeding--particularly Malays and more highly educated women--have increased. However, there is also evidence of changes in rates of breastfeeding within these subgroups. Many Malaysian infants have a total duration of breastfeeding (including with supplementation) considerably shorter than WHO's recommended four months of exclusive (unsupplemented) breastfeeding. Moreover, nearly all breastfed infants are first given supplementary food or beverage shortly after birth. Breastfeeding promotion efforts in Malaysia need to emphasize the appropriate timing of and types of supplementary feeding.

PIP: Trends in breast feeding in Malaysia from retrospective data obtained from Family Life Surveys in 1976 and 1988 indicate declines in initiation of breast feeding during the 1950s and increases since the 1970s. The declines are considered valid, although some of the differences between the two surveys are attributed to definitions and whether breast feeding was popular or not. Breast feeding changes have occurred recently and can be explained by ethnic and educational differences. Malays and educated women had higher breast feeding rates. The greatest increases in breast feeding occurred among women with at least some secondary education, and the number of educated women increased over time. Women with no education had the highest rates throughout the period; declines occurred in 1977 and then increased and stabilized recently. Durations of breast feeding were shorter among women who were better educated. For all population groups in Malaysia, breast feeding duration was less than the recommended WHO standard duration

of exclusive breast feeding. Duration of 4 months or more has decreased over time. Increased breast feeding was viewed as a result of greater awareness of the benefits to health and nutrition for breast fed infants. According to the information-diffusion hypothesis, breast feeding has increased, but information is still lacking about duration and timing of supplementary feeding, particularly among those less well educated. Promotion efforts should be directed to the appropriate timing and types of supplements.

A9 Assessment of growth and feeding practices in children with cleft lip and palate

[1]Gopinath VK and [2]Muda WA

[1]School of Dental Sciences; [2]School of Health Sciences, University Sains Malaysia

Southeast Asian J Trop Med Public Health. 36(1): 254-258, 2005

Feeding difficulties in cleft lip and palate (CLP) infants is commonly observed and is the most traumatic experience the family has to face. These infants are undernourished and have compromised growth. The purpose of this study was to 1) assess general health and growth parameters in children with CLP and in normal children; and 2) investigate the feeding methods of CLP infants and normal infants. A total of 221 children from birth to six years of both sexes, with CLP (60 children) and normal (161 children) were selected. The CLP and normal children were divided into three subgroups by age. The practice of feeding the infants in subgroup I was assessed using standard piloted questionnaires. The assessment of growth was done at baseline and at six months in all the subgroups. The general well being of the children was assessed by noting the number of common infections. Results showed that a significantly higher percentage of mothers with normal babies ($p < 0.01$) had a positive attitude towards breast feeding. When compared to normal children, CLP children were more susceptible to infections ($p < 0.05$) and measured significantly lower on the height growth curve($p < 0.05$). Hence, height can be used to monitor growth in CLP children.

A10 Evidence of a reversal of the breastfeeding decline in Peninsular Malaysia

Haaga JG

Am J Public Health 76(3): 245-251, 1986

Data from the Malaysia Family Life Survey show an increase in the percentage of infants breastfed, at least initially, from 75 percent in 1970-74 to 79 percent in 1975-77. Contrary to what would be expected if Malaysia were following the trends observed in the United States and Western Europe, the increase has occurred among poor and uneducated women as well as among the more fortunate. The increase was especially marked for infants born in hospitals and private clinics, which had very low rates of breastfeeding in the early 1970s. the changes may be due partly to a shift in the practices and recommendations of health professionals. Trends in infant feeding practices in Malaysia during the whole period 1950-77 are reviewed. Reasons for thinking the increase in the mid-1970s an artifact of the survey are presented and provisionally rejected. The implications of these findings for child health policy in Malaysia and for theories of infant feeding trends in developing countries are discussed.

A11 Health consequences of infant feeding in Malaysia: a review

Haaga JG

Malays J Reprod Health. 3(2): 85-10, 1985

This article reviews studies, of both Malaysian and other populations, on infant feeding patterns and their effect on health and survival prospects of children. The consequences of infant feeding patterns can be grouped into the 2 main categories of nutritional and immunological. Breast milk alone, even from a very poorly nourished woman, is usually adequate nutritionally for infants for some period after birth. Human milk contains lactoferrin and transferrin proteins which bind iron in the infant's gut, thus depriving certain bacteria of this nutrient and inhibiting their multiplication. Colostrum, the "pre-milk" produced by women in the 1st few days postpartum before mature milk comes in, is particularly rich in secretory IgA. 1 study, (Butz et al, 1982) with multivariate analysis, found that the risk of mortality was lowered the longer an infant was breastfed. Mortality influences of breastfeeding and environmental hygiene interact, with relative risk of early weaning being much greater in households lacking flush to toilets, piped water or both, than in households with these amenities. Although an unreliable means of avoiding pregnancy, breastfeeding is one of th major traditional means of birth spacing and population control. In an environment where an infant is protected by caretakers who will respond to signs for illness, and who are assured of an adequate supply of nutrients, feeding patterns are nearly indistinguishable in their effects in survival prospects. Within this type of environment, parents can freely make feeding decisions based on custom, advice, or convenience. Inappropriate feeding may not harm infants significantly if clean water is available, family hygiene is adequate, and if preventive and curative care for infectious diseases is widely available.

A12 Does breastfeeding really save lives, or are apparent benefits due to biases?

Habicht JP, Davanzo J and Butz WP

Am J Epidemiology 123(2): 279-290, 1986

Analysis of mothers' recall data collected in 1976-1977 by a probability survey in Peninsular Malaysia showed as association between breastfeeding up to 6 months of age and improved survey of infants throughout the first year of life. Inappropriate sample selection and inadequate control of confounding can introduce large biases in these analyses. The magnitude and direction of these biases were discussed. Even when these biases were dealt with, unsupplemented breastfeeding appeared more beneficial than supplemented breastfeeding. The younger the infant and the longer the breastfeeding, the greater the estimated benefitd in terms of deaths averted. The use of powdered infant formula did not appear to offset the detrimental effects of early weaning and supplementation. The positive relationships found in these analyses between breastfeeding and survival were not due to death precluding or terminating breastfeeding. Nor were they likely to be due to a shift away from breastfeeding because of recent illness, which was also controlled in the analyses. Nor were they likely to be due to other factors were taken into account, the beneficial effects of breastfeeding became stronger and imply that, if there had been no breastfeeding in this sample, twice as many babies would have died after the first week of life.

A13 Breast-feeding, social variables, and infant mortality: a hazards model analysis of the case of Malaysia

Holland B

Soc Biol. 34(1-2):78-93, 1987

A hazards model was used to estimate the relative risks of infant mortality at various points during the 1st year of life among Malaysian infants who were breastfed for various durations. Data on infant mortality, breastfeeding, and social variables were derived from the retrospective Malaysian Family Life Survey. To provide adequate samples in subperiods of the 1st year of life, analysis intervals were constructed starting at ages 0, 2, 4, and 7 months, and including up to 13 months of exposure. The preferred models for the 1st 3 analysis intervals included breastfeeding as a predictor of infant mortality. It is a particularly significant determinant in the 1st and 3rd intervals. The relative risk of death among those who received food other than human milk was 6.26 compared to those who did not, and the infant who was never breastfed was 12 times more likely to die than the infant who was breastfed at some time. Infants breastfed for intermediate durations had intermediate effects estimates. In each analysis interval, the regression coefficient for unsupplemented breastfeeding

was of larger magnitude than that for supplemented breastfeeding. Overall, this study shows that breastfeeding is an important determinant of infant mortality in Malaysia. Studies with larger samples are urged to confirm the preliminary finding of a monotonic relationship between breastfeeding duration and lower infant of mortality risks. However, this analysis demonstrates the utility of hazard model methodology as a powerful tool for calculating relative risk estimates when the sample size is relatively small and there are numerous covariates.

A14 Infant feeding practices in an urban squatter community

Khor GL

Malays J Reprod Health.7(1):41-51, 1989

The pattern of infant feeding practice was studied among Malay mothers in Kg. Sentosa, a squatter community in Kuala Lumpur. Breastmilk only was provided by most mothers up to the 4th week, after which it was increasingly replaced by cow's milk. 95% of the working mothers and 54% of the full-time housewives had introduced bottle-feeding supplemented with precooked cereal and porridge by 2 months of age. Factors related to maternal employment, household income and occurrence of illness in child affect significantly the duration of exclusive breastfeeding. Variability in the timing of commencement and completion of weaning could be attributed partially only (42.1% and 26.8% respectively) to the household, maternal and child variables taken together. This seems to imply that personal reasons largely govern decisions related to feeding infants.

A15 Fatty acid composition of breast milk from three racial groups from Penang, Malaysia

Kneebone GM, Kneebone R and Gibson RA

Department of Pediatrics, Finders Medical Center, Bedford Park, 5042 South Australia, Australia.

Am J Clinical Nutrition 41(4): 765-769, 1985

The fatty acid composition of samples of breast milk obtained from 51 mothers (26 Malay, 15 Chinese, 10 Indian) residing in Penang, Malaysia was determined by gas chromatography. Despite living in close physical proximity the mothers from the three racial groups showed distinct cultural differences in dietary intake. These differences were reflected in differences in the fatty acid composition of breast milk samples. The milk of Chinese mothers was generally less saturated (4 1%) than that of Malay and Indian mothers (52 and 50% respectively). The milk of Chinese mothers was also richer in linoleicacid (17%) than that of Malay and Indian mothers (9% and 11% respectively).Overall the levelof individual fattyacids fellwithin the range of values reported for Western mothers on well nourished dietsand pointed to breast milk of high standard despite large variations in the diet of Malaysian mothers.

A16 Breastfeeding and the use of maternal health services in Sarawak.

Kwa SK

Malays J Reprod Health.11(1):8-19, 1993

In Malaysia, a demographer analyzed data on 1583 children born to 1047 15-49 year old mothers in the 5 years before the 1989 Population and Family Survey was conducted in all districts of Sarawak, except Belaga. She examined the relationship between use of maternal health services, including contraception, and the breast feeding pattern. Most women used prenatal care and postnatal care services (98.2% and 82.6%, respectively). The mean duration of breast feeding was only 6.13 months while the median duration was even shorter (3 months). Mothers who received prenatal care were more likely to initiate breast feeding than those who received no prenatal care (84.1% vs. 75%), but their duration of breast feeding was much shorter (median, 5 vs. 14.3 months). Women who delivered at a private hospital compared to those who delivered elsewhere were less likely to initiate breast feeding (70.6% vs. 84.6-88.9%) and breast feed for a shorter period of time (median, 2.36 vs. 4.41-13.56 months). Nurses in private hospitals care for newborns in a separate room and give prelacteal feeds, particularly commercial infant formula, which jeopardizes mothers' initiation of breast feeding. Women who were assisted by a physician had the lowest rate of initiation of breast feeding (70.5% vs. 86.2-92.4%) and the shortest duration of breast feeding (2.68 vs. 4.67-14.55 months). Women who had ever used contraception compared to those who had never used contraception were somewhat less likely to initiate breast feeding (83.2% vs. 87.5%) and breast feed for a shorter time (4.29 vs. 12.82 months). These results suggest that the government needs to change its policies on health services to promote breast feeding. It should target health personnel and clients in the private sector and family planning workers.

A17 Kandungan laktoferin dalam susu ibu dan kaitan dengan pengambilan kalori, protein dan ferum

Maznah I & Rodziah AR

Department of Nutrition and Community Health, Faculty of Human Ecology, Universiti Pertanian Malaysia, 43400 UPM, Serdang, Selangor.

Mal J Nutr 2: 29-47, 1996

Kajian ini bertujuan untuk menentukan kandungan laktoferin dalam susu ibu dan menguji perkaitannya dengan pengambilan kalori, protein dan ferum dalam diet ibu. Kajian telah dilakukan ke atas 35 orang ibu yang baru melahirkan sehingga hari ke-30 kelahiran di kawasan Serdang. Sampel susu ibu dipungut sebanyak tiga kali iaitu pada peringkat kolostrum (hari ke-2), transisi (hari ke-7) dan matang (hari ke30). Maklumat kajian diperolehi melalui penggunaan borang soal selidik yang mengandungi

makiumat latar belakang subjek, Ingatan Diet 24 Jam dan Kekerapan Pengambilan Makanan. Maklumat Ingatan Diet 24 Jam dianalisis menggunakan DEMETER bagi menentukan pengambilan kalori, protein dan ferum ibu-ibu. Teknik ELISA sandwic tak bersaing telah digunakan untuk menentukan kandungan laktoferin dalam susu ibu. Hasil analisis yang dijalankan mendapati bahawa kandungan laktoferin menurun mengikut tempoh penyusuan dengan min laktoferin di dalam kolostrum sebanyak 7.0 ± 0.3 mg/ml (6.2 - 7.6 mg/ml), susu transisi sebanyak 3.5 ± 0.2 mg/ml (2.6-4.1 mg/ml) dan susu matang sebanyak 1.5 ± 0.2 mg/ml (1.2-1.9 mg/ml. Data pengambilan diet diet subjek kajian menunjukkan bahawa purata pengambilan nutrien ibu-ibu pada hari ke-30 meningkat berbanding hari ke-7. Purata pengambilan kalori pada hari ke7 ialah sebanyak 2540 ± 325 kcal dan meningkat kepada 2698 ± 364 kcal pada hari ke-30 sementara bagi protein pula sebanyak 65.0 ± 26.8 g pada hari ke-7 dan meningkat kepada 74.9 ± 32.1 g pada hari ke-30. Demikian juga bagi ferum, pada hari ke-7 didapati pengambilan sebanyak 11.5 ± 6.9 mg dan pada hari ke-30, ia meningkat kepada 14.4 ± 8.9 mg. Pekali Korelasi Pearson menunjukkan bahawa tiada perkaitan yang signifikan di antara pengambilan kalori, protein dan ferum dengan kandungan laktoferin pada $p<0.05$ ($r=0.1258, 0.0878, 0.2056$). Kajian ini mendapati bahawa kandungan laktoferin menurun sepanjang tempoh penyusuan, paling tinggi pada peringkat kolostrum dan aras laktoferin tidak dipengaruhi oleh pengambilan kalori, protein dan ferum ibu.

A18 Birth weight and the effects of birth spacing and breastfeeding on infant mortality

Millman SR, Cooksey EC.

Stud Fam Plann. 18(4):202-212, 1987

Analyses previously reported, based on data from the World Fertility Survey (WFS), are replicated here with data from the Malaysian Family Life Survey. Comparison of results, when data limitations inherent in the World Fertility Surveys are reproduced or relaxed, suggests that these limitations cause little distortion, and thus bolsters confidence in the validity of results based on WFS data in which these limitations are inescapable. Generalizations based on the present investigation and on the body of previous work that it tends to validate are presented. Most significantly, these include the greater importance of both breastfeeding and birth spacing under generally unfavorable conditions, the variability of durations to which some benefit of continued breastfeeding persists, and the observation that the great majority of birth-spacing effects operate through some mechanism other than the association of breastfeeding with birth interval lengths.

PIP: Analyses previously reported, based on data from the World Fertility Survey (WFS) are replicated with data from the Malaysian Family Life Survey, based on a stratified probability sample for 1,262 ever-married women 50 years of age in Peninsular Malaysia. Comparison of the results, when data limitations inherent in the WFS are reproduced or relaxed, suggests that these limitations cause little distortion, and thus bolsters confidence in the validity of results based on WFS data

in which these limitations are inescapable. Generalizations based on the present investigation and on the body of previous work that it tends to validate are presented. The greater importance of both breastfeeding and birth spacing under generally unfavorable conditions becomes clear. The relationship between breastfeeding and survival for all births, as well as for the last 2 births, emphasized in this model, has a logit coefficint significant at the .01 level for the 1st month of life as well as the period from birth to 1 year. The durations to which some benefit of continued breastfeeding persists, are variable. In countries where the situation generally is more favorable to child survival, as indicated by rates of infant mortality, breastfeeding's positive effects on child survival are less significant. Breastfeeding promotion and continuation should be the goal especially for programs operating among very poor groups. The great majority of birth spacing effects operate through some mechanism other than the association of breastfeeding with birth interval lengths, as indicated by the fact that significant survival advantages are often associated with birth spacing after controlling for breastfeeding.

A19 Breast milk immunoprotection and the common mucosal immune system: a review

Prameela KK[1] & Mohamed AEK[2]

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Mal J Nutr 16(1): 1 - 11, 2010

It is universally known that breastfeeding provides a broad spectrum of nutritional and non-nutritional advantages to the developing infant. Nonnutritive protecting potentials of breast milk towards different infections and non-infectious diseases are still attracting the attention of researchers in different specialties. The neonate, who is suddenly exposed to a wide variety of organisms, is in dire need of protection, enhancement and education of his immature immune system to encounter these organisms. The lactating mammary gland is an integral part of the common mucosal immune system which stands as a sentinel in combating pathogens that enter the body via the mucosal route. The common mucosal immune system also competently controls tolerance mechanisms to innocent proteins and is involved in surveillance of carcinogensis. The diverse roles of general mucosal immunity are nearly well established but the specialised functions of breast tissue and breast milk in boosting the immune responses need more emphasis and highlighting. The detailed understanding and evaluation of breast milk as an immunological tool is reviewed within the domain of the diverse activities of the common mucosal immune system.

A20 Risk factors associated with low bone mineral content in very low birth weight infants

Rohana J, Hasmawati J, Zulkifli SZ.

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Singapore Med J. 48 (3):191-194, 2007

Introduction: We report part of the findings of a study conducted to determine the correlation between bone mineral content (BMC) and biochemical bone markers in very low birth weight (VLBW) infants. Methods: This was a cross-sectional study, carried out between August 2001 and June 2004 in the neonatal intensive care unit of Hospital Universiti Kebangsaan Malaysia. Whole body BMC was measured by dual energy X-ray absorptiometry in 41 VLBW infants. RESULTS: The mean BMC/kg body weight was 25.8 (standard deviation [SD] 11.2) g per kg. The BMC of these infants had significant negative correlation with their birth weight (r equals -0.31, p-value equals 0.048). There was no significant difference in the mean BMC between different races and gender. The infants were divided into two groups based on the course of prematurity: "non-complicated" and "complicated" groups because of the lack of "healthy reference population" data for normal BMC values in premature infants. The "non-complicated" group (30) had received ventilator assistance for less than seven days, tolerated full enteral nutrition before the age of two weeks, had no sepsis or necrotising enterocolitis and did not receive regular diuretic or steroid treatment. The cut-off level for a desirable BMC per kg in VLBW infants was obtained from a value corresponding to one SD below the mean of the "non-complicated" group, i.e., 17.4 g per kg. Eight (19.6 percent) infants had BMC less than this value. Multilinear regression analysis of demographical characteristics, maternal factors, neonatal complications and nutrition received revealed that heavier birth weight (p-value equals 0.007) and longer duration of parenteral nutrition (p-value equals 0.03) were associated with lower BMC. Conclusion: VLBW infants who required parenteral nutrition for longer periods were at higher risk to having poorer bone mineralisation.

A21 Evidence from peninsular Malaysia of breastfeeding as a contraceptive method

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Stud Fam Plann. 23: 376-385, 1992

This report examines Malaysian women's perceptions of the contraceptive effect of breastfeeding, the determinants of their perceptions, and any effect these perceptions might have on nursing duration and contraceptive use. The report also considers whether women are consciously replacing breastfeeding with modern

contraceptive methods. Data from the 1976 Malaysian Family Life Survey are analyzed, and the author concludes that Malaysian women do perceive that breastfeeding has a contraceptive effect, but that this perception is not universal. Ethnicity and desire for a particular family size are the most significant determinants of this perception. Finally, Malaysian women's recognition of the contraceptive effect of nursing does not influence either the duration of their breastfeeding or their adoption of contraception. Malaysian women may not be abandoning breastfeeding to adopt contraception. More probably, breastfeeding declines and contraceptive prevalence increases with modernization.

PIP: A population scientist analyzed data on 1092 15-50 year old, ever-married women (1976-1977 Family Life Survey) living in Malaysia to determine how much they knew about breast feeding as a contraceptive method and whether this perception moderated their use of other contraceptives. Most women (61.6%) believed it was difficult to conceive while breast feeding, but a sizable percentage (38.4%) did not hold this belief. The most important determinants of the perception of the contraceptive effect of breast feeding were being Chinese and the desire to stop having children (odds ration [OR] = 1.75 [p .01] and 1.37, respectively, [p .05]). Women who wanted to stop childbearing were 61% more likely to use an effective contraceptive (oral contraceptive [OC]) than those who did not want to stop childbearing (p .01). Knowledge about the contraceptive effect of breast feeding did not affect either the duration of breast feeding or contraceptive use. Yet, education did play a significant role in OC use (OR for at least secondary education = 2.33). Moreover, younger women were more apt to use OCs than older women (OR = .93; p .01). Thus, modernization as evidence by the relationship between education and age with OC use was most likely the reason for the decline in breast feeding and the increase in contraceptive use. Evidence after the survey indicated that the decline in breast feeding had slowed and had even increased. Therefore, modernization appeared to be influencing both an increase in breast feeding and in contraceptive use.

A22 A Study of Marketing and its Effect on Infant Feeding Practices

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Med J Malaysia 56 (3): 319-323, 2001

A baby milk market was created in the late nineteenth and twentieth century and was conceived through the mutual attraction of the manufacturers and doctors. This has partly attributed to the change from breast to artificial feeding. This study was conducted to determine whether marketing had any effect on infant feeding practices. Fifty Malay mothers whose last child was aged less than five years were asked, by questionnaire and by interview, to identify whether several marketing

methods influenced their decision on the selection of infant feeding practice. It was found that these mothers felt milk advertisements on television were attractive (72%), were influenced by others to buy a particular brand of formula (38.4%), were influenced by free milk samples to buy a particular brand of milk formula (65.2%) and were not influenced by their doctors on the chosen method of feeding (68%). More studies should be conducted on a bigger sample in other settings and targeting other methods of marketing to substantiate the above results. Further, similar studies among Chinese and Indian mothers are also required.

A23 Factors associated with non-exclusive breastfeeding among 4-week post-partum mothers in Klang District, Peninsular Malaysia

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Mal J Nutr 15 (1):11-18, 2009

This is a cross-sectional study which investigated the association between non-exclusive breastfeeding and maternal, paternal, obstetric and infant factors. Data on maternal, paternal, obstetric and infant factors were collected through face-to-face interview using a structured questionnaire from 498 mothers with four-week-old infants who attended government clinics in Klang district between 17 and 28 July 2006. The prevalence of non-exclusive breastfeeding at four weeks was 45.8%. Factors significantly associated with non-exclusive breastfeeding at four weeks included Indian ethnic mother (OR = 4.06), working mother (OR = 3.55), mother from high household income (OR = 1.90), mother who smokes (OR = 7.27), primiparous (OR = 1.97), infant not sharing a bed with mother (OR = 1.75) and infant born prematurely (OR = 7.69). Identification of risk factors should assist in targeting women who are at increased risk of non-exclusive breastfeeding.

A24 Nutritional anaemia in pregnancy: a study at the Maternity Hospital, Kuala Lumpur

Tee ES, Kandiah M, Ali J, Kandiah V, Zahari MR, Kuladevan R and Hamzah Z

Malays J Reprod Health 2(1): 32-50, 1984

The study presents recent data on the prevalence and pattern of nutritional anaemia on the Maternity Hospital, Kuala Lumpur. A total of 309 pregnant women in their third trimester, of Malay, Chinese and Indian origin from the lower socio-economic strata were randomly selected for the study. Haematological indices (including Hb, PCV, MCHC and TRBC), serum iron, transferring saturation and ferritin, serum

folate as well as protein and albumin were determined. Based on Hb and PCV values, 30-40 percent of the women could be considered anaemic; approximately 50 percent of them presented with unsatisfactory serum iron, transferring saturation and ferritin values; 60.9 percent had low serum folate levels; and about 30 percent may be considered to be of poor protein nutriture. Anaemia in the study population was seen to be related mostly to iron and to a lesser extent, folate deficiency. Haematological, iron, folate and protein status was observed to be the poorest amongst the Indian women, better in the Malay group and generally the best amongst the Chinese women. Births records of 169 of these women revealed that all of them had live births. Nearly all the infants were delivered by normal vaginal delivery (NVD). The mean gestational age was 38.6 weeks. One of the infants had a birthweight of < 2.0kg; incidence of low birthweight < 2.5 kg, was 8.3 percent. Although there was a trend of deteriorating haematological, iron and protein status of women from the 0, 1-3 and > 4 parity groups, these differences were not statistically significant.

A25 Breastfeeding and waiting time to conception for Malay women: a tale of two surveys

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Soc Biol. 40 (3-4): 215-223, 1993

This study investigates the unusual relationship between breastfeeding and waiting time to conception in Malaysia as reported in Goldman et al. (1987). Using data from the Malaysian World Fertility Survey (MWFS), Goldman and her colleagues (1987) find that noncontracepting Malaysian women have an unusually long waiting time to conception, given their relatively short durations of breastfeeding. This study provides a similar analysis using data from the Malaysian Family Life Survey (MFLS) and finds a more typical relationship. I conclude that the distinction between full and partial breastfeeding made to respondents of the MFLS probably led to more reliable responses to questions about breastfeeding duration, especially for women who breastfeed for long durations.

PIP: In 1987, Goldman et al. analyzed data from the Malaysian World Fertility Survey (MWFS) and found that noncontracepting Malaysian women had a birth interval 8 months longer than expected from their relatively short duration of breast feeding (5.9 months). Analysis by ethnic group showed that it was the Malays who had the longer birth interval, with the Chinese women close to predicted times. In the present study, an attempt was made to reproduce Goldman's findings and then to compute comparable measures from data from the Malaysian Family Life Survey (MFLS) in order to explain this phenomenon. The MWFS, conducted during August-December 1974, asked if a baby was breast fed and, if so, for how many months. Waiting time to conception was calculated, with median waiting times and

medium breast feeding times calculated using increment/decrement tables. Current decrement calculations produced estimates very close to Goldman's. In the MFLS, conducted between August 1976 and August 1977, women were asked if they breast fed, even if it was for a few days. Median birth intervals and breast-feeding durations were calculated using lifetables for births between January 1972 and December 1974. Results showed that median birth intervals were very similar for the 2 surveys, but median duration of breast feeding was about double in the MFLS for all breast-fed babies born in 1972-74, with the discrepancy in the 2 surveys holding true for the Malays and not the Chinese. Thus, a problem in the interpretation of the breast-feeding question by MWFS respondents seems to account for the difference in breast-feeding durations given in the 2 surveys and also for the difference between the MWFS and other World Fertility Surveys (WFS). Malay women seem to have limited their reporting of months of breast feeding to months of full breast feeding. The Chinese women may have had less problem in this regard since the Chinese duration of any breast feeding was very short. Also, weaning may be a more distinct event for the Chinese women, whereas the Malays may extend weaning over a longer period of time. Responses may also have been influenced by the relative unpopularity of breast feeding in Malaysia during the early 1970s as compared to other WFS countries. Substituting MFLS data for breast feeding duration data reported in the MWFS increased Malaysia's waiting time to 18 months, only 3 months less than the observed WFS value of 21 months. This illustrates the importance of phrasing in questionnaires. Even the more detailed questions in the MFLS, however, do not provide data which sufficiently explain how Malaysia differed from other WFS countries during the 1970s. Further research on the balance of breast feeding and supplemental feeding and on perceived social approval is required to answer this question.

A26 Breast-feeding and infant feeding practices in selected rural and semi-urban communities in Kemaman, Terengganu

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Mal J Nutr 1:51-61, 1995

A survey was carried out in the district of Kemaman, Terengganu, Malaysia to study infant feeding practices in rural and semi-urban communities. A total of 593 mothers were interviewed and their socio-demographic information recorded. Data on infant feeding practices were collected from mothers who had children up to 15 months of age. Among breast-feeding mothers (n =157), 42.0 % fed their babies for less than 3 months and 58.0% bottle fed for more than 6 months. Sixteen children were found to be fed on sweetened condensed milk with 62.5% of them for the first 3 months. Among those who breast fed their babies, 40.1% were found to have bottle fed at one time or another. The majority of breast feeding mothers belonged to the groups having incomplete primary schooling or completed primary

education only and household income below RM600 per month. A substantial number of breast fed babies were given weaning foods in the form of porridge mixture (rice + egg, rice + vegetables, rice + meat, rice+ fish and cereals) between the age of 0 - 3 months. The findings of this study concluded that although breast-feeding is widely practiced, however, their duration has dwindled, and early introduction of solid foods is widespread.

A27 Infant feeding practices and attitudes of mothers in Kelantan towards breastfeeding

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Med J Malaysia 50 (2):150-5, 1995

The incidence of breastfeeding among 96 mothers (88/96 were Malays) who were attending various clinics at Universiti Sains Malaysia Hospital and Kota Bharu General Hospital was about 95%. The feeding patterns show that about 72% of mothers gave mixed feedings (breastmilk plus infant formula) while only 30% gave exclusive breastmilk to their infants in the first six months. Two main reasons for giving mixed feedings were that mothers had to start working soon after giving birth and reported "insufficient milk". Mixed feedings were seen to be more prevalent in the higher income group mothers (> RM1000 per month). About 64% of them who breastfed their child continued to do so beyond 6 months. Regarding their knowledge on breastfeeding, most mothers (98%) knew that breastmilk is good for baby's health, economical, strengthens bonding between mother and child, and was sufficient for the sustenance of the baby. However, when asked about colostrum, 66% of mothers who breastfed their child threw away the colostrum before feeding; some of the reasons given were that colostrum is dirty, and not suitable for the baby's health and it might cause some diseases.

A28 Dietary intake during pregnancy and birth weight: public versus private institutions

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Malays Appl Biol 19 (1): 1-11, 1990

Maternal dietary intake and its influence on birth weight of infants was assessed in normal pregnant women attending public (n=197) and private (n=88) clinics located in Kuala Lumpur. Dietary intake was determined using local food composition tables and reported as a mean of 3-day weighed food intake. The mean energy intake were 1726±271 kcal and 1778±260 kcal in the public and private groups respectively. Protein intake was significantly ($p<0.001$) higher in the private group which was reflected by a significant by ($p<0.01$) HIGHER MEAN BIRTH WEIGHT (3173±357g) as compared to the public group (2951±377g). Contribution of protein (15.6%) and fat (34.5%) to energy intake was higher in private group while carbohydrate (58.3%) was higher in the public group. The results revealed that maternal energy intake in both groups were considerably below those recommended by the recent FAO/WHO/UNU (1985) report with no apparent influence on body weight of their offspring. However, this findings may not reflect optimum quality of life and must be assumed only as minimum requirement.

A29 Pattern growth in weight and length among urban Malaysian infants

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International J Food Sciences and Nutr 43(2): 79-87, 1992

The growth pattern of 32 infants in Kuala Lumpur was followed from birth until 12 months of age. Birth weight and length of boys were slightly higher than the girls at 3.08 ± 0.4 kg, 49.4 ± 2.2 cm vs. 2.94 ± 0.4 kg, 48.8 ± 2.6 cm. While girls gained weight more rapidly than boys, the latter accelerated more in height based on NCHS (National Centre for Health Statistics) and Malaysian percentages. However, both experienced a deceleration in weight and height gain after the first six months. Among the infants studied, 15 were breast-fed for less than two months, 11 were breast-fed for six months and six were breast-fed until one year. The majority of the babies were given solid food at four months old. Hence this study showed that infant growth pattern is closer to the Malaysian growth percentile when compared to the NCHS reference and could vary according to feeding practices.

A30 Breastfeeding and weaning practices in rural communities of Kelantan

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Mal J Nutr 2: 148-154, 1996

A survey of infant-feeding and weaning practices of 566 mothers, systematically sampled from 15 rural villages, randomly selected in the district of Tumpat, Kelantan was carried out. Almost all mothers (97.3%) breastfed their children, reinforcing the previously reported high incidence of breast-feeding among rural Malaysian mothers. One hundred and seventeen (21.3%) of the 551 children breastfed were also given mixed feeding with infant fomulae as well. Weaning started before 4 months of age in 28.3% of the children and after 6 months of age in 12.8% of the children. The 3 most common type of food used in weaning were Nestum (45.0%), rice porridge or paste (42.6%) and wheat porridge or cakes (11.5%). Forty eight children (12.1%) discontinued breastfeeding once weaning was initiated. The main reasons for initiating weaning was mothers' perception that there was insufficient milk and that the child was always hungry (55.7%). Most mothers were also given advice by the health clinic staff on weaning, including the timing and the suitable weaning foods to give. All of the mothers were able to name at least one commercial weaning food product available in their community.

A31 Breastfeeding practices in rural Kelantan

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Mal J Med Scien 2(1):51-54, 1995

A total of 566 children aged 2 years and below were studied to assess breast and bottlefeeding practices in Tumpat, Kelantan. Nearly all (97.3%) of the children were breastfed. However, nearly half (42.7%) of the mothers ceased breastfeeding by 6 months. The main reasons for early cessation of breastfeeding was inadequate milk production and the inconvenience for mothers to work, plus the easy availability of infant formulae. Early counseling of mothers and even fathers can help reduce this early cessation of breastfeeding and also reduce infant formulae feeding.

MONITORING OF NATIONAL NUTRITIONAL STATUS

B 1 Body Mass Index in the institutionalized elderly people in Rumah Sri Kenangan Kemumin Kelantan, Malaysia

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Mal. J. Med. Scien. 4(1): 41-44, 1997

Anthropometric measurements of weight, height and body mass index was taken from 34 institutionalised elderly people, consisting of 24 male and 10 female, aged 55 to 90 years (mean 69.3 years), 20 Malay, 7 Chinese and 7 Indian, at Rumah Sri Kenangan Kelantan. The prevalence of low BMI (<20.0 kg/m2) was 50.0% and 17.6% of them had BMI below 17.5 kg/m2. There was no significant difference in the prevalence of low BMI between age (old and young elderly), gender (male and female) and ethnicity (Malay, Chinese and Indian). It can be concluded that the institutionalised elderly are suffering from chronic energy deficiency or subclinical malnutrition.

B 2 Body mass index of the elderly and young adult derived from height and knee height

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Mal. J. Med. Scien. 5(2): 45-49, 1998

Body mass index (BMI) is the widely accepted indicator to determine chronic energy deficiency (CED), and to a lesser extent underweight and overweight. BMI formula WT(kg)/ HT(m2) required the measurement of height (standing height). The question was raised about the appropriateness of height measurement in scoliotic people especially the elderly. Armspan was suggested as a surrogate for height. In the elderly the degenerative changes may occur around the shoulder joints and thus armspan measurement is also questionable. Knee height has been advanced as an another surrogate for height. In this study 43 elderly (age 62-89 years) and 129 young adult (age 22-23 years) were examined to determine the relationship between BMI and BMK (BMI deriving from knee height). It seemed that BMI and BMK correlate very well in both elderly and young adult, male and female with correlation coefficient for the regression were : r = 0.93 (elderly male), r = 0.86 (elderly female), r = 0.90 (young adult male) and r = 0.97 (young adult female). Knee height is a useful measurement to BMK in scoliotic, frail or other diseased elderly.

B 3 Body Mass Index, haemoglobin level and helminthic infection among the active, rural elderly people in Kelantan

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Mal. J. Med. Scien. 3(2):105-108, 1996

A study was carried out on the elderly people in rural villages of Kelantan to determine the prevalence of chronic energy deficiency (CED), anaemia and helminthic infection. A total of 155 respondents (N = 155), 75 male and 80 female, active, apparently health elderly aged 60 - 85 years participated in the study. Anthropometric measurements which include weight and height were carried out and blood and stool samples were collected. Haemoglobin level, serum iron and helminthic ova were determined. The prevalence of CED (BMI < 20.0 kg/m2), mild and moderate aneamia (Hb level between 8-<12 gm/dl), and helminthic infection among the elderly are 36.6%, 33.2% and 57.3%, respectively.

B 4 Current prevalence and predictors of protein-energy malnutrition among schoolchildren in rural Peninsular Malaysia

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Southeast Asian J Trop Med Public Health. 39(5): 922-31, 2008

A cross-sectional study was carried out to determine the current prevalence of protein-energy malnutrition (PEM) among Orang Asli schoolchildren and to investigate the potential predictors of malnutrition. A total of 241 (120 males and 121 females) Orang Asli schoolchildren age 7-12 years living in remote areas of Pos Betau, Pahang participated voluntarily in this study. Anthropometric and socioeconomic data were collected and the children were screened for intestinal parasitic infections. The overall prevalences of mild and significant underweight conditions were 52.3% and 37.3%, respectively, and the prevalences of mild stunting and wasting were 43.6% and 43.1%, respectively, while the prevalences of significant stunting and wasting were 43.6% and 5.6%, respectively. There was a significant association between gender (male) and malnutrition (p = 0.029). The results also showed a higher prevalence of stunting among children age < or = 10 years than in older children (p = 0.001). Other independent variables, including socioeconomic

status and intestinal parasitic infections, had no significant associations with malnutrition indices. PEM is prevalent among schoolchildren in rural Malaysia and therefore of public health concern since PEM diminishes immune function and impairs cognitive function and educational performance. School-based programs of prevention through health education and interventions should be considered as an essential part of measures to improve the quality of life of schoolchildren in rural Malaysia.

B5 Nutritional Problems of Malaysian Children and Approaches Taken to Overcome Them

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Asia-Pacific Journal of Public Health 4(1): 65-71, 1990

Nutritional status of children is an important factor in child survival, especially in developing countries. It is therefore important that nutritional problems are addressed and overcome. This paper reviews the many studies conducted in Malaysia on nutritional problems among children. It also documents the approaches, including intersectoral approaches, that have been taken to overcome these problems. Possible actions that have to be taken in the future to further improve the nutritional status of Malaysian children are discussed.

B6 Body Mass Index (BMI) of Adults: Findings of the Malaysian Adult Nutrition Survey (MANS)

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Mal J Nutr 15(2) : 97 - 119, 2009

The Malaysian Adults Nutrition Survey (MANS) was carried out between October 2002 and July 2003, involving 6,775 men and 3,441 women aged 18 - 59 years. Anthropometric assessment showed that the overall mean body weight and BMI were 62.65 kg (CI: 62.20, 63.09) and 24.37 kg/m2 (CI: 24.21, 24.53) respectively. Based on the WHO (1998) classification of BMI, 12.15% (CI: 11.26, 13.10) were obese (BMI > 30 kg/m2), and 26.71% (CI: 25.50, 27.96) overweight (BMI > 25 -

29.9 kg/m2). Significantly, more women were obese [14.66% (CI: 13.37, 16.04)] while significantly more men were overweight [28.55% (CI: 26.77, 30.40)]. Ethnicity wise, prevalence of obesity was highest among the Malays [15.28% (CI: 13.91, 16.77)] while overweight was highest for the Indians [31.01% (CI: 26.64, 35.76)]. Both obesity and overweight were highest among those aged 40 - 49 years. Obesity was highest for those whose household income was between RM1,500 - 3,500 while overweight was more prevalent for those whose household income exceeded RM3,500. The prevalence of overweight was highest for those with primary education [31.90% (CI: 29.21, 34.72)]. There was no significant urban rural differential in both obesity and overweight. The study found 9.02% (CI: 8.82, 10.61) with chronic energy deficiency (CED) (BMI < 18.5 kg/m2). The prevalence of CED was relatively higher in the indigenous population (Orang Asli) [14.53% (CI: 5.14, 34.77)], subjects aged 18-19 years [26.24% (CI: 21.12, 32.09)], and with monthly household income of < RM1,500 [10.85% (CI: 9.63, 12.20)]. The prevalence of CED was not significantly different among the geographical zones and educational levels, and between urban/rural areas and sexes. The results call for priority action to address the serious problem of overweight and obesity among Malaysian adults as it poses a grave burden to the country's resources and development.

B7 A structural equation model of the determinants of malnutrition among children in rural Kelantan, Malaysia

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Rural Remote Health 10 (1): 1248, 2010 (Online)

Many studies had shown that poor growth in children is associated with malnutrition. The underlying factors are diverse, multisectoral and interrelated, ranging from biological to social, cultural and economically related. Because the highest levels of under-nutrition worldwide are found in South Asia, it is essential that policymakers in the region understand the underlying determinants, in order to design effective public health intervention programs. This is especially so if public resources are limited. The purpose of this cross-sectional study was to examine causal relationships among the biological, behavioural and environmental factors related to malnutrition in children aged 5 years and under. Method: The instrument used in this study was based on a previously described conceptual framework for malnutrition in children, and tested for its psycometric component, using both qualitative and quantitative methods. As well as the use of a questionnaire, anthropometric and dietary data were collected from 295 children aged 5 years and below, randomly selected from clinics in Tumpat, Kelantan. The proposed model was tested and modified using structural equation modelling (AMOS software: ADC, Chicago, IL, USA). Results: The modified model fitted the data adequately. The results demonstrated that an environmental construct (with factors that included total household income ß = 0.68,

p <0.01; total expenditure ß = 0.67, p <0.01; number of rooms in the house ß = 0.46, p <0.01; and socioeconomic status ß= 0.71, p <0.01) had a significant effect on malnutrition. Neither the biological nor behavioural constructs had significant effects. Conclusion: These findings provide useful insights into the importance of focusing on environmental factors as the main target when designing intervention programs. This information will be useful for the prioritization of preventive programs when resources are limited, especially in a rural setting. Future studies should focus on the issues of the ability of the households to meet their basic needs, inequality in the population, and the effectiveness of intervention at both micro and macro levels. This study focused on a rural community, therefore the results can only be generalized to areas with similar characteristics.

B 8 Development of a questionnaire for the study of malnutrition among children in rural Kelantan, Malaysia

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Rural Remote Health 9: 1155, 2009 (Online)

Historical data have shown that the factors contributing to and underlying malnutrition among children are diverse, multisectoral and include interrelated biological, social, cultural and economic factors. To determine the these factors in a given population an accurate and reliable questionnaire is essential. This article concerns the process of questionnaire development and validation. METHOD: This study was based on a previously described conceptual framework of malnutrition in children and was conducted in two phases. During the first phase, an in-depth interview using a semi-structured questionnaire was conducted of 20 health workers who provide direct care for the malnourished study children in rural Kelantan, Malaysia. Based on these findings a theoretical framework was generated to assist the development of quantitative questionnaire. The developed questionnaire was then tested using a quantitative approach to establish its reliability and validity. RESULTS: Qualitative analysis of the in-depth interview revealed 17 items that were used to build a conceptual framework for questionnaire development. The questionnaire was then administered to 295 children and their parents/caregivers, with 28.76-35.28% of the children showing signs of malnutrition in the form of stunting, wasting and underweight. Exploratory factor analysis revealed two factors: environmental and behavioral with composite reliability of 0.70, and 0.74, respectively. The quantitative findings identified 14 items which were further tested with factor loadings, showing loading on to 2 factors. CONCLUSION: The developed instrument offers a potentially valid and reliable tool to determine the factors contributing to malnutrition among children in rural and poor communities in Tumpat, Kelantan, Malaysia.

B 9 A qualitative study on malnutrition in children from the perspectives of health workers in Tumpat, Kelantan

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Mal J Nutr 13(1): 19-28, 2007

Underlying causes of most nutrition related problems are diverse, including biological, social, cultural, and economic factors. Qualitative approaches complement quantitative methods in identifying the underlying meanings and patterns of relationships involved in managing malnutrition. This study examined perceptions regarding malnutrition among health workers from 7 clinics (community and health clinics) in Tumpat, Kelantan. A total of 18 nurses and 2 doctors, who were involved in monitoring child health and nutrition, were included in the study. These health workers were interviewed using a semi-structured questionnaire adapted from Sastry's framework on malnutrition (Sastry, 1996). The questionnaire included biological, behavioral and environmental factors that influence child health and nutrition. All the health workers perceived that mothers/caregivers play the main role in improving the health of malnourished children. The quality of childcare was rated as moderately satisfactory by the health workers. Most of the affected families who were given the Food Baskets did not fully use all the items for the malnourished child. Child feeding practice was based on the needs of the whole family rather than according to the target child's needs. Most of the mothers preferred processed cereals than rice porridge because the former is easier to prepare for the child. Although they were from a low socioeconomic background, most of the mothers were not earning additional income for the family. The qualitative methodology provided information that can be used as a basis for the designing of quantitative questionnaires to assess malnutrition among children. The induction characteristic of qualitative methods was used to gain an understanding of the underlying reasons or phenomena such as behaviours that are directly observable.

B10 Prevalence of malnutrition among children in an urban squatter settlement in Petaling Jaya

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Med J Malaysia. 47(3): 170-181, 1992

In a study of mild to significant malnutrition in an urban squatter settlement, the weights for age of 297 children between birth and ten years, and the heights for age and weights for height of 197 children between two to ten years were analysed. Using NCHS standards, the overall prevalence of underweight was found to be 18.9%, stunting 15.2%, and wasting 11.2%. Age and ethnicity were significantly associated with the prevalence of underweight and stunting. The growth achievement of children below the age of two years were significantly better off than the older children, and Chinese children significantly better off than Malay and Indian children.

PIP: Industrialization and urbanization attract in-migrant. Unable to afford conventional housing, many newcomers settle as squatters. These squatter settlements are generally polluted, overcrowded, and ridden with infectious diseases. Child malnutrition is widespread in urban and rural areas of Malaysia. This study explores the extent of mild to significant malnutrition in the squatter settlement of Kampung Baiduri located adjacent to an industrial area in Petaling Jaya. Weights for age of 297 children between birth and ten years, and heights for age and weights for height of 197 children between 2-10 years were collected over a 3-month period in 1988, and subsequently analyzed. On the basis of US National Center for Health Statistics standards, the overall prevalence of underweight was 18.9%, stunting 15.2%, and wasting 11.2%. Age and ethnicity were significantly associated with the prevalence of underweight and stunting. Moreover, the growth achievement of children under age 2 years was significantly better than that of older children, and Chinese children fared significantly better than Malay and Indian children. These findings indicate a need to make these children primary targets of nutrition intervention programs.

B11 Nutritional assessment of pre-school children in rural villages of the family dynamics, lifestyles and nutrition study (1997-2001); II. Prevalence of undernutrition and relationship to household socio-economic indicators

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Mal J Nutr 8(1): 33-53, 2002

This paper describes the nutritional status of pre-school children and analyzes its relationship to various household socio-economic indicators. Padi, rubber and fishing villages from the Functional Groups Study (1992-1996) were selected for having a high prevalence of child undernutrition, and all children between the ages of 12 and 72 months were measured for their weights and heights in April-May 1998. The NCHS reference values were used to calculate z-scores, which were categorised according to WHO (1983) recommendations. Children between minus 2SD and minus 1SD of reference median were classified as mildly malnourished. Prevalence of underweight was higher (30.5%) than stunting (22.3%), while wasting was only 9.7%. Padi villages had the highest prevalence of undernutrition, followed by fishing, and then rubber villages. Mean household incomes were found to be significantly lower for children with worse nutritional status, and undernutrition was higher in households below the poverty line income. The odds ratios for having stunted children were significantly higher for households whose heads were agricultural own-account workers (OR 3.66, 95% CI = 1.37-9.79), agricultural waged workers (OR 2.75, 95% CI = 1.06-7.10), and non-agricultural manual workers (OR 2.49, 95% CI = 1.04-6.00) compared to non-manual workers. Various household socio-economic indicators showed significantly higher odds ratios for underweight, stunting and wasting. After adjusting for confounding effects by logistic regression analysis, however, only mother's education was found to be a significant predictor for stunting, while poverty level and access to piped water supply were significant predictors for both underweight and stunting. Households without livestock were significant predictors for wasting. Thus, this study identified specific socio-economic factors that should be prioritized for policy and research towards the amelioration of childhood malnutrition in rural areas.

B12 Nutritional assessment of rural villages and estates in Peninsular Malaysia: I Socio-economic profile of households

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Mal J Nutr 3: 1-19, 1997

A nutritional study was carried out on six (five rural and one urban) low income groups in Peninsular Malaysia from 1992-1995. In this paper, the socio-economic data for the five rural groups - padi farmers, rubber smallholders, coconut smallholders, estate workers, and fishermen - are presented. With the exception of

the estate workers, the sample was predominantly Malay, with an overall mean household size of 5.30. Household incomes were generally low, and 47% of all households had incomes that were below the poverty line income (PLI) of RM405. Based on this PLI, the prevalence of poverty was above 50% among the padi, rubber, coconut, and fishing households. Nevertheless, the study population appeared to be better off in terms of the other indicators examined. Poultry rearing, for example, was widespread in the padi, rubber, and coconut villages; 65% of all households owned at least one motorised vehicle, 53% owned a refrigerator, and 83% owned a television set. Furthermore, over 80% of all households had access to piped water, 96% had electricity supply, and over 90% had a flush or pour-flush latrine. In comparison to the 1979-1983 poverty villages study (Chong et al., 1984), the households in the current study enjoyed better living conditions. Strict comparisons between the two studies, however, is difficult owing to the different criteria adopted in the selection of the study villages.

B13 Nutritional assessment of pre-school children in rural villages of the family dynamics, lifestyles and nutrition study (1997-2001); I. Socio-Economic Status of Households

Chee HL[1], Khor GL[2], Fatimah A[3] and Wan Abdul Manan WM[4], Ahmad Affendi S[5], Asnarulkhadi AS[6], Rohani A[7], Siti Jamilah B[5], Zahid E[6] and Zamaliah MM[2]

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Mal J Nutr 8(1): 13-31, 2002

This paper presents the socio-economic profile of households in the Family Dynamics Study (FDS) (1997-2001) and makes comparisons with the earlier Functional Groups Study (FGS) (1992-1996). For the current study, FGS villages with a high prevalence of child malnutrition were purposively selected. In each village selected, all households were included, and interviews with a structured questionnaire were conducted in April-May 1998. Incomes were generally low and incidence of poverty was high; 49.6% of the households were under the poverty line

income, of which 37.2% were poor and 12.4% were hard core poor. Overall, only 23.2% of heads of households were in agricultural occupations, others being comparison to the FGS, poverty in the current study is lower (49.6% of FDS households are poor compared to 55.2% of FGS households), the proportion of household heads in agricultural occupations is also lower (26.9% compared to 55.3%), while all other socioeconomic indicators were better, except for piped water supply, which remains inadequate for households in the current study.

B14 Relationship between body composition and bone mineral density in healthy postmenopausal Chinese women in Malaysia

Chee WSS, Ting GP, Tan SY, Chan SP, Zaitun Y & Suriah AR

Jurnal Sains Kesihatan Malaysia 5(2): 29-38, 2007

Bone loss in known to be accelerated during menopause. The postmenopausal period with advancing age has also been associated with a decrease in lean body mass, an increase in body fat mass and increase in body weight. This study investigated the relative contribution of lean body mass and body fat mass to bone mineral density (BMD) in 139 healthy postmenopausal Chinese women in Kuala Lumpur. Total body, lumbar spine (L2-L4), femoral neck and total hip BMD were measured using dual-energy X-ray absorptiometry (DXA). Findings revealed that 80% of the Chinese postmenopausal women had low bone mass (osteopenia) and 8% were osteoporotic at the lumbar spine and/ or femoral neck. Overall, body fat mass showed a positive correlation with BMD at all sites (total body, $r = 0.265$, $p < 0.001$; lumbar spine $r = 0.214$, $p < 0.05$, femoral neck $r = 0.254$, $p < 0.001$; total hip $r = 0.332$, $p < 0.001$). Similarly, lean body mass was positively correlated with BMD at most sites (Total body $r = 0.239$, $p < 0.001$; femoral neck $r = 0.365$, $p < 0.001$; total hip $r = 0.352$, $p < 0.001$) except at the lumbar spine. In a multiple stepwise regression analysis body fat mass was a significant predictor for BMD for total body ($p < 0.0001$) and lumbar spine ($p < 0.005$) BMD, while lean body mass was the major determinant of BMD at the femoral neck and total hip ($p < 0.0001$). These data suggested that both fat and lean mass were significant determinant of BMD, the former playing a greater role than lean mass in postmenopausal women. Therefore, postmenopausal women need to avoid being too underweight (and thus having too low body fat) and to maintain lean body mass to protect against osteoporosis.

B15 Anthropometry, dietary patterns and nutrient intakes of Malaysian estate workers

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Mal J Nutr 2(2): 112-126, 1996

Studies were carried out in two estates in Kedah and Johor to characterize the anthropometry and dietary patterns of 334 (169 females, 165 males) Malaysian estate workers. Subjects were Malay and Indian adults (aged 18 to 60 years) engaged in various work activities including rubber tappers, palm fruit harvesters, field supervisors and workers in the estate factories. Anthropometric results showed that the prevalence of overweight (26% in men, 25% in women) and obesity (5% in men, 11% in women) were higher compared to prevalence of underweight (11% in men, 9% in women) in these workers despite being engaged in moderate to heavy activities. The dietary intake pattern revealed that the main sources of calories in the diet were rice, cooking oil and sugar. Major sources of protein in the Malay diet were anchovies and fish whilst in the Indian diet protein was provided by salted fish, anchovies, eggs, fish, and pulses. The consumption of poultry, meat and dairy products were low for both ethnic groups. The dietary intakes of a subsampel of 108 normal weight subjects (56 females, 52 males) were recorded for 3 days. The results showed that the mean energy intake was 8.44 ± 2.12 MJ in males and 6.48 ± 1.29 MJ in females. The contribution of calories from protein, fat and carbohydrate were 13%, 22% and 60% in males and 12%, 23% and 65% in females, respectively. Alcohol intake was found to contribute five percent of energy in the diet of the Indian male subjects. Calcium, iron, vitamin A, thiamin, riboflavin and niacin intake were below 66% of the Malaysian RDA, particularly amongst the women. Income appeared to have a significant correlation with energy and iron intakes of the female workers as well as thiamin, niacin and riboflavin intakes of the male workers. There is a need for improving the quality of the dietary intakes of these workers as well as nutrition education on the prevention of obesity and its consequences.

B16 Food intake assessment of adults in rural and urban areas from four selected regions in Malaysia

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Mal J Nutr 3: 91-102, 1997

An assessment of the daily intake of major nutrients among 409 adults (males and females aged between 18-60 years, normal body mass index) residing in four regions in Malaysia was carried out as part of a major study on energy requirement. Subjects from both urban and rural areas completed a 3-day food record during the study. Mean energy intake among the men and women were 9.05 ± 2.21 MJ/day (2163 kcal/day) and 7.19 ± 1.60 MJ/day (1718 kcal/day) respectively, corresponding to 90% of the Malaysian RDA. A mean of 14% of the total energy was derived from protein, 23% from fat and 63% from carbohydrate. Energy intake amongst male subjects in the rural area (8.47 MJ/day, 2024 kcal) was significantly lower than their urban counterparts (9.52 MJ/day, 2275 kcal). There was no difference in mean energy intake in both the urban (7. 19 MJ/day, 1718 kcal) as well as rural women (7.16 MJ/day, 1711 kcal) corresponding to 86% of the RDA. The distribution of nutrients to the total energy intake amongst rural subjects were 13% for protein in both males and females, 65% for carbohydrate in males and 66% in females and 19% for fat in males and 21% for females. In the urban male and female subjects, the distribution of protein, carbohydrate and fat to the total energy intake were 14%, 55% and 29% and 30% respectively. The rural subjects showed a poorer mean intake of vitamins and minerals compared to the urban subjects. The diets of the male subjects in the rural area were deficient, less than two-third RDA in calcium, riboflavin and niacin. Calcium and iron intakes were less than two-third RDA in both the rural as well as the urban women. The rural women also had a poor intake of vitamin A and niacin. Overall, only protein and vitamin C intake met the RDA in most subjects from rural and urban areas.

B17 Weight status and dietary intake among female children and adolescents aged 6-17 years in a welfare home, Kuala Lumpur

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Mal J Nutr 14 (1): 79 - 89, 2008

A cross-sectional study was conducted among 13 female children and 40 adolescents residing in a welfare home. The objectives of this study were to determine underweight, overweight rates and body fat percentages as well as assess the dietary intake of energy, selected macro- and micro-nutrients among the subjects aged 6-17 years. The anthropometric measurements collected were Body Mass Index (BMI) and skinfold thickness of five body sites - triceps, subscapular, abdomen, suprailiac, and thigh. Dietary intake was assessed using a 24-hour dietary recall. This study indicated that the majority (75%) of the subjects were of normal weight, 21% were underweight and 4% were overweight. BMI and body fat percentages of the adolescents were found to be significantly higher than those of

the children (t=- 3.083, p=0.003; t=-7.321, p<0.001). A positive correlation between BMI and body fat percentage was also significant (r=0.791, p<0.001). In terms of dietary assessment, there were significant differences in percentage of RNI attainment between children and adolescents for energy, protein, iron, and folate (p<0.05). In conclusion, the majority of the children and adolescents had normal weight and average body fat percentages. Besides, all the children met the RNI requirements for all the studied nutrients while the adolescents met the RNI requirements for energy, protein, iron, and zinc with dietary calcium and folate slightly below the RNI requirements.

B18 Milk Tolerance among malnourished school children in Malaysia

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Asia-Pacific Journal of Public Health 3(4): 274-277, 1989

1,256 malnourished children, aged seven to ten years, were selected for study, 575 from Kuala Langat, 416 from Wilayah Persekutuan and 265 from Ulu Selangor. Ninety-three percent of the children were from low socio-economic groups with large family size, and most of their parents had only primary or no formal education. During the study period, children in Kuala Langat received daily milk supplementation for five days per week, those in Wilayah Persekutuan for two days per week, while those in Ulu Selangor did not receive any milk supplementation. The study shows that a majority of the malnourished primary school children liked to drink milk and that milk intolerance was not a problem among them.

B19 Secular trend of growth in Malaysian children

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J Singapore Paediatr Soc. 32(3-4):102-107, 1990

Over the past hundred years in industrialised countries and recently in some developing countries, children have been getting larger and growing to maturity more rapidly. This paper compares the growth of Malaysian children with similar socioeconomic backgrounds but born about twelve years apart. Data were obtained from records of 227 children born between 1968 and 1973 and 238 children born between 1980 and 1985. The children were followed-up regularly at the University Hospital Child Health Clinic in Kuala Lumpur for a variable period from birth to five years of age. Measurements for their weight, length and head circumference were

taken at each visit. There is a directional indication that boys and girls of the 1980-1985 cohort are taller, heavier and have bigger head circumferences from birth to five years of age and the difference widens as the child grows older. This study clearly shows that a positive secular trend has taken place in the last decade, reflecting an improvement of living conditions with time. The factors involved in the positive secular trend are manifold and the most important is probably nutrition.

B20 Urinary amino acids profile of vegetarians and non-vegetarians

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Ma1 J Nutr 12(1): 67-78, 2006

The objective of the study was to quantify and to profile the amino acids content in urine samples. The amino acids content in urine was determined in 162 individuals (62 young non-vegetarians aged 15-45 years, 24 elderly non-vegetarians aged 46-70 years, 40 young vegetarians and 36 elderly vegetarians) by high performance liquid chromatography (HPLC). The most common amino acids detected in the young and elderly individuals on vegetarian and non-vegetarian diets were phenylalanine, threonine, arginine and asparagine, while leucine, aspartic acid and alanine were not found in any urine samples in both groups. Isoleucine was not detected in the urine of vegetarians. The concentrations of the majority of essential amino acids were between 0.10 - 2.00 mg/24hrs except for histidine which had a range of 4.1 - 5.0 mg/24hrs. The concentrations of non-essential amino acids varied. Proline, glycine and tyrosine concentrations were between 0.10 - 1.00 mg/24hrs, while cysteine, glutamine, glutamic acid and cystine concentrations were between 11.0 - 21.0 mg/24hrs. Asparagine and hydroxy-proline had a range of 0.10 - 5.00 mg/24hrs, while serine and arginine ranged between 31.0 - 50.0 mg/24hrs. Isoleucine and serine were not detected in elderly vegetarians while histidine, glycine, glutamic acid and hydroxy-proline were not detected in elderly non-vegetarians. Isoleucine, glycine and hydroxy-proline were detected in young non-vegetarians but not in young vegetarians. The levels of amino acids showed no significant statistical differences between young vegetarians and non-vegetarians as well as between elderly vegetarians and non-vegetarians. Phenylalanine, threonine and trypthophan were commonly detected in the lacto-ovo and lacto vegetarians, while valine, cysteine, arginine and asparagine were commonly detected in vegans. In conclusion, except for isoleucine, general differences were seen in urinary amino acid excretions between vegetarians and non-vegetarians even though the differences were statistically not significant. Therefore lacto-ovo diets could be nutritionally adequate as the nutrients were substituted by dairy or plant products.

B21 Nutrition scene in Malaysia

Chong YH

Med J Malaysia. 41(1):1-3, 1986

Nutrition research has now progressed to the point where much is known about the foods we eat and their relation to health. The body is, broadly speaking, the product of its nutrition as exemplified by the saying: "you are what you eat". What we eat can therefore have a major influence on biological processes, health and well being. Malnutrition although more widespread amongst those who are socioeconomically disadvantaged is not necessarily a disease of poverty.Malnutrition is also found through poor food habits and ignorance of food requirements for different physiological groups and circumstances. For instance, the nutritional requirements of an infant, a toddler, schoolboy, pregnant mother, labourer, sedentary office worker or an elderly pensioner are not the same. Recent indicators and proxy indicators of nutrition for Malaysia such as toddler mortality, incidence of low birthweight, life expectancy at birth and food balance sheet statistics suggest a favourable and an improving nutrition situation at the macro level. However nutritional studies conducted at the local level, indicate that there are still a considerable amount of proteincalorie malnutrition, iron deficiency, anaemia and vitamin A deficiency.
Endemic goitre, a deficiency disease whose prevention by iodized salt was advocated by the French Chemist, Boussingault more than a hundred and fifty years ago can still be found in the interior of the Peninsular, Sarawak and Sabah. In striking contrast, chronic diseases associated with dietary excesses and the country's increasing affluence, such as coronary heart disease, hypertension and cancers have now emerged as the country's major killers to assume public health importance. Malaysia has had a long-standing history of nutrition research. In fact, two former directors of the Institute for Medical Research (IMR), Henry Fraser (Director from 1906-1916) and Thomas Stantion (Director from 1920-1926) contributed to the discovery that beri-beri were a disease of dietary origin.Through the two World Wars, the post-Merdeka era and until the early 1970s, the IMR remained the principal centre for nutrition research in the country. It is gratifying to note that there are now in addition, several university departments and institutions that are involved in nutrition research and training such as the Department of Social and Preventive Medicine, University of Malaya, Department of Community Health, Universiti Kebangsaan Malaysia (National University of Malaysia), Faculty of Food Science and Technology and Department of Human Development, Universiti Pertanian (Agricultural University), Department of Food Science and Nutrition, Universiti Kebangsaan, Food Technology Division, Malaysian Agricultural and Research Development Institute (MARDI) and also at Palm Oil Research Institute of Malaysia (PORIM).

B22 Relationship between blood lead concentration and nutritional status among Malay primary school children in Kuala Lumpur, Malaysia

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Asia-Pacific Journal of Public Health 19(3): 29-37, 2007

A cross-sectional study was conducted to identify the relationship between blood lead concentration and nutritional status among primary school children in Kuala Lumpur. A total of 225 Malay students, 113 male and 112 female, aged 6.3 to 9.8 were selected through a stratified random sampling method. The random blood samples were collected and blood lead concentration was measured by a Graphite Furnace Atomic Absorption Spectrophotometer. The nutrient intake was determined by the 24-hour Dietary Recall method and Food Frequency Questionnaire. An anthropometric assessment was reported according to growth indices (z-scores of weight-for-age, height-for-age, and weight-for-height). The mean blood lead concentration was low (3.4 ± 1.91 ug/dL) and was significantly different between gender. Only 14.7% of the respondents fulfilled the daily energy requirement. The protein and iron intakes were adequate for a majority of the children. However, 34.7% of the total children showed inadequate intake of calcium. The energy, protein, fat and carbohydrate intakes were significantly different by gender, that is, males had better intake than females. Majority of respondents had normal mean z-score of growth indices. Ten percent of the respondents were underweight, 2.8% wasted and 5.4% stunted. Multiple linear regression showed inverse significant relationships between blood lead concentration with children's age (ß= -0.647, p<0.001) and per capita income (ß=-0.001, p=0.018). There were inverse significant relationships between blood lead concentration with children's age (ß=-0.877, p=0.001) and calcium intake (ß= -0.011,p=0.014) and positive significant relationship with weight-for-height (ß=0.326, p=0.041) among those with inadequate calcium intake. Among children with inadequate energy intake, children's age (ß= -0.621, p< 0.001), per capita income (ß= -0.001,p=0.025) and protein intake (ß= -0.019, p=0.027) were inversely and significantly related with blood lead concentration. In conclusion, nutritional status might affect the children's absorption of lead and further investigation is required for confirmation.

B23 Nutritional status of Kadazan children in a rural district in Sabah, Malaysia

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Southeast Asian J Trop Med Public Health. 24(2): 293-301, 1993

The nutritional status of 896 Kadazan children below 6 years of age from 23 villages of Tambunan District were studied. When stunting and wasting were defined as those who were below two standard deviations of height-for-age and weight-for-height (Waterlow et al, 1977) and based on the National Center for Health Statistics reference population, 67.6% of boys and 66.8% of girls were stunted while 12.3% of boys and 8.3% of girls were wasted. Weaning foods and toddler feeding practices were unsatisfactory. The role of health education on child care and feeding practices is emphasized.

B24 Reliability, technical error of measurements and validity of instruments for nutritional status assessment of adults in Malaysia

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Singapore Med J 50(10): 1013-1018, 2009

Introduction: The Third National Health and Morbidity Survey Malaysia 2006 includes a nutritional status assessment of children. This study aimed to assess the inter- and intra-examiner reliability, the technical error of measurement and the validity of instruments for measuring weight, height and waist circumference. Methods: A convenience sample of 130 adults working in a selected office setting was chosen to participate in the study, subject to the inclusion and exclusion study

criteria. Two public health nurses, trained to follow a standard protocol, obtained the weight, height and waist circumference measurements. The weight was measured using the Tanita HD-318 digital weighing scale to the nearest 0.1 kg, and Seca Beam Scale to the nearest 0.01 kg. The height was measured using the Seca Bodymeter 206 and Stadiometer, both to the nearest 0.1 cm. The waist circumference was measured using the Seca circumference measuring tape S 201, to the nearest 0.1 cm. Results: The intra-examiner reliability in descending order was weight and height followed by waist circumference. The height measurement, on average, using the test instrument, reported a recording of 0.4 cm higher than the reference instrument, with the upper and lower limits at 2.5 cm and 1.6 cm, respectively. The technical error of measurement and coefficient of variation of weight and height for both inter-examiner and intra-examiner measurements were all within acceptable limits (below five percent). Conclusion: The findings of this study suggest that weight, height and waist circumference measured in adults aged 18 years and above, using the respective abovementioned instruments, are reliable and valid for use in a community survey. Limiting the number of examiners, especially for waist circumference measurements, would yield a higher degree of reliability and validity.

B25 Nutritional Status of Orang Asli (Che Wong Tribe) Adults in Krau Wildlife Reserve, Pahang

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Mal J Nutr 16(1): 55 - 68, 2010

This is a descriptive study on nutritional status of Orang Asli (Che Wong tribe) adults in Krau Wildlife Reserve. Twenty-six households, comprising 29 men and 28 women,participated in the study. Dietary diversity was assessed using food frequency questionnaire with 37 food groups. Weight, height and waist circumference were measured using standard instruments. The mean age for men and women was 39.9 ± 17.1 years and 33.7 ±16.1 years, respectively. Most (89.5%) of the adults had no formal education and about 89.5% of households were categorised as poor. There were 13.8% underweight, 72.4% normal, 10.3% overweight and 3.3% obese men. For women, 25.0%, 46.4%, and 28.6% were underweight, normal and overweight, respectively. While none of the men had at-risk waist circumference (men >90 cm), about 21.4% of women had waist circumference of >80 cm. The mean dietary diversity score was 9.47± 4.15 with men (9.48 ± 3.70) and women (9.46 ± 4.63) having similar scores. There was a significant correlation between waist circumference and household income ($r=0.36$, $p<0.01$); however, the association was only significant in women ($r=0.50$, $p<0.01$). Although under-nutrition still prevails, there are emerging cases of overweight and obesity in this rural Orang Asli community undergoing nutrition transition especially among the females.

B26 Child-minding and nutritional status of children 6-12 months old in Sarawak

Hardin S, Kiyu A

Sarawak Medical Department Headquarters, Jalan Tun Abang Haji Openg, Kuching, Sarawak.

Med J Malaysia. 46(4):338-343, 1991

A case-control study was carried out to determine the child-minding practices and their relationships with nutritional status of children between 6 and 12 months old. Sixty-five percent of the mothers go to the farm and 25 percent of, them bring their children with them. Only 42.8 percent of the children were looked after by their mothers. The odds of being malnourished were greater among children who were not looked after by their mothers. It is suggested that nutrition education be given in the village so that the other child-minders can benefit from it.

B27 Resting metabolic rate in a sample of girls in Malaysia and England

Henry CJ, Webster-Gandy JD, Koon PB, Ismail MN

Nutrition and Food Science Research Group, Oxford Brookes University, Oxford, England

Am J Hum Biol. 17(6):818-820, 2005

This cross-sectional study of age matched (10-11 years), pre-menarcheal girls in England and Malaysia investigated the effect of ethnicity on resting metabolic rate (RMR). The children were recruited from schools in Oxford, England, and Kuala Lumpur, Malaysia, and all measurements were conducted in the schools. The Malaysian girls were shorter (143.7 +/- 6.5 cm and 140.1 +/- 5.3 cm (mean +/- SD) for the English and Malaysian girls respectively) and lighter (32.5 +/- 5.3 kg compared with 38.0 +/- 8.7 kg for the English girls) with a smaller fat mass and fat free mass (FFM) than the English girls. Energy expenditure was lower in the Malaysian girls (4555 +/- 531 kJ/day compared with 5178 +/- 688 kJ/day for the English girls). Although a difference in RMR was observed between the two groups, when corrected for body composition the difference was no longer significant. No effect of ethnicity on the relationship of FFM and RMR was shown when the data were analyzed using analysis of covariance.

B28 Resting Metabolic Rate in a Sample of Girls in Malaysia and England

Henry CJK[1], Webster-Gandy JD[2] Koon PB[3] and Ismail MN[3]

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Am. J. Hum. Biol 17:818-820, 2005

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B29 A cost-effective modified micromethod for measuring urine iodine

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Tropical Biomedicine 23(1): 109-115, 2006

A modified micromethod for measuring urine iodine was successfully established and validated. The micromethod showed good correlation with the method used by several World Health Organization (WHO) collaborative laboratories (y=0.9342x + 4.6213; r=0.962; p=0.01; n=50). The micromethod also showed good agreement when compared to the reference WHO method. The sensitivity of the assay was 13.809ug/L (n=8) and mean recoveries were 114, 103 and 106% at concentrations of 30, 40 and 50ug/L (n= 3) respectively. At iodine concentrations of 51 ± 15.5, 108 ± 32.4 and 149 ± 38.6ug/L, intra-assay coefficient of variations (CVs) were 13%, 7% and 5% respectively (n=20), and inter-assay CVs were 10%, 15% and 7% respectively (n=10). The assay showed good linearity plot (y=1.0407x + 60.451; r=0.993; n=3)

B30 Predictive equations for the estimation of basal metabolic rate in Malaysian adults

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Mal J Nutr 4: 81-90, 1998

In the field of human energy expenditure, the measurement of basal metabolic rate (BMR) is an essential element to derive energy requirement estimates for any given population. Besides basic anthropometrics data, this paper reports the generation of predictive equation for basal metabolic rates of healthy Malaysian adult from prospective measurements on 307 male and 349 females aged 18-60 years, using the Douglas bag technique. These new equations based on body-weight reveal that the current FAO/WHO/UNU (1985) predictive equations overestimate BMR of adult Malaysian by an average of 13% in males and 9% in female subjects while differences of between 4-5% were observed when compared to Henry & Rees (1991) equations for tropical people. There is a good reason to believe that the capacity to slow down metabolism amidst the hot and humid climate experience throughout the year as a genuine phenomenon for Malaysians. Similarly, these findings suggest that at equal energy intake recommendation for similar body weight, the lower energy needs of Malaysian could put them at greater risk for developing obesity. These observed deviations must be taken into account in formulating energy requirements of the population.

B31 Anthropometric and food intake studies among Semai children

Ismail MN, Wong TS and Zawiah H

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Journal of the Malaysian Society of Health 6: 19-25, 1988

Nutritional status of 111 Semai children from 13 selected villages at a resettlement scheme in Betau was assessed based on anthropometry and food intake studies. The results revealed varying degrees of moderate to chronic malnutrition amongst preschoolers and children aged 7 to 10 years. Based on a 24 hour dietary recall, the intake of most nutrients were adequate when compared to the Malaysian RDI (Recommended Dietary Intake) with the exception of calories, niacin, and vitamin A. Results obtained in this study and many others involving children in Malaysia demonstrated that, under the present dietary circumstances, it is the level of energy intake that limits growth. Future research should be directed towards improving dietary intakes through appropriate intervention programmes.

B32 Anemia in pregnancy in Malaysia: a cross-sectional survey

Haniff J[1], Das A[1], Onn LT[1], Sun CW[2], Nordin NM[3], Rampal S[4], Bahrin S[5], Ganeslingam M[6], Kularatnam KIK[6], Zaher ZMM

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Asia Pac J Clin Nutr 16(3): 527-536, 2007

Anemia is the most prevalent nutritional deficiency during pregnancy. Except for a study conducted 10 years ago in Kelantan, Malaysia's available statistics are based on isolated small urban maternity hospital studies from the 1980s. There was therefore, a need for a large study at national level to estimate the magnitude of the problem in the country as well as to understand its epidemiology. This multi-center, cross-sectional study was conducted from February to March 2005, to assess the prevalence of anemia. Multistage stratified random sampling technique was used and 59 Ministry of Health (MOH) primary health care clinics were selected. Our final dataset consisted of 1,072 antenatal mothers from 56 clinics. The overall prevalence of anemia in this population was 35 % (SE 0.02) if the cut off level is 11 g/dL and 11 % (SE 0.03) if the cut-off level is 10 g/dL. The majority was of the mild type. The prevalence was higher in the teenage group, Indians followed by Malays and Chinese being the least, grandmultiparas, the third trimester and from urban residence. After multiple linear regression analysis, only gestational age remained significant. These findings are useful for our Maternal Health program planners and implementers to target and evaluate interventions. Work is in progress for outcomes and cost-effectiveness studies to best tackle this problem. In conclusion, the prevalence of anemia is 35% and mostly of the mild type and more prevalent in the Indian and Malays.

B33 Reliability and technical error of calf circumference and mid-half arm span measurements for nutritional status assessment of elderly persons in Malaysia

Jamaiyah H[1], Geeta A[1], Safiza MN[2], Wong NF[2], Kee CC[3], Ahmad AZ[2], Suzana S[4], Rahmah R [5], Khor GL [6], Ruzita AT[4], Chen WS[1], Rajaah M[1] and Faudzi A[2]

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Mal J Nutr 14(2): 137 - 150, 2008

This study sought to examine the reliability of two measurements; Calf Circumference (CC) and Mid-half Arm Span (MHAS). A sample of 130 elderly persons aged 60 years and above seen consecutively in the Kuala Lumpur Hospital outpatient clinic during the period of December 2005 to January 2006, upon consent, were recruited to the study. There was a high degree of reliability for both inter- and intra-examiner (r close to 1). For inter-examiner, on average the CC measurements taken by the first examiner were 0.3 cm lower than that of the second examiner. The upper and lower limit of the differences were +0.4 to -0.9 cm respectively. Inter-examiner MHAS measurements on average by the first examiner were 0.2 cm lower than that of the second examiner. The limits were +1.7 to -2.1 cm. By comparison, the inter-examiner CC measurements were more reliable than the MHAS measurements. For intra-examiner, on average the CC measurements at Time 1 were consistent with Time 2 (mean difference=0) with limits of the difference at + 0.5 cm. MHAS measurements at Time 1 were on average 0.1 cm less than at Time 2 with limits at +1.7 and -1.8 cm. The technical error of measurement (TEM) and coefficient of variation of CC and MHAS for both interexaminer and intra-examiner measurements were within acceptable limits with the exception of MHAS TEM. This study suggests that CC and MHAS measured in elderly persons 60 years and above, using Seca Circumference Tape ® 206, Germany (0.05 cm) are reliable and can be used in a community survey.

B34 An update of the general health status in the indigenous populations of Malaysia

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Department of Molecular Medicine, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia.

Ethn Health.13(3):277-87, 2008

OBJECTIVES: Health scenarios are constantly evolving, particularly in developing countries but little is known regarding the health status of indigenous groups in Malaysia. This study aims to elucidate the current health status in four indigenous populations in the country, who by and large been left out of mainstream healthcare developments. METHODS: Participants were recruited from the Temuan, Jehai, Kensiu and Bidayuh indigenous groups throughout Peninsula Malaysia and Sarawak. Health parameters including body mass index (BMI), blood pressure, casual blood glucose and, total cholesterol levels were measured using established methods. Malondialdehyde (MDA) and ferric-reducing antioxidant power (FRAP) levels were measured to assess oxidative stress status. Blood films were screened for evidence of microbial or parasitic infections and leukocyte differential counting was performed. RESULTS: The Temuan and Bidayuh who are more urbanized, had significantly higher mean body weight, BMI, total cholesterol ($p<0.05$) and higher

prevalence of obesity and hypercholesterolemia. Low cholesterol levels, elevated eosinophil counts and increased total IgE, indicative of immune responses to infection or allergy, were recorded in the rural Kensiu and Jehai. The Kensiu had higher levels of FRAP and lower levels of MDA, whereas the reverse was found in the Temuan. This suggests reduced oxidative stress in the Kensiu compared to the Temuan. Expected correlations between FRAP and MDA levels with age, were evident in Jehai. CONCLUSIONS: Our findings reflect a shifting health burden and an epidemiological transition, particularly in the Temuan and Bidayuh. These changes could be attributed to dietary habits, lifestyles and socio-economic factors brought about by urbanization.

B35 The nutritional and health status of the elderly at Rumah Seri Kenangan, Seremban,Malaysia

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Malays.Appl.Biol. 19(1):13-21, 1990

A nutritional and health status study was carried out on 57 elderly consistingof 12 Malays, 21 Chinese and 24 Indians at Rumah Seri Kenangan, Seremban. Parameters studied were food intake, anthropometry measurements and urinary pH, protein, glucose, ketone and blood as well as haemoglobin and haematocrit in the blood. The results of the study showed that 75% of the Malay subjects; 52% of Chinese and 29% of the Indians were underweight in contrast with none of the Malay subjects, 5% of the Chinese and 21% of the Indians were obese. The overall energy and nutrient intake were above 2/3 of the recommended dietary allowance (RDA) of Malaysia. With regards of the health status, the incidence of diabetes, heart disease, hypertension, bone and joint disease and asthma was lower than 20% in all subject studied.

B36 Nutritional and health status among young Indian adults in Malaysia

Karim NA & Kalidass M

Jurnal Sains Kesihatan Malaysia 2(1): 37-47, 2004

A study was carried out to determine the relationship between nutritional status and health status among 80 young Indian adults (16 men and 64 women). Anthropometric measurements such as weight, height, waist and hip circumference were taken. Food intake, blood glucose and blood pressure were also evaluated. Birth weight was obtained from certificates or proxy. Results showed that mean weight, height, body mass index (BMI) and waist to hip ratio (WHR) for men were 64.9 ± 9.1 kg, 1.7 ± 0.1 m, 21.6 ± 2.6 kg/m2 and 0.9 ± 0.1 respectively. The anthropometric results

reported for women were significantly (p = 0.05) lower than men expect for BMI (50.7 ± 9.9 kg), 1.6 ± 0.1 m, 20.4 ± 3.5 kg/m2, 0.8 ± 0.1). Mean energy intake for men was 2215 ± 323 kcal per day and was significantly (p = 0.05) higher than women (1594 ± 292 kcal per day). Men and women fulfilled only 88% and 80% respectively of the energy recommendation for Malaysia. The nutrient of concern among women was iron, meeting only 46% of RDA. Mean blood glucose was 4.7 ± 0.9 mmol/ L in men while 4.4 ± 0.6 mmol/ L in women. Systolic (SBP) and diastolic blood pressure (DBP) was 112 ± 8 mmHg and 76 ± 7 mmHg in men and significantly higher than in women (103 ± 10 mmHg SBP, 70 ± 8 mmHg DBP). Positive associations were abserved between birth weight and blood glucose, SBP, DBP and BMI, however the association were not significant.

B37 Evaluation of nutritional status among a group of young Chinese adults in Kuala Lumpur, Malaysia

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Asia Pacific J Clin Nutr 9(2): 82-86, 2000

A nutritional status study was carried out among a group of young Chinese adults, aged between 19 and 25, in Kuala Lumpur, Malaysia. Subjects comprised 108 young adults (55 women, 53 men) who were students at two institutes of higher learning. Physical characteristics were evaluated by anthropometric measurements while food intake was determined with a 3-day food record. Blood cholesterol and triglyceride were assessed using the Reflotron analyser. Birthweight was obtained from birth certificates or by proxy. The results showed that the mean body mass index (BMI) for men and women was 21.4 ± 3.3 and 20.0 ± 2.0, respectively, indicating normal weight. Further analysis of BMI classification demonstrated that 28% of men and 39% of women were underweight, 11% of men and 2% of women were overweight while 2% of men were obese. Mean waist-to-hip ratio showed that the subjects had a low risk of developing cardiovascular disease (0.72 ± 0.03 women; 0.81 ± 0.05 men). Mean energy intake was 8841 ± 1756 kJ per day for men and 6426 ± 1567 kJ per day for women. Closer analysis of energy intake of the subjects showed that 86% of men and 91% of women were consuming below the Malaysian recommendation for energy. Nutrients found to be deficient in at least one third of women were calcium, vitamin A, niacin and iron. Mean cholesterol intake in the diet was 278.7 ± 108.7 mg in men and 207.0 ± 82.5 mg in women and there was a significant difference between genders. Blood cholesterol and triglyceride levels were 3.88 ± 0.76 mmol/L and 1.08 ± 0.33 mmol/L, respectively in men, while these levels were lower in women, 3.87 ± 0.80 mmol/L for cholesterol and 0.99 ± 0.29 mmol/L for triglyceride. A general trend of higher mean blood cholesterol and triglyceride levels was shown in adults who were born with lower birthweights.

B38 Anthropometric and growth assessment of children receiving renal replacement therapy in Malaysia

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Journal of Renal Nutrition 12(2): 113-121, 2002

Objective: To report on the anthropometric and growth status of children receiving renal replacement therapy (RRT) in Malaysia. Design: Cross-sectional study with some retrospective elements. Setting: Outpatients' clinics in a major referral hospital in Malaysia. Patients: Fifteen renal transplants (mean age, 13.3 ± 2.8 years) and 35 continuous ambulatory peritoneal dialysis (CAPD) patients (mean age, 12.6 ± 3.0 years) participated. The RRT period ranged between 3 months to 6 years for both groups. Intervention: None. Main Outcome Measures: Body mass index (BMI), percent body fat (% BF), triceps skinfold (TSF), mid upper-arm circumference (MUAC), arm muscle area (AMA), and z scores for height and weight. Results: BMI for age indicated 7% of transplant subjects (TS) versus 40% of CAPD subjects were below the 5th percentile, whereas only 7% of TS were above the 95th percentile. % BF was higher for TS compared with the CAPD group for both sexes (boys, 19.5% and girls, 29.8% v boys, 12.4% and girls, 21.5%). Despite higher percentiles for TSF, transplant subjects still showed depleted muscle mass based on MUAC and AMA. z scores for height showed 93% of transplant subjects and 62% of CAPD subjects below -2 standard deviation (SD), whereas for weight these were 27% and 54%, respectively. Sixty-four percent of TS experienced catch-up growth for height and 86% for weight. These percentages were approximately halved for the CAPD group (32% and 43%, respectively). Conclusion: Patterns of growth and body composition appear distinctly different with the different RRT modalities. Serial anthropometric evaluation appears vital in pre- and post-RRT monitoring in pediatric renal populations.

B39 Nutritional status of children below five years in Malaysia: anthropometric analyses from the Third National Health and Morbidity Survey III (NHMS, 2006)

Khor GL[1], Noor Safiza MN[2], Jamalludin AB[3], Jamaiyah H[4], Geeta A[4], Kee CC[5], Rahmah R[6], Alan Wong N F[2], Suzana S[6], Ahmad AZ[2], Ruzita AT[6] & Ahmad FY[2]

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Mal J Nutr 15(2): 121 - 136, 2009

The Third National Health and Morbidity Survey (NHMS III) was conducted in 2006 on a nationally representative sample of population in Malaysia. Over 21,000 children aged 0-17.9 years were measured for body weight and stature according to the protocol of the World Health Organization. This article describes the nutritional status of children aged 0-59.9 months. Mean z score for weight for- age (WAZ), height-for-age (HAZ) and BMI-for-age were compared with the z-scores tables of the WHO standards. The overall prevalence of underweight and stunting of the children were 12.9% and 17.2% respectively. These levels included 2.4% severe underweight and 6.0% severe stunting. In terms of z scores, the age group of 0-5.9 months showed the best nutritional status with mean WAZ of -0.33 (95%CI: -0.52, 0.15) and -0.40 (-0.57, 0.24) for boys and girls respectively, while mean HAZ was 0.64 (0.38, 0.89) for boys and 0.76 (0.54, 0.98) for girls. Mean HAZ and WAZ status was least satisfactory after about 6 months, suggesting a faltering in growth rate at an age that coincides with dependence on complementary feeding. Prevalence of overweight based on BMI-for-age for the sexes combined was 6.4%, while that based on WAZ was 3.4%. The NHMS III results indicate that Malaysian children have better nutritional status compared to children under 5 years in neighbouring countries. In order to meet the targets set in the National Plan of Nutrition (2006-2015), more effective intervention programmes are needed to accelerate the reduction of underweight and stunting, and to arrest the rise of overweight in young children.

B40 Malnutrition among Semai children

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Med J of Malaysia 43(4): 318-326, 1988

A comprehensive assessment of the nutritional status of the Semai children in Perak was undertaken. Anthropometric measurements of 1180 children, biochemical analyses of blood and urine samples from 506, and dietary evaluation by weighing food intake of 30 preschool children were carried out. Widespread underweight and stunting were found with a relatively lower incidence among the infants and female adolescents. Iron deficiency anemia affected a high percentage of the children, who also showed low excretory levels of urea nitrogen and poor hydroxyproline index indicating slow growth rate. Dietary intake is characterized by sub-optimal quantitative levels and a high reliance on tapioca tuber for calories and nutrients.

B41 Patterns of food production and consumption in the ASEAN region

Khor GL, Tee ES and Kandiah M

World Review of Nutrition and Dietetics, 61: 1-40, 1990

The Association of Southeast Asian Nation (ASEAN) consists of the peninsular and the archipelago parts of Southeast Asia. Established in August 1967, ASEAN originally comprised of Indonesia, Malaysia, Philippines, Singapore and Thailand; Brunei Darussalam became the sixth member in 1984. This paper discusses the trends and issues related to food production and consumption with nutritional implications in the ASEAN region. The production of major food staples in countries in the region for 1984 was first discussed. The trends in crop production increases from 1980-1984 were also examined. The authors analysed the available food balance sheet data for the two decades 1961-1984 to examine the availability of several nutrients in the ASEAN countries, including calories, protein and fat. The patterns of consumption of major food staples and trade were also discussed. The authors next discussed the nutritional implications of population increase and food production in countries in the ASEAN region.

B42 Update on the prevalence of malnutrition among children in Asia

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Nepal Med Coll J. 5(2): 113-22, 2003

Approximately 70.0% of the world's malnourished children live in Asia, resulting in the region having the highest concentration of childhood malnutrition. About half of the preschool children are malnourished ranging from 16.0% in the People's Republic of China to 64.0% in Bangladesh. Prevalence of stunting and underweight are high especially in South Asia where one in every two preschool children is stunted. Besides protein-energy malnutrition, Asian children also suffer from micronutrient deficiency. Iron deficiency anaemia affects 40.0-50.0% of preschool and primary school children. Nearly half of all vitamin A deficiency and xeropthalmia in the world occurs in South and Southeast Asia, with large numbers of cases in India (35.3 million), Indonesia (12.6 million) and China (11.4 million). Another major micronutrient problem in the region is iodine deficiency disorders, which result in high goiter rates as manifested in India, Pakistan and parts of Indonesia. While under-nutrition problem persists, overweight problem in children has emerged in Asia, including Taiwan, Singapore and urban China and Malaysia. The etiology of childhood malnutrition is complex involving interactions of multiple determinants that include biological, cultural and socio-economic influences. Protein-energy malnutrition and micronutrient deficiency leading to early growth failure often can be traced to poor maternal nutritional and health care before and during pregnancy, resulting in intrauterine growth retardation and children born with low birth weight. While significant progress has been achieved over the past 30 years in reducing the proportion of malnourished children in developing countries, nonetheless, malnutrition persists affecting large numbers of children. The socio-economic cost of the malnutrition burden to the individual, family and country is high resulting in lower cognitive outcomes in children and lower adult productivity. Interventions that are cost-effective and culturally appropriate for the elimination of childhood malnutrition deserve the support of all.

B43 Nutritional assessment of rural villages and estates in Peninsular Malaysia II. Nutritional status of children aged 18 years and below

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Mal J Nutr 3: 21-47, 1997

This paper presents the results of anthropometric assessment of 2,364 boys and 2,415 girls aged 18 years and below drawn from the estates and rural community groups engaged in padi farming, rubber planting, coconut cultivation and fishing. The

children were mainly Malay, however in the estates, Indians predominated. The results showed that the percentage of boys who have normal weight-for-age, height-forage and weight-for-height were respectively 69.4%, 68.3% and 88.8%. Among girls, the percentage with normal values for weight-for-age, height-for-age and weight-for-height were 73.8%, 72.6% and 89.5% respectively. This study also showed the persistence of underweight, stunting and wasting amongst children in the study communities. Overall, the prevalence of underweight among boys was 29.8% and for girls 25.5%. The prevalence of stunting was 31.3% for boys and 26.9% for girls, while wasting was found in 9.3% boys and 8.5% girls. By age groups, the prevalence of underweight was lowest among the infants (16.8% for boys and 13.3% for girls), and highest among children aged above 1 to 6 years old (32.6% and 35.9% for boys and girls respectively). Children from the fishing, rubber and padi villages showed a higher prevalence of acute and chronic undernutrition than those from the coconut and the estate communities. In contrast, the mean prevalence of overweight in the five community groups did not exceed 2%. When compared with another peninsula-wide nutritional assessment of poverty villages undertaken in 1979-1983, it is found, over the past decade, that the prevalence of underweight in rural communities appeared to have decreased somewhat while that of stunting showed a more substantial decline. The persistence of current undernutrition has led to the manifestation of children who were too thin for their "non-stunted" height, thus giving rise to an apparently higher prevalence of wasting as found in this study. The implications of these results are discussed.

B44 Dual forms of malnutrition in the same households in Malaysia - a case study among Malay rural households

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Asia Pacific J Clin Nutr 12(4): 427-438, 2003

This report is a part of a multi-centre study in Asia on the problem of dual forms of malnutrition in the same households. In Malaysia, the prevalence of underweight and stunting persist among young children from poor rural areas. Overweight in adults, especially women from poor rural areas has been reported in recent years. Thus, this study was undertaken in order to assess the presence of the dual burden of underweight childoverweight mother pairs in a poor rural community. Out of 140 Malay households identified to have at least one child aged 1-6 years and mother aged above 20 years, 52.1% of the mothers were overweight, 15.7% of the children were underweight, 27.1% stunted and 5% wasted. Socio-economic background and food intake frequency data were collected from 54 underweight child/ overweight mother pairs (UW/OW) and 41 normal weight child/normal weight mother pairs (NW/NW). Compared with the overweight mothers, a higher

percentage of the normal weight mothers had received secondary education, were employed and with a higher household monthly income, although these differences were not significant. Patterns of food intake of the mothers and children appeared to have more similarities than differences between the UW/OW and NW/NW groups. Quantitative dietary intakes for 2 days using 24-hr recall and physical activity energy expenditure over the same period were assessed in a sub-group of UW/OW and NW/NW mothers and children. The NW/NW children showed significantly higher intake of total calories, fat and riboflavin than the UW/OW counterparts. Mean energy and nutrient intake of mothers from both groups were not significantly different, although the NW/NW mothers showed higher intake adequacy for total calories and most nutrients. While most of the mothers from both groups reported having no chronic illnesses, about half of the children in both groups had infections, especially gastrointestinal infections, over a 2-week period. Energy expenditure from physical activity for both UW/OW and NW/NW mothers and children did not differ significantly. This study confirmed inadequate intake of total energy and nutrients as the major factor for underweight in Malay children from rural aras. However, assessing intake and physical activity by interview methods were not sensitive enough to overcome perceived problems of under-reporting of energy intake and over-estimation of energy expenditure, especially by overweight subjects. Further investigations on a larger sample are necessary to understand the family dynamics leading to the double burden of malnutrition within the same household.

B45 Nutritional status of children in rural Sarawak, Malaysia

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Southeast Asian J Trop Med Public Health. 22(2): 211-215, 1991

The nutritional status of 641 children between the ages of 0 to 4 years old, from 835 households in 41 randomly selected rural villages with water supply in Sarawak were determined. Based on Waterlow's classification and the National Center for Health Statistics (NCHS) standards, 61% of the children were stunted and 44.1% were wasted. Based on Gomez's classification and the NCHS standards 81.9% of the children were malnourished. There was no sex difference in nutritional status. The percentage of malnourished children increased continuously with age while the percentage of children who were wasted increased from 6 to 36 months and then it leveled off. The percentage of stunted children also increased with age but the increase was sharpest in children who were 12 to 23 months old. It is noted that the Gomez classification overestimates the prevalence of undernutrition.

B46 Ascaris and Trichuris do not contribute to growth retardation in primary school children

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Southeast Asian J Trop Med Public Health. 26(2): 322-328, 1995

To access the effectiveness of the treatment of soil-transmitted helminthiasis (STH) on the growth of primary school children, 353 children were block stratified to receive either mebendazole plus pyrantel oxantel pamoate every three months or a placebo. The children were followed for two years with 89% completing the trial. Follow-up stools indicated that the treatment was efficacious for ascariasis and trichuriasis. There was virtually no hookworm infection. The children were malnourished as measured by the number below -2 SD of height and weight standards. There was no difference in height or weight between the treatment and control groups by sex initially or at the end of two years of follow-up. The treatment of Ascaris and Trichuris had no effect on growth parameters. The effect of STH on growth may be mediated through hookworm infections.

B47 Nutritional status of primary school children, Sepang District, Selangor 2004

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Malaysian of Medical Science 2(1): 11-23, 2006

Objectives: This study was carried out to determine the nutritional status of primary school children aged 6 to 11 years in Sepang District and to compare the results with a similar study carried out in 1999. Methods: This cross-sectional study was carried out in Sepang District using stratified random cluster sampling technique. A pre-tested, structured questionnaire was used to collect the data. Weight was recorded using a digital bathroom scale TANITA model HD-309 and height was measured by using a SECA Body meter Model 208. Body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters. Classifications of the nutritional status of respondents was based on WHO classification 1983 and 1995. Data were analysed using SPSS. Results: The overall mean BMI for the 1,910 respondents was 16.8 (95% CI= 16.67 - 16.99; SE=0.08). The median BMI was 15.7 ranging from 9.51 to 36.75 kg/m2. The majority (84.4%) had normal weight-for-age status, 7.6% respondents had weight-for-age status below -2 SD of the NCHS-WHO median and 8.0% had weight-for-age status above +2 SD of the NCHS-WHO median. The prevalence of underweight and overweight was significantly higher in the males compared to the females ($p < 0.05$). There was a

significant association between underweight and ethnicity ($p < 0.05$). The majority (90.3%) had normal height-for-age status, 8.8% had height-for-age below -2 SD of the NCHS-WHO standard median and 0.9% had height-for-age above 2 SD from the NCHS median. The prevalence of stunting was significantly higher in the male (10.3%) as compared to 7.4% in the females (?2 = 5.11, p = 0.02). The majority (81.4%) of the respondents were within the normal weight-for-height, 3.4% were wasted (weight-for-height was below -2 SD of the NCHS-WHO median) and 15.2% of the respondents were obese (weight-for-height that is more than +2 SD of the NCHS-WHO median). The prevalence of wasting was higher in the females (4.1%) compared to males (2.8%). The prevalence of obesity was slightly higher in the males (15.4%) compared to females (14.9%). Conclusion: The overall nutritional status of primary schools children is good. However, there still exists pockets of population in Sepang where chronic and acute forms of undernutrition persist in these children.

B48 Nutritional status and reproductive health of Orang Asli women in two villages in Kuantan, Pahang

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Mal J Nutr 4:31-54, 1998

The study was conducted to determine the nutritional status and reproductive health of 34 Orang Asli women, aged 16-45 years, from two Orang Asli villages in Kuantan, Pahang Darul Makmur. The results of the study indicate that on the whole, the women's nutritional status is generally not satisfactory. Their mean iron intakes for example, are very low, about one-quarter to one-third of the required level. All their other mean nutrient intake levels are below the required level. Only their mean intake of vitamin C exceeds the required level due to their frequent intake of raw vegetables. Their main source of carbohydrate is rice, while their main source of protein is fish, and their main source of minerals and vitamins are Chinese mustard and cabbage. From BMI measurements, it is found that less than half of the women (42.9%) have normal weight, 35.7% suffer from chronic energy deficiency (CED), 7.1% (one) are overweight, and 14.3% (two) are obese. The accessibility and availability of food are a problem for the women, limiting their choice of varieties of food sources. For their reproductive health needs, the pregnant women rely on the government hospital and clinics for their antenatal check-ups and birth deliveries. Of all the women, nine suffer from menstrual pain and five from vaginal discharge. Food taboos and cultural practices are practised by the pregnant women during their confinement. It is concluded that the nutritional status of the women needs to be improved since most of them have insufficient nutrient intake.

B49 Distribution of body weight, height and body mass index in a national sample of Malaysian adults

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Med J Malaysia 55 (1): 108-128, 2000

We describe the distribution of body weight, height and body mass index (BMI) by age, sex and ethnicity in Malaysian adults. A national sample of 28,737 individuals aged 20 or older had usable data. They were selected by stratified 2-stage cluster sampling. Percentile tables and curves by age, sex and ethnicity are presented. The body weight and BMI distributions were right skewed, while that of height was symmetrical. BMI distribution showed the expected increase with age, while that of height decrease with age. Differences in BMI between the 2 sexes and among the 4 ethnic groups were observed. Indians had the highest BMI, followed by Malays, Chinese and other indigenous ethnic group.

B50 Foodborne Diseases in Malaysia

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Med J Malaysia 57(1): 2002

The two articles pertaining to foodborne infections published in this issue of the Medical Journal of Malaysia (MJM) serve as a timely reminder of the importance of foodborne diseases. Foodborne diseases has been recognized as an emerging infectious disease. Although in many developed countries the incidence of infections caused by the classical enteropathogens like Salmonella typhi and Vibrio cholerae has decreased, new enteropathogens have emerged. These include E. coli, Vibrio vulnificus, Listeria monocytogenes,multiresistant Salmonella serotype Typhimurium Definitive type 104 and the parasite Cyclospora cayetanensis. Foodborne infections are common although the vast majority of cases are undiagnosed or unreported. In the United States it has been estimated that foodborne diseases cause approximately 76 million illnesses with 325,000 hospitalisations and 5,000 deaths each year. In Malaysia, where the standard of food hygiene is lower, the official reported figures for food-borne infections probably represent only the tip of a very large iceberg. The true incidence of foodborne infections in Malaysia is unknown and there has been little attempt in ascertaining the magnitude of the problem. Meftahuddin reports in this issue of the MJM that the reported incidence rates of major food

borne diseases had steadily declined from the years 1988 to 1997 except for food poisoning and cholera. Investigation of food poisoning outbreaks from the year 1996 to 1997 showed that 66.5% of the outrbreaks occurred in schools whereas only 0.4% originated from the contaminated food sold at various public food outlets. This data is probably the result of biased reporting. Outbreaks in residential schools are easily detected and in nearly all instances the affected students would be sent to a hospital. Outbreaks originating from a food outlet are much more difficult to detect since the affected individuals would go to different general practitioner clinics or hospital outpatient departments where the vast majority of illnesses are not notified. A community based study by Yap et al in 1993 among children in one urban and one suburban community estimated the rate of diarrhoeal illness to be 23.6 episodes per 100 person-years. If this rate is extrapolated to the whole country the total number of diarrhoeal episodes annually would run into the millions. Obviously such a large number of illness will have a significant economic impact on the country. Although the vast majority of cases do not result in hospitalizations or deaths, the economic loss due to absentism from work must be considerable. In this issue, Lee reports on the pattern of enteropathogens seen at the University Hospital Kuala Lumpur from the years 1978-1997. Only 11% of the stool specimens yielded a recognized enteropathogen. This is not surprising since many cases of diarrhoea have a viral aetiology and routine microbiological procedures will miss a significant number of bacterial enteropathogens. The five most common bacterial pathogens isolated were nontyphoidal Salmonella (57%), enteropathogenic E. coli (EPEC) (14%), Shigella spp. (11%), Campylobacter spp. (5%) and Aeromonas spp. (4%). In the United States Campylobacter spp. is the most common enteropathogen followed by nontyphoidal Salmonella. These differences may reflect true differences in disease patterns, differences in medical practice pertaining to obtaining cultures or differences in laboratory techniques themselves. There has not been any documented human cases of foodborne E. coli 517, Cylospora cayetanensis or Listeria monocytogenes in Malaysia. Again whether it is a case of true absence or failure of diagnosis is not known. However, Listeria spp. has been shown to be a frequent food contaminant in Malaysia. Nearly 74% of imported frozen beef and 56% of fermented fish sampled in a recent study were contaminated with Listeria spp. Another area of concern is the increasing resistance to antibiotics among enteropathogens. The National Antibiotic Resistance Surveillance programme revealed that in 2000, 10.6% and 8.5% of Salmonella typhi isolated in Malaysian government hospitals were resistant to ampicillin and chloramphenicol respectively. With non-typhoidal Salmonella, the resistance rates recorded against ampicillin, chloramphenicol and cotrimoxazole were 12%, 6.3% and 13.2% respectively. Among Shigella flexneri, all isolates were resistant to ampicillin and cotrimoxazole and over 80% resistant to chloramphenicol. No resistance to ciprofloxacin was seen among the Salmonella and Shigella isolates in Malaysia but this is already an emerging problem in Thailand. The control of foodborne infections requires multifaceted process. The surveillance mechanism in Malaysia needs to be improved. While large outbreaks like cholera epidemics and food poisoning in schools are easily detectable, diffuse outbreaks are often missed. There is a need to establish a system of active surveillance in sentinel populations. With improved surveillance and more accurate data, the magnitude of the problem from both the health and economic aspects can then be calculated. The

lack of food hygiene in this country also needs to be addressed. This applies particularly to street food. At the moment the street food industry is largely unregulated. Many hawkers are unlicensed and food is often prepared in private homes away from the point of vending, thus making enforcement of any food hygiene laws difficult. Obviously more effective enforcement of the law is required. This has to be complemented by a vigorous and comprehensive public education programme on the importance of food hygiene.

B51 The nutritional situation in metropolitan Kuala Lumpur, with focus on squatters

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Southeast Asian J Trop Med Public Health. 23 Suppl 3:17-30, 1992

Kuala Lumpur is the capital city of Malaysia with an estimated population of 1.55 million. Approximately 12% of the population live in squatter settlements occupying about 7% of the city total area. The squatter settlements generally are provided with basic amenities such as piped water, toilet facilities and electricity. Health indicators for the overall population of Kuala Lumpur are better off than for the rest of the country; however, intra-city differentials prevail along ethnic and socio-economic lines. Malays and Indians have higher rates for stillbirths, and neonatal, infant and toddler mortality than the Chinese. The wide disparity in the socio-economic status between the advantaged and the poor groups in the city is reflected in the dietary practices and nutritional status of young children from these communities. The percentage of preschool children from urban poor households with inadequate intakes of calories and nutrients is two to three times higher than those from the advantaged group. Compared to rural infants, a lower percentage of urban infants are breastfed. A lower percentage of Malays from the urban advantaged group breastfed, compared with the urban poor group. The reversed trend is found for the Chinese community. Growth attainment of young children from the urban poor is worse than the urban advantaged, though better than the rural poor. Health and nutritional practices implications related to both undernutrition and overnutrition are discussed, to illustrate the twin challenges of malnutrition in the city.

B52 Socioeconomic profile and nutritional status of children in rubber smallholdings

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Asia Pac J Clin Nutr. 11(2):133-41, 2002

This paper will present the socioeconomic profile and nutritional status of children aged 1-6 years in the rubber smallholdings of Peninsula Malaysia. A total of 323 households were involved in this study. The sociodemographic data were obtained through interviews with heads of households using a set of questionnaires. Anthropometric measurements were taken from 506 children aged 1-6 years from these households. The weight and height of the children were compared with the reference values of the National Center for Health Statistics (NCHS) and the nutritional status was classified based on the recommendations of WHO. The average age of the fathers was 39.9+/-8.6 years and 34.4+/-7.0 years for the mothers. The mean household size was 6.67+/-2.27. The majority (49.7%) of the heads of households received 4-6 years of formal education and 7.9% received no formal education. Based on the monthly per capita income, 24.0% were found to be in the hardcore poor category, 38.3% fall into the poor category and 37.7% in the above poverty income group. The prevalence of stunting and underweight among children between the ages of 1-6 years were highest among children from the hardcore poor, followed by the poor category and above the poverty line income group. Wasting was present in all income groups, with a prevalence of 4.2% found among the hardcore poor, 9.4% among the poor group and 8.4% in the above poverty income group. The Pearson Product Moment Correlation showed significant relationships between household total income and height-for-age ($r = 0.131$, $P = 0.05$) and weight-for-age ($r = 0.127$, $P = 0.05$). There were also significant correlations between monthly per capita income with height-for-age ($r = 0.16$, $P < 0.01$) and weight-for-age ($r = 0.13$, $P < 0.05$). The acreage of land utilised was correlated with height-for-age ($r = 0.11$, $P < 0.05$), weight-for-age ($r = 0.17$, $P < 0.05$) and weight-for-height ($r = 0.16$, $P < 0.05$). However, stepwise multiple regression analysis indicated that the predictor of height-for-age was monthly per capita income ($R2 = 0.03$, $P < 0.01$) and acreage of land utilised was a predictor for weight-for-age ($R2 = 0.03$, $P < 0.01$) and weight-for-height ($R2 = 0.01$, $P < 0.01$). Because income and acreage of land utilised have been shown to be associated with nutritional status, it is recommended that intervention programs that focus on generation of income and diversification of land utilisation should be undertaken. A multidiscipline approach involving the family, community and government agencies should be applied to any type of intervention program.

B53 Energy and nutrient intakes: findings from the Malaysian Adult Nutrition Survey (MANS)

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Mal J Nutr 14 (1): 1 - 24, 2008

Nutrition surveys based on a representative sample of the Malaysian adult population have hitherto not been reported. In 2003, the Ministry of Health, Malaysia, conducted the Malaysian Adult Nutrition Survey (MANS), the first and largest nutrition survey in the country which aimed to provide detailed quantitative information on nutritional status, food and nutrient intakes, and physical activity pattern on a nationwide representative sample of adult subjects between the ages of 18 and 59 years. The survey covered four zones in Peninsular Malaysia (Central, Southern, Northern and East Coast), Sabah and Sarawak. This paper presents the mean and selected percentiles of energy and nutrient intake of 6886 subjects by selected demographic and socioeconomic characteristics. Energy contributions by macronutrients and dietary adequacy in relation to the Recommended Nutrient Intake for Malaysians are also described. Information on dietary intake was collected by trained nutritionists using a one day 24-hour diet recall. Dietary data were analysed using Nutritionist Pro, a diet analysis software and statistical analysis was carried out using the SPSS ver. 13.0. In most of the demographic and socioeconomic groups, males had higher mean energy (1776 kcal) and nutrient intake and percent achievement of RNI than females (1447 kcal). The proportions of calories derived from macronutrients were within the recommendations for a healthy diet. Intake of micronutrients such as iron, calcium and vitamin A was about 50% of RNI particularly in women. Sodium intake of Malaysians, not reported in earlier studies, is also made available. Under-reporting using the EI/BMR ratio was found in half of the population studied. The present study provides the first national estimates of energy and nutrient intake of the Malaysian adult population. Regular nutrition surveys are needed at the national level to provide valuable information on trends in food and nutrient intake, particularly among age and ethnically diverse subgroups of the population.

B54 Nutritional status of school children receiving supplementary feeding program in Peninsular Malaysia

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Sains Malaysiana 32: 131-146, 2003

A total of 2541 school children comprising of 1265 students who were given the School Supplementary Feeding Program (SFP) and 1276 who were not given SFP (non-SFP) aged between 7-12 years, from Central and Southern regions of Peninsular Malaysia were involved in the study. Anthropometric measurements (weight, height and triceps skinfold) and their 24-hour dietary record were assessed. Results showed that SFP subjects had a lower mean body weight (26.9 ± 7.7 kg), height (130.7 ± 10.0 em) and triceps skinfold (TSF) thickness (9.8 ± 3.8 mm) than non-SFP subjects with mean body weight29.3 ± 9.2 kg, height 132.9 ± 10.4 cm and TSF thickness 10.8 ± 4.6 mm. Chinese subjects had the highest mean body weight (28.7 ± 7.9 kg), height (132.9 ± 10.3 em) and TSF thickness (l0.3 ± 3.7 mm) amongst the SFP subjects, as well as amongst non-SFP subjects with mean body weight 31.1 ± 9.3 kg, height 135.4 ± 10.3 em and TSF thickness 11.5 ±4.9 mm. This study also showed the persistence of underweight, stunting and wasting amongst these primary school children. The prevalence of underweight amongst SFP and non-SFP subjects were 14.6% and 10.0% respectively. The prevalence of stunting was 12.6% for SFP and 7.4% for non-SFP, while wasting was found in 11.1% for SFP and 9.5% for non-SFP. The prevalence of overweight amongst SFP and non-SFP subjects were 1.3% and 4.5% respectively. Overall, only intake of protein, vitamin A and vitamin C met the RDI in all subjects for both SFP and non-SFP. Based on the findings, it can be concluded that there is a need for the Food Supplementation Program to be continuously implemented in primary schools to ensure that they will get enough food to sustain their energy.

B55 Nutritional status of children of various Orang Asli communities in Peninsular Malaysia

Mohd Sham K, Zulkifli I and Lailanor I

Akademika, 7: 69-74, 1989

An anthropometric study of 566 Orang Asli children (276 boys and 290 girls) below 10 years of age was conducted in 28 villages in 7 separate areas in Peninsular Malaysia. Using below 2 standard deviations of he NCHS median as the cut-off, it was found that 56% of these children were underweight and 65.7% were stunted.

Using the reference mid-upper arm circumference values of Wolanski, it was found that 41.8% had low mid-arm circumference. The data in each of the areas visited varied. It was concluded that the prevalence of malnutrition is very high among the aborigines of Peninsular Malaysia. Nutritional status of children below 6 months was generally better, probably due to the predominance of breastfeeding. However, more and more mothers were turning to sweetened condensed milk for their babies, and the older children were fed diets consisting mainly of tapioca and low in calorie and protein. The report emphasized the importance of coordinating the various units in the Department of Orang Asli so that there are greater interactions and exchange of information for the betterment of the aborigines.

B56 Body mass status of school children and adolescents in Kuala Lumpur, Malaysia

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Asia Pac J Clin Nutr 13 (4): 324-329, 2004

Lifestyle and disease patterns in Malaysia have changed following rapid economic development. It is important to find out how these changes have affected the nutritional status and health behaviour of the population, especially school children and adolescents. Therefore a survey on school childrens' and adolescents' health behaviours and perception in Kuala Lumpur was initiated. This paper only reports the observed body mass status of the school children. A total of 3620 school children were selected in this survey using the method of multistage sampling. The students were surveyed using pre-tested questionnaires while weight and height were measured by the research team in the field. Using the cut-off of BMI-for-age > 95th percentile and <5th percentile for overweight and underweight respectively, there were a total of 7.3% of overweight students and 14.8% of underweight students. When analysed by gender; 7.5% of boys and 7.1% girls were overweight, while 16.2% of the boys and 13.3% of the girls were underweight. The youngest age group (11 years old) had the highest prevalence of underweight as well as overweight. With increasing age, the prevalence of underweight and overweight decreased and more children were in the normal weight range. The overall prevalence of overweight among the three ethnic groups was similar. However the prevalence of underweight was highest among the Indian students (24.9%), followed by Malays (18.9%) and Chinese (9.5%) ($P < 0.001$). The results showed that both the problems of under- and over-nutrition co-exist in the capital city of Malaysia. The promotion of healthy eating and physical activities is required to address the problems of under- and over-nutrition in order to build up a strong and healthy nation in the future.

B57 Waist circumference as a screening tool for weight management: evaluation using receiver operating characteristic curves for Malay subjects

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Asia-Pacific Journal of Public Health 15(2): 99-104, 2003

Body Mass Index (BMI) is the most established anthropometric indicator used for assessment of nutritional status. Other anthropometric indicators which are related closely to BMI are waist hip ratio (WHR) and waist circumference. In this paper, receiver operating characteristics (ROC) curves were constructed to assess the value of waist circumference and waist hip ratio as a screening measure for the need of weight management using BMI as the reference test. Sensitivity and specificity were calculated at several cut-offs.

The areas under the ROC curve calculated by comparing waist circumference with BMI were high (0.70 - 0.86) while the areas calculated for WHR were low (0.46 - 0.67). Sensitivities of 0.745 and 0.800 were observed at cut-off points of waist circumference at 90cm and 80cm for males and females respectively, while the false positive rates were 0.233 for males and 0.250 for females. These cut-off points could be considered as a fair trade-off.

Therefore it is concluded that waist circumference performed better than WHR as a screening test. It is indicative that waist circumference could be used as a tool in raising awareness of weight management in this population.

B58 Anthropometry and dietary intake of type 2 diabetes patients attending an outpatient clinic

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Mal J Nutr 8(1): 63-73, 2002

A cross sectional study on Type 2 diabetes patients seeking treatment in the Primary Health Care outpatient clinic of the University Malaya Medical Centre, Kuala Lumpur was undertaken. Two hundred and thirty-three subjects participated. They were asked questions on biodata and dietary intake using face-to-face interview techniques. Dietary intake was assessed using the 24-hour dietary recall. Anthropometric measurements including weight and height were taken and Body Mass Index (BMI) was computed to establish the extent of obesity. Of the 196 subjects, 66.8% were overweight (BMI =25 kg/m2) with 15.8% obese (BMI =30 kg/m2). The mean BMI of males and females were 25.9±4.3 kg/m2 and 27.2±4.7

kg/m2 respectively. The findings from the dietary survey showed that the mean energy intake of the subjects only achieved about 72% of the Recommended Daily Allowance (RDA) for Malaysia while protein intake of all subjects was adequate. The macronutreint contribution to the total calorie was consistent with the recommendation of the Malaysian Diabetic Association for a healthy diet for diabetes patients. The male subjects were found to meet the RDA requirements for all nutrients while the female subjects did not have sufficient intake of calcium, vitamin A and niacin. No consistent pattern in energy and nutrient intake was observed among different age groups. On the other hand, the Malay subjects seemed to have lower energy and all nutrient intake (except vitamin A and vitamin C) compared to the Chinese and Indian subjects. The Indian subjects seemed to have the highest intake of calcium compared to the others. Advice needs to be given to those who did not have adequate nutrient intake as well as those who need to reduce their weight.

B59 Body mass index and nutritional status of adults in two rural villages in Northern Malaysia

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Mal J Nutr 13(1): 9-17, 2007

There has been a change in the lifestyles of populations, including reduced physical activity and consumption of foods high in calories. Overweight and obesity are now replacing the more raditional public health concerns such as under-nutrition and infectious diseases as some of the most significant contributors to ill health. Determination of the body mass index (BMI) profile and nutritional status of adults of two rural coastal villages in Northern Malaysia was part of a community diagnosis in a community survey. Height and weight were measured and BMI calculated. Blood pressure was measured using a manual sphygmomanometer according to WHO guidelines. A standardized questionnaire was used to interview the villagers concerning their health. Out of the total population, 504 were above 20 years of age. Data was available for 441 persons for analysis. There were 210 (47.6%) males and 231 (52.4%) females. The prevalence of underweight was 9.8% (n=43), overweight 25.9% (n=114) and obesity 17% (n=75). The problem of over-nutrition was significantly higher among females, especially housewives. ($p< 0.05$). Those in ages 41-70 years were the majority with problems of over-nutrition ($p=<0.05$). More than half (52.9%; n=39) of those who were obese had hypertension ($p=<0.05$). Results show that a higher number of women especially housewives were obese and more than half of those obese subjects had hypertension. A more thorough nutritional profile using waist, hip and body fat measurement as well as an assessment of the dietary intake and activity regime of these villagers is needed. Interventions need to be carried out before more serious complications of obesity become rooted in this community.

B60 Nutritional status of the Commonwealth Games 1998 elite netball players during centralised training

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Mal J Nutr 5: 71-78, 1999

This study was carried out to determine the nutritional status of 16 elite netball players of the Commonwealth Games 1998, during centralised training at Bukit Jalil. The mean age of the subjects was 21.1±3.1 year. The physical characteristics were assessed through antropometric measurements. The dietary intake was estimated as a mean of 3-days weighed food record while the physical activity pattern was determined by time and motion study which was carried out simultaneously. A biochemical analysis test was carried out to evaluate the haemoglobin status of the athletes. The results indicated that the mean body weight and height were 62.5±7.9 kg and 1.69±0.06 meter, respectively. The percentage average body fat of the subjects was 23.7±2.8. Mean energy intake was recorded as 2726±507 kcal/day while energy expenditure was 3225±409 kcal/d with a negative energy balance of 499 kcal. The contribution of calories from carbohydrate, protein and fat were 59%, 16% and 26%, respectively. Intake of most micronutrients was sufficient and met the Malaysian RDA. The percentage average of the daily physical activity pattern revealed that 74% was spent for light activities, 12% for moderate while 14% for heavy activities. 94% of the athletes took supplements which vitamin C was the most popular (64%).

B61 Kajian rintis penilaian status pemakanan di kalangan pesakit onkologi pediatric di Hospital Universiti Kebangsaan Malaysia

Noor Aini MY, Zalina AZ, Raiza S, Rosita J, Suzana S & Rahman AJ

Jurnal Sains Kesihatan Malaysia 5 (1): 47-58, 2007

Malpemakanan merupakan masalah yang biasa berlaku di kalangan pesakit onkologi pediatrik. Banyak faktor yang menyumbang kepada keadaan malpemakanan ini seperti ketaknormalan fisiologi, kesan tumor dan juga kesan sampingan rawatan. Kajian hirisan lintang ini merupakan suatu kajian rintis untuk menentukan status pemakanan di kalangan 17 orang pesakit onkologi pediatrik yang berumur di antara 4 hingga 12 tahun di Hospital Universiti Kebangsaan Malaysia, Kuala Lumpur. Status pemakanan ditentukan dengan pengukuran antropometri dan pengambilan diet yang menggunakan kaedah ingatan diet 24 jam selama 3 hari bersama pesakit dan penjaga. Profil biokimia (aras serum albumin dan hemoglobin) diperolehi melalui rekod perubatan. Melalui pengukuran antropometri, nilai berat dan tinggi digunakan untuk menghitung skor-z dan persentil berat-untuk-umur, tinggi untuk-umur berdasarkan data rujukan NCHS (WHO 1983). Manakala, persentil Frisancho (1981) digunakan untuk mengganggarkan malpemakanan berdasarkan ukurlilit lengan atas (MUAC). Indeks berat-untuk-umur menunjukkan 70.6% daripada

subjek berada di bawah -2 skor-z iaitu kekurangan berat badan. Indeks tinggi-untuk-umur menunjukkan 76.5% daripada subjek berada di bawah - 2 skor-z iaitu kebantutan. Manakala berdasarkan MUAC seramai 35.3% subjek mengalami keadaan malpemakanan teruk (< 5 persentil) dan 23.6% subjek mengalami keadaan malpemakanan yang sederhana (> 5 - <10 persentil). Seramai 70.6% dari subjek mengalami aras hemoglobin yang rendah (< 11 g/dl) dan 29.4% adalah hipoalbuminemia (< 35 g/dl). Jumlah pengambilan makronutrien subjek dibandingkan dengan saranan individu (Seashore 1984) bagi pengambilan tenaga dan protein adalah baik, kecuali subjek pada kumpulan umur 10 - 12 tahun sahaja pengambilan tenaga dan proteinnya hanya memenuhi 70% daripada saranan. Sebagai kesimpulan, walaupun tahap pengambilan makanan subjek adalah memuaskan tetapi masalah malpemakanan kronik adalah prevalen. Penilaian awal ke atas status pemakanan pesakit adalah penting untuk merangka pelan intervensi bagi peningkatan kualiti hidup.

B62 The nutrition and health transition in Malaysia

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Public Health Nutr. 5(1A):191-195, 2002

The accelerated phase of industrialisation and urbanisation in recent decades has inevitably brought about changes in the lifestyle of Malaysians. Changes in dietary habits and sedentary lifestyles are known to be associated with changes in health and increased prevalence of chronic diseases in the population. The objective of this paper is to provide a better understanding of the link between demographic variables and food consumption patterns related to the nutrition transition in Malaysia. This review uses various reports and publications from several ministries and selected local studies. The statistics compiled over the last two decades have shown that as the population achieves affluence, intakes of calories, fats and sugars increase, which may account for the substantial increase in food importation bills over the same period. Similarly, the rapid growth of the fast food industry during the last decade has added another dimension to the change in food consumption patterns of Malaysians. With the exception of a study on adolescents, the prevalences of overweight and obesity in children and adults are not strictly comparable due to the difference in body mass index (BMI) cut-off points in children and the study protocol in adults, and hence should not be misinterpreted as trends. The recent recommendation to lower the BMI cut-off points for Asians would only increase the magnitude of the existing prevalence among adults. The need to promote healthy nutrition for the population must be pursued vigorously, as the escalation of nutrition-related chronic degenerative diseases - once an urban phenomenon--has now spread to the rural population at an alarming rate. This paper indicates that the problem is real and needs urgent attention because it may be just the tip of the iceberg.

B63 Malnutrition and food consumption patterns in Malaysia

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International Journal of Food Science Nutrition 43: 69-78, 1992

In a rapidly developing country like Malaysia problems related to nutrition present themselves with contrasting features. While health indicators such as the toddler mortality rate, incidence of low birth weight and food balance sheet data suggest an improving nutritional situation, direct nutrition assessment indicates that chronic protein energy malnutrition is still common amongst children in rural areas and urban slums. Initial surveys of the adult urban population indicate about 10% prevalence of chronics energy deficiency in both sexes. Food consumption data revealed an average energy intake below the recommended daily intake for Malaysia in most age groups. Although death due to malnutrition is rare in Malaysia, it is known to cause considerable ill-health, impaired mental performance in children, loss of productivity in adults and an overall decline in quality of life. This paper reports the prevalence of malnutrition in the last two decades, the possible contributing factors and recommendations for alleviating the problems in Malaysia.

B64 Malnutrition and its risk factors among children 1-7 years old in rural Malaysian communities

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Asia Pacific J Clin Nutr 6(4): 260-264, 1997

The aims of this study were to investigate the nutritional status of children aged 1-7 years in Malaysian rural communities and to identify its risk factors. In all, 221 children were assessed using anthropometric measurements, dietary questionnaires and other tools. Weight-for-age, height-for-age, weight-for-height were analysed. Based on the NCHS standards, the overall prevalence of underweight, stunting and wasting was 46.2%, 18.1% and 30.3% respectively. Almost one-third of the 1-2 years old groups were malnourished. Univariate analysis identified household income £ MR750.00 as a significant risk factor of stunting and wasting.

B65 Food consumption patterns: findings from the Malaysian Adult Nutrition Survey (MANS)

Norimah AK[1], Safiah M[2], Jamal K[3], Siti Haslinda[4], Zuhaida H[5], Rohida S[6], Fatimah S[3], Siti Norazlin[2], Poh BK[1], Kandiah M[7], Zalilah MS[7], Wan Manan WM[8], Fatimah S[2] and Azmi MY[9]

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Mal J Nutr 14 (1): 25 - 39, 2008

This study reports the food consumption patterns of adults aged 18 to 59 years in the Malaysian Adults Nutrition Survey (MANS) carried out between October 2002 and December 2003. A total of 6,742 subjects comprising 3,274 men and 3,468 women representing the northern, central , southern and east coast of Peninsular Malaysia as well as Sabah and Sarawak were interviewed. A semiquantitative food frequency questionnaire (FFQ) which consisted of 126 food items was used to evaluate the food consumption pattern (habitual food intake) of the respondents during the previous one- year period. The results demonstrate that nasi putih (cooked rice) was consumed by 97% of the population twice daily (average 2½ plates per day). Other food items consumed daily were marine fish, (one medium fish per day), green leafy vegetables (one cup per day) and sweetened condensed milk (three teaspoons per day. The mean frequencies for daily intake of rice, leafy vegetables, marine fish, local kuih, anchovy (ikan bilis) and biscuits were significantly higher among the rural compared to the urban adults. In contrast, more urban dwellers consumed chicken and eggs more frequently than their rural counterparts. More men than women consumed chicken and eggs more frequently. Malaysian adults showed a satisfactory habit of drinking plain water, with 99% drinking at least six glasses of plain water daily. Other beverages such as tea (47%), coffee (28%), chocolate-based drinks (23%) and cordial syrup (11%) were also consumed on daily basis, however, in a smaller proportion of the population. There were differences in the prevalence of daily consumption of foods when comparing urban and rural population, and also between men and women. The prevalence of daily consumption of marine fish among rural and urban adults was 51% and 34% respectively. For sweetened condensed milk, men and women consumed 43% and 28% respectively; however, more women drank full cream milk than men. Between the age groups, 21% of adults below 20 years old consumed chicken at least once

a day, while this pattern of intake was not shown in the older age groups. Our findings show that adults, aged 50 to 59 years old, had the highest prevalence of daily consumption of full cream milk with 24% while those aged 18 to 19 years old had the lowest prevalence of daily consumption at 15%. The food consumption pattern of Malaysian adults appears to be satisfactory. However, some changes in food habits are recommended especially in substituting the less wholesome sweetened condensed milk with the more nutritious full cream or skimmed milk.

B66 A comparison of nutritional status between male athlete and male non athlete at Universiti Kebangsaan Malaysia

Norimah AK, Yeo WW

Sains Malaysiana 19(3): 37-44, 1990

This nutritional status study comprised of 70 sportsmen representing five sports event and 47 non sportsmen of the university. The methodology involved anthropometric measurement, a three-day dietary record and answering a questionnaire (only for sportsmen). The results showed that there was a significant difference ($p>0.05$) in the weight, height and percent body fat between the sportsmen and the non sportsmen. On comparing the intake of calorie, protein, carbohydrate and fat between the sportsmen and the non sportsmen, there was no significant difference observed although on the average, the sportsmen consumed a higher calorie, protein and carbohydrate in their diet.

B67 Nutritional status of students attending Universiti Kebangsaan Malaysia main campus in Bangi

Norimah AK, M Riza AR

Journal Malaysian Society of Health 17: 39-34, 1999

A nutritional status study was carried out in 1992 among Universiti Kebangsaan Malaysia (UKM) students from the main campus in Bangi. A total of 347 men and women participated in this study, comprising 158 Malays,133 Chinese and 58 Indians. Anthropometric measurements such as weight and height were taken and body mass index was calculated. Food intake was evaluated using 3-day dietary record. Mean weight and height were highest in Indian men, followed by Chinese and Malay men respectively. Among women, mean weight was heaviest among Indians, followed by Chinese and Malays. Mean body mass index (BMI) was also highest among Indians compared to Chinese and Malays for both men and women. Overweight was present in 5% Malay,12% Chinese and 6% Indian men and in 7% Malay, 4% Chinese and 4% Indian women respectively while 23% to 33% men, and 32% to 47% women among the ethnic groups were underweight. Food intake data indicated that the mean intake among man ranged between 2062-2167 kcal/day,

while in women the mean was lower, ranging between 1656-1739 kcal/day. The mean energy intake in both genders was lower than RDA. Iron intake was inadequate in many women; 61% Malay, 59% Chinese and 72% Indian women did not meet at least two-thirds of the recommended intake. The intake of macronutrients and other nutrients was satisfactory.

B68 Nutritional status of pregnant mothers among the staff and students of Universiti Kebangsaan Malaysia, Bangi

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Journal of the Malaysian Society of Health 6(1): 26-29, 1988

This study was conducted to assess the nutritional status of 46 pregnants mother in UKM,Bangi. Dietary intake data indicated that the consumption of calories, protein, niacin, vitamin A and vitamin C exceeded that of Malaysian Recommended Dietary Intake (RDI). However calcium, iron, thiamine, and riboflavin intake were below the recommendation. Anthropometric data indicated that more than fifty percent of the subject gained excessive weight. Hemoglobin and hematocrit determination indicated that only 11% of the pregnant mothers were found to be anemic.

B69 Nutritional status among Chinese preschoolers in Subang Jaya, Selangor

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Mal J Nutr 6: 45-53, 2000

A nutritional status study was carried out among Chinese preschoolers (4-6 years old) residing in Subang Jaya, Selangor. 91 preschoolers (48 boys and 43 girls) of Chinese descent participated in the study. Anthropometric measurements such as weight and height were taken and compared with the NCHS reference. Food habits and demographic background were also evaluated. The results indicated that the prevalence of underweight, wasting and stunting was 2% respectively, while the prevalence of overweight was 3%. Food habits data showed that most preschoolers consumed the daily main meals and snack once a day. Fruits were consumed between three to four times per week. Food items preferred by these preschoolers were milk, fish and fruits. In general, preschoolers in this study favoured foods,

which were deep fried rather than steamed or roasted. Correlation analysis showed that there was no significant relationship between income, education of parents and anthropometric index (weight for age, height for age and weight for height). The nutritional status of these preschool children in Subang Jaya was satisfactory.

B70 Nutritional status of women and children in Malaysian rural populations

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Asia Pacific J Clin Nutr 4: 319-324, 1995

This study was conducted to investigate the nutritional status of the rural population in Malaysia, especially women and children. A total of 262 women aged 18 and over and 183 children aged 2-6 years were selected using multistage cluster sampling from four locations in rural areas. It was found that the prevalence of malnutrition among children 2-6 years old ranged between 25.5% in the Malays Felda settlement scheme to 80% in the Orang Asli settlement. Malnutrition was associated with worm infestations, bottle feeding and early weaning. More than 30% of Orang Asli women were malnourished compared to less than 15% of Malay Felda settlement women. On the other hand, Malay women in the land settlement scheme had a higher risk of developing overweight and diabetes. Goitre was found among 11.5% of children; however, no cretinism was found. Breast feeding was still a common practice among rural mothers, but inadequate health education tended to reduce the duration of breast feeding and increased early weaning. Upgrading women's status in the rural areas will ultimately improve the nutritional and health status of the children and community as a whole.

B71 Ukuran Antropometri Kanak-Kanak Melayu Keluarga Mewah di Taman Tun Dr Ismail, Kuala Lumpur

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Med J Malaysia 48(1): 76-82, 1993

This study was done to determine the anthropometric measurement patterns of Malay children from wealthy families in Malaysia and to make a comparison with NCHS reference population. A population of 900 children aged between 3-12 years old from Taman Tun Dr Ismail, Kuala Lumpur (TDI), was examined but only 871 of them were eligible for the study. Weight, height, mid-arm circumference and skin

fold thickness were measured. The increment pattern of anthropometric measurements of TDI children was quite similar to NCHS except for having a lower median weight for age and height for age. There was prepubescent increase in skin fold thickness in both sexes, followed by a midpubescent decrease and a late pubescent increase. The study indicated that Malay children from a wealthy background have growth rates comparable to children in the West, hence NCHS percentile charts are suitable as a reference for comparing the nutritional status of Malay children in Malaysia.

B72 Predictive equations for the estimation of basal metabolic rate of Malaysian adolescents

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Mal J Nutr 5:1-14, 1999

A longitudinal study was conducted to relate basal metabolic rate (BMR) with growth during adolescence. Subjects comprise 70 boys and 69 girls aged between ten and thirteen years at the time of recruitment. Parameters studied include anthropometric measurements and BMR, which was measured by indirect calorimetry using the Deltatrac metabolic monitor. Measurements were carried out serially once every six months, with a total of 713 BMR data points collected over three years. Mean BMR of boys aged 11, 12, 13 and 14 years were 4.96 ±0.63 MJ/day, 5.28 ±0.71 MJ/day, 5.73 ±0.68 MJ/day and 5.92 ±0.63 MJ/day, respectively; while mean BMR of girls in the 10, 11, 12 and 13 year age groups were 4.96 ±0.63 MJ/day, 4.85 ±0.63 MJ/day, 5.05 ±0.55 MJ/day and 4.94 ±0.51 MJ/day, respectively. Comparison of measured BMR with BMR values predicted from the FAO/WHO/UNU (1985) equations shows that the predictive equations overestimated the BMR of Malaysian boys by 3% and that of girls by 5%. The Henry & Rees (1991) equations for populations in the tropics underestimated BMR of boys and girls by 1% and 2%, respectively. Linear regression equations to predict BMR based on body weight were derived according to sex and age groups. It is recommended that these predictive equations be used for the estimation of BMR of Malaysian adolescents.

B73 Physical Activity Pattern and Energy Expenditure of Malaysian Adults: Findings from the Malaysian Adult Nutrition Survey (MANS)

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Mal J Nutr 16(1): 13 - 37, 2010

This paper aims to report the physical activity pattern and energy expenditure of adults aged 18 - 59 years in the Malaysian Adults Nutrition Survey (MANS) carried out between October 2002 and December 2003. The survey included 7349 adults representative of Peninsular Malaysia (Northern, Southern, Central and East Coast), as well as Sabah and Sarawak. A total of 6926 adults, comprising 3343 men and 3583 women, completed the physical activity section of the survey. Physical activity data was obtained using a physical activity questionnaire and 24-hour physical activity recall. Basal metabolic rate (BMR) was calculated from Ismail et al. (1998) predictive equations; total energy expenditure (TEE) was then estimated through factorial calculations based on time allocated and energy cost of various activities. Physical activity level (PAL) was calculated as the ratio of TEE to BMR. It was found that almost three-quarters of Malaysian adults traveled by passive modes of transportation. Only a third reported having ever-exercised, and an even smaller proportion of the population (14%) had adequate exercise. The population also spent the majority of their time (74% of the day) in sedentary activities, such as sleeping or lying down; doing light intensity activities (15% of the day), and doing moderate to vigorous intensity activities (10% of the day). Mean BMR and TEE was significantly higher amongst men than women, while mean PAL values were similar for men [1.6 (1.6 - 1.7)] and women [1.6 (1.6 - 1.6)]. More men (16%) were categorised as having active PAL compared to women (10%), while more women (43%) were categorised as having sedentary PAL compared to their male counterparts (37%). The present study provides the first in-depth report of the physical activity pattern, and national estimates of energy expenditure and physical activity levels of Malaysian adults, and concluded that Malaysian adults are generally sedentary. It is thus important that physical activity be further promoted and integrated into the lives of the population, preferably through various health promotion efforts as well as through the commitment of the authorities in providing a suitable environment for an active lifestyle.

B74 Anthropometric measurements and body composition of English and Malaysian footballers

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Mal J Nutr 5:79-86, 1999

This comparative study was conducted to determine the anthropometric measurements and body composition of football teams in the UK and Malaysia. A total of 32 footballers from two teams were studied. The teams were the St Mary's University team (UK) and the Selangor Reserved League team. The height and body weight of the subjects were measured using SECA digital balance with height attachment. Skinfold thickness measurements were taken using Harpenden skinfold callipers at four sites (biceps, triceps, subscapular and suprailiac) and the VO2 max of the subjects was estimated by participation in a multi-stage 20m shuttle-run test. The UK team were significantly heavier ($p<0.05$), taller ($p<0.05$) and had a higher body fat content ($p<0.05$) than their Malaysian counterpart. There was no significant difference in VO2 max between the two teams, with the Malaysians recording a slightly higher VO2 max. With regard to playing position, the defenders were found to be the most physically robust and yet had the highest VO2 max, whilst the midfielders had the lightest body weights. More data on the body composition and nutritional status of Malaysian footballers would allow adjustments to be made to dietary intakes and training levels in order to obtain maximum performance throughout the football season.

B75 Social and health profiles of rural elderly Malays

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Singapore Med J. 42(5):208-13, 2001

Aim: To evaluate the social and health functions of rural elderly Malays. METHOD: A survey was carried out on 350 elderly Malays aged 60 and above using a set of socio and health questionnaires. RESULTS: The majority of elderly people in the study were married (64%), unemployed with no pension (76%), relied on children for their main economic resources (62%) and perceived that they have sufficient money to buy the food they require (61%). Most of the subjects felt healthy, contented and satisfied with their everyday life, were able to do most of the Activities of Daily Living (ADL) tasks and were actively involved in community

activities. However, most of the subjects (60%) had either one or two diagnosed chronic diseases. Thus, only 15% of the subjects had not taken any type of medicines during the previous 12 months. CONCLUSION: Although the majority of the elderly in this study were able to perform all the ADL tasks and perceived their health as good, physical impairments (eg. sight, hearing and chewing difficulties) are prevalent and the use of medicines is widespread. It is expected that in future a greater proportion of rural elderly Malays will live alone and will face economic and health problems because of the lack of sufficient and satisfactory programmes for this age group.

B76 Development of a screening tool for detecting undernutrition and dietary inadequacy among rural elderly in Malaysia: simple indices to identify individuals at high risk

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Int J Food Sci Nutr. 50(6):435-44, 1999

Undernutrition and the consumption of poor diets are prevalent among elderly people in developing countries. Recognising the importance of the early identification of individuals at high nutritional risk, this study aimed to develop a simple tool for screening. A cross-sectional study was conducted on 11 randomly selected villages among the 62 in Mersing District, Malaysia. Undernutrition was assessed using body mass index, plasma albumin and haemoglobin on 285 subjects. Dietary inadequacy (a count of nutrients falling below two-thirds of the Recommended Dietary Allowances) was examined for 337 subjects. Logistic regression analysis was performed to identify significant predictors of undernutrition and dietary inadequacy from social and health factors, and to derive appropriate indices based on these predictions. The multivariate predictors of undernutrition were 'no joint disease', 'smoker', 'no hypertension', 'depended on others for economic resource', 'respiratory disease', 'perceived weight loss' and 'chewing difficulty', with a joint sensitivity of 56% and specificity of 84%. The equivalent predictors of dietary inadequacy were 'unable to take public transport', 'loss of appetite', 'chewing difficulty', 'no regular fruit intake' and 'regularly taking less than three meals per day', with a joint sensitivity of 77% and specificity of 47%. These predictions, with minor modification to simplify operational use, led to the production of a simple screening tool. The tool can be used by public health professionals or community workers or leaders as a simple and rapid instrument to screen individual at high risk of undernutrition and/or dietary inadequacy.

B77 Impact of nutritional status on the quality of life of advanced cancer patients in hospice home care.

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Asian Pac J Cancer Prev. 10(6): 1003-1010, 2009

Background: Cancer patients frequently experience malnutrition and this is an important factor in impaired quality of life. Objective: This cross-sectional study examined the association between global quality of life and its various subscales with nutritional status among 61 (33 females and 28 males) advanced cancer patients cared for by selected hospices in peninsular Malaysia. Methods: The Patient Generated-Subjective Global Assessment (PG-SGA) and the Hospice Quality of Life Index (HQLI) were used to assess nutritional status and quality of life, respectively. Results: Nine (14.7%) patients were well-nourished, 32 (52.5%) were moderately or suspected of being malnourished while 20 (32.8%) of them were severely malnourished. The total HQLI mean score for these patients was 189.9-/+51.7, with possible scores ranging from 0 to 280. The most problem areas in these patients were in the domain of functional well-being and the least problems were found in the social/spiritual domain. PG-SGA scores significantly correlated with total quality of life scores ($r2= 0.38$, $p<0.05$), psychophysiological well-being ($r2= 0.37$, $p<0.05$), functional well-being ($r2= 0.42$, $p<0.05$) and social/ spiritual well-being ($r2= 0.07$, $p<0.05$). Thus, patients with a higher PG-SGA score or poorer nutritional status exhibited a lower quality of life. Conclusion: Advanced cancer patients with poor nutritional status have a diminished quality of life. These findings suggest that there is a need for a comprehensive nutritional intervention for improving nutritional status and quality of life in terminally ill cancer patients under hospice care.

B78 Nutritional status of 1-3-year-old children and maternal care behaviours in the Orang Asli of Malaysia

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South African Journal of Clinical Nutrition 18(2): 173-180, 2005

A study was undertaken to determine the relationship between maternal care behaviours, with regard to child feeding practices and mother/child hygiene, and nutritional status of children aged 1-3 years among the Orang Asli of Malaysia. The study was conducted between September 2003 and August 2004. The adapted version of the Birch Child Feeding Questionnaire, which contains 24 items loading on six child feeding care factors, was used to assess mothers' beliefs, attitudes and

practices regarding child feeding. 92 mother-child pairs were included in the study. Of the children, 41 were girls and 51 were boys. The mean age of the mothers was 28.54±6.58 years. Majority of the mothers perceived themselves as being always responsible for feeding and deciding on the portion size and kinds of foods eaten. Most mothers perceived their child's weight as normal. More than 70% were concerned about their child with regard to maintaining desirable weight, while about 50% were concerned about their children becoming overweight. Mothers generally did not practice dietary restrictions or pressure their children to eat, while more than two-thirds regularly monitored their child's eating behaviour. Among the 6 child feeding care factors examined, perceived responsibility, perceived child weight and concern about child weight were significantly related to the nutritional status of the children. Hygiene behaviours were positively, albeit weakly, related to weight-for-age, indicating that good hygiene practices may contribute to good current nutritional status of children.

B79 Nutritional status of 1-3-year-old children and maternal care behaviours in the Orang Asli of Malaysia.

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Department of Nutrition and Health Sciences, Universiti Putra Malaysia, Selangor, Malaysia

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B80 Nutrition and educational achievement of urban primary schoolchildren in Malaysia

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Asia Pacific J Clin Nutr 9(4): 264-273, 2000

The relationship between nutrition, health and educational achievement of school-age population in less developed countries has been of interest to many researchers due to the frequent observation that many children did not complete primary school and those who completed, did not do as well as children in the developed countries. Nevertheless, nutritional and health status by itself is not the only variable affecting educational achievement, since biological, psychological, socioeconomic and cultural factors could directly or indirectly affect both nutrition, health status and educational achievement. The mechanism by which health and nutrition influence educational achievement is not well established, but poor health and malnutrition in early childhood may affect cognitive abilities, necessary for learning process and consequently educational achievement. A study was conducted in Kuala Lumpur, Malaysia, to investigate the relationship between nutritional status and educational achievement among primary schoolchildren from low income households (n = 399). A high percentage of them were mild-significantly underweight (52%), stunted (47%) and wasted (36%) and increasingly overweight (6%). In general, more boys than girls were found to experience some form of malnutrition. While weight-for-height did not differ significantly according to family, child and school factors, weight-for-age and height-for-age differed significantly by gender. Also, height-for-age was significantly related to household income. This indicates that stunting may be a consequence of prolonged socioeconomic deprivation. Educational achievement was measured based on test scores for Malay language (ML), English language (EL) and mathematics (MT). While a majority of the schoolchildren obtained optimum scores (>75) for ML and MT, the majority of them had insufficient scores (<50) for EL. Children's total score (TS) for the three subjects was significantly associated with household socioeconomic status, gender, birth order and heightfor-age. Even after controlling for household socioeconomic status, significant association between TS and height-for-age persisted. In this sample of schoolchildren, household income, gender, birth order and height-forage were significant predictors of TS. The finding that height-for-age is related to educational achievement agrees with other studies, which have reported that height-for-age, compared to weight-for-height or weight-forage is linked to educational achievement. Height-for-age reflects the accumulation of nutritional deprivation throughout the years, which may consequently affect the cognitive development of the children.

B81 The association of nutritional risk with physical and mental health problems among elderly in a semi-urban area of Mukim Kajang, Selangor, Malaysia

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Mal J Nutr 10(2): 149-158, 2004

Imbalances and deficiencies of nutrients are particularly prevalent among the elderly, resulting in increased risk of illness and impaired outcome, as well as reduced quality of life. A cross-sectional study was conducted to assess the nutritional risk and to determine its association with physical and mental health problems among the elderly in a semiurban community in the District of Hulu Langat, Selangor. Elderly people aged 60 years and above were included in the study, conducted from 11th March to 10th May 2004. Data were collected using a questionnaire-guided interview method. The Nutrition Screening Initiative Checklist (NSI-13) was used to assess the level (low, moderate, high) of nutritional risk of the subjects. The questionnaire also included the Barthel Index, Geriatric Depression Scale (GDS-30) and Elderly Cognitive Assessment Questionnaire (ECAQ) to identify functional status, depressive symptoms and cognitive impairment respectively, among the respondents. Out of 316 elderly residents, 300 agreed to participate in the study (response rate 94.9%). Respondents aged from 60 to 93 years old and the mean age was 67.08±6.6. Prevalence of moderate and high nutritional risks were 25.3% and 36.3% respectively. Nutritional risks were found to be significantly associated with age (p=0.015), marital status (p=0.00), chronic illness (p=0.000), functional disability (p=0.000) and depressive symptoms (p=0.010). In conclusion, the health status of the elderly strongly depends on their nutritional risk. Age, marital status, chronic illness, functional disability and depressive symptoms are factors to be emphasised when assessing the nutritional risk of the elderly.

B82 Nutritional requirements of athletes exercising in a hot environment

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Mal J Nutr 11(2): 189-198, 2005

Competition in a hot environment is not conducive for optimal sports performance as both dehydration and hyperthermia adversely affect mental and physical performance. In addition, the ability to train in heat is also impaired if the nutritional needs are inadequate. During prolonged bouts of exercise in a hot environment, an

excess of 1 liter of body fluid per hour can be lost. Fluid intake strategies should be undertaken and should be of paramount concern to the athlete if the athlete has to perform more than one training or competition sessions in a single day. Fluid strategies, including hydration well prior to the exercise bout, drinking as much as is comfortable and practical during the exercise session, and rehydrating aggressively afterwards in preparation for the subsequent exercise bouts, are needed to ensure an adequate water intake to prevent chronic dehydration during competition in hot conditions as the body does not adapt to dehydration. Rapid recovery of fluid losses after an exercise bout is assisted by the replacement of some of the electrolytes losses. Carbohydrate is the main fuel used by the muscle during hard training and competition and its requirement for exercise in hot conditions is further increased due to the shift in substrate utilisation towards carbohydrate oxidation. Daily food intake should focus on replacing glycogen stores after exercise. Competition diet strategies such as enhancing carbohydrate availability (carbohydrate loading) prior to endurance competition, pre-event carbohydrate intake, intake of sports drinks in events lasting longer than 45 minutes should be undertaken in hot conditions and practised during training. Carbohydrate ingestion may not enhance performance for all events undertaken in hot environment, however, there is no disadvantage of consuming sports beverages containing the appropriate carbohydrates and electrolytes during competition and training. There is also no good evidence to suggest that specific supplementation is necessary or will improve performance in sports activities undertaken in a hot environment. In conclusion, the primary aim of athletes training in a hot environment must be to ingest a source of energy, usually carbohydrate and fluid for replacement of water lost as sweat.

B83 Taraf pemakanan kanak-kanak berumur satu hingga enam tahun di FELDA Sg. Koyan, Pahang

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Mal J Nutr 1: 115-128, 1995

Tujuan kajian ini adalah untuk menilai taraf pemakanan kanak-kanak di FELDA Sungai Koyan, Pahang. Ukuran antropometri telah dijalankan di atas 105 orang kanak-kanak yang terdiri daripada 62 lelaki dan 43 perempuan berumur 12 hingga 72 bulan. Daripada jumlah kanak-kanak tersebut, maklumat pengambilan makanan ke atas seramai 84 kanak-kanak yang berumur 4 hingga 6.9 tahun dilaksanakan. Faktor sosio-ekonomi yang dapat mempengaruhi taraf pemakanan kanak-kanak juga dikaji. Hasil ukuran antropometri kanak-kanak mendapati sebanyak 14.3% (n=15) kanak-kanak mengalami kekurangan berat badan, 10.5% (n=11) kebantutan dan 2.9% (n=3) kesusutan berdasarkan Rujukan NCHS, manakala terdapat 28.6% (n=30) kanak-kanak mempunyai ukuran lilitan lengan kiri yang rendah berdasarkan rujukan Frisancho yang menandakan kekurangan simpanan kalori dan protein. Dari segi kajian diet bagi kanak-kanak lelaki dan perempuan yang berumur 4-6.9 tahun,

purata pengambilan kalori, kalsium, niasin dan tiamin adalah bawah paras yang disyorkan untuk Malaysia. Walau bagaimanapun, pengambilan protein, ferum, vitamin A, riboflavin dan vitamin C adalah melebihi paras saranan. Dari segi kekerapan pengambilan makanan, kajian menunjukkan jenis makanan yang paling kerap diambil adalah seperti nasi, ikan, susu dan daging. Makanan seperti sayur-sayuran dan buah-buahan juga kerap diambil oleh kanak-kanak. Berdasarkan kepada ujian korelasi Pearson terdapat perkaitan yang bererti antara taraf pemakanan kanak-kanak (berat ikut umur dan ketinggian ikut umur) dengan pendidikan ibu dan bilangan anak, manakala tahap pengetahuan pemakanan ibu juga menunjukkan perkaitan yang bererti di antara taraf pemakanan kanak-kanak (berdasarkan berat ikut umur).

Pengambilan kalori yang tidak mencukupi merupakan salah satu faktor penting yang menyebabkan malnutrisi protein-tenaga. Masalah ini juga dipengaruhi oleh faktor sosio-ekonomi seperti tahap pendidikan dan pengetahuan pemakanan ibu serta bilangan anak dalam isirumah. Ibubapa seharusnya digalakkan untuk melibatkan diri dalam aktiviti yang menambahkan pengetahuan pemakanan dan menggalakkan amalan pemakanan yang baik. Pihak FELDA digalakkan mengadakan lebih aktiviti tersebut.

B84 Body mass index, ageing and differential reported morbidity in rural Sarawak

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Eur J Clin Nutr. 47(1):9-19, 1993

Classifications of adult low energy nutritional status based on the Quetelet or body mass index (weight/height2) have often assumed independence of age and sex. This paper reports findings of a study of 447 men and 564 women aged over 18 years and belonging to the Iban tribe of central Sarawak, East Malaysia. BMI and fat-free mass fell markedly in both sexes, and fat mass in women but not men, after about 40 years of age. In men over age 40, and women aged 18-40, BMI was sensitive to reported morbidity. For subjects aged over 40 years, BMI was related to morbidity independently of age effects in men, and to age alone in women. These findings suggest that the functional significance of low BMI differs between the sexes and with age.

B85 Nutritional Situation of a Chinese Community

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Singapore Medical Journal 39(8): 348-352, 1998

Aim: To evaluate the anthropometric measurements and dietary intake of the free-living elderly in a Chinese community. Method: A survey was carried out on 48 male and female subjects aged 60 to 96 years using anthropometric, dietary intake and questionnaire techniques. Results: The study indicated female subjects to have more health problems, like pain at the joints (33%), hypertension (17%) and diabetes (27%) as compared to the male subjects. Dietary intake analysis showed the Chinese male subjects to have a higher energy intake (1,623 kcal) compared to the females (1,197 kcal) even though they did not fulfill the recommended dietary intake. The intake for energy, fats and carbohydrates, was found to be significantly different (p l 0.05) between both sexes. Anthropometric measurements indicated male elderly subjects to be significantly heavier (p l 0.05, 55.4 kg) and taller (161.8 cm) than female elderly subjects (49.5 kg; 146.2 cm respectively). About half of the elderly were normal in their BMI (male 55.6%; female 50%) and only 6.6% of the female subjects were obese. More male subjects were found to be underweight (33%) compared to female subjects (17%). Waist hip ratio was 0.92 for male and 0.87 for female. Conclusion: Our study showed that female elderly subjects had more health problems compared to male elderly subjects. On the whole, the elderly did not fulfill the recommended amount for energy intake while the percentage for carbohydrates, fats and protein from the total calorie intake were not in accordance with the healthy diet guidelines. Anthropometrically, male subjects were heavier and taller than female subjects. Looking at body mass index, most of the male elderly subjects were in the normal to underweight range. With these results, more research is warranted to give a clearer picture of the Chinese elderly in the country.

B86 Anthropometric measurements of the elderly

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Mal J Nutr 1998; 4:55-63

Body composition was assessed in a group of 344 free-living elderly between 60 and 89 years by means of anthropometry. The height, weight and body mass indexes of the elderly were reduced with advancing age in both the males and females. Skinfold thickness measurements also declined with age. Overall, the female elderly had a greater tricep skinfold thickness but smaller mid-arm circumferences, mid-arm muscle circumference and mid-arm muscle area compared to the male.

B87 Nutritional and health status of the elderly at the folks home

Suriah AR and Azhar A

Journal of the Malaysian Society of Health, 6(1): 14-18, 1988

A study of 3 ethnic groups of old folks was carried out at Rumah Sri Kenangan, Cheras. Subjects consisted of 9 Malays, 29 Chinese and 30 Indians. Their age ranged from 50-89 years old. Data from the 24-hr dietary intake revealed that they were adequate in all the nutrients studied except for vitamin A, riboflavin and niacin, when compared with the Malaysian RDI. Anthropometric measurements indicated that the Indian subjects were heavier, with 10% of them being obese. Sixty-three percent of elderly were found to be underweight. Overall, the elderly groups were not anaemic or hypertensive but when looking at individual race, the Indians were found to be more anaemic, hypertensive and diabetic compared to other races. Biochemical assessments of the elderly under study indicated adequate protein intake where the urea: creatinine ratio were found to be more than 6 but when comparing race, 50% if the Malays had poor protein intake.

B88 Validation of nutritional screening tools against anthropometric and functional assessments among elderly people in Selangor

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Mal J Nutr 13(1): 29-44, 2007

This cross sectional study was conducted to determine the validity of three screening tools, Mini Nutritional Assessment Short Form (MNA-SF), Malnutrition Risk Screening Tool for Community (MRST-C) and Malnutrition Risk Screening Tool for Hospital (MRST-H) among elderly people at health clinics. The screening tools were validated against anthropometric and functional assessments. The anthropometric assessments that were carried out included body weight, height, arm span, body mass index (BMI), calf circumference (CC) and mid upper arm circumference (MUAC). A set of questionnaire on manual dexterity, muscular strength, instrumental activities daily living (IADL) and cognitive status was used to assess functional abilities. A total of 156 subjects were recruited from rural (38 subjects) and urban (118 subjects) health clinics at Sabak Bernam and Cheras respectively. Subjects' age ranged from 60 to 83 years old, with 44.2% were men and 55.8% women. The prevalence of muscle wasting among the subjects assessed from MUAC and CC were both 7.0%. MNA-SF had the highest correlation with BMI ($r = 0.497$, $p<0.001$), followed by MUAC ($r = 0.398$, $p<0.001$), CC ($r = 0.473$, $p<0.001$), cognitive assessment ($r = 0.229$, $p<0.001$) and handgrip strength ($r = 0.209$, $p<0.001$). Whilst MRST-C had the highest correlation with IADL score

(r = -0.320, p<0.001) andMRST-H had the highest correlation with the lock and key test (r = -0.325, p<0.01). Sensitivity was the highest for MNA-SF (93.2%), followed by MRST-H (52.5%) and MRST-C (25.8%). Specificity was the highest for MRST-H (97.3%), followed by MRST-C (90.8%) and MNA-SF (79.4%). Positive predictive value (PPV) for MRST-H, MNA-SF and MRST-C was 55.5%, 18.2% and 14.1%, respectively. In conclusion, among the screening tools being validated,MNA-SF is considered the most appropriate tool to be used in health clinics for identification of elderly individuals who are at high risk of malnutrition.

B89 A multidimensional assessment of nutritional and health status of rural elderly Malays

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Asia Pac J Clin Nutr 16 (2):346-353, 2007

A multidimensional assessment of nutritional and health status comprised of subjective global assessment (SGA), anthropometry function, biochemistry, dietary intake, social and health aspects was carried out on 820 older people (52.8% men and 47.2% women) from four rural areas of Peninsular Malaysia. A proportion of the subjects had been classified as either overweight (25.7%) or chronic energy deficient (20.3%). Although 49% of subjects had normal body weight, 68.4% have been classified as having mild to moderate malnutrition according to the SGA. Only 1.1% and 2.3% had low serum albumin and ferritin, respectively. Almost 80% of subjects, especially men, were at high risk of cardiovascular diseases on the basis of the assessment of total cholesterol and LDL-cholesterol. The majority of the subjects (87.2%) were fully independent in performing daily tasks, with men having a significantly higher score compared to women (p<0.001). However, men were less likely to be able to perform a flexibility test (50.7%) than were women (27.0%) (p<0.05). The mean energy intake for men (1412 ± 461 kcal/d) and women (1201 ± 392 kcal/d) were below the Recommended Nutrient Intake (RNI) for Malaysia, although this is a difficult assertion to make in an age-group which generally experiences declining energy expenditure. Moreover, 52.5% of men and 47.5% of women might have underreported their food intake. Dietary micronutrients most likely to be deficient were thiamin, riboflavin and calcium. It is concluded that a substantial proportion of rural elderly Malays had problems related to both undernutrition and overnutrition. An appropriate nutrition intervention program is needed to improve the nutritional status of rural elderly Malays.

B90 Malnutrition as assed using anthropometry among elderly malays residing in a rural area of Malaysia

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Journal Malaysian Society of Health 17: 29-38, 1999

Recognising the lack of information concerning the nutritional status of the elderly in Malaysia, a study was conducted to assess malnutrition through anthrophometry of 350 rural elderly Malays aged 60 years and above. Approximately 38% of the subjects were underweight [chronic energy deficiency (CED) I to III], with women being more likely to be classified as having CED III. Around 12% were overweight, particularly women. Women were also found to be four and three times more likely to be peripherally wasted as assessed by mid-uppe arm circumference ($p<0.05$) and corrected arm muscle area ($p<0.05$), respectively. Older subjects in both sexes were more likely to be peripherally wasted. In conclusion, although Malaysia has a rapidly developing economy, CED is a major problem among rural elderly Malays which requires urgent attention. The prevention and early treatment of CED is vital in order to enhance the quality of life and reduce long term health care costs.

B91 The relationship between growth, basal metabolic rate (BMR) and the initiation of puberty

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Journal of the Malaysian Soceity of Health 6 (1): 19-25, 1988

A longitudinal study of growth, energy expenditure and pubertal status is in progress in Oxford and Kuala Lumpur in 280 pre-adolescent children. In both centres and identical protocol is being used. This involves the measurement of 21 indices of body size and body composition (anthropometry) and a single measurement of basal energy expenditure every six months. Assessment of pubertal status using Tanner's ratings is carried out once yearly. The study is unique and significant in three major areas. (1) It puberty. (2) To collate longitudinal the nature and significance of racial differences in BMR.

B92 Micro-computer analysis of food consumption data using an electronic spreadsheet

Tee ES

ASEAN Food Journal 1(3): 143-145, 1985

Using a conventional calculator, the amount of repetitive calculations required to analyse the data of a food consumption study can be rather tedious. The paper describes the use of general purpose spreadsheet (electronic worksheet) programme in a micro-computer for the purpose. A template worksheet is first created with all the required formulae built into it. To analyse the collected data, only the quantities of foodstuffs reported to be consumed need to be entered. Automatic recalculation of the required values may then be executed rapidly. Important considerations in adopting the procedure are the amount of random access memory, storage capacity available in the micro-computer system, as well as the spreadsheet used. The number of nutrients that may be analysed would have to be adjusted according to the available hardware and software. In spite of its limitations, for those who have no access to large computers or the services of a programmer, the method may be useful in the analysis of food consumption data from small scale studies.

B93 Nutritional assessment of rural villages and estates in Peninsular Malaysia*. III. Prevalence of anaemia

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Mal J Nutr 4:1-29, 1998

As a part of the recent UPM-IMR collaborative study on the nutritional status of communities in rural villages and estates in Peninsular Malaysia from 1992-1995, this report presents findings on the haemoglobin levels and the prevalence of anaemia amongst these rural dwellers. A total of 69 villages and 7 estates located in 9 states in Peninsular Malaysia were studied. Results of the study on the 5 communities (total n=8024), namely fishing, padi, rubber, coconut and estate communities, are presented according to five age groups, namely less than 7 years (n=1418), 7-12.9 years (n=1778), 13-17.9 years (n=701), 18-59.9 years (n=3241) and ?60 years (n=886). The extent of the anaemia problem varied considerably amongst the various age groups and community types. The prevalence of anaemia and mean Hb level (g/dl) for subjects of both sexes were respectively 24% and 12.1 for those < 7 years; 21.9% and 13.0 for the 7- 12.9 years old; 17.8% and 13.7 for the 13-17.9 years; 21.0% and 13.8 for 18-59.9 years; and 22.7% and 13.6 for those 60 years of age and above. While the female adults (18-59.9 years) had a

significantly higher prevalence rate for anaemia of 25% compared to 14% found in the male adults, no significant difference in the prevalence rates were found between the sexes for the other age groups. The problem was most serious among adult women, young children and the elderly. Amongst the various community types, the fishing community had the highest prevalence of anaemia at an overall rate of 50%, taking into consideration both sexes and all age groups. The rubber smallholders, in contrast, had the lowest prevalence of anaemia, at an overall rate of about 10%. Intervention and preventive health programmes should therefore be continued to be focussed on the above groups of rural subjects, particularly those in the fishing community.

B94 Regional study of nutritional status of urban primary schoolchildren. 3. Kuala Lumpur, Malaysia

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Division of Human Nutrition, Institute for Medical Research, Kuala Lumpur, Malaysia.

Food Nutr Bull. 23(1): 41-47, 2002

A total of 5,995 (7.8% of all 7- to 10-year-old primary schoolchildren in Kuala Lumpur), randomly selected from 166 schools (97.6% of all schools), were measured for their weight and height. The analyses of all weight and height data, including the cutoffs used for defining stunting, underweight, and wasting and for thinness and overweight, were carried out as recommended by the World Health Organization (WHO). The prevalances of stunting (height-for-age Z score < -2 SD), underweight (weight-for-age Z score < -2 SD) and wasting (weight-for-height Z score < -2 SD) among all the children studies were 6.7%, 7.1%, and 4.5%, respectively. Undernutrition among boys was more serious than among girls according to all three indicators. Because it was not possible to analyze the weight-for-height data for most of the children above 8.5 years of age, body mass index (BMI)-for-age was used to determine the prevalences of thinness and overweight for all the children. Based on the reference data, the prevalence of overweight (at or above the 95th percentile) was 9.7% and 7.1% for boys and girls, respectively, and 8.4% overall.

B95 Priority nutritional concerns in Asia

Tee ES

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Food Nutr Bull. 23(4):345-348, 2002

The sustained economic growth and increasing economic stability in the Asian region over the last three decades have been accompanied by changing lifestyles leading to significant changes in the food and nutrition issues facing Asian countries. The chronic diseases associated with excessive consumption of nutrients, especially fat, are becoming increasingly apparent. At the same time, Asia has a disproportionate share of the malnutrition problem. Underweight and stunting remain significant problems in many Asian communities, and micronutrient deficiencies of iron, iodine, and vitamin A continue to afflict large population groups. Effective data collection and analysis are essential to formulate and implement intervention programs to address both sides of the changing nutrition scenario in Asia.

B96 Nutrition of Malaysians: where are we heading?

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Mal J Nutr. 5:87-109, 1999

Rapid and marked socioeconomic advancements in Malaysia for the past two decades have brought about significant changes in the lifestyles of communities. These include significant changes in the dietary patterns of Malaysians, eg the increase in consumption of fats and oils and refined carbohydrates and a decreased intake of complex carbohydrates. This resulted in a decline in the proportion of energy from carbohydrates, while an increase in the percentage contribution of fat has been observed. Changes in meal patterns are also evident: more families eat out, busy executives skip meals, the younger generation miss breakfasts and rely too much on fast foods. Many Malaysians have the mistaken belief that the taking of vitamin and mineral supplements can make up for the lack of these nutrients in their daily diets. In addition, communities have become generally more sedentary. All these changes have brought about undesirable effects with significant proportions of the affluent segments of the population being afflicted with various non-communicable diseases associated with overnutrition, namely obesity, hypertension, coronary heart disease and cancers. Nutrition activities and programmes are now being directed to tackle this increasing trend, whilst still attempting to eliminate the undernutrition problems. The ultimate strategy towards achieving a healthy nation is the promotion of a healthy lifestyle, including inculcating a culture of healthy eating. Comprehensive long term programmes, including a series of Healthy

Lifestyle (HLS) Programmes have been carried out by the government. Launched in 1991 for six consecutive years, the first phase of the Programme comprised one thematic campaign each year, commencing with coronary heart disease and ending with diabetes mellitus. To further strengthen this long-term strategy, another series of activities to be carried out under the second phase of the HLS programme from 1997 to 2002 was launched within the framework of the National Plan of Action on Nutrition (NPAN) for Malaysia. The implementation of these programmes is, however, a challenge to health and nutrition workers. There is a need to examine the strategies for nutrition education to ensure more effective dissemination of information. The challenge is to determine how best to promote healthy eating within the present scenerio of rapid urbanisation, "western" dietary pattern influence, a whole barrage of convenience and "health" foods and nutrition misinformation. Malaysia continues to march ahead with its development plans to elevate the nation and its people to an even higher level of socio-economic status. The crucial question is: are we able to arrest the increase in these diet-related chronic diseases? Or are we heading towards further deterioration in dietary pattern and increase in these diseases? It will be a difficult and challenging journey ahead, requiring the concerted effort of all in the country. It is hoped that through this conference of sharing experiences with other Asian countries, a better understanding and improved strategies could be arrived at.

B97 The nutrition situation and nutrition action programs in four ASEAN countries

Tontisirin K

ASEAN Food Journal, 1(4): 162-168, 1985

The paper provided background information about the nutrition situation and the nutrition programmes in four ASEAN countries, namely Indonesia, Malaysia, Philippines and Thailand. The report was based on published data obtained from the library and by correspondence, as well as information collected during visits to each of the countries. Visits were paid to persons and institutions involved in delivery of nutrition and health services, including the ministries of health, universities, and community and other organisations. Field visits were also made to observe the implementation of action programmes at the community level in these countries. The prevalence and severity of the nutritional problems in each country, as well as the intervention programmes implemented were separately presented and discussed. The author also made several recommendations for close collaboration in training, research and the exchange of information among ASEAN countries.

B98 Nutritional assessment of rural villages and estates in peninsular Malaysia: Total blood cholesterol values in children, adolescents and adults

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Asia Pacific J Clin Nutr 9(2): 115-121, 2000

The present study is unique in the Malaysian context on two counts; first, it employs for the first time a functional group approach (groups based on occupational or economic activity) in the assessment of community nutritional status. Second, the study provides on a nationwide-sampling basis, information on total blood cholesterol (TC) levels in rural children (7.0-12.9 years; n = 1921) and adolescents (13.0-17.9 years; n = 753) which were hitherto unavailable. Total blood cholesterol measurements were performed on 7184 subjects ranging from 7 to 75-years-old (males = 3151; females = 4033) from households in 69 rural villages and seven estates in peninsular Malaysia, which were based on selected multistage random sampling according to the household's involvement in the following economic activities: rice farming, rubber smallholding, coconut smallholding, fishing and employment in estates. In all functional groups, TC values increased with age and there was a distinct gender effect, namely females had higher TC values than males throughout the age spectrum analyzed. Mean TC levels for children and adolescents were in the range 3.85-4.37 mmol/L, rising markedly during adulthood to an overall mean of 4.91 ± 1.13 mmol/L for men and 5.17 ± 1.11 mmol/L for women. In adults (³ 18.0 years), there was marked disparity in mean TC values among the functional groups; males and females from rice households had the lowest mean TC values (4.58 and 4.99 mmol/L, respectively). Individuals at 'high risk' (TC > 6.20 mmol/L) averaged 16.0% in women and 11.6% in men, with women from the fishing, rubber and coconut households particularly affected (17.1-21.1%). When compared to earlier rural TC data reported for closely similar rural communities in the peninsula, the present findings suggest a 'hypercholesterolemic shift' approximating 0.39 mmol/L (15 mg/dL) in the adult population; however, this was not apparent in the children and adolescents from these rural communities.

B99 Body mass index and fat patterning of adults in rural Sarawak

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Mal J Nutr 2: 128-136, 1996

Body fatness distribution is a useful epidemiological and clinical marker of health risk among European and other populations. Prevalence of obesity among adults is rising in many parts of Malaysia, and it is important to understand the extent to which fat patterning is robust across different age groups and between the sexes. This analysis examines fatness and fat distribution in rural Sarawakian adults aged 20 to 80 years to determine the extent to which fat patterning varies by sex and age. Principal component analysis of five skinfolds (biceps, triceps, subscapular, suprailiac and medial calf) shows upper body-lower body fat distribution as contributing most to within-group variation in the sum of five skinfolds for both males and females. When divided into younger and older age groups, clear differences were identified. For the males, while absolute fatness does not change with age, there is a change in fat patterning, with a trunk-extremity component disappearing, and a trunk-lower body pattern persisting. Females experience a decline in subcutaneous fatness across age groups, and while the most important component of fat distribution, trunk to lower body subcutaneous fatness, the same for younger and older women, the second component is different, with upper limb-lower body distribution in the younger age group being replaced with upper to lower trunk distribution. The similarities in fat patterning among males and females suggest that the use of fat patterning indices in this Malaysian population need not be sex-specific, but age group- and sex-dependent differences in the second principal component indicate that they should be used with caution, since the relationships between fat patterning and mortality are still poorly understood among Malaysian populations.

B100 The nutritional status of 1081 elderly people residing in publicly funded shelter homes in Peninsular Malaysia

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European Journal of Clinical Nutrition 59: 318-324, 2005

Objectives: The aim of this study was to determine the: (1) prevalence of undernutrition as determined by the 'DETERMINE Your Nutritional Health Checklist' (NHC) and (2) factors independently associated with undernutrition among the older residents of these publicly funded shelter homes in Peninsular Malaysia. Design: A total of 1081 elderly people (59%M) over the age of 60 y were surveyed using questionnaires determining baseline demographics, nutritional and cognitive status, physical function and psychological well-being. Setting: Shelter homes, Peninsular Malaysia. Results: In all, 41.4% (n¼447) were nourished (score o3), 32.1% (n¼347) at moderate risk (score between 3 and 5) and 26.6% (n¼287) were at high risk of undernutrition (score45) according to the NHC. A large proportion of subjects were underweight with 14.3% of subjects recording a low body mass index (BMI) o18.5 kg/m2 and a further 18.2% recording a BMI between 18.5 and 20 kg/m2. The residential geriatric depression score (GDS-12R) (relative risk (RR)¼1.03 (95% confidence interval (CI) 1.01-1.05); P¼0.002) and the number of illnesses (RR¼1.14 (95% CI 1.07-1.21); Po 0.001) were found to be independently associated with nutritional risk (NHC score Z 3). Using a BMIo18.5 kg/m2 as an objective marker for nutritional risk, the NHC was shown to have a sensitivity of 66.4% (95% CI 58.0-74.2%), specificity of 42.7% (95% CI 39.3-46.1%), positive predictive value of 16.2% (95% CI 13.3-19.5%) and a negative predictive value of 88.4% (95% CI 84.9-91.4%). Conclusions: Many elderly people residing in publicly funded shelter homes in Malaysia may be at-risk of undernutrition, and were underweight. The NHC is better used as an awareness tool rather than as a screening tool.

B101 Body mass index and body fat status of men involved in sports, exercise, and sedentary activites

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Malaysian Journal of Medical Sciences 16(2): 21-26, 2009

A cross-sectional study was carried out in Kota Bharu on three groups of men with ages ranging from 18 to 44 years. The study groups included 83 athletes representing various types of sports and levels of participation (athlete group), 80 active men who exercised a minimum of 30 minutes per day at least 3 times per week (exercise group), and 80 inactive men (sedentary group). The objectives of the study were to compare the body mass indices (BMIs) and body fat statuses among the three groups with different physical activity levels. The height and weight of respondents were measured using the Seca weighing balance with height attachment. Skinfold thickness of biceps, triceps, subscapular regions, and suprailiac regions of each respondent were measured using Harpenden skinfold calipers.

Percentage body fat was calculated as the sum of the four measurements of skinfold thickness. The results showed that the mean (± SD) BMIs in the athlete, exercise, and sedentary groups were 22.6 ± 2.9, 23.4 ± 3.5, and 24.3 ± 4.6 kg/m2, respectively. The combined prevalence of pre-obese (BMI 25.029.9) and obese (BMI ³ 30.0) subjects was 21.7% in the athlete group, 29.9% in the exercise group, and 47.5% in the sedentary group. The mean (± SD) percentage of body fat in athletes was 15.7 ± 5.4%, which was lower than in the exercise (18.9 ± 5.5%) and sedentary (20.6 ± 5.8%) groups. The study revealed that individuals who are actively involved in physical activity, particularly in sport activities, have lower BMIs and percentage body fat values compared to sedentary people. Therefore, to prevent obesity, all individuals are encouraged to perform regular physical activity, particularly sports activities.

B102 Anthropometric measurements and body composition of selected national athletes

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Mal J Nutr 2: 138-147, 1996

This study was conducted to determine the anthropometric measurements and body composition of selected national athletes. A total of 84 male athletes from 10 different types of sports and 24 female athletes from 5 types of sports were studied. The height and body weight of subjects were measured using the SEGA weighing balance with height attachment. Skinfold thickness measurements were taken using the Harpenden Calipers at 4 sites (biceps, triceps, subscapular and suprailiac). Percentage of body fat was calculated from the sum of 4 measurements of skinfold thickness. Based on body mass index (BMI), most of the male (68 subjects or 81%) and female (19 subjects or 79%) athletes were classified as normal. The percentage average body fat for both male and female athletes were 13.8 ± 4.5% and 24.7 ± 5.3%, respectively. The male and female athletes also had lower percentage of body fat when compared to non-athletes, however these athletes had slightly higher percentage of body fat when compared to those in selected countries

B103 A study on the nutritional status of physically active men in Kota Bharu

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Mal J Nutr 9(2): 95-103, 2003

A cross-sectional comparative study was conducted to determine the nutritional status among physically active groups in Kota Bharu. The study population comprised 83 adult male athletes from 8 different types of sports (athlete group), 80 active men who exercised a minimum of 30 min per day for at least 3 times per week (exercise group), and 80 inactive men (sedentary group). All the respondents were aged between 18 to 44 years. Measurements taken from the respondents were anthropometric measurements, systolic (SBP) and diastolic (DBP) blood pressure, and serum total cholesterol (TC). The results showed that the combined prevalence of pre-obese (BMI 25.0-29.9) and obese (BMI = 30.0) was 21.7% in athletes, 29.9% in exercise group, and 47.5% in sedentary group. The mean (± SD) percentage of body fat in athletes was 15.7 ± 5.4%, which was lower compared to the exercise (18.9 ± 5.5%) and sedentary (20.6 ± 5.8%) groups. The incidence of waist-to-hip ratio above 0.9 in athlete, exercise and sedentary groups was 9.6%, 18.7% and 31.3%, respectively. The incidence of hypertension (SBP =140 and/or DBP =90 mmHg) was 13.2% in athletes, 17.5% in exercise group and 42.5% in the sedentary group. The TC values showed that the prevalence of "high risk" individuals (TC =6.20 mmol/l) was also lower in athletes (20.5%), compared to the exercise (36.2%) and sedentary (47.5%) groups. The study revealed that individuals who are actively involved in physical activity, particularly in sport activities have better nutritional status compared to sedentary people. However, the nutritional status in the athlete and exercise groups was still unsatisfactory. The incidence of poor health status related to over nutrition in the active groups was rather high and needs attention from health professionals. Further studies are needed to determine nutritional practices among physically active groups.

B104 Measurement of nutritional status using conventional anthropometry and D^2O in Sarawak, Malaysia.

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Eur J Clin Nutr. 50(10): 668-671, 1996

OBJECTIVE: To evaluate the effect of different methods (plateau or back extrapolation) of calculating total body water (TBW) from deuterium dilution in an environment characterised by high water turnover. The back extrapolation model is assumed to be more accurate when water turnover is high. DESIGN: Cross-sectional study with measurement of body composition by deuterium dilution and conventional anthropometry. SETTING: Rural Sarawak, Malaysia. SUBJECTS: 24 adults of the Iban population. RESULTS: TBW was significantly different by method of calculation ($P < 0.0001$), and mean fat free mass was lower by 1.3 kg using the back extrapolation technique, equivalent to a mean 3.1 (s.d. 0.8)% reduction. The same 1.3 kg difference was equivalent to a mean 16.6 (s.d. 12.3)% increase in fat mass using the back extrapolation technique. Back extrapolation values were used in subsequent analyses. Percentage fat correlated significantly with BMI and skinfold thicknesses in females, but only with BMI in males. Fat mass was significantly correlated with skinfolds and BMI in both sexes. Fat free mass was correlated with BMI in both sexes. CONCLUSIONS: The back extrapolation method produced values for fat mass that differed substantially from those obtained by the plateau method. The difference between calculation methods could be lessened by using saliva samples in place of urine. Back extrapolation values for body fat correlated well with anthropometric measurements in females, less well in males. This difference is due to characteristics of the study population.

B105 Nutritional research in Malaysia

Wan Ngah WZ and Khalid BAK

Asia Pacific J Clin Nutr 2: 61-62, 1993

The nutritional status of a country is closely associated with the gross national product (GNP)[1]. An increasing GNP gives rise to improved nutritional status. As a country that is undergoing a rapid and progressive change from an agrarian to an industrialized economy, Malaysia is experiencing a shift in problems associated with undernutrition to that of overnutrition. Previously, due to the limited comprehensive data available on the nutritional status of the Malaysian population, research concentrated on the determination and evaluation of nutritional status generally through such indirect health indicators as life-expectancy at birth and mortality rates of infants, toddlers and mothers[2]. The results obtained over the period from 1957 to 1982 showed a marked improvement in mortality rates for the groups concerned, hence better health. It is not surprising that the GNP also showed a remarkable

improvement during this period. However, considerable variations linked to local economic factors were observed. The richer states registered a higher life expectancy than the poorer states. There were also different mortality rates between different communities and in various parts of the country. Studies using assessments of nutrient intakes from food consumption and anthropometric indicators provided data on vitamin A deficiency[3], anaemia in children and women[4,5], prevalence of endemic goitre[6,7] . Acute malnutrition and severe chronic undernutrition were minimal, but chronic undernutrition and underweight were rampant; in communities with a higher income health status was better. Apart from providing community health indicators, studies on dietary patterns and food consumption carried out in recent years has also acted as a basis for continuing research[8,9] and for the nutritional research of Malaysia in the future.

As Malaysia continues to move progressively towards being a more developed industrialized nation, nutritional problems associated with those of the more affluent and developed countries of the North and the emerging 'tiger economies' would obviously be a major research target of nutritionists. In addition to the evidence from indirect health and nutrition indicators, such conditions as obesity, non-insulin-dependent diabetes mellitus (NIDDM), cardiovascular disease and cancers of the lung, breast and colon are indicative of affluence and also of changing lifestyles and dietary habits. High-fibre, 'natural', carbohydrate rich dietary intake is giving way to more processed food, particularly fast food, to food that is rich in fat, salt and sugar, and to increased alcohol consumption.

The impact of urbanization on certain communities in selected towns, rural settlements and remote rural areas has been carried out using NIDDM and endemic goitre as indicators. The prevalence of NIDDM in recent years is closely correlated with the more affluent and modern lifestyles of the Malaysian population in general[10]. It should be stressed that studies on aspects of undernourishment and deficiencies in the less fortunate segments of the Malaysian population, especially the remote and rural communities, the poor and the lower income groups, are still being carried out. The prevalence of endemic goitre in some parts of Peninsular Malaysia and Sarawak bears testimony to cassava being still the staple diet of the communities involved and an important source of goitrogens[11].

The economy and Malaysia's primary produce continues to influence the trend of nutritional research. The overt economic implication of the Tropical Palm Oil labelling policy by the United States government probably almost single-handedly shaped the present trend in nutritional research. An integrated, concerted approach has been initiated to research on the relationship between palm oil and its by-products to health and nutrition. Studies comparing the effects of palm oil, compared to those of other types of vegetable oil, on lipid profiles in man[12,13] have been carried out. The effect of palm oil and its by-products, particularly tocopherols and tocotrienols, on serum lipoproteins, free radical formation and chemical carcinogenesis in humans and animals have been reported. Studies have shown that tocotrienols purified from palm oil could reduce the severity of chemical carcinogenesis in the

rat[14,15]. The effect of palm oil on artherosclerosis and its relationship to lipid profile and lipid peroxidation is being studied by several groups. Similarly, the effect of tocotrienols on protein glycosylation in diabetics, muscle contractility in thyroid disorders and their relationship to peroxidation are being keenly investigated with support from local palm oil research funds.

It may well be that Malaysia can count itself well off, for example in terms of information. As more information is revealed through the publication of numerous scientific reports, how could this knowledge be made useful to the Malaysian population in general, and to medical practitioners and other scientists and professions concerned with nutrition in particular? The ideal solution would be a continuous, integrated effort involving researchers, the relevant authorities and the mass media in different educational activities that would make good nutritional habits and healthy lifestyles attractive to the public as a way towards a better quality of life. Ultimately, what nutritional researchers have been working for is Malaysians who are healthy, wealthy and wise.

B106 Low birth weight incidence in Lundu, Sarawak

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Med J Malaysia 49(2): 164-168, 1994

The overall mean birth weight of the total deliveries (1986-1988) in Lundu Hospital was 2.96 kg. The mean birth weight for the male babies was 2.94 kg. The Chinese babies had a significantly higher mean birth weight (3.12 kg) than the other ethnic groups ($p < 0.05$). The overall incidence of low birth weight (LBW) in this study was 11.84%. The Chinese again had a lower incidence of LBW of 6.73% compared to Ibans who had the highest incidence of LBW, 13.59%, with the Bidayuhs 12.97% and Malays, 12.45%. It was also noticed that of the 14.9% preterm deliveries, 37.5% were LBW. The very young mothers (15-19 years) and older mothers (> 40 years) seem to have a higher incidence of LBW. Mothers who had medical conditions like anaemia, hypertension, preeclampsia also had a higher incidence of LBW when compared to mothers who did not have a medical condition. Special emphasis should be given to mothers who have medical conditions, and to very young and very old mothers during antenatal care, to prevent incidence of LBW.

B107 The nutritional status of Iban preschool children, Sarawak

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Med J Malaysia 40 (3): 185-190, 1985

An anthropometric study and dietary investigations were conducted in an Iban community in the Sixth Division of Sarawak. 140 children aged 0 to 6 years, were assessed anthropometrically. Their mean weights and heights were much lower than those of their counterparts in Singapore. 7% of the children were nutritional dwarfs while about 68% were either wasted or wasted as well as stunted. Rice was the staple food in the community while other foods were considered unnecessary. Child feeding practices also reflected this dependency on rice leading to a toddler diet which is mainly carbohydrate in nature. The dietary assessment showed a quantitative adequacy of energy as well as protein, a finding which does not reflect the seasonal fluctuations with periods of hunger. The predominant contribution from rice resulted in protein intakes which were qualitatively deficient.

B108 The nutritional status of children in an urban squatter community in Malaysia

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Asia-Pacific Journal of Public Health 3(4): 297-300, 1989

An anthropometric assessment was conducted on a sample of 309 children, aged twelve years and below, from an urban squatter community in Kuala Lumpur, Malaysia. The community consists mainly of Malays and Indians and is fairly established with a mean length of residence of about fifteen years. There was not much difference between the two ethnic groups with regard to educational status or income. Most of the residents were unskilled or semiskilled workers employed in factories and government agencies. About 40 percent of the infants and toddlers were found to be wasted, while about one-third of the older children were stunted. There appears to be some association between income per capita and nutritional status.

B109 Anthropometric indices and life style practices of the indigenous Orang Asli adults in Lembah Belum, Grik of Peninsular Malaysia

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Asia Pac J Clin Nutr 16(1): 49-55, 2007

A nutritional status survey of Orang Asli (Aboriginal) adults in Lembah Belum, Grik, has been conducted involving a total of 138 subjects. Jahai (58.7%) was the main ethnic group as compared to that of Temiar (41.3%). Based on the Body Mass Index (BMI) characteristics, the majority (63.2%) of the respondents were normal, 26.7% underweight and 10.1% were either overweight or obese. However, by using two different indices of waist circumference and waist-to-hip ratio, 1.6% and 10.8% of the total respondents revealed abdominal obesity, respectively. Measurement of mid upper arm muscle circumference (MUAMC) indicated that about 40% showed nutritional insufficiency whereas 0.8% showed over-nutrition. Body fat classification revealed that 53.4% of the respondents were thin, 45.8% at normal level and only 0.8% were obese. Student's t-test revealed a significant difference in anthropometric indices of body weight, height, MUAMC, triceps, biceps, MUAC, sub-scapular, supra-iliac and body fat according to gender. Meanwhile, analysis of variance showed significant differences in body weight, waist circumference, WHR and body fat according to different age categories. It was also found that those who smoked had lower BMI compared with non-smokers. Alcohol consumption was associated with higher BMI and WHR among the respondents. Pearson correlation test between anthropometric measurements and socio-economic and demographic factors showed that ethnic group was the strongest variable.

B110 Anthropometric characteristics of rural elderly females in Malaysia

Zaitun Y and Terry RD

Ecology of Food and Nutrition 26: 109-117, 1991

The purpose of this paper is to report selected anthropometric measurements of 305 healthy ambulatory Malay females 55 years and older from two sub-districts in Negeri Sembilan. A variety of measurements were taken, and used in several formulas to further describe the anthropometric characteristics of the sample. The mean height of the sample was 147.2 cm. Both standing and sitting heights declined significantly with age. There was considerably less decline in arm span with age, and the correlation knee height and age was not significant. The mean body weight for the entire sample was 49.8 kg and the mean body mass index (BMI) was 22.9 kg/m2. Both body weight and BMI declined with age. Values for body weight and BMI were highly correlated. Although over one-third (38.4%) of the respondents

were classified in the overweight category, the prevalence of over-weight declined with age. In contrast, about one-fourth (24.6%) of the sample were classified in the under-weight category, and the prevalence of underweight increased with age. Both the waist hip circumferences tended to decline with age, while waist-hip ratio (WHR) tended to increases in body fat may have been distributed more in the abdominal area of the body than in the hip area. The right anf left arm circumferences were significantly and negatively correlated with age. Similarly, age was negatively correlated with arm circumference (AMC), mid-arm muscle area (MAMA), both right and left triceps skinfold thickness and mid-arm fat area (MAFA). The negative correlation between age and measurements of upper arm anthropometry suggests a decline of these indicators with aging. Thus, age was significantly related to changes in many of the anthropometric characteristics of the elderly Malay females in this sample. These age-related changes may be a function of biological, secular, and/or methodological variation.

B111 Assessment of nutritional status among a sample of elderly Chinese in a rural area

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Asia Pacific J Clin Nutr 7(3/4): 329-336, 1998

The purpose of this study was to assess the nutritional status of a sample of elderly Chinese who were 50 years and older in a rural area in Terengganu. Fifty males and fifty female elderly who fulfilled the selection criteria were randomly selected from a list of names. Respondents were interviewed using a questionnaire. The nutritional status was determined using anthropometric measurements, 24-hour dietary recall and food intake frequency. Data were analyzed using SPSS and DEMETER programmes. The Pearson's correlation test, T-test F-test were used to test the hypotheses. Most of the respondents (59%) were 60 years old and above with a mean age of 62.6. Most of them were Buddhists (59%), had a primary level of education (49%), were living with at least one family member (94%) and were still married (77%). The mean monthly household income was RM1242 and most of them (54%) had incomes of less than RM1000. The anthropometric results revealed that the mean body weight and height and height were higher for males than females. Based on the BMI, most of the males (70%) were classified within the normal range and more females (22%) were classified as overweight. Based on the WHR, there were more females (62%) who were classified at higher risk for obesity and chronic disease. The frequency of food intake showed that 13 food items were frequently consumed, 34 food items were moderately consumed and seven food items were consumed lee frequently. The dietary assessment showed that most respondents consumed more than 67% RDA for energy and most of the nutrients, except for calcium. Pearson's correlation test showed significant negative relationships between intakes of protein, iron, vitamin A and vitamin C and the

respondents' ages. Household income was also significantly correlated with intakes of energy, carbohydrates and thiamin. The T-test revealed significant differences for intakes of protein, calcium, iron, vitamin A and vitamin C according to marital status. In general, the nutritional status for male elderly was better than for female elderly and the overall nutritional status could be considered to be fair. Nevertheless, appropriate strategies, food assistance and nutrition education programmes need to be formulated and provided to the elderly, especially to those who lives alone and who are at a higher nutritional risk.

B112 Nutritional status of primary school children from low income households in Kuala Lumpur

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Mal J Nutr 6: 17-32, 2000

Growth status was examined in relation to gender and age factors in urban primary school children (6-10 years old) from low income households in Kuala Lumpur, Wilayah Persekutuan. The sample consisted of 4212 boys (53%) and 3793 girls (47%). Data on weight and height data were obtained from two sources - investigator's and teachers' measurements of the school children. This study defined mildly and significantly underweight, stunted or wasted as z-score below minus one and below minus two of the NCHS/CDC reference median, respectively. Approximately 52% (n = 4149), 50% (n = 3893) and 30% (n = 2568) of the school children were underweight, stunted and wasted, respectively. However, the majority of these undernourished children were in the mild category. Prevalence of overweight (> 2 SD of NCHS/WHO reference median) was found in 5.8% of the sample. For both, prevalence of undernutrition and overnutrition, more boys than girls were found to be underweight stunted wasted and overweight. Compared to girls, boys had lower mean z-scores for the variables height-for-age ($p<0.05$) and weight-for-height ($p<0.01$). Older children had significantly lower mean z-scores for height-for-age ($p<0.001$) but higher mean z-scores for weight-for-height ($P<0.001$) than younger children. This finding indicates that with increasing age, stunting is associated with improved weight-for-height or that the children's weights have been adapted to their short statures. In conclusion, results demonstrate a high prevalence of underweight, stunting and wasting and an increasing prevalence of overweight among these low-income school children. Efforts recommended to address health and nutrition problems among school children should include health and nutrition monitoring (e.g. growth monitoring using the existing growth data collected by schools) and interventions.

B113 Estimates and distribution of body mass index in a sample of Malaysian adolescents.

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Med J Malaysia. 61(1):48-58, 2006

The purpose of this study was to report on the estimates and distribution of body mass index in a sample of Malaysian adolescents. The study utilized a cross-sectional design and multi-stage random sampling of secondary schools to select 5 urban and 9 rural schools in Kedah and Penang. A total of 6555 male and female adolescents (11-15 years old) of Malay, Chinese and Indian ethnic groups were measured for weights and heights for body mass index calculation. Information on household demographic and socioeconomic were obtained from parents through self-administered questionnaires. Analyses of body mass index distribution by location, ethnicity, gender and age were conducted using Chi-square test of SPSS 11.5. More of the rural (12.1%) and urban (19.4%) adolescents were underweight and overweight, respectively. While in all ethnic, gender and age groups, rural adolescents were more likely to be underweight, more of the urban adolescents were overweight. The prevalence of underweight was highest among the Indians (19.2%) and lowest in Chinese (7.2%). The prevalence of overweight in the three ethnic groups was in the range of 18-19%. More male than female adolescents were underweight (15% vs 7.8%) and overweight (19.5% vs 16.7%). Consistent patterns were also observed across location, ethnic and age groups. As age increased, the prevalence of overweight decreased across the ethnic and gender groups. The reported findings can serve as current reference on body mass index distribution of Malaysian adolescents and a basis for future efforts in health and nutrition interventions for Malaysian children and adolescents.

B114 Factors affecting Nutritional Status of Malaysian Primary School Children

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Asia-Pacific Journal of Public Health 17(2): 71-80, 2005

This paper investigates the nutritional status of a randomly selected cohort of school children and the factors affecting it. This random survey was conducted in the state of Selangor, involving 1,405 primary students (aged 9-10 years from 54 national primary schools). Physical examination was carried out on all the students.

Information on the students was also obtained from the parents. Blood samples were taken by using the finger pricking technique. Body mass index (BMI) was used as a measure of physical growth.

The students were mainly from urban areas (82.9%). The mean age was 9.71 years and a higher proportion was females (51%). Malays constituted 83.6%, Indians 11.6% and Chinese 4.2% of the study population. The mean weight and height were 32.30 kg and 135.18cm respectively. The mean BMI was 17.42 kg/m^2, with 1.2% of the students underweight, 76.3% normal BMI, 16.3% overweight and 6.3% were obese. Nutritional status was significantly related to blood pressure, history of breast feeding, eating fast food, taking canned/bottled drinks, income and educational level of parents. Significant differences in nutritional status between sexes and locations (rural/ urban) were also found. The prevalence of overweight and obese children was of concern. There is thus an urgent need for the School Health Program to periodically monitor the school children's eating habits and physical growth. Appropriate counselling on nutritional intake and physical activities should be given not only to schoolchildren but also to their teachers and parents or caregivers.

B115 Assessing the nutritional status of children with leukemia from hospitals in Kuala Lumpur

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Mal J Nutr 15(1): 45-51, 2009

A cross-sectional study was carried out to evaluate the nutritional status of 51 subjects with leukemia aged 4 to 12 years from the Haematology & Oncology Paediatric Ward, Universiti Kebangsaan Malaysia Medical Centre (PPUKM) and the Paediatric Institute of Kuala Lumpur. Nutritional status was assessed using anthropometric measurements, biochemical and haematological parameters. Subjects comprised 32 (62.7%) males and 19 (27.3%) females. Most of the subjects (41.2%) were in the age group of 4 to 6 years. More than half of the children were Malays (70.6%) followed by Indians (15.7%) and Chinese (13.7%). The subjects were diagnosed as acute lymphoblastic leukemia (ALL) (84.3%) followed by acute myelogenous leukemia (AML) (13.7%) and chronic myelogenous leukemia (CML) (2.0%) respectively. Most of the children were in remission status (54.9%). Underweight (<-2 SD for weight-for-age) was observed in 37.3% of the children while 17.6% of them were stunted (<-2 SD for height-for-age), and sign(s) of malnutrition (<-2 SD) for mid upper arm circumference (MUAC)-for-age was

observed in 15.7% of the subjects. Approximately 20.0% of the subjects were in the severe malnutrition category with respect to low serum albumin levels (<3.5g/dl). All subjects had hemoglobin levels of less than the normal range. While the results indicated no significant differences in the nutritional status of subjects with leukemia at different stages of treatment, it was observed that the prevalence of malnutrition was higher in children with newly diagnosed leukemia. Thus, the nutritional status of children with leukemia should be monitored closely as there is a likelihood of deterioration owing to the disease.

B116 Sosio-economic determinants of nutritional status of children in rural peninsular Malaysia

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Asia Pasific J Clin Nutr. 7(3/4), 307-310, 1998

The data presented is part of the findings from a four-year collaborative research project between Universiti Putra Malaysia, the Institute for Medical Research and the Ministry of Health Malaysia. The project assessed the nutritional status of the major functional groups in Peninsular Malaysia. Mukim Sayong and Pulau Kemiri in the District of Kuala Kangsar, Perak were two of the subdistricts selected to represent small rubber holdings in nutritional status of children below 9 years of age. A total of 307 house holds were studied. Approximately 63% of the households were involved in rubber activities and the majority of them were hired tappers. The average monthly income of the households was RM467 and the income ranged between RM30 to RM2120. Base on the per capita poverty line income of RM84.38, it was found that 14.1% of the households earned less than RM42.19, which can be considered has hard-core poor, while 32.7% were poor (monthly per capita income between RM42.19 and RM84.38).Slightly more then half (52.7%) earned income above the poverty line. The average family size was 4.5, ranging from 1 through to 16. The majority of the heads of households (56.6%) had between 3 and 6 years of education, and 14.5% did not receive any formal education. The prevalence of stunting among children 0-5 years of age was 26%, while 31.5% were underweight and 3.8% wasted. Among children aged between 5 and 9 years, almost the same pattern of nutritional status was noted. The overall percentages of stunting, underweight and wasting among these children were 29.2%, 26.1% and 0.62%, respectively. Analysis on nutritional status according to income level showed a noticeable difference in the prevalence of malnutrition in children above and below the poverty line income. The Student's t-test indicated significant differences in weight-for-age and weight-for-height between the two poverty line income for children below 5 years of age. Pearson's correlation coefficient showed a

significant correlation between height-for-age with household size ($r = -0.26$, $P < 0.05$), and monthly per capita income with weight-for-height ($r = -0.25$, $P < 0.05$). There was a highly significant correlation between acreage of land cultivated and weight-for-height ($r = -0.42$, $P < 0.01$), and weight-for-age ($r = -0.25$, $P < 0.05$). The findings indicated the influence of sosio-economic factors on the nutritional status of children.

B117 Prevalence of malnutrition amongst preschool children in the FELDA scheme

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Journal Malaysian Society of Health 5(1): 85-88, 1985

The study was carried out to assess the nutritional status of 111 preschool children aged 4-6 years residing at Sungai Behrang and Sungai Klah FELDA schemes. Anthropometric data revealed moderate to chronic malnutrition in both the locations although the prevalence were higher in the former. Based on the 24 hour dietary recall, the intake of most of the nutrients with the exception of protein, thiamine and vitamin C were below the Malaysian RDI. Biochemical assessments of children indicated poor physical growth of some 49% of the children in Sungai Behrang and 43% at Sungai Klah where their hydroxyproline index were found to be less than 1.5

B118 Nutritional status and parasitic infection among Orang Asli preschoolers in Kelantan

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Asia Pacific J Clin Nutr 7(3/4), 329-336, 1998

A nutrition and parasitological cross-sectional survey of preschool children aged 1 to 6 years from an Orang Asli village resettlement scheme in Kelantan was done. A total of 397 children were examined and anthropometric measurements were taken. There were 262 stool specimens collected and examined using a modified Stoll's technique. The nutritional status was poor, a prevalence of 32.3% underweight, 93.5% stunting and 13.1% wasting based on the NCHS reference values. Soil transmitted helminthic infections were predominat, and the prevalence rate of ascaris, trichuris and hookworm infection were 47.7%, 35.9% and 11.1% recpectively. The intensity of ascaris infection were 64.5% (low), 27.3% (moderate) and 8.3%

(high). Giardiasis was detected in 8.8% of the children. The intensity of ascaris infection was not associated with the observed nutritional anthropometric indicators. Thus other factors may contribute more to the poor nutritional status found. A community trial is presently being undertaken to confirm whether helminthic infections play an important role in the poor nutritional status. Presumptive-mass antihelminthic treatment was migh then be based more on a risk a risk approach, treating only children identified as at risk of poor nutrition.

B119 The nutritional status of children in resettlement villages in Kelantan

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Southeast Asian J Trop Med Public Health. 30(1):122-128, 1999

A cross-sectional survey of the nutritional status of children aged 1-10 years old from the Kuala Betis resettlement villages was carried out. A total of 620 children were examined, of which 329 were preschool children and 291 were schoolchildren. The age was determined and anthropometric measurements such as weight, height and MUAC were taken. The nutritional status was assessed by looking at the distributions of the z-scores of weight-for-age (WAZ), height-for-age (HAZ) and weight-for-height (WHZ) in relation to the growth charts of the National Center for Health Statistics reference population. It was found that the nutritional status of the Orang Asli children was poor, with a prevalence of 33.7-65.3% underweight, 55.3-74.4% stunting and 4.4-29.7% wasting based on the NCHS reference values. The prevalence of malnutrition among the Malay children was lower, underweight--7.3-34.1%, stunting--9.8-34.1% and wasting--1.7-17.1%. The nutritional status of the Orang Asli children were poorer compared to the Malay children. More preschool Orang Asli children were stunted compared to the Orang Asli schoolchildren. This may be due to the poor economic base of the Orang Asli community during the transformation period after resettlement. A comprehensive primary health care program is essential, especially targeting the preschool Orang Asli children in these resettlement villages.

B120 The prevalence of malnutrition and geo-helminth infections among primary schoolchildren in rural Kelantan.

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School of Medical Sciences, Universiti Sains Malaysia, Kota Bharu.

Southeast Asian J Trop Med Public Health. 31(2):339-345, 2000

A cross-sectional study of the nutritional status of schoolchildren aged 7-10 years from the Kuala Betis Resettlement Scheme in Gua Musang, Kelantan was done. A total of 291 schoolchildren were examined but only 183 (62.9%) fecal samples were returned for geo-helminth infection analysis. The prevalence of stunting was

40.4% and underweight was 28.4%. A total of 127 schoolchildren (69.4%) were positive for at least one of the 3 geo-helminth infections. The most common geo-helminth was Ascaris lumbricoides (62.8%), followed by Trichuris trichiura (38.9%), and hookworm infection was relatively low (12.6%). All the anthropometric indices measured were lower in the geo-helminth infected children compared to the uninfected childen, except for the weight-for-height z-score. However the differences were insignificant Geo-helminth infections may not be a significant factor in malnutrition of these schoolchildren. However, with the availability of safe, efficacious and cheap broad spectrum anthelmintics, regular mass treatment should be given in selected areas where the prevalence of geo-helminth infections is still high, so that these schoolchildren will be able to achieve their growth potential during their school years.

FOOD INTAKE AND HEALTHY DIETARY PRACTICES ACROSS THE LIFESPAN

C1 Prevalence of smoking and drinking habits among Form Six students in Petaling District, Selangor

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Med J Malaysia 61(1): 41-47, 2006

Smoking and alcohol intake patterns may persists from adolescence to adulthood. The aims of this study is to determine the prevalence and factors associated with smoking and drinking habits among Form Six students. This was a cross-sectional study conducted in January 2003 among Form Six students from government schools in the Petaling District, Selangor. 136 self-administered questionnaires were distributed to students selected through multi-stage stratified sampling. Response rate in this study was 90.1% (136/151). The respondents were mainly Chinese 60 (44.1%) and female 88 (64.7%). The prevalence of smoking was 22.8% whereas the prevalence of alcohol intake was 47.8%. Only 33.1% of the respondents practiced undetermined activities and 1.5% have undetermined characters. There were significant associations between smoking and males (Adjusted OR 2.56, 95% CI 1.02-6.43) and smoking and alcohol intake (Adjusted OR 2.74, 95% CI 1.11-6.78). Alcohol intake has significant negative association with Malays (Adjusted OR 0.83, 95% CI 0.03-0.27). Smoking habits among adolescents were associated with males and alcohol intake. However, only alcohol intake was negatively associated with Malays. Program interventions to reduce behavioural problems, particularly smoking and alcohol intake should be emphasized.

C2 Effects of Nutritional Status on Academic Performance of Malaysian Primary School Children

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Asia Pac J Public Health 17(2): 81-87, 2005

Numerous factors are known to affect the academic performance of students. These include prenatal conditions, birth conditions, postnatal events, nutritional, socio-economic factors and environmental factors. This paper examines the nutritional status and its relationship with academic performance of 9-10 years old primary school children recruited randomly in Selangor, Malaysia. A standard self-administered questionnaire was utilized to obtain pertinent information and a face-

to-face interview was also conducted with the parents. Results of the academic performances were extracted from the students' report cards. The intellectual performance was assessed using Raven's Coloured Progressive Matrices. Physical examination was also conducted on these students by doctors. Overall 1,405 students and 1,317 parents responded to the survey. Of these 83.6% were Malays, 11.6% Indians, and 4.2% Chinese. The majority of them (82.9%) were from urban areas. The female: male ratio was 51:49; mean age was 9.71 years. The mean height and weight were 32.3 kg and 135.2 cm respectively. Their mean BMI was 17.42 kg/cm^2, with 0.9% underweight, 76.3% normal BMI, 16.3% overweight, and 6.3% obese. Academic performance was significantly correlated with breast feeding, income and educational level of their parents, BMI, and whether they have been taking breakfast. There was a weak correlation between presence of anaemia and intellectual performance. Improving the socio-economic status of the parents will lend a helping hand in the academic performance of the students. Since breast feeding is associated with better academic and intellectual performance it must be emphasized, particularly to expectant mothers in the antenatal clinics.

C3 Comparison of Food Choice Motives between Malay Husbands and Wives in an Urban Community

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Mal J Nutr 16(1): 69 – 81, 2010

The main objective of this study was to determine the motives underlying the selection of foods between husbands and wives in an urban community. This cross-sectional study was carried out in Bandar Baru Bangi, Selangor, Malaysia among 150 married couples aged 20 and above, who voluntarily agreed to participate and were not on any special diet. Data were collected using the Food Choice Questionnaire (FCQ) which measured the health-related and non health related factor that influence people's food choices. It consisted of 36 items designed to assess the reported importance of nine factors: health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern. In this study, the FCQ was adapted and a new factor, religion (religious guidelines), was included. Demographic characteristics including age, occupation, education, household income and household size were also collected. Data were analysed using SPSS version 16. Results showed that 40.7% of husbands (mean age= 43.33 + 11.16 years) and 55.3% of wives (mean age= 41.28 + 10.93 years) perceived themselves as the main food shopper while 12.0% of the husbands and 85.3% of the wives perceived themselves as the main meal planner. Husbands rated religion as the most prominent factor in food choice motives with a mean average rating of 4.56 + 0.59 on a 5-point rating scale, followed by health and convenience factor.

Meanwhile, the wives rated health as the most essential factor with mean average rating of 4.49 + 0.58, followed by religion and convenience factor. Sensory appeal, ethical concerns and familiarity were rated as the bottom three factors of food choice motives among these two groups. Price of foods was not considered as an important factor in making food choices for the subjects in this study. In conclusion, the husbands and wives of this urban community rated religion, health and convenience as the three most important food choice motives in food selection.

C4 Healthy eating away-from-home: effects of dining occasion and the number of menu items

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International Food Research Journal 15(2): 201-208, 2008

Consumers are reported to be increasingly concerned about their health. Nonetheless, consumers show different attitudes toward food at home and away from home. In particular, consumers tend to shy away from healthy food items when dining on special occasions. This study is the first to look into the number of healthy menu items provided to consumers during dining occasions. The impacts of two independent variables (dining occasion: normal vs. special; number of healthy items: limited vs. extended) on consumers' dining menu selection was examined among female university students. The results of this study indicate that both dining occasion and the number of healthy items offered could influence consumers' food selection independently. Although consumers are more likely to choose unhealthy items while dining'on special occasions, offering more healthy items would increase the probability of healthy eating. This study also offers some insights into the food categories and cooking methods favored by consumers. Further studies should explore other potential foods that would enhance the selection of healthy options by consumers.

C5 Applicability of the stages of change and Weight Efficacy Lifestyle Questionnaire with natives of Sarawak, Malaysia

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Rural and Remote Health.7(4): 864, 2007 (Online)

INTRODUCTION: There is an increase in the prevalence of overweight and obesity in Malaysia. Besides prevalence studies, not much is known about either overweight or obese individuals. The objective of this study was to determine the stages of change in losing weight and the self-efficacy in eating control of three indigenous groups of overweight and obese adults in Sarawak, Malaysia. METHODS:

A cross-sectional study was conducted in one rural region in Sarawak using a purposive sample. A structured questionnaire, which included two scales: (1) Weight: Stages of change (SOC) to assess readiness to change; and (2) Weight Efficacy Lifestyle Questionnaire (WEL) (both adopted from the transtheoretical model of change); and a set of pre-tested questionnaires on socio-demographic data, the presence of health problems and self-assessment of weight appropriateness, was used to interview respondents. RESULTS: The stage distribution for weight loss of these adults respondents (n = 271) showed that 60.5% (n = 164) were in the pre-contemplation stage, 20.7% (n = 56) were in the contemplation stage, 8.5% (n = 23) were in the preparation stage, and 8.9% (n = 24) were in the action stage, while only 1.5% (n = 4) were in the maintenance stage. Except for education, the stage differences were generally stable across age, sex, race, household income, presence or absence of health problem, self-perceived weight and presence of overweight or obesity. Respondents were least able to control their eating under social pressure and food availability, according to their WEL score. CONCLUSION: A large proportion of the overweight or obese adults was not intending to lose weight. The factor structure of the two WEL original subscales enabled partial differentiation between respondents who were able or unable to resist eating in situations where there were availability of food and experienced physical discomfort. The study results indicate the importance of assessing individuals' SOC score in order to implement stage-matched intervention strategies. More studies should be performed in order to validate the WEL questionnaire for use with a Malaysian sample.

C6 Body Mass Index and factors related to overweight among women workers in electronic factories in peninsular Malaysia

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Asia Pac J Clin Nutr. 13(3): 248-254, 2004

Factors related to overweight were examined in a cross-sectional survey that included 1612 women workers from 10 large electronics assembly factories in Peninsular Malaysia. Respondents were Malaysian citizens, direct production workers below the supervisory level, and had worked at least a year in the factory where they were presently employed. Heights and weights were taken to calculate the body mass index (BMI). Weights and BMI increased with increasing age. After adjusting for age, odds ratios for overweight were significantly raised for married women in relation to not married women (OR 1.5, 95% CI=1.15-2.02), lower secondary education in relation to higher than upper secondary education (OR 1.8, 95% CI=1.06-3.14), monthly income RM800-999 (OR 1.7, 95% CI=1.21-2.45) and >/=RM1,000 (OR 1.8, 95% CI=1.23-2.72) in relation to <RM600, working in rotating shifts that included nightshifts (OR 1.6, 95% CI=1.28-2.06), and not staying in hostel (OR 1.4, 95% CI=1.02-1.88). In a logistic regression model with all variables included as covariates, the factors significantly associated with overweight were age, marital status, education, income, and working in rotating shifts. The overall prevalence of overweight was 37.4%; the overall mean BMI was 24.2+/-5.4 kg/m(2). Prevalence of overweight and mean BMI for younger age groups were similar to Malay women in the country-wide representative National Health and Morbidity Survey II, but the older age groups in this study had higher overweight prevalence and mean BMI than the national sample. Electronics women workers face a higher risk of overweight, and is an important group for nutrition intervention.

C7 Dietary calcium intake in postmenopausal Malaysian women: comparison between the food frequency questionnaire and three-day food records

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Asia Pac J Clin Nutr 11(2): 142-146, 2002

The objective of this study was to compare the dietary calcium intakes assessed by a quantitative food frequency questionnaire (FFQ) and the three-day food record method in 230 Chinese postmenopausal women aged 50-65 years in Kuala Lumpur. The results showed that the mean calcium intake from the dietary records was 447 ± 168 mg/day and 499 ± 211 mg/day from the FFQ. The mean difference in intake by the two methods was 51.3 mg (95% CI = - 30.8 - 77.9; SD = 181.2, P > 0.05), which did not differ significantly from zero. Pearson's correlation coefficient of 0.56 was obtained between the two methods. Ninety-five percent of the individuals classified by food records fell into the same or within-one-quartile category when classified by FFQ. Forty-eight percent were classified into the same quartile by both

methods. No subjects were grossly misclassified by the FFQ. The FFQ correctly identified subjects with calcium intakes below the Malaysian recommended daily allowance (450 mg/day) with 60% specificity and with 92% specificity for women consuming less than 800 mg calcium/day. In conclusion, the FFQ developed was a useful, rapid clinical tool for assessing calcium intake and identifying postmenopausal Chinese women with low calcium intakes in Malaysia.

C8 Resemblance in dietary habits and calcaneal ultrasound attenuation in malay mother-daughter pairs

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Mal J Nutr 9(2): 85-93, 2003

The relationship between dietary habits and bone health status was evaluated in 61 pairs of premenopausal mothers and their biological daughters aged 10-19 years. Subjects were volunteers living in Kuala Lumpur. Bone status of the calcaneus was assessed using Quantitative Ultrasound (QUS) which measured the Broadband Ultrasound Attenuation (BUA; in units of dB/MHz) of the bone. Daily nutrient intake of all subjects was evaluated using a 3-day dietary record. Reproductive history, food intake habits, and physical activity level were assessed using questionnaires. Bone health status of mothers (mean BUA of 98.0 ± 15.8 dB/MHz) was significantly higher ($p<0.001$) compared to their daughters (mean BUA of 86.4 ± 17.0 dB/MHz). BUA ($r=0.30$, $p<0.05$), weight ($r=0.30$, $p<0.05$) and BMI ($r=0.32$, $p<0.05$) were significantly correlated within mother-daughter pairs. Lifestyle characteristics such as calcium intake and physical activity were not correlated. However, other dietary habits (energy intake, milk intake and frequency of skipping meals) in daughters were significantly correlated with their mothers. This study suggests that mothers play an important role in influencing the dietary habits of their daughters, which in turn may affect their bone health status.

C9 The prevalence of endemic goitre in the Keningau Division of Sabah

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Asia Pac J Public Health 3(1): 78-81, 1989

Four areas of differing remoteness were studied to determine the prevalence of goitre in the Keningau Division of Sabah. These areas were Keningau town, the Biah Resettlement Scheme, the Dalit subdistrict and the Pagalunggan subdistrict. The predominant ethnic group in these areas is the Murut.

The overall endemicity of goitre for the study population was 76.5% for females aged 15 years and above. There was a significant correlation between the incidence of goitre and the remoteness of an area. The Dalit subdistrict has the highest incidence of goitre (82.6%) followed by the Pagalunggan subdistrict (77.8%), the majority of these goitre cases being classified as grade 2 (visible goitres). These were the two most remote areas in the study. In contrast, Keningau town, the least remote area has the lowest incidence of goitre (62.5%) with most of the goitres being relatively small. With regards to salt usage in the Dalit subdistrict, only 3.0% used iodised salt; 28.0% used fine salt; 3.6% used coarse salt and 65.5% used both fine and coarse salt. In the Pagalunggan subdistrict, all females used uniodised salt with 17.6% using fine salt, 20% using coarse salt and the remainder using both fine and coarse salt. As yet, there is no legislation for the iodisation of salt in Sabah. It is clear that all types of salt need to be iodised and adequately distributed to deprived areas, particularly inland areas.

C10 Eating behaviors among female adolescents in Kuantan District, Pahang, Malaysia

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Pak J Nutr 8(4): 425-432, 2009

This study examined eating behaviors among female adolescents. A total of 407 female students aged between 13-19 years were randomly selected from two secondary schools in Kuantan district, Pahang, Malaysia. All participants were required to complete a self-administered Eating Behaviors Questionnaire and their weight and height were measured by the researchers. A majority of the participants were Malays (65.3%), followed by Chinese (28.3%) and Indians (6.4%). There were 5.9% underweight participants, 75.4% were normal-weight and 18.7% were overweight. About one third (35.9%) never skipped any of the daily three meals, but another half (52.6%) skipped at least one meal a day and the remaining (11.5%) had even skipped all three meals in a day. The most frequently missed meals were breakfast (47.4%). Half (51.4%) snacked between meals daily and three in four (76.9%) had their meals with family members. No differences were found between the socio-demographic variables (age, household members, parent's total year of schooling, parental monthly income and living arrangement) and meal skipping behaviors. However, those who usually skipped meals were those who usually eat alone ($Chi2 = 16.933$, $p < 0.0001$), overweight ($Chi\ 2 = 15.943$, $p < 0.05$) and were Malays ($Chi2 = 33.827$, $p < 0.05$). In conclusion, meal skipping, snacking and practicing various weight loss behaviors were some of the unhealthy eating behaviors depicted among adolescent girls. Focusing on promotion of healthy eating that stresses on the importance of regular intakes of main meals during adolescence is crucial for their current and future health and well-being.

C11 Sex and ethnic differentials in physical activity levels of adolescents in Kuantan

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Mal J Nutr 13(2): 109-120, 2007

A cross-sectional study was conducted to determine the physical activity levels of 400 adolescents (13 years old) in Kuantan, Pahang using the Physical Activity Questionnaire for Older Children (PAQ-C). The associations of physical activity levels with sex, ethnicity and body mass index were also determined. About one third (35.3%) of the adolescents were in the low physical activity level category, 61.5% in the moderate physical activity level and only 3.0% of the adolescents were in the high physical activity level category. More males (77.9%) were physically active than females (54.9%). Twice as many female adolescents (45.1%) were in the low physical activity level category compared to the male adolescents (22.1%). The associations between physical activity with ethnicity and body mass index were not significant. However, there was a significant interaction effect of sex and ethnicity in mean physical activity score ($F = 2.36$, $p<0.01$). Malay males had a significantly higher mean physical activity score as compared to Chinese males ($t=2.13$; $p<0.05$). Although Chinese females had a higher mean physical activity score than Malay females, the difference was not statistically significant. Conversely, there was no interaction effect of sex and BMI status in mean physical activity score. This study suggests that physical activity intervention to promote regular physical activity is needed since a high proportion of the adolescents fall within the low physical activity level category.

C12 Knowledge Of Diabetes Mellitus Among Diabetic And Non-Diabetic Patients In Klinik Kesihatan Seremban

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Med J Malaysia 61(4): 399-404, 2006

The Malaysian Ministry of Health has undertaken various campaigns on healthy lifestyle and health promotion over the years. The impact of these campaigns has been mixed and not well documented. This cross-sectional study evaluated the knowledge level of patients with and without diabetes in a large urban polyclinic using a 41-item questionnaire. One hundred and forty-nine adults (83 with diabetes, 66 without diabetes) participated in this study. Patients with diabetes had higher overall knowledge scores than those without diabetes (81.8% vs 64.00%, $p < 0.001$). While the overall knowledge of patients without diabetes appeared to be acceptable, several areas of knowledge deficiency were identified in this group - areas that should be filled by the on-going health promotion activities

C13 Pengambilan sarapan pagi dan pengaruh ke atas pencapaian kognitif kanak-kanak sekolah rendah

Ezzat SG, Yusof NA, Ponnusamy, S. and Syahiza A

Jurnal Sains Kesihatan Malaysia 3: 1-7, 2005

Cognitive development and physical growth among children depend on their nutritional status which include the habit of taking breakfast. The purpose of this study was to determine the effects of breakfast consumption before school on the cognitive performance of primary school children. A cross sectional study was conducted among primary school children in the rural and urban areas. The subjects consisted of 165 Malay students aged 10 years old. Three types of subscales from Wechsler Intelligence Scale For Children-III test were used to measure the cognitive stage of the children, i.e. arithmetic, coding and digit span. The results showed that the performance of students who took breakfast was significantly higher in arithmetic ($p<0.05$) and digit span ($p<0.05$) than those who did not take breakfast. This study also found that 62.2% of the subjects from rural areas took breakfast for five consecutive days and 21.7% of subjects from the urban areas did not take breakfast at all. This study showed the importance of taking breakfast among school children to achieve better cognitive abilities.

C14 Energy, protein, fat and carbohydrate intakes of underweight, normal weight and obese government office workers in an urban area

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Asia Pacific J Clin Nutr 5: 88-91, 1996

Diet is one of the major factors contributing to the development of obesity, apart from heredity and energy balance. The objective of this cross-sectional study is to assess energy, carbohydrate, protein and fat intakes in relation to bodyweight status among government office workers in Kuala Lumpur. A total of 185 Malay men and 196 Malay women aged 18 and above were randomly selected as the study sample. Height and weight were taken to determine body mass index (BMI). The dietary profile was obtained by using 24-hour dietary recalls and food frequency methods. This was analysed to determine average nutrient intake per day. Other information was ascertained from tested and coded questionnaires. The subjects were ctegorised into three groups of bodyweight status namely underweight (BMI < 20 kg/m2), normal weight (BMI 20-25 kg/m2) and obese (BMI > 25 kg/m2). The prevalence of obesity was 37.8%. The study showed that the mean energy intake of the respondents was 1709±637 kcal/day. The energy composition comprised of 55.7±7.6% carbohydrates, 29.7±21.7 % fat and 15.6±3.8% protein. There was no significant difference in diet composition among the three groups. The findings indicate that normal weight and overweight individuals had a lower intake of calories and carbohydrates than the underweight individuals ($p<0.05$). However, there were no significant differences in fat intakes.

C15 Perception of bodyweight status among office workers in two government departments in Kuala Lumpur

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Mal J Nutr 1: 11-19, 1995

The objective of this paper is to assess the perception of bodyweight status among the office workers in two government departments in Kuala Lumpur. A total of 385 Malay workers aged between 18 to 55 years were randomly selected from the Prime Minister's Department and the Ministry of National Unity and Community Development. The weights and heights of all subjects were measured and their Body Mass Index (BMI) determined. In this study, obesity is defined as individuals having ??25 kg/rn 2 . A questionnaire was prepared to obtained information on socioeconomic status, health aspects, dietary intakes, activity levels and perception on bodyweight status. The study revealed a high prevalence of obesity (38.1 %) and among the obese subjects, 21.7 % perceived themselves as having normal weight. The normal weight and underweight subjects perceived themselves as obese (33.5 % and 6.3 % respectively). A small percentage (5.7 %) of the obese individuals who perceived themselves as obese did not wish to Lose weight. In contrast, 9.7 % of the normal weight subjects who perceived themselves as having normal weight wanted to lose weight. A third person's perception on the subjects' bodyweight status is significantly associated with the subjects' bodyweight status ($P<0.05$). Among the obese subjects, more men (32.3 %) perceived themselves as having normal weights as compared to the women (12.3 %). This implies that women are more aware of their bodyweight status as compared to the men.

C16 Perkaitan di antara pengambilan kalsium dan faktor-faktor gaya hidup dengan status kesihatan tulang di kalangan wanita selepas menopaus

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Mal J Nutr 6: 75-95, 2000

Kajian ini bertujuan untuk mengkaji perkaitan di antara pengambilan kalsium dan faktor-faktor gaya hidup dengan status kesihatan tulang di kalangan 56 wanita selepas menopause di Kelab Warga Tua Evergreen, Petaling Jaya. Teknik pensampelan bertujuan digunakan untuk pemilihan sample kajian. Kepadatan mineral tulang (KMT) di bahagian femur proksimal dan lumbar L2-L4 diukur melalui kaedah Dual Energy X-ray Absorptionmetry (DEXA) di klinik KVOTC, Subang Jaya. Sesi temubual dijalankan berpandukan borang soal selidik dan diikuti

dengan pengukuran antropometri. Hasil kajian menunjukkan min umur responden ialah 64.0 tahun. Min berat badan dan ketinggian responden ialah masing-masing 53.7kg dan 1.55meter. Secara keseluruhannya, min indeks jisim tubuh (IJT) di kalangan responden adalah memuaskan (22.4 kg/m^2) dengan hanya 17.9% dikategorikan sebagai berlebihan berat badan (>25 kg/m^2). Min pengambilan kalsium keseluruhan ialah 807.31 mg dan kira-kira 76.2% disumbangkan daripada pengambilan makanan. Kebanyakan responden (83.9%) dapat memenuhi saranan pengambilan kalsium mengikut RDA untuk Malaysia. Min KMT pada bahagian lumbar, leher, wards dan trokanter ialah 0.983 ± 0.178 g/cm^2, 0.745 ± 0.126 g/cm^2, 0.604 ± 0.150 g/cm^2 dan 0.674 ± 0.127 g/cm^2 masing-masing. Kira-kira 32.1% responden dikategorikan osteoporosis pada bahagian wards, manakala 10.7% masing-masing diklasifikasikan osteoporosis pada bahagian lumbar L2-L4 dan leher femur. Hampir separuh responden mengalami jisim tulang rendah pada leher (53.6%) dan wards (50.0%), dan di bahagian femur proksimal dan bahagian lumbar L2-L4 (53.6%). Ujian pekali Pearson menunjukkan korelasi negatif yang signifikan di antara umur dengan KMT pada bahagian leher ($r = -0.419$, $p<0.01$) dan wards ($r = -0.356$, $p<0.01$). Bagi IJT, terdapat perkaitan positif yang signifikan dengan KMT pada bahagian leher ($r = 0.299$, $p<0.05$) dan trokanter ($r = 0.297$, $p<0.05$). Selain itu, kekuatan genggaman tangan kanan meningkat secara signifikan dengan KMT pada bahagian leher ($r = 0.498$, $p<0.001$), wards ($r = 0.394$, $p<0.01$) dan trokanter ($r = 0.369$, $p<0.01$), sementara KMT pada bahagian leher ($r = 0.291$, $p<0.05$) sahaja menunjukkan perkaitan yang signifikan dengan kekuatan genggaman tangan kiri. Terdapat perkaitan negatif yang signifikan di antara jangkamasa selepas menopaus dengan KMT pada bahagian leher ($r = -0.419$, $p<0.01$) dan wards ($r = -0.363$, $p<0.01$). Pengambilan suplemen kalsium mempunyai perkaitan positif yang signifikan dengan KMT pada bahagian lumbar ($r= 0.302$, $p<0.05$). Secara keseluruhannya, jumlah pengambilan kalsium meningkat secara signifikan dengan KMT pada bahagian trokanter (0.265, $p<0.05$), wards ($r = 0.296$, $p<0.05$) dan lumbar ($r = 0.338$, $p<0.05$). Bagi aktiviti fizikal pula, jangkamasa melakukan aktiviti fizikal dalam seminggu meningkat secara signifikan dengan KMT pada semua bahagian femur iaitu wards ($r = 0.277$, $p<0.05$), leher ($r = 0.315$, $p<0.05$) dan trokanter ($r = 0.878$, $p<0.05$) dan bahagian lumbar ($r = 0.531$, $p<0.05$). Walau bagaimanapun, tiada perkaitan yang signifikan di antara jumlah kafeina yang diambil sehari dengan KMT. Hasil kajian ini menunjukkan bahawa peningkatan pengambilan kalsium dan aktiviti fizikal adalah penting untuk memperbaiki dan memelihara jisim tulang di kalangan wanita selepas menopause. Oleh itu, program-program pendidikan kesihatan dan pemakanan yang sesuai dapat dirangka untuk mencegah penyakit osteoporosis bagi mereka yang berisiko tinggi.

C17 Dietary intake of adolescents in a rural fishing community in Tuaran District, Sabah

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Ma1 J Nutr 12(1): 11-21, 2006

Dietary intakes and lifestyle habits during adolescence may predict the occurrence of obesity and other diet-related chronic diseases later in life. The purpose of this study was to determine dietary intake of adolescents in a fishing community in Tuaran District, Sabah. A total of 199 apparently healthy adolescents comprising 94 male and 105 female subjects were purposively selected for the study. The mean age of the subjects was 15.2 ± 2.2 years with female subjects having a higher mean age of 15.7 ± 2.4 years compared to the males (14.6 ± 1.8 years). The mean BMI of the subjects was 18.4 ± 2.9 kg/m2 with females having a significantly higher BMI (18.9 ± 2.8 kg/m2) than the males (17.8 ± 3.0 kg/m2). Based on the WHO classification (WHO, 1995), 19.6% of the subjects could be classified as thin while 4.5% were at risk of overweight. Overall for both sexes, intake of energy and most nutrients were below the Malaysian recommended nutrient intake (RNI) levels for adolescents, with the exception of vitamin C and niacin. The male subjects showed higher mean intake for vitamin A, thiamine, niacin and vitamin C than the females. Calcium and iron intake ranked among the lowest levels, at 33.4% and 47.2% respectively of the RNI values for both sexes. The main sources of energy were rice, flour products and tubers while fish and seafood were the chief sources of protein. Majority of the subjects (84%) reported taking breakfast daily, which often consisted of fried noodles, fried banana, doughnuts and coffee. Consumption of snacks was popular and commonly consumed snacks were bread, biscuits, and fried banana. The present study revealed that 25.5% and 14.3% of the male and female adolescents respectively were thin, with majority of them consuming inadequate levels of energy and several key nutrients. The results underscore the need for adolescents to be targeted for nutrition and health education as they go through a period of marked physical, physiological and psychological changes.

C18 Prevalence of thiamine deficiency at a drug rehabilitation centre in Malaysia.

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Med J Malaysia 61(5): 519-525, 2006

A possible outbreak of beriberi occurred at a drug detention and rehabilitation centre, Pusat Serenti Bukit Cabang, Perlis, Malaysia in February 2004. This outbreak was identified following the presentation of a large number of inmates at a health centre with signs and symptoms of ankle oedema and shortness of breath. Further investigations revealed the death of three inmates at the General Hospital with similar clinical presentations during the period from October 2003 till February 2004. A cross sectional comparative study was carried out at the rehabilitation centre to find out the prevalence of thiamine deficiency among the inmates both symptomatic and asymptomatic. A total of 154 inmates were examined (57 symptomatic and 97 asymptomatic cases). It was found that 74% from the sample study (114 cases) had thiamine deficiency (44 symptomatic and 70 asymptomatic). Further statistical analysis showed that ankle oedema is consistent with the diagnosis of thiamine deficiency but lack sensitivity ($p < 0.05$, sensitivity 24.6%, specificity 95%). This outbreak could have been triggered by poor diet intake of thiamine by the inmates coupled with possible intake of certain thiamine antagonists in their diet.

C19 Amino acids and muscle protein metabolism with aging

Fujita S

Jurnal Sains Kesihatan Malaysia 7 (1): 1-11, 2009

Sarcopenia is age-associated loss of skeletal muscle mass and strength which develops slowly over decades and becomes a significant factor to disability among the elderly population. Although several mechanisms of sarcopenia have been proposed, they all seem to affect the balance between muscle protein synthesis and breakdown, resulting in the net muscle loss. In present article, the most recent findings regarding the role of nutritional intake on muscle protein metabolism in the elderly will be reviewed. Particular focus will be given to dietary protein requirement for elderly, acute anabolic response of amino acids and protein intake, age-associated changes in the response of muscle protein to a meal intake, and the role of insulin resistance of muscle protein metabolism among the elderly. Finally, possible benefits and risks of protein and amino acid supplements for the prevention and treatment of sarcopenia will also be reviewed.

C20 Energy intake and activity pattern during pregnancy in relation to infant birth weight

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Asia-Pac J Public Health 7(1): 34-38, 1994

The study was designed to determine if the activity pattern of pregnancy women on an intake of energy lower than that recommended will affect fetal growth. Subjects who volunteered were either attending public or private hospitals. Pregnant women in the "private" group were significantly older ($p < 0.001$) weighed somewhat less and significantly taller ($p < 0.001$) when compared to the "public" group. Differences in energy intake during the second and third trimesters between the "public" and "private" groups were small; 1608 ± 334, 1726 ± 271 kcal and 1627 ± 367, 1778 ± 260 kcal, respectively. However, daily activity patterns revealed that the "public" group was more active as reflected by the higher energy expenditure of 1412 ± 74 kcal and 1578 ± kcal during the second and third trimesters respectively. There was a significant difference ($p < 0.01$) in birth weight between the "public" and "private" groups; 2951 ± 377 g and 3173 ± 357 g respectively. This study indicates that energy intakes lower than recommended and sedentary lifestyles have no direct influence on birth weights of babies.

C21 Sociodemographic determinants of glycaemic control in young diabetic patients in peninsular Malaysia

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Diabetes Res Clin Pract. 47(1): 57-69, 2000

Recent studies have shown that good glycaemic control can prevent the development of diabetic complications in type 1 and type 2 diabetes. We wished to observe the glycaemic control in patients from different centres in Peninsular Malaysia and the factors that determine it. We recruited 926 patients with diabetes diagnosed before age 40 years from seven different centres, with proportionate representation from the three main ethnic groups. Clinical history and physical examination were done and blood taken for HbA1c and fasting glucose. The overall glycaemic control was poor with geometric mean HbA1c of 8.6% whilst 61.1% of the patients had HbA1c greater than 8%. Glycaemic control in patients with type 2 diabetes varied between various centres and ethnic groups, with the best control obtained in Chinese patients. Significant predictors of HbA1c in both type 1 and type 2 diabetes include access to nurse educators, ethnic background and WHR. In type 2 diabetes, use

of insulin was a significant predictor, while in type 1 diabetes, household income was a significant predictor. Socioeconomic status did not have a significant effect in type 2 diabetes. There were no significant differences in the glycaemic control in patients with different educational status. In conclusion, glycaemic control in big hospitals in Malaysia was poor, and was closely related to the availability of diabetes care facilities and ethnic group, rather than socioeconomic status.

C22 Daily energy intake, energy expenditure and activity patterns of selected Malaysian sportsmen

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Mal J Nutr 1: 141-149, 1995

Seventeen members of the national sepaktakraw squad undergoing centralised training participated in a comprehensive study to determine their daily food intake, activity patterns and energy requirements. Food intake was recorded as a mean of 3-days weighed food intake and the nutrient contents were calculated using a local food composition table. The energy cost of standardised activities was determined by indirect calorimetry while time and motion study was used to estimate the daily energy expenditure of each subject. The mean daily energy intake was 2784±373 kcal (11.6±1.6 MJ) while the mean daily energy expenditure was 3004±298 kcal (12.6±1.2 MJ), with a negative energy balance of 220 kcal ((0.9 MJ). Intake of other nutrients were adequate when compared with the Malaysian RDA, with the exception of niacin. The results of the activity pattern study indicated that the subjects spent about 80% of the day doing light activities while 20% of the day was devoted to their training programme comprising of moderate to heavy activities. This data set represents the first of its kind in Malaysia and should provide impetus for further research in this area which would help establish dietary guidelines for Malaysian sportsmen.

C23 Prevalence of coronary risk factors in a sample of Chinese women in Kuala Lumpur

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Med J Malaysia. 52(4): 367-376, 1997

Several risk factors for cardiovascular disease amongst a sample of urban Chinese women were investigated. These factors included body mass index (BMI), waist hip ratio, total blood cholesterol (TC), HDL-cholesterol and Lp(a) levels, blood pressure, cigarette smoking, family history of chronic disease, dietary habits and frequency of selected food intake. The subjects were found to have coronary risks with respect to BMI and TC level, both of which increased with age of the women.

Hypertension, HDL-cholesterol and Lp(a) levels appeared not to pose as risk factors amongst these subjects. Dietary habits and intake showed significant correlations with subjects' BMI status. Health promotion is called for towards reducing the modifiable coronary risk factors.

C24 Perceptions of body image among Malaysian male and female adolescents

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Singapore Med J 50(3): 303-311, 2009

Introduction: Body image concerns are common among adolescents as they undergo rapid physical growth and body shape changes. Having a distorted body image is a risk factor for the development of disordered eating behaviours and eating disorders. This study was undertaken to investigate body image concerns among Malaysian male and female adolescents aged 11-15 years. Methods: A total of 2,050 adolescents (1,043 males and 1,007 females) with a mean age of 13.1 +/ - 0.8 years from secondary schools in Kedah and Pulau Pinang were included in the study. Questionnaires were used to collect socioeconomic data and body image indicators. Results: The majority (87 percent) of the adolescents were concerned with their body shape. While the majority of underweight, normal weight and overweight male and female subjects perceived their body weight status correctly according to their body mass index (BMI), a noteworthy proportion in each category misjudged their body weight. About 35.4 percent of the males and 20.5 percent of the females in the underweight category perceived themselves as having a normal weight, while 29.4 percent and 26.7 percent of the overweight males and females respectively also perceived that they had a normal weight. A higher proportion of the females (20 percent) than males (9 percent) with a normal BMI perceived themselves as fat. Most of the male (78-83 percent) and female subjects (69-74 percent) in all the BMI categories desired to be taller than their current height. An appreciable proportion of both the males (41.9 percent) and females (38.2 percent) preferred to remain thin, or even to be thinner (23.7 percent of males and 5.9 percent of females). Females had a significantly higher mean body dissatisfaction score than males, indicating their preference for a slimmer body shape. More males (49.1 percent) preferred a larger body size while more females (58.3 percent) idealised a smaller body size. Compared to normal weight and underweight subjects, overweight males and females expressed lower confidence and acceptance levels, as well as expressed greater preoccupation with and anxiety over their body weight and shape. Conclusion: As having a distorted body image may lead to negative effects such as unhealthy eating habits and disordered eating behaviours, it is recommended that appropriate educational efforts on body image be incorporated into school health activities for adolescents.

C25 Dietary and blood folate status of Malaysian women of childbearing age

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Asia Pac J Clin Nutr 15(3): 341-349, 2006

The protective role of folic acid taken during the periconceptual period in reducing the occurrence of neural tube defects (NTD) has been well documented by epidemiological evidence, randomized controlled trials and intervention studies. Much of the evidence is derived from western populations while similar data on Asian subjects is relatively nascent. Baseline data on folate status of Malaysian women is lacking, while NTD prevalence is estimated as 10 per 10,000 births. This study was conducted with the objective of determining the dietary and blood folate status of Malaysian women of childbearing age. A total of 399 women comprising 140 Malay, 131 Chinese and 128 Indian subjects were recruited from universities and worksites in the suburbs of Kuala Lumpur. Inclusion criteria were that the subjects were not pregnant or breastfeeding, not taking folic acid supplements, not habitual drinkers or smokers. Based on a 24-hour recall, the median intake level for folate was 202.4mg (59.4-491.8 mg), which amounts to 50.6% of the Malaysian Recommended Nutrient Intakes level. The median (5-95th percentiles) values for plasma and red cell folate (RBC) concentrations were 11 (4-33) nmol/L and 633 (303-1209) nmol/L respectively. Overall, nearly 15.1% showed plasma folate deficiency (< 6.8 nmol/L), with Indian subjects having the highest prevalence (21.5%). Overall prevalence of RBC folate deficiency (< 363 nmol/L) was 9.3%, and an almost similar level prevailed for each ethnic group. Only 15.2% had RBC concentration exceeding 906 nmol/L, which is associated with a very low risk of NTD. The result of this study point to the need for intervention strategies to improve the blood folate status of women of childbearing age, so that they have adequate protection against the occurrence of NTD at birth.

C26 Food production strategies for improving household food security amidst rising food prices: sharing the Malaysian experience

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International Food Research Journal 15(3): 249-257, 2008

Food and fuel prices have soared in recent years affecting most adversely the poor and those with fixed incomes. Since 2000, wheat price in the international market has more than tripled and maize prices have more than doubled. The price of rice, the staple of billions in Asia, has tripled in the past year. The surge of food prices

has been blamed on multiple factors including higher energy and fertilizer costs, greater global demand, drought, the loss of arable land to biofuel crops and price speculation. In light of the spiraling rise in food prices, there is the prospect of increasing rates of under-nutrition worldwide. As it is, 800 million are estimated to be suffering from chronic malnourishment, with another 2.1 billion people living close to subsistence levels on less than US$2 a day. Some perspectives of the food production experience of Malaysia are shared here as a case of a country that has built up capabilities and resources through high level of foreign and domestic investment leading to a diversified economy. In response to the recent surge in the price of rice, the Malaysian government announced the setting up of a dedicated fund amounting to US$1.25 billion to increase production of food including fruits and vegetables, and targeting 100% self-sufficiency in rice, by growing rice on a massive scale in Sarawak. During the current five-year development plan for the period of 2006-2010, (Ninth Malaysia Plan), the role of the agriculture sector is considerably enhanced to be the third pillar of economic growth, after manufacturing and services. Among the measures taken, are those aimed at increasing incomes of smallholders and fishermen mainly through improving productivity. These measures include encouraging more rice farmers to participate in mini-estates and group farming, providing financial assistance to rehabilitate cocoa, pepper and sago smallholdings, enhancing the capabilities of coastal fishermen, and setting up of a special program to assist poor households in the agriculture sector to diversify their sources of income. The various socio-economic programs in Malaysia that have been put in place over the years may have cushioned to some extent so far the severity of the dramatic hikes in food prices.

C27 Weight loss practices among Malaysian adults

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Asia-Pacific Journal of Public Health 14(2): 99-104, 2002

The practice of losing weight is gaining popularity globally with an increase in health consciousness among the general public. A survey was conducted in seven shopping centres in Kuala Lumpur and its neighbouring towns to assess the weight-loss practices of the general public. Out of the 1032 people approached by the researcher, 389 (37.7%) admitted that they had tried to lose weight before. Of these respondents, 50.4% had the wrong perceptions about their weight with 39.1% of the respondents having BMI lower than what they had perceived. The most common weight-loss method used was dieting (89.5%), followed by exercise (81%) and the use of slimming teas (24.9%). Exercise (79.0%) was perceived as the most effective method for losing weight, followed by dieting (71.6%). Most respondents (60.6%) obtained their weight-loss products from the pharmacies but only 34.9% of these respondents had consulted the pharmacists on these products. Therefore, pharmacists should play a more active role in assisting the general public to lose weight successfully and safely.

C28 Dietary practices of adolescents in Singapore and Malaysia

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Singapore Med J 46(6): 282-288, 2005

Introduction: This study sets out to investigate any differences in dietary practices between adolescents in Singapore and Malaysia. Methods: An adolescent dietary practices survey was conducted in Singapore and Malaysia involving 200 adolescents (100 from each country) aged 11 to 21 years in order to have a better understanding of the adolescents' dietary practices. Dietary practices were assessed by a self-administered dietary practices questionnaire (DPQ). Results: The major differences identified between adolescents' dietary practices in Singapore and Malaysia are related to alcohol consumption and venue for taking of lunch. More Malaysian adolescents have their lunch prepared at home (32.9 percent), compared with 7.2 percent of Singaporean adolescents. More adolescents in Malaysia drink alcohol (49.4 percent), compared with only 21.7 percent of Singaporean adolescents. Conclusion: From the dietary practices survey of adolescents from Singapore and Malaysia, it may be concluded that while general dietary practices are similar, the major differences identified were significantly (p-value is less than 0.05) higher alcohol consumption by Malaysian adolescents and significantly (p-value is less than 0.05) more Malaysians took their lunch at home compared with Singaporeans. The reasons for the differences are discussed in the paper.

C29 Gender differences in eating behavior and social self concept among Malaysian University Students

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Mal J Nutr 8(1): 75-98, 2002

University students may encounter personal, family, social, and financial stresses while trying to cope with their academic challenges. Such constraints could affect their eating behavior and health status which, in turn may have negative effects on their studies. In light of little information in Malaysia on this subject, this study was undertaken on a sample of 180 students pursuing different academic programs in a Malaysian university. The study objectives were to determine the students' eating behavior including body weight control and the extent of fear of being fat, their social self concept that reflects the five selves namely, the psychological self, the social self, the sexual self, the family self and the physical self. Eating behavior and

social self concept were determined based on various methods previously validated in studies on young adults in Asia and Australia. This article focuses on gender comparisons for these determinants. The results showed that psychological and emotional factors have a significant bearing on the eating behavior of university students. Uninhibited eating behavior of both the males and females showed significant and negative correlations with feelings pertaining to personal worth, the physical self, and their relationships with peers and families. Gender differences were manifested for some determinants. The females showed more restrained eating behavior than the males; the females have a significantly higher score for family relationship, which appears to be a significant factor on male students' eating behavior. Future studies on a larger sample size may help to unravel the extent to which psychological factors influence eating behavior of students, and the underlying psychosocial basis for some of the gender differences reported in this study.

C30 Drinking Habits of Malaysians in General Practice

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Med J Mal 49(4): 369-374, 1994

Five hundred and sixty-two consecutive attenders at an urban general practice were studied using the Consumption Index which has been successfully used in a general hospital sample. 70% of Chinese, 11% of Malays and 42% of Indians have used or are currently using alcohol - a vast majority of them were social drinkers. Among those who ever drank, 6% of Chinese and 22% of Malays drank more than 14 units per week. The hypotheses that more Indians used alcohol and used it more heavily were not supported in this urban sample. Possible explanations for these findings and the limitations of this study are discussed.

C31 Nutritional Factors and Academic Achievements of Children in a National Type Primary School (Tamil) Selangor, Malaysia

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Journal Malaysian Society of Health (16): 59-65, 1998

A study was carried out to examine the relationship between nutritional status and academic performance of 60 children aged 9 years attending primary school (SRJK(Tamil)), Serdang, Selangor. Nutritional status was determined using four indicators viz : weight for age, height for age, weight for height and plasma haemoglobin. Marks obtained at the end of the term examination for Bahasa

Malaysia, English and mathematics were used to evaluate academic performance. The relationship between socio-economic, demographic, scholastic and nutritional factors in relation to academic performance were determined. The study children were all Indians. Majority of their parents had primary education and more than 1/3 earned less than RM 1000 per month. The anthrophometric assessment showed that 18.3 % of the children were underweight, 6.7 % were stunted and 18.3 % exhibited wasting. The prevalence of anemia was 12.0 %. Among the non-nutritional factors examined, the average time spent travelling from home to school was 59.2 ± 20.1 minutes while an average of 1.48 ± 0.25 hours were spent studying at home. The average time spent attending tuition classes was 3.4 ± 1.2 hours. Attendance at school was found to be good (95.0 %). The children's academic performance based on average scores obtained for the three subjects taught was a moderate 57 %. Academic performance were found to be related to nutritional factors such as weight for age, height for age, haemoglobin, energy level, and the intake of calcium and fat. In conclusion, poor nutritional status, especially low haemoglobin levels, among school children, may be a deterring factor to good academic performance.

C32 Eating patterns of school children and adolescents in Kuala Lumpur

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Ma1 J Nutr 12(1): 1-10, 2006

Eating patterns such as eating frequency, skipping of breakfast, and frequency of meals eaten away from home might influence school-going children's nutritional status, which will then influence their health and academic performance. This article reports the findings of a survey on the eating patterns of the school children and adolescents in Kuala Lumpur. A total of 3620 school children studying in Primary 5, Secondary 2 and Secondary 4 were selected using multi-stage sampling. The students were surveyed using a pre-tested questionnaire while their weights and heights were measured in the field. It was found that 19.9% skipped at least one meal a day with the youngest group having the lowest prevalence. The most frequently missed meal is breakfast (12.6%) followed by lunch (6.7%) and dinner (4.4%). The school is an important provider of breakfast and lunch for the students. As the students' age increased, the prevalence of eating breakfast and lunch in school increased. The youngest age group had the highest prevalence of snacking and taking of nutritional supplements ($p<0.05$). Fast food and local hawker food were also consumed by about 60-70% of the students. Logistic regression analysis showed that skipping of breakfast is significantly associated with age, sex, BMI and taking of nutritional supplements. Promotion of healthy eating should be targeted at students in primary and secondary schools as they tend to depend on outside food.

C33 A qualitative study on perceptions and knowledge of Orang Asli mothers on child health and nutrition

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Mal J Nutr 11(2): 75-88, 2005

Focus group discussion is a qualitative method of data collection that has gained recognition in the health research field. A total of 8 focus group discussions were carried out with Orang Asli women of childbearing age (20-50 years old) to assess their perceptions and knowledge of child health and nutrition. Four of the groups were from 6 Temuan villages (n=40) in Sepang District, while four others were from 4 Mah Meri villages (n=31) on Carey Island. Most of the women had no formal education or had attended primary school only. The topics discussed were on the women's perceptions of a healthy child and contributory factors to child health; their perceptions of good (nutritious) and bad (less nutritious) foods; their knowledge on foods and nutrients in relation to general functions, and specifically to growth and brain development as well as diseases. All Mah Meri and Temuan groups defined 'healthy' and 'unhealthy' in terms of behaviours and body appearances. A healthy child is able to play, socialise, eat and sleep well and seems energetic and cheerful, while an unhealthy child does not exhibit these behaviours and appearances. All the groups cited personal hygiene of the child and cleanliness of food and home environment as important contributors to child health. Healthy and unhealthy foods were defined mostly in relation to disease outcomes. All groups considered fruits and vegetables as 'good' foods while sugar and snacks were 'bad' foods. Meat, eggs, milk and fish were also considered as 'good' foods by several groups. All Mah Meri and Temuan groups agreed that nutritious foods prevent children from illnesses as the foods would provide energy and improve blood circulation. Compared to the Temuan, most Mah Meri women were unable to identify food sources of nutrients. Both the Temuan and Mahmeri groups were not able to relate nutrients to their specific functions. While the women were able to relate the associations between foods and diseases, most of the women lack knowledge on the appropriate foods for growth and development. The focus group findings would contribute to better understanding of care-givers' perceptions and knowledge regarding child health and nutrition, which could then be utilised in the development of appropriate health and nutrition strategies to address child health and nutrition problems in the Orang Asli community.

C34 A qualitative study on coping strategies among women from food insecurity households in Selangor and Negeri Sembilan

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Mal J Nutr 16(1): 39 - 54, 2010

Understanding the experiences of household food insecurity is essential for better measurement and assessment of its nutritional, physical and psychological consequences. This qualitative study explored coping strategies and their perceived severity in relation to household food insecurity. Women (n=57; 20-50 years old) from rural and urban areas in Selangor and Negeri Sembilan participated in this study. These women were interviewed using a semi-structured questionnaire. The questionnaire was divided into two parts, that is, demographic and socio-economic information and women's experiences of coping with household food insecurity. Women were chosen since they were primarily responsible for food acquisition and preparation for the all household members. Thematic analysis was utilized in data analysis. Thematic analysis is a method for identifying, analysing and reporting patterns and themes of the qualitative data. Themes capture something important related to the study objectives and describe an integrating as well as relational idea from the data. Results showed that households displayed a variety of non-food related coping strategies and food-related coping strategies. Women's descriptions of non-food related coping strategies to food insecurity were categorised into five themes i.e. cloth purchasing behaviors, reduce school-going children's expenditure, delay the payment of bills, adjust lifestyle and increase cash and income earning. Food related coping strategies were categorised into four themes i.e. food stretching, food rationing, food seeking and food anxiety. Food stretching is a strategy of food insecurity that affects the quality of diet. Food rationing comprises coping strategies of food insecurity related to the quantity of food available for household's consumption. Food seeking is a strategy of acquiring food through socially unacceptable ways and food anxiety is a strategy that indicates households allocating money to buy staple food in order to prevent food insecurity. Each coping strategy showed a different level of perceived severity, that is, less severe, quite severe, severe and very severe. In conclusion, the qualitative data provide valuable information for understanding the experiences of food insecurity that can be used as a basis to develop direct indicators that can capture the core behaviours and their level of severity to measure household food insecurity.

C35 Nutrient intake and socio-economic status among children attending a health exhibition in Malaysian rural villages

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Med J Malaysia. 50(4): 382-390, 1995

A dietary survey was carried out in 216 children (109 males, 107 females) aged 1-7 years, living in rural villages in Selangor, Malaysia to assess their nutrient intake and to determine the association between nutrient consumption and socio-economic background. All the children studied had inadequate intakes of energy, iron and niacin according to Recommended Daily Intake (RDI). Children aged of 4-9 years showed inadequate intake of calcium, thiamine and riboflavin. However, the intake of protein, vitamin A and ascorbic acid were above the recommended value. The mean percentage requirements of protein, iron and niacin were significantly higher in children from small families compared with children from large families. However the employment status of mothers had a significantly effect on the mean percentage requirements of niacin. The results indicate that education level of the mothers, is strongly associated with the mean percentage nutrient requirements of children and we strongly feel that this is a strategy to be adopted for improvement in nutrition of children.

PIP: During January-June 1993, in the rural villages of Mukim Labu and Dengkil, Malaysia, a dietary survey was conducted of 216 children 1-7 years old attending a health and worm infestation exhibit. It aimed to determine the dietary intake of these children and to examine the association between dietary intake with age, household income, family size, employment status of mothers, and level of mothers' education. All the children had lower intakes of energy, iron, and niacin than the recommended daily intake (RDI). Their intake of protein, vitamin A, and ascorbic acid tended to be more than the RDI, however. Children 4-9 years old consumed insufficient amounts of calcium, thiamin, and riboflavin. The researchers controlled for age in the remaining analyses, since it is a confounding factor. Children from low-income households had significantly lower intakes of protein, iron, and niacin than those from higher income households (p 0.05). Children from small size families (1-5) consumed more riboflavin than those from larger size families (=or 6) (104.6 vs. 67.4-74.3 mg; p 0.05). Children of working mothers consumed more niacin than those whose mothers were housewives (66.3 vs. 44.1 mg; p 0.05). Mother's education had a positive association with intake of protein, iron, vitamin A, and niacin (p 0.05). These findings suggest that household income, mother's education, and small family size had a positive association with nutrient intake.

C36 Nutritional status and food habits of middle-aged adults in selected areas of Selangor

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Mal J Nutr 9(2): 125-136, 2003

A food habits and health status study was carried out among 100 Malay adults aged 40 years and above. The study protocol incorporated anthropometric measurements, evaluation of food habits and determination of blood glucose, cholesterol and blood pressure. Mean body mass index (BMI) for men and women were 27.2 ± 4.2 kg/m2 and 27.0 ± 5.2 kg/m2 respectively, which on average showed that the subjects were overweight. Food habits evaluation indicated that rice, fish and vegetables were the foods consumed almost everyday by the majority of the subjects. Meat, dairy products and fruits were eaten once to three times per week. Food intake score for sugar and salt demonstrated that a majority of men and women consumed moderate amounts of these foods. Most subjects exercised twice to three times a week for 15 min per session. Blood glucose tests revealed a mean of 5.04 ± 1.60 mmol/l in men and 4.86 ± 2.10 mmol/l for women. Mean cholesterol for men was 5.06 ± 1.22 mmol/l while it was 4.90 ± 1.34 mmol/l in women. Mean systolic and diastolic blood pressure in men was normal of 127.69 ± 13.60 mm Hg dan 85.87 ± 7.97 mm Hg, while in women it was 127.42 ± 17.54 mm Hg, 83.53 ± 9.50 mm Hg. The mean value for glucose, cholesterol and blood pressure increased with age. The food habits of these adults were satisfactory; however blood test for the nutrients of interest exhibited an increasing trend towards blood pressure, blood cholesterol and glucose with age. Middle-aged adults should adapt to a more active lifestyle and be more cautious of their food habits. This is to ensure a healthy well being throughout their life span.

C37 Food intake and anthropometric status of female athletes at Universiti Kebangsaan Malaysia (UKM)

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Jurnal Perubatan UKM 14(1): 27-35, 1992

A total of 50 female athletes who were representing the university in five sports events were studied. Thirty female non-athletes were also included in the study for anthropometric comparison. The food intake record showed that the athletes were nor taking sufficient calories but had a balanced distribution of carbohydrate, fat and protein (51%,35% and 14% of the total caloric intake respectively) in the diet. The calcium and iron intake were below while thiamine and riboflavin intake were above the recommended intake (RDI, Malaysia). Anthropometric measurements indicated that the athletes had a slightly higher weight, height, height and lean body mass but lower percent of body fat. Hemoglobin analysis revealed that 71% (out of 31 subjects) of the athletes were anemic.

C38 Energy intake and energy expenditure among lactating women

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Asia Pacific J Clin Nutr 7(3/4): 329-336, 1998

A study on energy intake and energy expenditure of 30 lactating women was carried out in Selama, Perak, Malaysia. The objective of the study was to determine the daily energy intake, energy expenditure and milk volume of the lactating mother. The study also assessed the relationship between body fat stores and milk production. Data were collected by using anthropometric measurements, 24 hour dietary recall, physical activity records, and a questionnaire on the background information of the respondents. Data on milk production was collected by weighing the baby before and after a feeding. The difference in weight, which is equivalent to the milk volume, was multiplied by the total number of feedings in 24 hours, to obtain the total milk volume per day. The mean age of the respondents was 30 ± 6.5 years, ranging from 20-44 years of age. The age of the infants was in the range of 1-3 month. Percent of body fat was determined by measuring the thickness of the biseps, triseps, suprailiac and subscapular skinfolds. The mean body fat percentage was 21.4%, ranging between 18.1% - 27.1%. There was no significant relationship between milk volume and percentage body fat. Around 6.6% of the respondants were classified as chronic energy deficient, indicated as having BMI below 18.5 kg/m2, and 19.9% of respondents were in the overweight and obese categories (BMI > 25.0 and BMI > 30.0, respectively). There was no significant relationship found between the between the BMI of the mother and the milk volume. Mean energy intake and mean energy expenditure was 2043.9 ± 458.6 kcal and 3054.0 ± 251.7 kcal, respectively, which indicated a negative energy balance among the women. The energy intake of the mother correlated significantly with the milk production. Mean milk volume was 604.4 ± 113.5 ml where the mean milk intake per day by the male infant was 616.2 ml and by the female infant was 576.6 ml. this study showed that milk production of Malaysian mothers was comparable with those studies found in other developing countries but lower than those found in developed countries.

C39 Assessment of physical activity level among individuals with Type 2 Diabetes Mellitus at Cheras Health Clinic, Kuala Lumpur

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Mal J Nutr 16(1): 101 - 112, 2010

A cross-sectional study was carried out to assess the physical activity levels among patients with type 2 diabetes mellitus (DM) at Cheras Health Clinic in Kuala Lumpur. A total of 132 subjects (62 men and 70 women) aged 30 years and above participated in this study. Data was collected using an interview based questionnaire to obtain socio-demographic and health profile information. Physical activity was assessed using a shortened version of the International Physical Activity Questionnaire (IPAQ). Anthropometric measurements and body fat were also taken. Glycaemic status, that is, HbA1c, fasting blood sugar (FBS) and 2 hours post-prandial (2-HPP) were obtained from medical records. Results showed that the mean age of the patients was 51.9 + 5.8 years. The majority of patients had poor glycaemic control based on HbA1c (70.7%), FBS (71.9%) and 2HPP (85.4%). Patients who were unmarried and aged(60 years and above had a lower physical activity level ($p<0.05$). In the older age group, low physical activity was associated with poor glycaemic control ($p<0.05$). Patients in the moderate and high physical activity level were motivated to perform physical activity so as to be healthy (68.1%). Low physical activity level among patients was due to lack of time (54.5%) and lack of energy (21.2%). In conclusion, physical activity levels of the patients were unsatisfactory and associated with poor glycaemic control, especially in the elderly. There is a need to encourage diabetic patients to undertake regular physical activity in order to achieve optimal glycaemic control.

C40 Factors associated with poor academic achievement among urban primary school children in Malaysia

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Singapore Med J 51(3): 247-252, 2010

Introduction: The aim of this study was to identify factors associated with poor academic achievement during the early school years. Methods: This was a cross-sectional study of urban Primary Two children. Sociodemographic and medical data were obtained from questionnaires and interviews. Achievement was based on

marks obtained in the core subjects of the Primary One examination. All students underwent the Raven's Standard Progressive Matrices test as a general measure of cognitive ability, audiometry and visual tests, and standardised measurements of weight and height. Results: Out of 1,470 eligible children, 206 (14 percent) had poor academic achievement. Of the 919 children who participated in the study, 111 (12.1 percent) had poor achievement compared with 95 (17.2 percent) of the 551 non-participants.Using logistic regression analysis, the factors that were found to be independently associated with poor academic achievement were lower mean Raven scores (p-value is less than 0.001), lower mean socioeconomic status scores (p-value is less than 0.001), larger sibship size (p-value is 0.031), male gender (odds ratio [OR] 1.7; 95 percent confidence interval [CI] 1.1-2.65) and a history of prematurity (OR 14; 95 percent CI 2-97.8). Conclusion : Cogni t ive abi l i t y, gender, prematurity and social factors contribute to poor academic achievement during the early school years. The higher proportion of poor achievers among non-participants warrants further attention.

C41 Changes in body weight, dietary intake and activity pattern of adolescents during Ramadan

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Mal J Nutr 2: 1-10, 1996

A study was carried out on 117 schoolchildren comprising 51 boys and 66 girls between the ages of 10 and 13 years to evaluate the effect of Ramadan-fasting on body weight. The results revealed that more than 90% of the subjects experienced a decrease in body weight during Ramadan. The initial mean body weight of the boys and girls were 35.7 ± 6.7 kg and 35.2 ± 6.1 kg respectively. After four weeks' fast, the boys and girls significantly lost ($p<0.001$) an average of 4.2% and 3.7% of their initial body weight respectively. Dietary intake and activity pattern were also assessed in a subgroup of 20 boys and 30 girls during the same period. The mean daily energy intake during Ramadan-fasting {boys 1230 ± 363 kcal (5.15 ± 1.52 MJ), girls 1034 ± 290 kcal (4.33 ± 1.21 MJ)} was significantly lower ($p<0.001$) than intake assessed before Ramadan {boys 1520 ± 463 kcal (6.36 ± 1.94 MJ), girls 1344 ± 428 kcal (5.62 ± 1.79 MJ)}. Both values were found to be below the suggested daily dietary intake for Malaysians of similar sex and age group recommended by Teoh (1975). Both boys and girls significantly decreased their intakes of fat, carbohydrate and thiamine during Ramadan. However, intakes of protein, niacin, vitamins A and C were found to be comparable to non-fasting values. During Ramadan, the mean intake of all nutrients analysed except protein were lower than recommended values. The boys spent significantly more ($p<0.05$) time sitting and significantly less ($p<0.05$) time standing and in moderately active pursuits during Ramadan. During this period, the boys spent more time in prayers compared with

the girls. Time spent on all other activities did not differ between the fasting and non-fasting months. The findings suggest that the decrease in body weight during Ramadan may be primarily due to the reduction in energy intake since activity pattern remain fairly constant. The nutrient intake pattern of the adolescents studied may be of great concern in the long-term, as it does not meet the requirements for the normal growth of adolescents.

C42 Physical Activity Pattern and Energy Expenditure of Malaysian Adults: Findings from the Malaysian Adult Nutrition Survey (MANS)

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Mal J Nutr 16(1): 13 - 37, 2010

This paper aims to report the physical activity pattern and energy expenditure of adults aged 18-59 years in the Malaysian Adults Nutrition Survey (MANS) carried out between October 2002 and December 2003. The survey included 7349 adults representative of Peninsular Malaysia (Northern, Southern, Central and East Coast), as well as Sabah and Sarawak. A total of 6926 adults, comprising 3343 men and 3583 women, completed the physical activity section of the survey. Physical activity data was obtained using a physical activity questionnaire and 24-hour physical activity recall. Basal metabolic rate (BMR) was calculated from Ismail et al. (1998) predictive equations; total energy expenditure (TEE) was then estimated through factorial calculations based on time allocated and energy cost of various activities. Physical activity level (PAL) was calculated as the ratio of TEE to BMR. It was found that almost three-quarters of Malaysian adults traveled by passive modes of transportation. Only a third reported having ever-exercised, and an even smaller proportion of the population (14%) had adequate exercise. The population also spent the majority of their time (74% of the day) in sedentary activities, such as sleeping or lying down; doing light intensity activities (15% of the day), and doing moderate to vigorous intensity activities (10% of the day). Mean BMR and TEE was significantly higher amongst men than women, while mean PAL values were similar for men [1.6 (1.6-1.7)] and women [1.6 (1.6-1.6)]. More men (16%) were categorised as having active PAL compared to women (10%), while more women

(43%) were categorised as having sedentary PAL compared to their male counterparts (37%). The present study provides the first in-depth report of the physical activity pattern, and national estimates of energy expenditure and physical activity levels of Malaysian adults, and concluded that Malaysian adults are generally sedentary. It is thus important that physical activity be further promoted and integrated into the lives of the population, preferably through various health promotion efforts as well as through the commitment of the authorities in providing a suitable environment for an active lifestyle.

C43 Weight management among women workers in Kuala Lumpur

Poh.BK, Sia.PH, Norimah.AK, Ismail.MN

Jurnal Sains Kesihatan Malaysia 4 (1): 71-84, 2006

Obesity prevalence and body image consciousness are on the rise, and women often try to lose weight using a variety of methods. This paper reports the knowledge on body weight management amongst working women aged 30-45 years in Kuala Lumpur. Respondents comprised 131 school teachers and 122 civil servants. Anthropometric measurements included body weight and height; while knowledge on weight management was assessed using a questionnaire. The respondents were Malays (64%), Chinese(26%) and Indian women (10%) with mean age of 38.3 ± 4.6 years old. The respondents were grouped into two weight categories based on body mass index(BMI) : normal weight (BMI 18.5 to 24.9 kg/ m2) and overweight (BMI =25.0 kg/m2). Mean body weight and BMI were significantly different ($p < 0.001$) between the two weight categories. Overweight and normal weight groups had mean body weight of 69.0 ± 9.5 kg and 53.5 ± 5.3 kg; while mean BMI were 29.2 ± 3.6 kg/m2 and 21.9 ± 1.7 kg/m2; respectively. Mean scores for knowledge on weight management were similar for both weight categories, 62.4 ± 13.7 and 61.8 ± 13.4 for overweight and normal weight, respectively. A majority of overweight (71%) and normal weight (73%) women had moderate level (scores 59-74%) of weight management knowledge. However, it was interesting to note that there were more overweight women (20%) who had high knowledge level (scores = 75%) as compared to normal weight women (15%). Only 9% of overweight and 12% of normal weight women demonstrated low knowledge level (scores <50%). School teachers were significantly ($p < 0.001$) more knowledgeable than civil servants in weight management matters with mean knowledge scores of 65.5 ± 12.3 and 58.4 ± 13.9, respectively. On the whole, the results indicated that women were fairly knowledgeable in healthy body weight management. Knowledge on body weight management is essential for preventing comorbidity risks related to overweight problem. The study also revealed that there was a need for nutrition education related to body image and effective weight management.

C44 Postpartum dietary intakes and food taboos among chinese women attending maternal and child health clinics and maternity hospital, Kuala Lumpur

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Mal J Nutr 11(1): 1-21, 2005

Traditionally, Chinese women adhere to special dietary practices during the month following childbirth. This paper discusses the dietary practices and food taboos practised by Chinese women in Kuala Lumpur. A total of 134 Chinese mothers of children below one year were recruited from three Maternal and Child Health Clinics and Maternity Hospital, Kuala Lumpur. Questionnaires and in-depth interviews were used to obtain information on socioeconomic background, dietary practices, food taboos and cooking methods during the confinement period. Food intake was assessed by multiple 24-hour dietary recall among 34 mothers during their confinement month (zuo yuezi). Body weight and height were measured, and body mass index calculated. Majority of the respondents had secondary school education (77.6%), household income between RM1001 and RM3000 (64%), and were homemakers (48.5%). The women were aged 18 - 39 years, and 68% were of normal weight. Most women (82%) practised 30 days of confinement, during which they adhered to special dietary practices. The diet was directed at attaining yin-yang (cold-hot) balance, whereby "hot" foods were most commonly used and "cold" foods were avoided. Ginger, rice wine and sesame seed oil, considered "hot" foods, were used in large amounts in the cooking. Rice, chicken and pork were also consumed in large amounts. Most vegetables and fruits were considered "cold" and were prohibited during confinement. Most mothers drank specially-prepared teas boiled from Chinese herbs. Mean energy intake was 19% below RNI, while mean protein intake was 93% above RNI (NCCFN, 2005). Mean intakes of thiamin, riboflavin and niacin were above 75% of RNI, while vitamins A and C were at half of RNI or less. Mean iron and calcium intakes were at 222% and 67% of RNI, respectively. It is concluded that most Chinese women in Kuala Lumpur do conform to special dietary practices during zuo yuezi.

C45 Body image perception, dietary practices and physical activity of overweight and normal weight Malaysian female adolescents

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Mal J Nutr 10(2): 131-147, 2004

Body image plays an important role in the management of body weight, especially among female adolescents. This study examined the differences in body image perception, weight management knowledge, eating behaviour and physical activity between overweight and normal weight Malaysian female adolescents. Body mass index screening was done on 588 secondary school students to identify overweight (OW) and normal weight (NW) subjects. A BMI-for-age of => 85th percentile and between => 5th and < 85th percentile were used as cut-offs for identifying suitable subjects of overweight and normal weight, respectively. Fifty girls identified as being OW were matched for age and ethnicity with 50 NW students. Subjects completed a self-administered questionnaire on demographics, eating behaviour and physical activity, a weight management knowledge inventory (WMKI) and the Body Silhouette Chart. The study sample comprised Malays (40%), Chinese (30%) and Indians (30%) with a mean age of 14.76 ± 1.15 years. The majority of them were from families with a monthly household income of less than RM1,000. Significantly more NW subjects (?2=6.112, p=0.013) than OW subjects had incorrect perception of their current body weight status. The WMKI revealed that more OW subjects (64%) than NW subjects (52%) had a low level of weight management knowledge. Eating behaviour patterns were not significantly different between OW and NW subjects, but more OW subjects skipped one or more daily meals as compared to their NW counterparts (?2=0.174, p=0.010). Physical activity patterns were similar in both groups. Healthy eating and physical activity promotion programmes in schools should include sound weight management practices.

C46 Diet, nutritional knowledge and health status of urban middle-aged Malaysian women

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Asia Pac J Clin Nutr. 15(3): 388-399, 2006

The objective of the study was to assess nutritional and health status as well as nutritional knowledge in urban middle-aged Malaysian women. The impact of menopause on diet and health indices was also studied. The study included 360 disease free women, non users of HRT,aged > or =45 years with an intact uterus recruited from November 1999 to October 2001. Personal characteristics, anthropometric measurements and blood sample were acquired followed by clinical examination. Nutrient intake and nutritional knowledge was determined by a quantitative FFQ and KAP. The findings showed that urban middle-aged women, aged 51.65+/-5.40 years had energy intakes (EI) 11% below RDA, consisting of 53% carbohydrates, 15% protein and a 32% fat which declined with age. The sample which comprised of 42.5% postmenopausal women had a satisfactory diet and healthy lifestyle practices. Premenopausal women consumed more dietary fat (6%) with other aspects of diet comparable to the postmenopausal women. Iron

intake was deficient in premenopausal women, amounting to 56% RDA contributing to a 26% prevalence of anaemia. Overall, calcium intake reached 440 mg daily but dairy products were not the main source. The postmenopaused had a more artherogenic lipid profile with significantly higher total cholesterol (TC) and LDL-C, but more premenopausal women were overweight/obese (49% versus 35%). EI was the strongest predictor for BMI and waist circumference (WC), with WC itself an independent predictor of fasting blood sugar and TC with BMI strongly affecting glucose tolerance. High nutritional knowledge was seen in 39% whereas 20% had poor knowledge. Newspapers and magazines, followed by the subject's social circle, were the main sources of nutritional information. Nutritional knowledge was positively associated with education, household income, vitamin/ mineral supplementation and regular physical activity but inversely related to TC. In conclusion, middle-aged urban women had an adequate diet with low iron and calcium intakes. Nutritional knowledge was positively associated to healthier lifestyle practices and lower TC. A comparable nutrient intake and lifestyle between pre and postmenopausal women suggested that health changes associated with menopause was largely independent of diet.

C47 Motives for food choice: a comparison of consumers from Japan, Taiwan, Malaysia and New Zealand

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Food Quality and Preference 13(7-8) 489-495, 2002

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With increasing emphasis on understanding consumer preferences in export markets, particularly in Asia, there is a need to determine those factors that influence food choice in other cultures. The Food Choice Questionnaire (FCQ), which assess the relative importance of nine factors thought to be important motives in food choice: Health, Mood, Convenience, Sensory Appeal, Natural Content, Price, Weight Control, Familiarity, andEthical Concern, was administered to groups of female consumers in Japan, Taiwan, Malaysia, and New Zealand. The Food Neophobia Scale was also administered in New Zealand, Taiwan and Japan. There was agreement between Taiwanese and (ethnically Chinese) Malaysian consumers in the most important food choice factors: Health, Natural Content, Weight Control and Convenience. In contrast, Price was most important for Japanese consumers and Sensory Appeal for New Zealand consumers. Familiarity was rated as least important by all countries, and Ethical Concern was also considered unimportant by all countries except Japan, where it was rated as relatively important. Older consumers generally gave higher ratings. Differences between consumer groups were also shown in the degree of neophobia. These data are important in demonstrating differing motives for food choice cross-culturally, and also provide indications of which food claims may be useful in promoting choice in the countries studied.

C48 Nutrient intakes of Kelantan state athletes

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Mal. J. Med. Scien. 4(1):74-78, 1997

Dietary status was evaluated in thirteen male Kelantan State athletes. Each athlete kept a 7-day weighed food intake record. Diets were analysed for nutrient content using a computerised software package. Mean daily energy intake averaged 10.7±3.7MJ×d-1 (2567±887 kcal×d-1) or 175±60 kJ×kg BM-1×d-1. Carbohydrate, protein and fat intake averaged 6.4±2.1 g×kg BM-1, 1.6±0.6 g×kg BM-1 and 1.1±0.5 g×kg BM-1, respectively. The energy derived from carbohydrate, fat and protein respectively, averaged 61.9±8.5%, 23.0±6.5%, 23.0±6.5% and 15.1±3.6% of the total energy intake. Most of the selected vitamins and mineral intake were below United States Recommended Dietary Allowances except for riboflavin, vitamin C and iron.

B49 Eating disorders among female college students in Kelantan

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Asia Pacific J Clin Nutr: 7(3/4), 329-336, 1998

The problem of eating disorders has not been widely studied in Malaysia, particularly in relation to anorexia nervosa and bulimia. It is the aim of this paper to report a preliminary study on eating disorders and nutritional status among female college students in Kelantan. A total of 861 female students (n = 861) from Teachers Training College, College of Nursing and Universiti Sains Malaysia, were investigated regarding their eating habits, anthropometry, health status and psychological profiles. For dietary intake a 24-hour dietary recall was employed and anthropometric measurements consisted of weight, height, mid-upper arm circumferences and tricep skinfold thickness. In evaluating eating disorders and psychological profiles, a translated and validated eating attitude test and eating disorders inventorywere used. The general health questionnaire was used to evaluate their health status. The results indicated that 52.3% of the respondents estimated their body weight to be less than 50kg; however, upon actual measurement only 49.6% weighted less than 50kg. based on body mass index classification, the propotions of those with grade I, II and III thinness were 18.1%, 3.9% and 1.7%, respectively. About 67% of the respondents were within normal BMI (18.5 - 24.9 kg/m2). 22.5% of the respondents had their energy intake less than 1000kcal per day. 11.5% felt guilty after eating a full meal, while 4.9% had a desire to vomit after eating. About 38% experienced irregular menstrual cycles and about 12.2% were following some form of dietary regimen to lose weight.

C50 Ramadan fasting among pregnant women in Muar district, Malaysia and its association to health outcomes

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Malays J Reprod Health. 7(1): 69-83, 1989

PIP: A mixed cohort (retrospective and prospective) study was conducted on Malay pregnant women attending a rural health center in Muar district of Malaysia in 1985. Among the 605 women who were eligible for the study, 477 were exposed to Ramadan fasting. The remainder comprised of nonexposed or "o" day faster group. Controlling for the confounders, the study showed that weight gain during pregnancy and infant birth weight, among the varying exposed and nonexposed to Ramadan fasting groups, were not statistically different. The gestational age of the infant vary among the exposed groups and the unexposed by 4-7 days and this is significant statistically (p=0.001).

C51 Food intakes and preferences of hospitalised geriatric patients

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BMC Geriatr. 2: 3, 2002

BACKGROUND: A cross sectional survey was carried out on 120 hospitalised geriatric patients aged 60 and above in Hospital Universiti Kebangsaan Malaysia, Kuala Lumpur to investigate their nutrient intakes and food preferences. METHODS: Food intakes were recorded using a one day weighed method and diet recall. Food preferences were determined using a five point hedonic score. Food wastages and factors affecting dietary adequacy were also investigated. RESULTS: The findings indicated that the mean intakes of energy and all nutrients investigated except for vitamin C and fluid were below the individual requirement for energy, protein and fluid, and the Malaysian Recommendation of Dietary Allowances (RDA) for calcium, iron, vitamin A, thiamin, riboflavin, niacin and acid ascorbic. In general, subjects preferred vegetables, fruits and beans to red meat, milk and dairy products. There was a trend of women to have a higher percentage for food wastage. Females, diabetic patients, subjects who did not take snacks and subjects who were taking hospital food only, were more likely to consume an inadequate diet ($p < 0.05$ for all values). CONCLUSIONS: Food service system in hospital should consider the food preferences among geriatric patients in order to improve the nutrient intake. In addition, the preparation of food most likely to be rejected such as meat, milk and dairy products need some improvements to increase the acceptance of these foods among geriatric patients. This is important because these foods are good sources of energy, protein and micronutrients that can promote recovery from disease or illness.

C52 Nutritional status of rural elderly Malays: dietary and biochemical findings.

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Int J Vitam Nutr Res. 69(4): 277-284, 1999

A cross-sectional nutritional survey was carried out on 350 elderly Malays aged 60 and above from 11 randomly selected villages in a rural area on the East Coast of Malaysia. The findings indicated that the mean intakes of energy and all of the nutrients investigated were below the Malaysian Recommended Dietary Allowances, excepts for protein and vitamin C. Nutrients most likely to be inadequate were vitamin A, thiamine, riboflavin, niacin and calcium, with more than 50% of the subjects having estimated intakes of below 2/3 of the recommendations. However, vitamin A status was adequate, with only 2 subjects being biochemically deficient (plasma retinol < or = 0.7 mmol/l). Approximately a third of the subjects had hypoalbuminaemia (plasma albumin < 3.3 g/dl) and anaemia (Haemoglobin < 12 g/dl for men; < 13 g/dl for women). Riboflavin deficiency, as assessed by an erythrocyte glutathione reductase activation coefficient (EGRAC) of more than 1.35 was identified in 77% of the subjects. The prevalence of vitamin E deficiency (plasma a-tocopherol < or = 12 mmol/l) was 27%, with men being at a greater risk. In conclusion, the dietary intakes of these rural elderly Malays was inadequate. Over three quarters of the sample were biochemically deficient in riboflavin, the functional consequences of which need to be further investigated.

C53 The association of nutritional risk with physical and mental health problems among elderly in a semi-urban area of Mukim Kajang, Selangor, Malaysia

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Mal J Nutr 10(2): 149-158, 2004

Imbalances and deficiencies of nutrients are particularly prevalent among the elderly, resulting in increased risk of illness and impaired outcome, as well as reduced quality of life. A cross-sectional study was conducted to assess the nutritional risk and to determine its association with physical and mental health problems among the elderly in a semiurban community in the District of Hulu Langat, Selangor. Elderly people aged 60 years and above were included in the study, conducted from 11th March to 10th May 2004. Data were collected using a questionnaire-guided interview method. The Nutrition Screening Initiative Checklist (NSI-13) was used to assess the level (low, moderate, high) of nutritional risk of the subjects. The questionnaire also included the Barthel Index, Geriatric Depression

Scale (GDS-30) and Elderly Cognitive Assessment Questionnaire (ECAQ) to identify functional status, depressive symptoms and cognitive impairment respectively, among the respondents. Out of 316 elderly residents, 300 agreed to participate in the study (response rate 94.9%). Respondents aged from 60 to 93 years old and the mean age was 67.08±6.6. Prevalence of moderate and high nutritional risks were 25.3% and 36.3% respectively. Nutritional risks were found to be significantly associated with age (p=0.015), marital status (p=0.00), chronic illness (p=0.000), functional disability (p=0.000) and depressive symptoms (p=0.010). In conclusion, the health status of the elderly strongly depends on their nutritional risk. Age, marital status, chronic illness, functional disability and depressive symptoms are factors to be emphasised when assessing the nutritional risk of the elderly.

C54 Household food insecurity and coping strategies in a poor rural community in Malaysia

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Nutrition Research and Practice 2(1): 26-34, 2008

This cross-sectional study assessed household food insecurity among low-income rural communities and examined its association with demographic and socioeconomic factors as well as coping strategies to minimize food insecurity. Demographic, socioeconomic, expenditure and coping strategy data were collected from 200 women of poor households in a rural community in Malaysia. Households were categorized as either food secure (n=84) or food insecure (n=116) using the Radimer/Cornell Hunger and Food Insecurity instrument. T-test, Chi-square and logistic regression were utilized for comparison of factors between food secure and food insecure households and determination of factors associated with household food insecurity, respectively. More of the food insecure households were living below the poverty line, had a larger household size, more children and school-going children and mothers as housewives. As food insecure households had more school-going children, reducing expenditures on the children's education is an important strategy to reduce household expenditures. Borrowing money to buy foods, receiving foods from family members, relatives and neighbors and reducing the number of meals seemed to cushion the food insecure households from experiencing food insufficiency. Most of the food insecure households adopted the strategy on cooking whatever is available at home for their meals. The logistic regression model indicates that food insecure households were likely to have more children (OR=1.71; $p<0.05$) and non-working mothers (OR=6.15; $p<0.05$), did not own any land (OR=3.18; $p<0.05$) and adopted the strategy of food preparation based on whatever is available at their homes (OR=4.33; $p<0.05$). However, mothers who reported to borrow money to purchase food (OR=0.84; $p<0.05$) and households with higher incomes of fathers (OR=0.99; $p<0.05$) were more likely to be food secure. Understanding the factors that contribute to household food insecurity is imperative so that effective strategies could be developed and implemented.

C55 Nutritional evaluation of working Malay women in Kuala Lumpur as studied by total food duplicate method

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Tohoku J Exp Med 180(2): 99-114, 1996

Nutrient intake was surveyed by the total food duplicate method in 49 adult ethnically Malay women (at the ages of 18 to 47 years and mostly at 30-39 years) working in Kuala Lumpur, Malaysia. Simultaneously, hematological examinations, serum biochemistry, anthropometry and clinical examination were conducted. Nutrient intakes were estimated in reference to the weight of each food item and the standard food composition tables. Lunch was the most substantial meal of the day with rice as a staple food. Compared with the Recommended Dietary Allowance (RDA) values, daily intakes of energy (1,917 kcal as an arithmetic mean), protein (62.2 g), vitamin B1 (0.83 mg) and vitamin B2 (1.18 mg) were sufficient, but intakes of minerals [i.e., calcium (347.8 mg) and iron (12.5 mg)] and some vitamins [i.e., vitamin A (equivalent to 627 micrograms retinol) and niacin (7.84 mg)] were less than RDA. When evaluated on an individual basis, the prevalence of those who took less than 80% RDA was highest for iron (92%), followed by niacin (80%), calcium (57%) and vitamin A (57%). The presence of 7 hypohemoglobinemia cases may be related to the insufficient iron intake. Overweight cases (14 women) were also detected, the prevalence of which increased at advanced ages. Lipid intake was rather high (28% of total food on energy basis), for which the major source was plants with limited contribution from fish/shellfish.

C56 Eating behaviour, body image, and self-esteem of adolescent girls in Malaysia

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Percept Mot Skills. 106(3): 833- 844, 2008

This cross-sectional study was undertaken with 489 secondary school girls, ages 15-17 years, to examine disordered eating behaviours of adolescent girls in Malaysia and to estimate associations with body weight, body-size discrepancy, and self-esteem. Dietary restraint, binge eating, body image, and self-esteem were assessed using the Restrained Eating scale of the Dutch Eating Behaviour Questionnaire, the Binge Scale Questionnaire, the Contour Drawing Rating Scale, and the Rosenberg Self-Esteem Scale, respectively. Pearson correlations estimated associations between variables. There were 3.1% underweight, 9.8% at risk of

being overweight, and 8.6% overweight girls. A total of 87.3% were dissatisfied with their own body size. Dietary restraint and binge eating were reported by 36.0% and 35.4%, respectively. Body Mass Index ($r = .34$, $p < .01$) and body-size dissatisfaction ($r = .24$, $p < .01$) were significantly associated with dietary restraint and binge eating, but self-esteem ($r = -.20$, $p < .001$) was significantly associated only with binge eating.

C57 Nutrient intake among elderly in southern Peninsular Malaysia

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Mal J Nutr 2: 11-19, 1996

Studies were conducted in selected areas in three states namely Johor (n=117, male=55, female=62), Negeri Sembilan (n=130, male=52, female=78) and Malacca (n=97, male=33, female=64) involving free living elderly (age range from 60 to 93 years old). Respondents were divided into three age cohort groups that is 60 to 69 years, 70 to 79 years and above 80 years old. Assessment of macro and micronutrients were obtained from 24-hour diet recall for three consecutive days. Household measurements were used to estimate the amount of food consumed. Mean energy intake for both sexes were lower than the Malaysian RDA. Mean energy intake were also found to decline with age increment. The percentage of carbohydrate from total calories is higher compared to fat and protein. No respondents were found to consume less than 1/3 RDA for protein. Although no significant difference in nutrient intake was noted among age cohort groups, there was a decline in the intake of protein, fat and carbohydrate. Significantly ($p < 0.05$) lower carbohydrate intake was noted in cohort group above 80 years. As for vitamins and minerals consumption, more than 50% of the elderly population studied consumed less than 2/3 RDA for vitamin A, thiamine, riboflavin, niacin and calcium. Very low intake of nutrient may lead to many health problems. Overall mean energy intake indicate the respondents consume less than the Malaysian RDA for all three age cohort groups. Total mean energy intake were also found to decline with age increment for both sexes. Due to the low energy intake, higher percentage of elderly were found consuming less than 2/3 RDA for thiamine (65%), riboflavin (63%) and niacin (90%). Other nutrients which were also being consumed less than 2/3 RDA by the respondents are vitamin A (67%) and calcium (65%). The intake of calcium which was found to be extremely low (ranged from 277 to 303 mg) could lead to problems like osteoporosis.

C58 Validation of a dietary history questionnaire against a 7-D weighed record for estimating nutrient intake among rural elderly Malays

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Mal J Nutr 6: 33-44, 2000

Energy and nutrient intake estimated using a pre-coded dietary history questionnaire (DHQ) was compared with results obtained from a 7-d weighed intake record (WI) in a group of 37 elderly Malays residing in rural areas of Mersing District, Johor, Malaysia to determine the validity of the DHQ. The DHQ consists of a pre-coded dietary history with a qualitative food frequency questionnaire which was developed to obtain information on food intake and usual dietary habits. The 7-d WI requires subjects to weigh each food immediately before eating and to weigh any leftovers. The medians of intake from the two methods were rather similar and varied by less than 30% for every nutrient, except for vitamin C (114%). For most of the nutrients, analysis of group means using the Wilcoxon matched pairs signed rank sum test showed no significant difference between the estimation of intake from the DHQ and from the WI, with the exceptions of vitamin C and niacin. The DHQ significantly overestimated the intake of vitamin C compared to the WI ($p<0.05$), whilst, the intake of niacin was significantly underestimated ($p<0.05$). The consistency of ranking as assessed using the Spearman's rank correlation coefficient (r) was satisfactory since there were positive correlations between all of the investigated nutrients estimated using the DHQ with those assessed using the WI, except for niacin. Furthermore, both the DHQ and the WI classified approximately 38 to 62% of the subjects into the same tertile for all nutrients, except vitamin C. Therefore, the DHQ was modified by adding a checklist of foods rich in vitamin C and niacin. In conclusion, the DHQ was fairly valid for obtaining the usual intake of most nutrients, particularly on a group basis. These findings indicate that in an elderly population with a high prevalence of illiteracy, a specially designed DHQ can provide very similar estimations to that obtained from 7-d WI.

C59 Food intakes and habits of rural elderly Malays

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Asia Pacific J Clin Nutr 9(2): 122-129, 2000

A cross-sectional nutritional survey was carried out on 350 elderly Malays aged 60 and above from 11 randomly selected villages in a rural area on the east coast of Malaysia. The findings indicated that the mean intakes of energy and of all of the nutrients investigated were below the Malaysian Recommended Dietary Allowances, except for protein and vitamin C. With respect to dietary habits, almost all of the subjects reported that they had breakfast (99.3%), lunch (97.9%) and dinner (90.4%) daily or almost daily (5-6 times/week). However, approximately half of the subjects, especially women, had particular beliefs and prohibitions about specific foods. Most of the subjects usually ate their meals at home, particularly dinner, with 99.3% always having dinner in their own home. Thus, although the rural elderly Malays studied had regular meal intakes, the dietary intake was inadequate. There is a need to plan community-based intervention programmes in order to prevent the subsequent consequences of malnutrition that lead to increased morbidity and mortality.

C60 Good oral health, adequate nutrient consumption and family support are associated with a reduced risk of being underweight amongst older Malaysian residents of publicly funded shelter homes.

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Asia Pac J Clin Nutr. 15(3): 400-405, 2006

A low body mass index in older people has been associated with increased mortality. The main objective of this study was to identify factors associated with low body mass indices [BMIs] (< 18.5 kg/m2) in older residents of shelter care facilities in Peninsular Malaysia. 1081 elderly people (59% M) over the age of 60 years were surveyed using questionnaires determining baseline demographics, nutritional and cognitive status, physical function and psychological well being. Body mass index was also determined. Subjects were recruited from publicly funded shelter homes in Peninsular Malaysia. 14.3% of residents had BMIs < 18.5 kg/m2. Multivariate analyses (adjusted for age and sex) revealed that having no family (RR 1.98[95%CI 1.40-2.82], p<0.001) and negative responses to statement 3 [I eat few fruits or vegetables or milk products] (RR 0.62 [95% CI 0.42-0.90]; P= 0.013) and statement 5 [I have tooth or mouth problems that make it hard for me to eat] (RR 0.69 [95% CI 0.50-0.96]; P= 0.023) of the ' Determine Your Nutritional Health Checklist' were independently associated with low BMIs (<18.5 kg/m2). Older people with no family support were at risk of becoming underweight. Older people who consumed fruits, vegetables or milk or had good oral health were less likely to be underweight. Nutrient intake, oral health and social support were important in ensuring healthy body weight in older Malaysians.

C61 Physical Charateristics and Dietary Intake of Malaysian national basketball players

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International Medical Research Journal 1(1): 49-54, 1997

A review of the literature indicated that no research has been conducted on the physical characteristics and dietary intake of Malaysian national basketball players. Information on physical characteristics and food intake of 11 male and 13 female Malaysian national basketball players were obtained during centralised training. Weight and height were measured using the SECA beam balance with height attachment. Skinfold thickness was measured using the Harpenden calipers at 4 sites (biceps,triceps, subscapular and suprailiac). The percentage of body fat was calculated from the sum of the 4 skinfold thickness measurements. Food intake was recorded as a mean of 3-days weighed food intake and the nutrient contents were calculated using a local food composition table. Based on weight and height (BMI), most of the male subjects (82%) and all female subjects (100%) were classified as normal (BMI 20.0 - 25.0). The percentage average body fat for male and female athletes were 14.1 ± 2.3% and 25.6 ± 4.7%, respectively. The mean daily energy intake for male subjects was 3671 ± 291 kcal or 81% of Malaysian RDA (Recommended Dietary Allowances) adjusted for athletes. The mean percentage contribution of energy from protein, fat and carbohydrate were 16%,27% abd 57%, respectively. The mean daily intake of other nutrients namely protein, calcium, iron, vitamin A, riboflavin, niacin and vitamin C met or exceeded 100% RDAs, except for thiamine which was 1.68 ± 0.25 mg or 94% RDA. For female athletes, the mean daily energy intake was 2470 ± 369 kcal or 86% of Malaysian RDA. The mean percentage contributions of energy from protein, fat, carbohydrate were 13%, 24% and 63% respectively. The mean intake of iron was also lower than the RDA, that is 14.4 ± 3.0 mg or 50% RDA, while mean intake of other nutrients met or exceeded 100% RDA. The inadequacy of energy and thiamine intake by male subjects and energy and iron intake by female subjects indicates the need to pay serious attention in the meal preparation and planning for Malaysian national basketball players during centralised training.

C62 Health literacy and food beliefs among Ibans, Sarawak

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Med J Malaysia 40 (4): 294-300, 1985

A morbidity survey was carried out on a sample of eight longhouses in the Entabai area of the Sixth Division, Sarawak. Of the 645 respondents interviewed, only 148 (22.9%) had experienced at least one spell of illness during the one month prior to the survey. A total of 161 spells of illness were reported, giving a rate of three spells per person per year for the community. Most of the complaints were mild in nature, with fever and aches being the commonest reported. About two thirds of the illnesses were seen by the village aide or at the klinik desa, while the remaining preferred to be treated by the manang. A sub-sample of 49 heads of household was interviewed on their views of the causation, prevention and spread of five common conditions. About 14 - 43% of the respondents had no knowledge of the causes of fever, cough, diarrhoea or worms. Among those who mentioned some causative factors, only a portion had correct concepts of the various aspects of diseases. Food taboos associated with the five conditions were not too numerous or extensive enough to affect dietary intakes. However, this is not so during the post-partum period where the mother is not allowed to eat many vegetables and meat which are common items in their everyday diets.

C63 The female athlete triad among elite Malaysian athletes: prevalence and associated factors

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Asia Pac J Clin Nutr 18 (2): 200-208, 2009

Women participating in a wide range of competitive sports are at higher risk of developing eating disorders, menstrual irregularities and osteoporosis, which are generally referred to as the 'female athlete triad'. The objective of this study was to determine the prevalence of female athlete triad and factors associated with this condition among athletes participating in different sports. A total of 67 elite female athletes aged between 13-30 years participated in the study and were subdivided into the 'leanness' and 'non-leanness' groups. Eating disorders were assessed using a body image figure rating and the Eating Disorder Inventory (EDI) with body dissatisfaction (BD), drive for thinness (DT), bulimia (B) and perfectionism (P) subscales. Menstrual irregularity was assessed with a self-reported menstrual history questionnaire. Bone quality was measured using a quantitative ultrasound

device at one-third distal radius. Prevalence of the female athlete triad was low (1.9%), but the prevalence for individual triad component was high, especially in the leanness group. The prevalence of subjects who were at risk of menstrual irregularity, poor bone quality and eating disorders were 47.6%, 13.3% and 89.2%, respectively, in the leanness group; and 14.3%, 8.3% and 89.2%, respectively, in the non-leanness group. Since the components of the triad are interrelated, identification of athletes at risk of having any one component of the triad, especially those participating in sports that emphasise a lean physique, is an important aid for further diagnosis.

C64 Relationship between Frequency of Sugary Food and Drink Consumption with Occurrence of Dental Caries among Preschool Children in Titiwangsa, Kuala Lumpur

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Mal J Nutr 16(1): 83 - 90, 2010

Dental caries are attributed to various factors including diet. The present crosssectional study determined the frequency of sugary food and drink consumption and defined its relationship to dental caries among preschool children. A total of 50 preschoolers (aged 5-6 years) in three kindergartens of the Department of Community Development (KEMAS) in Titiwangsa, Kuala Lumpur participated in this study. A set of structured questionnaires was used to assess the frequency of sugary food and drink consumption. Dental check ups were performed by a dentist. The dft index (decayed, filled teeth) was used to describe incidence of caries in subjects. Results showed that 62% of the subjects had dental caries. with the mean dft score being 3.72. The frequency of sugary food consumption by the majority of subjects was 2 times a day, while the frequency of sugary drink consumption was more than 3 times a day. There was no significant relationship between frequency of sugary food and drink consumption with incidence of caries. Subjects with high dft scores were more likely to report dental pain. The prevalence of dental caries in preschoolers in this study was high, indicating a need for effective dental health promotion to improve dental health status of this age group.

C65 Dietary pattern and nutritional status of Iban preschool children in Julau, Sarawak

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Asia Pacific J Clin Nutr 7(3/4): 329-336, 1998

The purpose of the study was to identify the dietary patterns and to assess the nutritional status of Iban preschool children and to determine their association with selected factors. A total of 119 preschool children aged above 1 year to 5 years were selected from ten long-houses in Julau, Sarawak, using stratified random sampling. Based on the 24-hour dietary recall, the intake of all nutrient with the exception of protein were below the Malaysian RDA. Their diet also lacked variety, particularly food sources of calories. Food sources of protein, vitamin and minerals were first introduced at a mean age of 11 months, whereas caloric sources were introduced at a mean age of 13 months. The dietary history showed that 86.6% of the children had been breastfed. The anthropometric measurements revealed that 44.5% of the children were underweight. 42.0% were stunted and 9.3% were wasted. There was a positive and significant association between parent's education, household income, food expenditure, household size and number of female members in a household with the children's dietary pattern. Parent's age, literacy level and occupation, including the above factors, except for household size, number of female members and father's education were positively and significantly associated with the children's nutritional status. The yield of hill padi and duration of storage, together with the number of chickens reared were also positively and significantly associated with the children's dietary pattern. The intake of calories, protein, thiamin, riboflavin and niacin were positively and significantly associated with the children's nutritional status. The age at which the children were first introduced to leafy and wild vegetables, fruits, caloric and protein sources were negatively and significantly associated with their nutritional status. Worm infestation was negatively and significantly associated with the children's mid-arm circumference for age. The above findings indicated that household composition and sosio-economic status, late introduction of nutritious food and incidence of worm infestation were factors associated with malnutrition in the community. This is further complicated by poor dietary patterns which lack variety of food sources and inadequate food production.

C66 Food Neophobia and Nutritional Outcomes in Primary School-Children

Food Neophobia and Nutritional Outcomes in Primary School-Children

Zalilah MS, Khor GL, Mirnalini K, Sarina S

J Community Nutr 7: 121-129, 2005

Food neophobia, unwillingness to try novel foods, is a personality trait that can influence children's food preferences and consequently their food acceptance and consumption. The purpose of this study was to determine whether children with food neophobia have poor dietary and growth outcomes compared to non-neophobic children. Subjects were 332 primary school children from 6 randomly selected schools in the district of Hulu Selangor, Selangor. Parents and children were interviewed to obtain demographic, socio-economic, food neophobia and dietary intake information. The children were also measured for weights and heights. One-way ANOVA and Chi-square procedures were utilized for statistical data analysis. Children with food neophobia had higher intakes of energy and most nutrients than average and neophilic children. However, only the mean intakes of protein ($p < 0.05$), fat($p < 0.05$), vitamin A($p < 0.01$) and iron($p < 0.01$) were significantly higher in neophobic than average or neophilic children. Compared to neophilic and average groups, a higher percentage of neophobic children met 2/3 of the RNIs for energy (85.2%), protein (98.4%) and vitamin A (72.1%). Mean percentage of carbohydrate energy was lowest (54.8 ± 6.6%) while fat energy (31.8 ± 6.2%) %) was highest among neophobic children. Neophobic group had the lowest percentage of children (49.2%) with carbohydrate energy > 55% but highest percentage (50.8%) with fat energy > 30%. For the three study groups, the mean number of servings for all food groups, except grain and cereal, did not meet the Food Pyramid recommendations. Neophobic children consumed significantly more numbers of servings from the meat group than average and neophilic groups ($p < 0.01$). All study groups had relatively low mean dietary diversity scores but neophobic children had the lowest score (0.67 ± 0.73) compared to the average (0.97 ± 0.72) and neophilic (1.98 ± 0.81) groups. Significant difference in mean dietary diversity scores were only observed between neophobic and neophilic children ($p < 0.05$). Higher percentages of neo-phobic children had low weight-for-height and were at-risk of overweight ($p < 0.05$). Nutrition practitioners need to understand children's food preferences in their efforts to promote healthful diets for children. To improve children's eating behaviors, parents may need the guidance and support from nutritionists and dietitians that are specific to their needs and their child's situation.

C67 Indicators and nutritional outcomes of household food insecurity among a sample of rural Malaysian women

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Pakistan Journal of Nutrition 3 (1): 50-55, 2004

The objectives of this study were to determine the indicators and nutritional outcomes of household food insecurity among a sample of poor rural communities in Malaysia. The Radimer/Cornell Hunger and Food Insecurity Instrument was utilized to categorize food secure and insecure households. Demographic, socioeconomic, coping strategies and anthropometric information were collected through in depth interviews with Malay and Indian women (n=200). More than 50% of the households experienced some degree of food insecurity. In general, the food insecure households were characterized as living below poverty line and had larger household size, more children, school-going children and non-working mothers. For both households, major expenditures were on foods, utilities, child education, loans and transportation with food insecure households spending higher proportion of their incomes (97%) compared to food secure households (84%). While more than 50% of food insecure women were overweight (26%) and obese (30%), the percentages of overweight and obese among food secure women were 30 and 9%, respectively. Similarly, more food insecure women (40%) had at-risk waist circumference (> 88cm) than food secure women (29%). Overweight and abdominal adiposity among the women were associated with a number of independent variables such as women as housewives, women with more children, larger household size and food insecurity. However, after adjusting for factors that are related to body mass index and waist circumference, only food insecurity remained as a significant risk factor for overweigh and at-risk waist circumference. Although more validity tests are required, the findings demonstrated that the Radimer/Cornell Hunger and Food Insecurity Instrument has some validity to be utilized in Malaysian population. Given that obesity is an emerging public health concern in the developing nations, the findings that food insecurity is a risk factor for overweight must be further investigated.

C68 Food Security and child nutritional status among Orang Asli (Temuan) households in Hulu Langat, Selangor

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Med J Malaysia 57(1): 36-50, 2002

This study was conducted to determine the prevalence of household food insecurity and its potential risk factors and outcomes among the Orang Asli (Temuan) households. Socioeconomic, demographic and food security information of the

households and anthropometric measurements and dietary intake of preschoolers (n = 64) were obtained using a structured questionnaire. Food security was assessed using the Radimer/Cornell hunger and food insecurity instrument. Diet quality was based on 24 hour recall and analyzed according to the Malaysian RDA and Food Guide Pyramid. Majority of the households (82%) reported some kind of household food insecurity. The prevalence of significant underweight, stunting and wasting were 45.3%m 51.6% and 7.8%, respectively. Dietary intakes were less than 2/3 RDA levels for calories, calcium and iron. However, the intakes of protein, vitamin A, vitamin C and niacin exceeded the RDA and the sources for these nutrients were mainly rice, fish and green leafy vegetables. Among the five food groups, only the number of servings from cereals/cereal products/tubers group was achieved while that of the milk/dairy products was the worst. Majority of the children (68.7%) had poor, 31.3% had fair and none with excellent diet quality. In general, diet quality and nutritional status of the children decreased as household food insecurity worsened. It is recommended that the nutritional problems of Orang Asli children be addressed through health nutrition and economic programs and further studies should be carried out on determinants and consequences of household food insecurity.

C69 Daily energy intake from meals and afternoon snacks: Findings from the Malaysian Adults Nutrition Survey(MANS)

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Mal J Nutr 14(1): 41 - 55, 2008

Meal and snack patterns are associated with energy and nutrient intakes and consequently health and nutritional status. The aim of this paper is to describe the percentage of daily energy intake from meals and afternoon snack among Malaysian adults. The study included a representative sample of adults aged 18- 59 years (n=7349) from a nationwide Food Consumption Survey conducted by the Ministry of Health. Information on dietary intake was obtained using a one day 24-hour diet recall (24-HDR). Dietary data on 6886 adults were analysed using Nutritionist ProTM and statistical analysis was carried out using the SPSS 13.0. The median percentage of daily energy intake is reported only for adults consuming meals and afternoon tea and by socio-demographic characteristics as well as body mass index (BMI) status. More than 80% of Malaysian adults consumed morning meals, lunch and dinner and 54% reported having afternoon tea. The median

percentage of energy intake from morning meals, lunch, dinner and afternoon tea was 29.9%, 30.5%, 32.4% and 17%, respectively. There were variations in the median percentage of energy from meals and snacks according to the socio-demographic variables and BMI status. It is important to understand the eating patterns of Malaysians as the information can assist in efforts to address obesity and diet-related chronic diseases among adults.

C70 Assessment of food insecurity among low income households in Kuala Lumpur using the Radimer/Cornell Food Insecurity Instrument - A Validation Study

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Mal J Nutr 7(1&2): 15-32, 2001

Food insecurity exists whenever people are not able to access sufficient food at all times for an active and healthy life. This study used the Radimer/Cornell hunger and food insecurity instrument to assess food insecurity and to determine the risk factors and consequences of food insecurity among low-income households in Kuala Lumpur. One hundred and thirty-seven Malay pre-school children (4-6 years old) from Taman Sang Kancil were measured for their weights and heights. Questionnaires were used to collect food security and socioeconomic information on the households. The findings indicated that 34.3% of the households were food secure, while 65.7% experienced some kind of food insecurity, (27.7% households were food insecure, 10.9% individuals were food insecure and 27.0% fell into the child hunger category). The prevalence of underweight, stunting and wasting were 44.5%, 36.5% and 30.7% respectively. The prevalence of high weight-for-height (overweight) was 13.1%. Based on multinomial logistic regression, larger household size (OR=1.418; $p<0.01$) and lower educational level of mothers (OR=0.749; $p<0.01$) and fathers (OR=0.802; $p<0.05$) were found to be significant risk factors for food insecurity. The study, however, did not find any significant difference in children's nutritional status according to household food security levels. It is recommended that for the Malaysian population, the Radimer/Cornell hunger and food insecurity instrument should be modified and further validated with various ethnic groups in a variety of settings. The validation should include the appropriateness of the statements to the target grounds and their different risk factors and outcomes of food insecurity.

C71 Dietary intake, physical activity and energy expenditure of Malaysian adolescents

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Singapore Med J 47(6): 491-498, 2006

Introduction: Paediatric obesity is a public health concern worldwide as it can track into adulthood and increase the risk of adult morbidity and mortality. While the aetiology of obesity is multi-factorial, the roles of diet and physical activity are controversial. Thus, the purpose of this study was to report on the differences in energy intake, diet composition, time spent doing physical activity and energy expenditure among underweight (UW), normal weight (NW) and at-risk of overweight (OW) Malaysian adolescents (317 females and 301 males) aged 11-15 years.

Methods: This was a cross-sectional study with 6,555 adolescents measured for weights and heights for body mass index (BMI) categorisation. A total of 618 subjects were randomly selected from each BMI category according to gender. The subjects' dietary intake and physical activity were assessed using self-reported three-day food and activity records, respectively. Dietary intake components included total energy and macronutrient intakes. Energy expenditure was calculated as a sum of energy expended for basal metabolic rate and physical activity. Time spent (in minutes) in low, medium and high intensity activities was also calculated.

Results: The OW adolescents had the highest crude energy intake and energy expenditure. However, after adjusting for body weight, the OW subjects had the lowest energy intake and energy expenditure (p-value is less than 0.001). The study groups did not differ significantly in time spent for low, medium and high intensity activities. Macronutrient intakes differed significantly only among the girls where the OW group had the highest intakes compared to UW and NW groups (p-value is less than 0.05). All study groups had greater than 30 percent and less than 55 percent of energy intake from fat and carbohydrate, respectively.

Conclusion: The data suggested that a combination of low energy expenditure adjusted for body weight and high dietary fat intake may be associated with overweight and obesity among adolescents. To prevent overweight and obesity among children and adolescents, strategies that address eating behaviours and physical activity are required. Various segments of the society must be involved in efforts to promote healthful dietary intakes and active lifestyle in children and adolescents.

C72 Assessment of dietary intake among university students: 24-hour recall verses weighed record method

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Mal J Nutr 5:15-20, 1999

The purpose of this study was to assess the dietary intake of University Putra Malaysia students using the weighed record method and the 24 hourdietary recall method. The validity of the 24-hour recall method was studied by comparing it with the weighed record method. A total of 40 male and 25 female students age between 18-29 years volunteered to participate in this study. All the subjects were required to weigh and record the foods they ate for 1 day. Without prior knowledge of the purpose of the visit, the 24-hour recall was carried out the following day. The nutrients analysed were calorie, carbohydrates, protein, fat, calcium, iron, vitamin A and vitamin C. Comparisons of the nutrient intake between these two methods were determined. The paired t-test indicated no significant difference in group's mean nutrient intake between the weighed record method for all nutrients. The differences in group mean intake for all nutrients between weighed record and 24-hour recall method ranged from -3% to 3.6%. A total of 4 nutrients were underestimated, namely energy, protein, vitamin C and iron. The correlation coefficients showed a strong positive relationships between the two methods (ranged from $r = 0.88\text{-}0.98$, $p < 0.01$) for all of the nutrients analysed. In conclusion, the agreement between nutrient values from two different methods indicated that the 24 hour recall is a suitable method for the dietary assessment of university students.

MACRO AND MICRONUTRIENT EXCESSES AND DEFICIENCIES

D1 Supplementation with iron and deworming for mild and moderate anaemia in the elderly in Kelantan

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Mal. J. Med. Scien. 6(1): 57-60, 1999

Baseline survey showed that the prevalence of chronic energy deficiency, mild and moderate anaemia and helminthic infection were 36.6%, 33.2% and 57.3% respectively.An interventive (single blind) study by iron supplementation and deworming were given to the elderly with mild and moderate anaemia for 3 months. The subjects, N = 108, were divided into 4 groups. Group A was treated with iron supplementation, Group B by deworming, Group C with both iron supplementation and deworming, while Group D, as a control group was given placebo. The result showed that the effectiveness of the intervention (test minus placebo) for haemoglobin and haematocrit were: Iron supplementation (Group A), Haemoglobin 5.03 gm% (t=4.761, p= 0.0018), Haematoctrit 0.63 (t=2.830, p=0.0116). Deworming (Group B), Haemoglobin 1.40mg% (t=0.071, p=0.7900), Haematoctrit 0.41 (t=2.034, p=0.0554). Iron and Deworming (Group C), Haemoglobin 2.38gm% (t-3.606, p=0.0013), Haematoctrit 0.46 (t=3.114, p=0.0044). The result showed that iron supplementation and deworming had improved the level of haemoglobin and haematoctrit in elderly with borderline anaemia significantly.

D2 Thyroid function and pubertal development in malnutrition

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Ann Acad Med Singapore. 23(6): 852-855, 1994

Thyroid function and pubertal development of aborigines (Orang Asli) and Malays at different socioeconomic strata were assessed among 1136 subjects aged 7 years and above. Anthropometric measurements, goitre and pubertal staging were done. Serum thyroxine (T4), triiodothyronine (T3) and growth hormone were measured using radioimmunoassays (RIA) and serum thyroid stimulating hormone (TSH) by immunoradiometric assays (IRMA). It was found that serum T3 in children was significantly higher in Malays from rural areas, girls and children aged less than 13 years. However, in adults, T3 was significantly associated with anthropometric indices. On the contrary, serum T4 levels were higher among children from urban areas. In adults, serum T4 levels were significantly related to nutritional status and they increased according to the levels of social development, being lowest in remote areas and highest in urban areas. However, serum TSH levels were significantly

higher in Orang Asli at all ages and among malnourished children. By using multiple regression, apart from age, gender and ethnicity, nutritional status was a significant predictor for T3 levels in children and adults. Presence of goitre was an important factor which determined the T4 levels in children and adults after controlling for other factors. It was also a predictor for TSH levels in children but not in adults. Fasting serum growth hormone (GH) levels were significantly higher among less privileged groups and decreased according to social development. Serum growth hormone was negatively correlated with anthropometric indices and had a significant association with malnutrition.

D3 Prevalence and predictors of low serum retinol and hypoalbuminaemia among children in rural Peninsular Malaysia

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Royal Society of Tropical Medicine and Hygiene 101(12): 1233-1240, 2007

Vitamin A deficiency and malnutrition are still considered public health problems in rural areas of developing countries, including Malaysia. A cross-sectional exploration study was carried out on 281 Orang Asli (Aborigine) children aged between 2 and 15 years in Selangor, Malaysia. The overall prevalence of low serum retinol (<70μmol/l) and hypoalbuminaemia (<35g/l) were 25.2 and 7.8%, respectively. Univariate analysis showed that severe ascariasis, significant stunting and giardiasis were significantly associated with low concentration of serum retinol. As well as intestinal parasitic infections, low socio-economic status was a significant predictor of hypoalbuminaemia. Logistic regression analysis identified severe ascariasis and significant stunting as predictors of low serum retinol, while mixed intestinal parasitic infection and low household income were predictors of hypoalbuminaemia. In conclusion, control measures for intestinal parasitic infections should be included as one of the strategies for the prevention and control of malnutrition and vitamin A deficiency in this population.

D4 Anaemia and iron deficiency anaemia among aboriginal schoolchildren in rural Peninsular Malaysia: an update on a continuing problem

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Transactions of the Royal Society of Tropical Medicine and Hygiene, 102(10): 1046-1052, 2008

A cross-sectional study to determine the current prevalence of anaemia and iron deficiency anaemia (IDA) and to investigate the possible risk factors for IDA was carried out on 241 aboriginal schoolchildren (120 boys, 121 girls) aged 7-12 years and living in remote areas in Pos Betau, Pahang, Malaysia. Haemoglobin (Hb) level was measured and serum iron status was assessed by serum ferritin (SF), serum iron (SI) and total iron binding capacity measurements. Socioeconomic data were collected using pre-tested questionnaires. All children were screened for intestinal parasitic infections. Overall, 48.5% (95% CI 42.3-54.8) of children were anaemic (Hb < 12 g/dl). The prevalence of IDA was 34% (95% CI 28.3-40.2), which accounted for 70.1% of the anaemia cases. The prevalence of IDA was significantly higher in females than males. Low levels of mothers' education and low household income were identified as risk factors for IDA. Severe trichuriasis also found to be associated with low SF and SI. Logistic regression confirmed low levels of mothers' education and gender as significant risk factors for IDA. Improvement of socioeconomic status and health education together with periodic mass deworming should be included in public health strategies for the control and prevention of anaemia and IDA in this population.

D5 A study of prevalence of anaemia in adolescent girls and reproductive-age women in Kuala Lumpur

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Arch Med Sci 5(1): 63-68, 2009

Introduction: Anaemia is a common disorder of the haemopoietic system commonly found in the developing countries. The present study was undertaken to highlight the prevalence of anaemia in healthy adolescent girls and a reproductive-age group of adult women residing in an urban area. Material and methods: A total of 441 individuals comprising healthy, non-pregnant, non-lactating, reproductive-age women (aged 13 to 50 years) participated in the study. Informed consent was taken and the

individuals were screened for haemoglobin level. Anthropometric measurements including body weight and height were recorded. All statistical data were analyzed using the program Statistical Package for Social Sciences. Results: Mean body weight of adolescent girls (52.5 ±11.0 kg) was significantly lower ($p < 0.05$) than adult women (57.7 ±13.4 kg). Based on the body mass index (BMI) classification of the World Health Organization, the majority of adolescents (77.4%) and adults (50.7%) were classified as normal. Only a small proportion of adolescents (2.2%) and adults (16.1%) were classified as underweight. Mean value for haemoglobin of adolescents (12.6 ±0.9 g/dl) was significantly higher ($p < 0.001$) than adults (12.1 ±1.3 g/dl). Prevalence of anaemia amongst adults (41.7%) was higher than adolescents (28.3%). Nutrient intake of anaemic adolescents was lower than non-anaemic adolescents. Conclusions: The results highlight the prevalence of anaemia in adolescent girls and reproductive-age women which may be helpful in combating this common disorder in the urban population.

D6 The effect of milk supplementation on bone mineral density in postmenopausal Chinese women in Malaysia

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Osteoporos International 14(10): 828-834, 2003

Dietary studies often report low calcium intake amongst post-menopausal Malaysian women and calcium deficiency has been implicated as part of the etiology of age-related bone loss leading to osteoporosis.Therefore, the objective of this study was to examine the effectiveness of high calcium skimmed milk (Anlene Gold, New Zealand Milk, Wellington, New Zealand) to reduce bone loss in Chinese postmenopausal women. Two hundred subjects aged 55-65 years and who were more than 5 years postmenopausal were randomized to a milk group and control group. The milk group consumed 50 g of high calcium skimmed milk powder daily, which contained 1200 mg calcium (taken as two glasses of milk a day). The control group continued with their usual diet. Using repeated measures ANCOVA, the milk supplement was found to significantly reduce the percentage of bone loss at the total body compared to the control group at 24 months (control)1.04%, milk)0.13%; $P<0.001$). At the lumbar spine, the percentage of bone loss in the control group was significantly higher (-0.90%) when compared to the milk (-0.13%) supplemented group at 24 months ($P<0.05$). Similarly, milk supplementation reduced the percentage of bone loss at the femoral neck (control) 1.21%, milk 0.51%) ($P<0.01$) and total

hip (control) 2.17%, milk) 0.50%) (P<0.01). The supplemented group did not experience any significant weight gain over the 24 months. The serum 25-hydroxy vitamin D level improved significantly (P<0.01) from 69.1±16.1 nmol/l at baseline to 86.4±22.0 nmol/l at 24 months in the milk group. In conclusion, ingestion of high calcium skimmed milk was effective in reducing the rate of bone loss at clinically important lumbar spine and hip sites in postmenopausal Chinese women in Malaysia. Supplementing with milk had additional benefits of improving the serum 25-hydroxy vitamin D status of the subjects.

D7 The prevalence of endemic goitre in the Keningau Division of Sabah

Chen PC, Wong ML and Ong FP

Asia Pacific Journal of Public Health 3(1): 78-81, 1989

Four areas of differing remoteness were studied to determine the prevalence of goitre in the Keningau Division of Sabah. These areas were Keningau town, the Biah Resettlement Scheme, the Dalit subdistrict and the Pagalunggan subdistrict. The predominant ethnic group in these areas was the Murut. The overall endemicity of goitre for the study population was 76.5% for females aged 15 years and above. There was a significant correlation between the incidence of goitre and the remoteness of an area. The Dalit subdistrict had the highest incidence of goitre (82.6%) followed by the Pagalunggan subdistrict (77.8%), the majority of these goitre cases being classified as grade 2 (visible goitres). These were the two most remote areas in the study. In contrast, Keningau town, the least remote area had the lowest incidence of goitre (62.5%) with most of the goitres being relatively small. With regards to salt usage in the Dalit subdistrict, only 3.0% used iodised salt; 28.0% used fine salt; 3.6% used coarse salt and 65.5% used both fine and coarse salt. In the Pagalunggan subdistrict, all females used uniodised salt with 17.6% using fine salt, 20% using coarse salt and the remainder using both fine and coarse salt. As yet, there is no legislation for the iodisation of salt in Sabah. It is clear that all types of salt need to be iodised and adequately distributed to deprived areas, particularly inland areas.

D8 The prevalence of endemic goitre among Penans of the Baram

Chen PC and Yap SB

The Medical Journal of Malaysia 43(2): 159-161, 1988

A total of 253 Penan households from the Silat area, Ulu Baram and the Tutoh of the 4th Division, Sarawak were studied with regards to the prevalence of endemic goitre and the consumption of iodised salt. Of the 343 Penan women aged 15 years ans above who were examined, 60.6% had goitres. The serious nature of this, in the case of the Penans, is indicated by the fact that 39.3% of adult men have goitres. For both sexes, the remote Silat Penans had the highest rate of goitre

prevalence, followed by those from the less inaccessible Ulu Baram, while the more accessible Tutoh had the lowest rates. Only 10.7% of the Penan households interviewed consumed iodised salt, while the majority (73.0%) used rock salt. There is thus a need to revise legislation to require the iodization of all forms of salt including rock salt.

D9 Hookworm infection and protein-energy malnutrition: transverse evidence from two Malaysian ecological groups

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Trop Geogr Med. 42(1): 8-12, 1990

Anthropometric and parasitological data from cross-sectional studies of two groups of primary school children (Group I of Indian origin, 325 boys and 259 girls, age = 7 years; Group II of Malay origin, 284 boys and 335 girls, age = 7-9 years) from two different ecological settings in Peninsular Malaysia were examined for epidemiological evidence of an association between hookworm infection and protein-energy malnutrition. In both ecological groups, significant weight, height and haemoglobin deficits were observed in children with hookworm infection after adjustment for covariables including Ascaris and Trichuris infection intensities and other child and family characteristics. The deficits were related to the intensity of infection based on egg counts. These findings suggest that hookworm may be an important determinant of chronic protein-energy malnutrition, as well as anaemia, in areas where diets are generally inadequate in protein, energy, and iron. Well-controlled intervention studies are needed to confirm these observations.

D10 Iron status and dietary iron intake of adolescents from a rural community in Sabah, Malaysia

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Asia Pacific J Clin Nutr 13(1): 48-55, 2004

Iron deficiency anaemia (IDA) is the most prevalent micronutrient deficiency in the world affecting the general health and wellbeing of millions. In Malaysia, moderately high prevalences of anaemia have been reported amongst infants, young children and women of childbearing age. Data is scant for the adolescents. This study was undertaken to assess the iron status and dietary intake of 165 adolescents, comprising 74 male and 91 female subjects, aged 12 to 19 years, from the rural

communities in Tuaran District of Sabah, Malaysia. Convenience sampling was used for the selection of study subjects. Multiple iron status indicators namely, serum ferritin (SF), transferrin saturation (TS), mean corpuscular volume (MCV) and haemoglobin (Hb) were determined for the study. The mean age of the subjects was 15.2 ± 2.1 years. While the majority of the subjects (77.6%) had normal body mass index (BMI) values, 17.6% were underweight and 4.8% overweight. About 35% to 40% of the subjects showed deficient values for haematocrit, serum ferritin, serum iron, mean corpuscular haemoglobin (MCH), mean corpuscular volume (MCV) and transferrin saturation (TS), and 20% were anaemic (Hb <12 g/L). Using the multiple criteria of iron status indicators, the prevalence of iron depletion, iron deficiency and IDA in the male and female adolescents were 5.4% vs. 6.6%, 18.9% vs. 26.4% and 5.4% vs. 26.4%, respectively. Iron deficiency anaemia (85.0%) contributed largely to the prevalence of anaemia. The dietary iron intake of the adolescents was unsatisfactory, with approximately 98% of subjects failing to meet the Malaysian RDA level. Almost all the female subjects (91%) had dietary iron intake below two-thirds of the RDA level compared with a much smaller proportion for the male adolescents (68%). The prevalence of IDA in the present study population, especially in the female adolescents, appears to be a significant public health problem. Priority should therefore be given to the eradication of iron deficiency in adolescents from low-income areas by dietary modification and micronutrient supplementation amongst female adolescents.

D11 Low Vitamin D status has an adverse influence on bone mass, bone turnover, and muscle strength in Chinese adolescent girls

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Journal of Nutrition 139(5): 1002-1007, 2009

Our goal in this cross-sectional study was to investigate the influence of low-vitamin D status on bone mass, bone turnover, and muscle strength in 301 healthy Chinese adolescent girls. Blood plasma 25-hydroxyvitamin D [25(OH)D] was measured by RIA and plasma and urine biomarkers of bone turnover were measured. Bone mineral content (BMC) and density and bone area for the whole body and the distal and proximal forearm were measured by dual energy X-ray absorptiometry. When vitamin D deficiency was defined as a serum 25(OH)D concentration of 50 nmol/L and severe deficiency as <25 nmol/L, 57.8% of subjects were vitamin D deficient and 31.2% were severely deficient. Multivariate analysis shows that girls with adequate vitamin D status had higher size-adjusted BMC for the whole body ($P < 0.001$), distal forearm ($P < 0.001$), and proximal forearm ($P < 0.01$) than those with

poorer vitamin D status after adjusting for body size, handgrip strength, physical activity, and dietary intakes of calcium and vitamin D. Similar results were also found for handgrip muscle strength. Participants with adequate vitamin D status had significantly lower concentrations of bone alkaline phosphatase in plasma and deoxypyridinoline:creatinine ratio in urine compared with those of the vitamin D-deficient girls. Adolescent girls with adequate vitamin D status had significantly higher bone mass and muscle strength compared with those with poor vitamin D status. This may be attributed in part to a lower rate of bone remodeling with adequate vitamin D status. These findings suggest that adequate vitamin D status during adolescence is important for optimizing bone mass, which may lead to higher peak bone mass at maturity. Poor vitamin D status also compromises forearm muscle strength.

D12 Determinants of iron status in Malaysian adolescents from a rural community

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Int J Food Sci Nutr. 55(6):517-525, 2004

Iron deficiency anaemia is the most common micronutrient deficiency worldwide. The prevalence of anaemia in the developing countries is three to four times higher than that in the developed countries. The iron status was assessed in 199 apparently healthy male and female adolescents aged 12-19 years living in a fishing community in Sabah, Malaysia. Data on socio-economic characteristics, lifestyles, anthropometry measurements, iron status, and dietary intake were gathered. Dietary intake of energy, iron, and most nutrients (with the exception of protein and vitamin C) were below the recommended levels for Malaysian adolescents. Three-quarters of the iron was derived from plant foods. The mean haemoglobin value for the male was 13.9 +/- 1.3 g/dl with 9.5% having less than 12 g/dl, while the respective figures for the female were 12.4 +/- 1.6 g/dl and 28.6%. The mean serum ferritin concentrations for male and female adolescents were 21.5 and 15.4 microg/l, respectively; with 25.7% of the males and 49.5% of the females having deficient levels of ferritin. Dietary intake of total energy and iron, and gender were found to be independent determinants of serum ferritin and haemoglobin levels, accounting for over 40% of the variations for each of these iron indicators. In males, but not in females, the intake of dietary protein and iron, and physical activity were also found to be significant determinants of serum ferritin. The age of subjects and household size were significant determinants of haemoglobin levels for male subjects, but not for female subjects. The findings indicate the importance of adequate intake of energy and dietary iron for improving the iron status of adolescents.

D13 Prevalence of thiamine deficiency at a drug rehabilitation centre in Malaysia

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Med J Malaysia 61(5): 519-525, 2006

A possible outbreak of beriberi occurred at a drug detention and rehabilitation centre, Pusat Serenti Bukit Cabang, Perlis, Malaysia, in February 2004. This outbreak was identified following the presentation of a large number of inmates at a health centre with signs and symptoms of ankle oedema and shortness of breath. Further investigations revealed the death of three inmates at the General Hospital with similar clinical presentations during the period of October 2003 till February 2004. A cross-sectional comparative study was carried out at the rehabilitation centre to find out the prevalence of thiamine deficiency among the inmates both symptomatic and asymptomatic. A total of 154 inmates were examined (57 symptomatic and 97 asymptomatic cases). It was found that 74% from the sample study (114 cases) had thiamine deficiency (44 symptomatic and 70 asymptomatics). Further statistical analysis showed that ankle oedema is consistent with the diagnosis of thiamine deficiency but lack sensitivity ($p < 0.05$, sensitivity 24.6%, specificity 95%). This outbreak could have been triggered by poor diet intake of thiamine by the inmates coupled with possible intake of certain thiamine antagonists in their diet.

D14 Iron-deficiency anaemia and serum ferritin levels in Malaysian women

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Med J Malaysia. 41(4): 300-304, 1986

Serum ferritin and blood haemoglobin levels were studied in 229 women attending a family planning clinic. Ferritin values ranged from 2 to 438 μg/l and was skewed with an arithmetic mean of 41.8 and geometric mean of 23.4μg/l; 26.6% were iron-deficient (ferritin < 12 μg/l). Haemoglobin values were normally distributed with a mean of 11.7 g/dl but 59% were anaemic (Hb < 12g/dl). The correlation between ferritin and haemoglobin values was poor (r =0.147) but almost all women with a haemoglobin below 10 g/dl were iron deficient. This study reaffirms the need for monitoring iron-deficiency anaemia in apparently healthy women seeking contraception.

D15 Vitamin D status and its association with parathyroid hormone concentrations in women of child-bearing age living in Jakarta and Kuala Lumpur

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Eur J Clin Nutr. 62(3): 373-378, 2008

OBJECTIVE: To describe the vitamin D status of women living in two Asian cities,--Jakarta (6 degrees S) and Kuala-Lumpur (2 degrees N), to examine the association between plasma 25-hydroxyvitamin D and parathyroid hormone (PTH) concentrations, and to determine a threshold for plasma 25-hydroxyvitamin D above which there is no further suppression of PTH. Also, to determine whether dietary calcium intake influences the relationship between PTH and 25-hydroxyvitamin D. DESIGN: Cross-sectional. SETTING: Jakarta, Indonesia and Kuala Lumpur, Malaysia. PARTICIPANTS: A convenience sample of 504 non-pregnant women 18-40 years. MAIN MEASURES: Plasma 25-hydroxyvitamin D and PTH. RESULTS: The mean 25-hydroxyvitamin D concentration was 48 nmol/l. Less than 1% of women had a 25-hydroxyvitamin D concentration indicative of vitamin D deficiency (<17.5 nmol/l); whereas, over 60% of women had a 25-hydroxyvitamin D concentration indicative of insufficiency (<50 nmol/l). We estimate that 52 nmol/l was the threshold concentration for plasma 25-hydroxyvitamin D above which no further suppression of PTH occurred. Below and above this concentration the slopes of the regression lines were -0.18 (different from 0; P=0.003) and -0.01 (P=0.775), respectively. The relation between vitamin D status and parathyroid hormone concentration did not differ between women with low, medium or high calcium intakes (P=0.611); however, even in the highest tertile of calcium intake, mean calcium intake was only 657 mg/d. CONCLUSION: On the basis of maximal suppression of PTH we estimate an optimal 25-hydroxyvitamin D concentration of approximately 50 nmol/l. Many women had a 25-hydroxyvitamin D below this concentration and may benefit from improved vitamin D status.

D16 Red cell folate and predicted neural tube defect rate in three Asian cities

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Asia Pac J Clin Nutr.16(2): 269-273, 2007

Background: Periconceptional folic acid reduces neural tube defect (NTD) risk. Red blood cell folate concentration is inversely associated with NTD risk. In many countries there is a lack of information on NTD rates. Red cell folate status in women of childbearing age may be a surrogate for NTD rates and may be helpful in identifying countries or regions most likely to benefit from improved folate status. Objective: To predict NTD rates using red cell folate concentrations in women of childbearing age living in three Asian cities Design: Cross-sectional convenience samples of non-pregnant women living in Beijing (n=220), Kuala Lumpur (n=389), and Jakarta (n=129). Results: Red cell folate concentrations were highest ($p<0.001$) in women from Jakarta at 872 nmol/L (95% CI; 833, 910) followed by Kuala Lumpur at 674 nmol/L (95% CI: 644, 704) and lowest in Beijing at 563 nmol/L (95% CI: 524, 601). Accordingly, predicted NTD rates were highest in Beijing at 30/10000 (95% CI: 27, 33), followed by Kuala Lumpur at 24/10000 (95% CI: 22, 25), and lowest in Jakarta at 15/10000 (95% CI: 14, 15). Conclusion: Our red blood cell folate data suggests that of the three cities improving the folate status of women in Beijing would have the greatest impact on NTD rates.

D17 Haemoglobin level and iron status of orang asli in a malaria endemic area

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Sains Ma1aysiana 27: 31-37, 1998

Orang Asli (21 females, and 23 males, aged 16 - 53 years) at Pos Piah Sungai Siput, Perak have average haemoglobin levels at the lower end of the normal range (12.2 ± 1.1 g/100 ml in females and 13.9 ± 1.7 g/100 ml in males). To determine whether these values are due to a deficiency in iron, levels of iron in plasma and total iron binding capacity (TIBC) were measured. The average plasma iron levels were in the normal range, 113.8 ± 35.1 g/100 ml in females and 145.5 ± 54.2 μg/100 ml in males. The TIBC levels were also normal, (244.2 ± 76.5 g/100 ml in females and 284.6 ± 47.4 μg/100 ml in males) indicating that a deficiency in iron did not occur. Thus the low levels of haemoglobin in these subjects could be due to genetic factors such as haemoglobinopathy. Further investigations are being carried out to study the incidence of haemoglobinopathy in this malaria endemic area.

D18 Association of iron deficiency with or without anaemia and cognitive functions among primary school children in Malaysia

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Mal J Nutr 16(2): 67 - 76, 2010

Iron deficiency and anaemia affect millions of children worldwide. This study aimed to investigate the effect of iron deficiency with or without anaemia on cognitive functions, specifically with short-term memory, attention and visualmotor coordination in children. A total of 173 primary school children was enrolled. Cognitive functions were assessed using the Wechsler Intelligence Scale for Children. Three sub-tests were selected to assess processing speed (coding test), immediate auditory memory (digit span test) and visual processing and problem solving ability (maze test). The results showed significant correlation between age and coding test ($r = 0.38$, $p<0.001$), digit span test ($r = 0.16$, $p = 0.028$), and maze test scores ($r = 0.28$, $p<0.001$), and the total of the three cognitive function test scores ($r = 0.43$, $p <.001$). After age adjustment of the cognitive function tests, iron deficient children without anaemia scored significantly lower than the healthy children ($p<0.001$) on coding test, while iron deficient children with anaemia and iron deficient children without anaemia scored significantly lower ($p<0.001$) than the healthy counterparts on maze test. No significant differences were observed on digit-span score among the groups. This study confirms the negative effect of both iron deficiency and iron deficiency anaemia on processing speed and visual-motor coordination in children.

D19 Interindividual variation in circulating zinc concentrations among healthy adult men and women.

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Int J Food Sci Nutr. 47(5): 383-390, 1996

Circulating zinc concentrations were measured in 73 healthy adult males and females 19-52 years of age who were volunteers for eight different metabolic studies at the University of California, Berkeley. The interindividual variation in the eight studies varied from 5 to 20%; the global coefficient of variation for all studies was 12 +/- 7% (mean +/- SD). The analysis of a reference plasma sample on six different days showed a mean coefficient of variation of 3.8%. Thus, only a small portion of the intraindividual variation is due to day-to-day analytical differences. There was no relationship between circulating zinc concentrations and age, height, or body mass index. Nor were there any significant differences due to gender.

Information regarding dietary zinc and protein intakes was available from three-day weighed food intake records from 44 of the subjects. Plasma zinc concentrations were unrelated to the intake of either zinc or protein in those subjects. The results of this study show that the impact of age, gender, body size and dietary zinc or protein on circulating zinc concentrations are too small to be detected in the presence of the analytical and endogenous factors that influence plasma/serum zinc concentrations. Also, within a population of healthy adults, circulating zinc concentrations may vary by as much as 15%.

D20 Anemia and iron status of Malay women attending an antenatal clinic in Kubang Kerian, Kelantan, Malaysia

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Southeast Asian J Trop Med Public Health. 36(5): 1304-1307, 2005

The purpose of this study was to detect the frequency of iron deficiency anemia in women attending their first antenatal clinic at a Maternal and Child Health Clinic in Kubang Kerian, a district of Kelantan that is located on the East coast of Malaysia. A cross-sectional study was done over a two-month period and fifty-two Malay women were enrolled in this study. Red blood cell indices and serum ferritin were used as a screening tool for anemia and iron status. Eighteen patients (34.6%) were anemic. The majority were classified as having mild anemia (90%). Four of them had hypochromic microcytic anemia. Of 52 women, 7 had iron deficient erythropoiesis and 11 (61.1%) had iron deficient anemia. The prevalence of iron deficiency anemia in pregnant women was 21.2%, which is similar to other developing countries. The serum ferritin level was significantly associated with the hemoglobin level ($p=0.003$). Other red blood cell indices were not useful in predicting iron deficient erythropoiesis. It is important to detect iron deficient erythropoiesis during the first antenatal check-up, as it is an early manifestation of iron deficiency anemia. In conclusion, screening for iron deficient is recommended during first antenatal visit because iron deficiency anemia is still the leading cause of nutritional deficiency in pregnant women. This will initiate an early therapeutic intervention so as to reduce public health problem.

D21 The increasing importance of vitamin B12 deficiency as a contributing factor to anemia in Malaysia

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Southeast Asian J Trop Med Public Health. 25(3): 457-458, 1994

A comparative study was done to determine the profile of vitamin B12 and folate status in Malaysians during two different periods. For the period of 1987/88, we analysed a total of 9,162 cases (inpatients) referred for vitamin B12 estimation and 10,290 cases for folate estimation. We found that 2.6% were vitamin B12 deficient and 31.2% were folate deficient. For the period of 1992/93, of the 9,962 cases assayed, 8.2% were found to be vitamin B12 deficient whereas 7.6% of the 10,355 cases referred were folate deficient. Vitamin B12 and folate were assayed either using microbiological or radioassays. These findings indicate that there appears to be a change in the status of both vitamin B12 and folate over the five year interval.

D22 Energy requirements of Malaysian soldiers in a base camp

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Mal J Nutr 2: 168-174, 1996

The energy intake and expenditure of 20 healthy soldiers (mean age, 25 years, weight 61 kg and height 1.67 m) was assessed. Trained personnel stayed in the camp throughout the 5 weeks study period. Each soldier was subjected to a 7-day comprehensive protocol involving anthropometric, food intake, activity pattern and energy expenditure measurements. The mean change in body weight and fat content was minimal, -0.2kg and -0.25%, respectively. Body fat and BMI ranges from 10.0-21.6% and 19.8-24.9, respectively. The mean energy intake of 2190 ± 197 kcal was well below (81%) the recommended allowance of 2700 kcal for the Malaysian Armed Forces. The ration scale analysed chemically provides 2900 kcal thus suggesting a 24% wastage of daily ration. Contribution of protein (15%), fat (25%) and carbohydrate (60%) to energy intake appears to be in line to healthy dietary guidelines. Energy cost of standardised activities were found to be lower in Malaysian soldiers as compared to British soldiers studied under similar environment in the tropics. The mean total daily energy expenditure (TDEE) for soldiers were 2886 ± 222 kcal with a negative energy balance of about 700 kcal. The results suggested that there is a need to review the current provision with regard to food supply and preparation in army camps, to ensure that the menu provided are appealing as well as nutritious for the soldiers.

D23 Micronutrient status and intervention programs in Malaysia

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Food Nutr Bull. 26(2 Suppl 2): S281-S285, 2005

Approximately 70% of the world's malnourished children live in Asia, giving that region the highest concentration of childhood malnutrition worldwide. Prevalence of stunting and underweight are high especially in south Asia where one in every two preschool children is stunted. Iron-deficiency anemia affects 40%-50% of preschool and primary schoolchildren. Nearly half of all vitamin A deficiency and xerophthalmia in the world occurs in south and southeast Asia. Iodine deficiency disorders have resulted in high goiter rates in India, Pakistan, and parts of Indonesia. Compared with other developing countries in Asia, the nutrition situation in Malaysia is considerably better, owing to rapid economic and socioeconomic development that has occurred since Malaysia gained its independence in 1957. Prevalence of undernutrition and micronutrient deficiency is markedly lower in Malaysian children. Nonetheless, undernutrition in the form of underweight, stunting, and anemia can be found in poor communities throughout the country. A prevalence of 25% underweight and 35% stunting is reported among young children from poor rural households. Anemia and subclinical forms of vitamin A deficiency were reported in children under 5 years old. Typical of a country in nutrition transition, Malaysia faces the dual burden of malnutrition in children, with the persistence of under-nutrition problems especially among the poor and the emerging overweight problem especially in urban areas. Since 1996, nutrition programs of the government sector are coordinated under the National Plan of Action for Nutrition. These activities and other nutrition intervention efforts by other agencies are discussed in this paper.

D24 Micronutrient deficiency and its alleviation: The case of Malaysia

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Asia Pacific J Clin Nutr 11(Suppl.): S377-S381, 2002

Since attaining independence in 1957, Malaysia has achieved marked socio-economic development including advances made in the health care delivery system. Vital statistics over the decades showed much improvement in the health status of Malaysians in general. For example, the infant, toddler and maternal mortality rates have declined to levels reflective of developed countries namely, 9.5, 0.7 and 0.2 per 1,000 live births respectively in 1997. The nutritional status of Malaysians mirrors a society that is undergoing nutrition transition. Consequences of the dual

burden of under- and over-nutrition are evident in various age groups in rural and urban areas. Nutrition problems which persist include underweight and stunting in children, anaemia in young children, women and the elderly, iodine deficiency disorders in interior population groups in Sarawak and Sabah, folic acid deficiency among pregnant women, and subclinical retinol deficiency in young children. The Ministry of Health has played a pivotal role in implementing various nutrition intervention programmes towards the alleviation of these problems. These programmes will be elaborated.

D25 Iodine deficiency disorder in Sarawak, Malaysia

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Asia Pacific J Clin Nutr 7 (3/4): 256 - 261, 1998

The state of Sarawak in Malaysia has a high prevalence of iodine deficiency disorders (IDD). This has been revealed through a review of goitre surveys that were carried out in the State from the early 1970s to the 1990s. The primary cause was low iodine intake. Contributory factory were low iodine content in the soil and water as well as high cassava consumption. Virtual elimination of IDD is one of the nutritional goals of the IDD prevention and control program. The strategies adopted include the iodination of course salt, which is sold in the market by shopkeepers and also provided free from government health clinics; legislation requiring that salt sold in IDD-gazetted areas must be iodised; and the use of indicators used in the monitoring and evaluation of the program include the availability of iodised salt in the market and household, iodine levels in water supply that had been fitted with indicators, goitre volume measured by ultrasound, and urinary iodine excretion among school children.

D26 Serum folate concentration, cognitive impairment, and DNA damage among elderly individuals in Malaysia

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Nutr Res 29(5): 327-334, 2009

The notion that dietary factors affect cognitive function and subsequently the risk of dementia has increased over the years from a global viewpoint. Because low folate intake has been described to impair cognitive function, we tested the hypothesis that low serum folate concentration is associated with cognitive impairment and an attenuated increase in DNA damage. We investigated the relationship between serum folate concentration, cognitive impairment, and DNA damage among elderly people attending health clinics in Klang Valley, an urban area in Malaysia. Two hundred thirty-two participants, composed of 115 men (49.6%) and 117 women (50.4%), were involved; none of the patients were diagnosed with

neuropsychiatric problems, nor where they terminally ill. Sociodemography and health variables were assessed through face-to-face interview. Cognitive impairment review was conducted through an Elderly Cognitive Assessment Questionnaire. The estimation of dietary intake, serum folate concentration, and DNA damage was individually analyzed using validated Dietary History Questionnaires, immunoassay methods, and an Alkaline Comet Assay study (10 mL of peripheral venous blood), respectively. Results indicated that more men had cognitive impairment (33.0%) and DNA damage (27.0% for percentage DNA in tail, 22.6% tail moment) compared with women (25.6%, 15.4%, and 15.4%, respectively) ($P < .05$ for all parameters), recording an average folate deficiency value of 13.9% (0.2% higher than women). Multivariate binary logistic regression analysis outlined the association of cognitive impairment with older age (odds ratio [OR], 2.74; 95% confidence interval [CI], 1.35-5.57), smoking habits (OR, 5.12; 95% CI, 2.48-10.57), poor serum folate concentration (OR, 3.46; 95% CI, 1.26-9.52), and DNA damage (percentage DNA in tail) (OR, 13.70; 95% CI, 1.36-138.29). In conclusion, this study highlighted the important role of serum folate concentration for cognitive function and provided a concise picture regarding the elevated levels of oxidative DNA damage in peripheral lymphocytes.

D27 An evaluation of the effectiveness of water iodinator system to supply iodine to selected schools in Terengganu, Malaysia

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Tropical Biomedicine 23(2): 172-178, 2006

This is a cross-sectional study conducted from January to September 2004 in a group of school children aged 8 -10 years old. The schools and study subjects were selected using stratified systematic sampling technique. A total of 44 schools and 1100 subjects were selected from schools with iodinator and schools without iodinator. Samples collected were spot urine and drinking water. Dietary and iodised water consumption data were obtained from interviews. A total of 931 subjects (84.6%) responded; 558 (50.7%) from schools with iodinator and 373 (33.9%) from schools without iodinator. Results showed that in more than half (53.8%) of the schools with iodinators, mean water iodine level was below 25 µg/L. The study population in Terengganu was found to be mildly iodine deficient with an overall median urine iodine concentration (uIC) of 74 µg/L. Based on WHO criteria, 4.1% with uIC <20 µg/L (severe), 19.5% with uIC between 20-49 µg/L (moderate), 49.2% with uIC between 50-99 µg/L (mild) and 27.2% was iodine sufficient with uIC >100 µg/L. Majority of the study subjects were found to have high seafood intake (> 90%) and low in goitrogen food intake. This study suggests water iodinator system may not be a suitable method of supplying iodine and an alternative is needed in order to eradicate the iodine deficiency problem seen in some parts of Malaysia.

D28 Socioeconomic correlates of Iodine status among school children in Sarawak, Malaysia

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Asia Pac J Public Health 14(2): 110-117, 2002

Iodine deficiency is recognized as a public health problem. This paper assesses iodine status by socioeconomic factors in school children in Sarawak, East Malaysia. Kuching, Bau and Simunjan districts were chosen based on advice from the Sarawak's Medical and Health Authority. 803 school children, aged eight years; were selected from 19 schools via proportionate systematic sampling. About half the proportion of the school children were from Kuching, 24% from Simunjan and 22% from Bau. Almost all were equally distributed by sex. By mother's race, almost half were Malays, followed by Bidayuh, Iban, Chinese and other races. Mean urinary iodine concentration was 3.36 μg/ 100ml, mean creatinine level was 111.10 mg/100ml and mean creatinine/iodine ratio was 39.45 μg/ gram. Four female children (0.5%) were found to have enlarged thyroid. Urinary iodine levels were significantly different by district, mother's race and household income. It was highest in Kuching, among children with Malay mothers, and with household incomes more than RM500 per month. Conversely, it was lowest in Bau, among children of Iban/Dayak and Chinese mothers, and incomes of RM500 or less per month. Based on the WHO/UNICEF/ICCIDD classification, the Sarawak school children in the present study fall into the moderate IDD category. The low prevalence of goitre is a positive finding indicating that iodine deficiency is corrected over time.

D29 The prevalence of endemic goitre in Kelantan, Malaysia

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Med J Malaysia 48(1): 64-70, 1993

A large-scale study was undertaken in the Sate of Kelantan, to determine the prevalence of goitre. A total of 2,450 subjects above the age of 15 years were selected from 31 localities in the state and examination for goitre was done using the technique of Perez. The state was divided into 3 areas - coastal area (area 1), inland area (area 2) and the area in between the coast and the inland area (area 3). The overall prevalence of goitre was 36.8% and the prevalence in areas 1, 2

and 3 were 23.0%, 35.9% and 44.9% respectively and ranged from 6.9% in a locality in area 1 to 59.7% in a locality in area 3. In all areas, the prevalence was higher in females than in males. The prevalence of grades I, II and III goitres were 21.5%, 1.0% and 0.5% respectively in area 1, 33.6%, 1.5% and 0.7% respectively in area 2 and 41.7%, 2.2% and 1.0% respectively in area 3. Amongst age groups, goitre prevalence was highest in the 36 to 45 years age group in area 1 (33.9%), in the 15 to 25 years age group in area 2 (39.6%) and in the 26 to 35 years group in area 3 (54.3%). In all the areas, goitre prevalence was lowest in the above 56 years age group. We concluded that the prevalence of goitre was high in Kelantan and there were regional differences in the prevalence rate within the state.

D30 Selenium: more than just a micronutrient mineral

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Mal J Nutr 13(1): 101-107, 2007

Selenium is a micronutrient mineral found mainly in soils. Studies on selenium have increased rapidly worldwide especially after it has been shown to reduce the risk of certain types of cancer in humans and animals. The exact mechanism of action on how selenium inhibits diseases, in particular cancer, is still unknown. To date, the use of selenium in preventing or treating diseases is limited. However, many aspects about the biochemistry of selenium have been identified. This article reviews a number of key clinical, experimental and epidemiological studies on selenium as an anti-carcinogenic agent for some types of cancers. Some nutritional information on selenium and its recommended intake are also included. More clinical and experimental studies are needed to confirm previous findings on the role of selenium as an anticarcinogenic agent.

D31 Dietary fat and fibre intakes of Malaysian adults: issues and implications when 'western targets' are set as dietary goals

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Mal J Nutr 3: 137-147, 1997

This article examines the fat and fibre intakes of Malaysian adults and highlights discrepancies and practical limitations if these intakes are to match the levels for these nutrients advocated in the World Health Organisation (WHO) and American Heart Association (AHA) 'diet models'. Local data on food consumption showed

that the total fat intakes amongst Malaysian adults, contrary to common perception, were not high and the mean values obtained fell within the range of 40-66g or 22-26% kcal. As such, the dietary target of 30% kcal total fat or its intermediate target of 30-35% kcal, advocated by WHO and AHA mainly to address the problem of a high consumption of dietary fats in western populations, should not be adopted indiscriminately by Malaysians. Dietary fatty acid (FA) analysis by high performance liquid chromatography (HPLC) coupled with the use of food composition tables, showed that the typical Malaysian diet prepared with palm olein or palm olein-groundnut oil blends as cooking oil contained 3.2-4.0% kcal polyunsaturated fatty acids (PUFA), mainly as the w-6 linoleic acid, which is also the predominant essential fatty acid (EFA) in humans. This level of linoleic acid, with an ?-6/ ?--3 FA ratio approximating 10, is adequate for basal PUPA and EFA needs but fell short of the 4-10% kcal linoleic acid recommended by WHO (1993) to counter the effects of the cholesterol-raising saturated fatty acids (SFA). This raised upper limit of 10% kcal linoleic acid (previously 7% kcal), which equals the level of PUFA implied in the AHA diet model, appears unnecessarily high considering that the cholesterol-lowering potential of linoleic acid is maximum at about 6% kcal, while the health hazards associated with long-term high intakes of PUPA have never been completely dismissed. The new WHO lower limit for dietary linoleic acid (4% kcal) would have a controversial impact of raising the previous minimal 3% kcal EFA to above 4% kcal (linoleic + alpha-linolenic acids). Similarly, the WHO recommendation for total dietary fibre of 27-40g (equivalent to a daily combined intake of 400g of vegetables and fruits, 30g of which should come from pulses) appears at present, too high a dietary target for the average Malaysian adult whose habitual daily diet was estimated to contain about 180g of vegetables plus fruits, providing only about 13-16g total dietary fibre. Appropriately, an expert panel on Malaysian Dietary Guidelines has recommended instead, 20-30% kcal total fat containing 3-7% kcal PUFA, and 20-30g total dietary fibre for the local population.

D32 Towards improved fat intake and nutrition for Malaysians

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Mal J Nutr 1: 21-30, 1995

An examination of the fat composition of the diet of a Malaysian urban hostel population obtained by chemical analysis of representative meals prepared by a 7-day rotation menu, revealed both nutritional attributes and limitations when compared against the dietary messages contained in the American Heart Association (AHA) and World Health Organisation (WHO) models. The Malaysian diet supplies 26% kcal i.e. 66 g total fat (51 g vegetable fats, 15 g animal fats) and contains <300 mg cholesterol, which are below the upper limits for these dietary constituents in the AHA and WHO models and conflicts with the perception that Malaysians in general, may be consuming too much fat and cholesterol. The supply of essential

fatty acids (EFA), however, appears sub-optimal at 3.2% kcal mainly due to the comparatively low content of both the omega-6 (linoleic acid) and omega-3 [alphalinolenic, eicosapentaenoate (EPA) and docosahexaenoate (DHA)] fatty acids in the Malaysian diet. The estimated omega-6/omega-3 fatty acid ratio of 10 further reflects an imbalance of these two families of polyunsaturated fatty acids (PUFA), which can be corrected to a ratio of 5 to 7 by moderate increases in the consumption of fish, soyabeanbased foods, and pulses and nuts. Considering the current status of knowledge on the health effects of the different families of fatty acids, the ratio of 2:3:1 for the saturated fatty acids (SFA), monounsaturated fatty acids (MUFA) and PUFA in the diet is judged to improve fat intake and nutrition in Malaysians. Such a dietary fatty acids ratio can be satisfied by the use of a cooking oil containing 28% SFA, 53% MUFA, and 19% PUFA, which may obtained by the judicious blending of palm olein with MUFA-rich and PUFA-rich vegetable oils. Alternatively, moderate increases in the consumption of marine fish, pulses, nuts, soybeanbased foods and their products would also serve the same end.

D33 Ocular manifestation of vitamin A deficiency among Orang Asli (Aborigine) children in Malaysia

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Asia Pacific J Clin Nutr 11(2): 88-91, 2002

This study determined the prevalence of ocular manifestation of vitamin A deficiency in Orang Asli (Aborigine) children. Night blindness was found in 16.0% of the children, conjunctiva xerosis in 57.3%, Bitot's spot in 2.8%, corneal xerosis in 0.5% and corneal scars in 5.6%. These findings show that history of night blindness had sensitivity, specificity and predictive value (positive) of 47.2, 98.1 and 96.2%, respectively, compared with the standard diagnosis procedure using luxometer readings.

D34 Protein energy malnutrition, thyroid hormones and goitre among Malaysian Aborigines and Malays

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Asia Pacific J Clin Nutr 1: 13-20, 1992

The relationship between malnutrition, goitre and thyroid hormones was studied among Aborigines and Malays in Ulu Langat, Malaysia. Fifty Aborigines aged 27 years were selected randomly for anthropometric, clinical and hormonal assessment. Fifty Malays of similar age from the nearby Malay village were chosen as controls. The Aborigines had a higher prevalence of malnutrition and goitre compared to the Malays. The prevalence of goitre was 26.5% amongst Aborigines and 19.6% among the Malays. All the nutritional indexes measured were significantly different between the two communities, especially among females. The differences corresponded to significant differences in levels of thyroid-stimulating hormone (TSH) measured using a highly sensitive TSH assay. By univariate analysis the increase in TSH corresponded to the decrease in body mass index (BMI). On the other hand, no association was found between BMI and goitres. No thyroid autoantibodies were detected and all subjects were clinically euthyroid and had normal thyroxine and triidothyronine levels. However, consumption of cassava conferred a four-fold risk of developing goitres. The high prevalence of goitres in malnourished subjects in this region which is not known to be iodine deficient could be due to cassava consumption.

D35 Iodine content in drinking water not an important determinant of endemic goitre

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Asia Pacific J Clin Nutr 2: 115-118, 1993

The prevalence of goitre was determined in several communities in rural parts of Pahang. Urine specimens were collected randomly among the participants. Drinking water from various sources such as river and spring, and water from gravity feed systems was also collected to determine the iodine content by using the ashing method. The results were compared to that of Kuala Lumpur City. lt was found that the prevalence of goitre in rural areas was between 20 and 70% depending on village, ethnic group, age and gender. The interior parts of the jungle where Aborigines lived was moderately endemic with goitre prevalence of goitre more than 20% and urinary iodine content 2.0-5.0 µg I/dl). A nearby Malay traditional

village which was studied had mild endemia (prevalence 10-30% and urinary iodine content 5.0-10.0 μg I/dl) while a Felda Malay resettlement scheme and Kuala Lumpur City did not have endemic goitre. Endemic goitre in rural areas was associated with low iodine content in drinking water. Even though Kuala Lumpur had low iodine content in its drinking water there was no endemic goitre, indicating that other factors were more important.

D36 The prevalence of goitre in remote inland versus coastal areas

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Med J Malaysia 50(3): 256-262, 1995

The study was conducted to compare the prevalence of goitre among Malays and Aborigines in remote inland rural areas to those in coastal areas. All subjects were examined thoroughly by an experienced endocrinology for the presence of goitre. The overall goitre prevalence in coastal areas was 6.3%, 6.0% (4/67) of Aborigines and 6.7% (4/60) of Malays were affected. However, in remote inland areas, the prevalence of goitre was almost 5 times higher compared to coastal areas. The prevalence of goitre was 30.7% in Baling; 30.2% (19/63) Aborigines and 30.8% (92/299) Malays were affected. Iodine deficiency is the most likely cause for the high prevalence of goitre in the remote inland areas.

D37 Levels of thyroxine, TSH, thyroid volume and mental performance among Orang Asli in selected settlements in Malaysia

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Department of Community Health, Medical Faculty, Universiti Kebangsaari, Kuala Lumpur, Malasyia.

East Afr Med J. 73(4): 259-263, 1996

A significant difference in the levels of thyroxine (T4), thyroid stimulating hormone (TSH) and thyroid volume among settlements at various selected Orang Asli locations is reported. The levels improved according to the level of socio-economic development. No significant difference was found in mental performance by location.

D38 Serum thyroid stimulating hormone (TSH) in malnutrition: preliminary results

Osman A, Khalid BAK, Tan TT, Wan Nazaimoon WM, Wu LL, Ng ML

Singapore Med J 34 (3): 225-228, 1993

This is a report of a cross sectional study involving 3 groups of children, moderately malnourished (BMI < 15), mildly malnourished (BMI 15-18) and well nourished (BMI > 18) to determine the differences in hormonal and biochemical parameters between the groups. The children were of age range from 7-17 years old. The children were from the same area with exposure to the same food, drinking water and environment. There were significant differences in the nutritional indices between the three groups. No differences were observed in levels of triiodothyronine (T3), thyroxine (T4) and T3:T4 ratio. Significant difference however was found in the TSH levels using highly sensitive IRMA TSH assays. Moderately malnourished children had higher TSH levels ($p < 0.05$) compared to mildly malnourished and well-nourished children. No difference was found between the mildly malnourished and well-nourished groups. There were no significant differences in serum cortisols done at similar times, fasting growth hormone and calcium. Serum alanine transminase (ALT) however was higher in moderately malnourished than in well-nourished children. Thus using highly sensitive IRMA TSH assays, we were able to detect differences in TSH levels even though T3, T4 and T3:T4 ratio, cortisol, growth hormone and calcium were normal, implying in moderately malnourished children, a higher TSH drive to maintain euthyroid state.

D39 Iodine deficiency status and iodised salt consumption in Malaysia: findings from a national iodine deficiency disorders survey

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Asia Pac J Clin Nutr 2010;19 (4):578-585

A nationwide cross-sectional school-based survey was undertaken among children aged 8-10 years old to determine the current iodine deficiency status in the country. Determination of urinary iodine (UI) and palpation of the thyroid gland were carried out among 18,012 and 18,078 children respectively while iodine test of the salt samples was done using Rapid Test Kits and the iodometric method. The results showed that based on WHO/ICCIDD/UNICEF criteria, the national median UI was 109 µg/L [25th, 75th percentile (67, 166)] showing borderline adequacy. The overall national prevalence of iodine deficiency disorders (IDD) with UI<100 µg/L was 48.2% (95% CI: 46.0, 50.4), higher among children residing in rural areas than in urban areas. The highest prevalence of UI<100 µg/L was noted among the aborigines [(81.4% (95% CI: 75.1, 86.4)]. The national total goiter rate (grade 1 and grade 2 goitre) was 2.1%. Of 17,888 salt samples brought by the school children, 28.2% (95% CI: 26.4, 30.2) were found to have iodine content.

However, the overall proportion of the households in Malaysia using adequately iodised salt as recommended by Malaysian Food Act 1983 of 20-30 ppm was only 6.8% –(95% CI: 5.1, 9.0). In conclusion, although a goitre endemic was not present in Malaysia, almost half of the states in Peninsular Malaysia still have large proportion of UI level <100 µg/L and warrant immediate action. The findings of this survey suggest that there is a need for review on the current approach of the national IDD prevention and control programme.

D40 Vitamin D status among postmenopausal Malaysian women

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Asia Pac J Clin Nutr 13 (3): 255-260, 2004

Serum levels of 25-hydroxyvitamin D (25 (OH) D) were determined in 276 (103 Malays and 173 Chinese) postmenopausal women, aged 50 to 65 years. The level of 25 (OH) D was significantly lower in the postmenopausal Malay women (44.4 ± 10.6 nmol/L) compared to the Chinese women (68.8 ± 15.7 nmol/L) (P<0.05). There were 27% Malay women with serum 25 (OH) D in the range of 50 - 100 nmol/L (defined as lowered vitamin D status, or hypovitaminosis D) and 71% with levels in the range of 25 - 50 nmol/L (defined as vitamin D insufficiency) compared to 87% and 11% Chinese women respectively. Serum 25 (OH) D was found to significantly correlate with BMI, fat mass and PTH level. Multivariate analyses showed that race has a strong association with vitamin D status. The high prevalence of inadequate levels of serum vitamin D found in our study may have important public health consequences and warrants the development of a strategy to correct this problem in the older adult Malaysian population.

D41 Anaemia and cognitive function among Chinese elderly in old folks homes

Suzana S, Lee XK, Siti Balkis B, Mokhtar AB, Nor Aini U and Junara MH

Jurnal Sains Kesihatan Malaysia, Jilid 3 (1) 2005

The relationship between anaemia and cognitive function was evaluated among 35 Chinese elderly (24 men and 11 women) aged 60 to 85 years (mean age 70.1 ± 6.7 years) from five old folks homes in Klang Valley. They were interviewed to obtain information on social and health status, habitual dietary intake and cognitive function. Hodkinson's Abbreviated Mental Test was used to measure the cognitive function. Haematological indices which included Full Blood Count (FBC), serum iron, serum ferritin, Total Iron Binding Capacity (TIBC), serum folate and serum cobalamine (vitamin B12) were measured using an automated analyzer. Anthropometric measurements and clinical signs of anaemia were also examined. The findings indicated that the prevalence of anaemia as assessed using haemoglobin alone was 22.9%, while iron deficiency anaemia based on low serum iron, microcytic and hypochromic criterion was detected among 5.7% of the sample. Subclinical folate and vitamin B12 deficiencies were diagnosed among 34.3% and 8.6% of the subjects. However, there was no occurrence of megaloblastic anaemia. There was a positive correlation between cognitive score with mid upper arm circumference (MUAC) (r=0.547, p<0.01) and body mass index (BMI) (r=0.501,

$p < 0.01$). All subjects with low haemoglobin and serum iron and approximately three quarter of subjects with folate and vitamin B12 deficiencies were classified as having cognitive impairment. In conclusion, subclinical malnutrition and anaemia may play a role in the deterioration of cognitive function in the elderly.

D42 Survey of Availability of Iodine-Enriched Salt in Sarawak

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Med J Malaysia 50(4): 391-395, 1995

Three hundred and forty-five salt samples were randomly taken from 106 sources where iodized salts were supplied or put for sale in all areas gazetted as endemic goitre areas in Sarawak. The samples were analyzed for the presence of iodine. In areas in Sibu, Sarikei and Kapit Divisions, 53-70% of salt put for sale was iodized while in the other 6 Divisions, it was less than 27%. As iodination of salt is an interventive measure in addressing goitre problem in the State, regular monitoring of iodination facilities and iodine content of iodized salt in the affected areas is important to ensure the effectiveness of the programme.

D43 Carotenoids and retinoids in human nutrition

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Crit Rev Food Sci Nutr. 31(1-2): 103-163, 1992

Since the discovery of vitamin A as a fat-soluble growth factor in the early part of the century, research into carotenoids and retinoids has attracted the attention of many scientists. These two groups of compounds are still being actively studied all over the world since many gaps in knowledge exist and new frontiers are being pursued. Recent developments in studies into the possible roles of carotenoids and retinoids beyond their classical functions in vision have created a great deal of excitement in the biomedical community. This review covers a wide range of topics pertaining to these two closely related compounds. Particular emphasis is given to the functions of these compounds and their roles in human nutrition. Various aspects of vitamin A deficiency and studies on carotenoids and retinoids in cancer development and prevention are reviewed in some detail.

D44 School-administered weekly iron-folate supplements improve hemoglobin and ferritin concentrations in Malaysian adolescent girls

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Am J Clin Nutr 69(6): 1249-1256, 1999

Background: Iron deficiency and its consequent anemia constitute the commonest micronutrient deficiency in the world. Objective: We investigated whether long-term, weekly iron folate supplements administered at school would improve haemoglobin and ferritin concentrations in adolescent girls, including those with mild-to-moderate anemia and hemoglobin concentrations indicating borderline anemia. Design: Subjects were 266 girls with hemoglobin concentrations of 80-119.9 g/L (group A) and 358 girls with hemoglobin concentrations of 120-130 g/L (group B) who were otherwise healthy. Two hundred sixty-six girls in group A and 268 girls in group B were randomly assigned to receive either 60 or 120 mg Fe plus 3.5 mg folic acid weekly for 22 wk. Ninety of the girls in group B were randomly assigned to receive only 5 mg folic acid weekly. Capillary hemoglobin and plasma ferritin were measured at baseline and after 12 and 22 wk of supplementation. Results: By the end of the study, 2% of the girls had dropped out and > 96% had taken ^{3}20 of the 22 tablets; side effects were minimal. Mean plasma ferritin increased significantly in all iron-supplemented groups, independently of initial hemoglobin values and iron doses. Ferritin concentrations decreased in the girls supplemented with folic acid only. As expected, hemoglobin responses to iron were higher in group A than in group B and increases were positively correlated with initial plasma ferritin. Hemoglobin failed to respond to folate supplementation if initial plasma ferritin concentrations were low. Mean hemoglobin increased significantly and consistently in relation to the length of treatment. Conclusion: Long-term, weekly iron-folate supplementation was found to be a practical, safe, effective, and inexpensive method for improving iron nutrition in adolescent schoolgirls.

D45 Kandungan makronutrien di dalam makanan yang terdapat di kantin sekolah rendah

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Mal J Nutr 2: 67-77, 1996

Tiga buah sekolah rendah yang mempunyai corak pengendalian makanan yang berbeza di Kuala Selangor telah dipilih untuk kajian. Semua contoh makanan yang disediakan semasa lima hari persekolahan telah diambil dan dianalisa kandungan kalori, protein, lemak dan karbohidrat. Kebanyakan daripada makanan yang disediakan adalah berasaskan nasi seperti nasi lemak, nasi ayam, mee dan kuih-kuih tradisional. Kandungan kalori dan protein per hidangan makanan adalah masing-masing di antara julat 77-274 kcal dan 0.9-3.6 g. Makanan yang disediakan di bawah Rancangan Makanan Tambahan mengandungi kalori yang lebih tinggi berbanding dengan makanan yang dijual di kantin sekolah. Walau bagaimanapun kandungan protein dan kalori masih rendah berbanding dengan yang disarankan oleh Kementerian Pendidikan Malaysia, yang mana berdasarkan menu sepatutnya menyediakan sekurang-kurangnya 10 g protein dan 290-390 kcal. Peratus sumbangan tenaga daripada protein di dalam makanan yang disediakan di kantin sekolah juga adalah lebih rendah daripada yang disarankan.

D46 A study of the prevalence of endemic goitre in an inland Iban Community, Sarawak

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The Med J Malaysia 40(3): 243-246, 1985

Eight longhouses were selected randomly for a goitre survey in the Entabai area of the 6th Division, Sarawak. A total of 645 subjects were examined and a goitre prevalence of 46.4% was found for subjects 15 years and above.. The females had a higher rate of 69.5% as compared with their male counterparts with 24.4%. Below the age of 15 years, prevalence was low and there was not much difference between the two sexes. After the age of 15 years, the prevalence among the females increased from 40% to almost 80% by the age of 25 years. The males, on the other hand, showed a decrease in prevalence after the age of 15 years and levelled off at about 30%. The females also had much larger goitres than males. About 43% of the households surveyed consumed iodised salt but the rates tend to fluctuate according to supplies. There was however no direct correlation between goitre prevalence and consumption of iodised salt.

D47 Epidemiology of aplastic anaemia in the State of Sabah, Malaysia

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Med J Malaysia 53(1): 59-62, 1998

Aplastic anaemia is a rare disease which is more prevalent in the Far East. In Malaysia, it appears to be unusually common in the state of Sabah. A retrospective analysis of all cases of aplastic anaemia diagnosed between January 1993 and March 1996 was undertaken. The criteria of the International Aplastic Anaemia and Agranulocytosis Study (IAAAS) were used. In this 39 month period, 31 cases were confirmed by marrow trephine biopsy to be aplastic anaemia. The male-to-female ratio was 3:4. Median age of diagnosis was 23 years. There were 24 patients (77%) who were from the Kadazan-Dusun ethnic group, which forms 18% of the population of Sabah. The incidence of aplastic anaemia in Sabah appears to be higher than that reported elsewhere in the Far East, at 4.8 per million population per year. Peak incidence is in the elderly group at 8.6 per million followed by a second peak in young people aged 15 to 24 (7.9 per million). The aplastic anaemia to total acute leukaemia ratio is 0.37. The marked male preponderance and apparent susceptibility of the Kadazan-Dusun people are also notable. A further prospective study to address the true incidence of aplastic anaemia and possible aetiologic factors accounting for these observations is necessary.

D48 Effect of iodized oil supplementation on thyroid hormone levels and mental performance among Orang Asli schoolchildren and pregnant mothers in an endemic goitre area in Peninsular Malaysia

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Asia Pacific J Clin Nutr 9(4): 274-281, 2000

Although endemic goitre is no longer a major public health problem in Malaysia, iodine deficiency still remains a significant problem in a few remote settlements. The aim of this study was to determine the effectiveness of iodized oil intervention in the prevention of endemic goitre among the indigenous people in Malaysia. A pretest and post-test controlled trial was conducted among primary schoolchildren and pregnant mothers in Lasah, Sungai Siput and Perak. Legap Post and Yum Post were selected as the intervention areas, while Perwor Post and Poi Post were taken as controls. The variables studied included thyroid hormone concentrations, thyroid volume, urinary iodine excretions and mental performance. A baseline and two

follow-up visits were conducted in both intervention and control areas. Intervention subjects were given iodized oil in the form of capsules which were taken orally (Laboratoire Guerbet, Paris, France). There was a significant increase in serum thyroxine hormone (T4) concentrations ($P < 0.0001$) and a significant decrease in thyroid stimulating hormone (TSH) concentrations ($P < 0.05$) in the schoolchildren following the intervention, however, pregnant mothers did not show any significant changes in T4 and TSH concentrations. Thyroid size was significantly reduced in both groups ($P < 0.05$). Urinary iodine excretions showed a significant increase in both groups following the intervention ($P < 0.01$). However, mental performance in schoolchildren was not affected. In conclusion, iodized oil (oral) is effective in reducing thyroid size, as well as improving the supply of iodine among schoolchildren and pregnant mothers in endemic goitre areas; however, its long-term effects need to be monitored closely. This method can be considered as an alternative while awaiting national coverage for the salt iodization program.

D49 Micronutrients and its correlation with mental performance among schoolchildren in Bario, Sarawak : a preliminary study

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Med J Malaysia 58(3): 309-319, 2003

Children who are born in a community with insufficient micronutrients, particularly iodine, in remote rural areas are associated with low intellectual functions and mental retardation. The aim of this crosssectional study is to determine the mental performance of the schoolchildren in Bario, a highland settlement of the Kelabit people in the district of Baram, Sarawak, and to determine its correlation with the availability of iodine in the environment, as well as other micronutrients such as selenium, copper and manganese. A total of 25 schoolchildren in Bario, age ranging from 7 to 12 years old participated in the study. Mental performance of the schoolchildren were tested using TONI-2 (Test of Non-verbal Intelligence -second edition), a cognitive ability measures with a response format which eliminates language and reduces motoric and cultural factors. The iodine levels from several wells, soils and salt found in Bario were determined using HPLC (software version 3.05.01), whilst serum levels of selenium, copper and manganese were measured using Graphite Furnace Atomic Absorption Spectrophotometer (GFAAS). The results showed that the median and mode scores of intelligence percentile were 11.0 and 5.0 respectively. The maximum score achieved were at the 'average' level with the quotient score between 90-110. It was found that salt produced from one of the

wells in Bario contained high quantity of iodine. Based on standards established by the Trace Elements Laboratory, Roben Institute, University of Surrey, United Kingdom, schoolchildren in Bario are having sufficient blood levels of copper and a high selenium and manganese levels. Despite the remoteness of the study area, the schoolchildren in Bario, Sarawak, showed higher mental performance compared to other isolated areas. This is probably correlated with the high micronutrients availability, particularly iodine, found naturally in Bario.

D50 Goitre prevalence and mental performance amongst the Aborigines in Sinderut, Pahang

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Sains Ma1aysiana 25(2): 51-58, 1996

Goitre prevalence and mental performance were determined amongst the Aborigines in Sinderut, a remote rural area in Pahang. A total of 196 subjects aged 4 to 60 years old were selected for study. Goitre status was determined by an experienced endocrinologist using classification suggested by World Health Organization; while mental performance was measured using Raven's test (Oxford Psychologists Press). Blood specimen was also taken for thyroxine (T4) and thyroid stimulating hormone (TSH) measurement. It was found that goitre prevalence was 26.5% (52/ 196); with visible goitre prevalence of 42.3% (22152). The overall mean of goitre volume was 21.4 ± 19.1 ml (range: 3.0 - 90.8 ml), while the prevalence of mental performance for the percentile value of more than 5.0 was 26.5% (range: 5.0 - 50.0). Mean thyroxine levels was 75.4 ± 19.3 nmol/L (range: 19.9 - 138.1 nmol/ L) while mean levels of thyroid stimulating hormone was 4.9 ± 3.2 mU/L (range: 0.4 - 18.9 mU/L). There was no significant correlation between hormone levels and mental performance score (Pearson Correlation; T4: r=-0.002, p=0.9736; TSH : r=0.10, p=0.1843). Goitre volume and mental performance score (Pearson Correlation; r=-0.02, p=0.8395). Goitre prevalence of more than 20% in this area indicates a moderate endemia, while mental performance showed a low thinking level in the Aborigines particularly those who lived in remote areas.

D51 Evaluation of trace elements iron, zinc, copper and lead in the diet of female university students

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Mal J Nutr 1(1): 31-40, 1995

Food consumption of 50 female students in Universiti Kebangsaan Malaysia was recorded for 7 days. Foods and drinks most frequently consumed were selected for analysis of iron, zinc, copper and lead content. The mean daily intakes of energy, protein, carbohydrate and fat among the students are 6.5±1.4 MJ (1550±335 kcal), 59.8±18.5g. 227. 1±54.6 g and 46.0±11.5 g respectively. This diet contributed 19.6±6.4 mg Fe, 7.0±2.0 mg Zn and 1.6±0.6 mg Cu per day which were lower than the Malaysian RDA for Fe and US RDA for Zn, while Cu is within the recommended range. The main sources of these minerals in the student's diet were rice, rice products, meat and animal products. Lead concentration in the diet (134±77 ug/day) is below the acceptable daily intake (ADI) value suggested by Codex Alimentarius Commission (1984). This study indicated concern regarding the low intake of the essential trace elements on long term basis among the students.

D52 Anaemia during pregnancy in rural Kelantan

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Mal J Nutr 3:83-90, 1997

A retrospective study of anaemia in pregnancy in rural Kelantan was conducted. The study sample consist of 9,860 mothers who had antenatal care at one of the 102 rural health clinics selected and had delivered a live baby. Anaemia in pregnancy was determined by reviewing the antenatal records for the haemoglobin level recorded at the first and last antenatal visit. Estimation of haemoglobin was done either by photocalorimetric methods or the Sahliís method in these rural clinics. At the time of booking, 47.5% of the mothers were anaemic by WHO criteria (Hb < 11.0 g/dl), with 1.9% having less than 9.0 g/dl. Age of mother, parity and late gestational age at the first antenatal visit were associated with anaemia during pregnancy at the time of booking. However, practise of contraception by the mother did not show any association with anaemia in pregnancy. There were 594 mothers (6.0%) who delivered a baby weighing less than 2.5 kg. There was no association between the low birth weight of the child and the status of anaemia in the mother at the last antenatal visit.

OVERWEIGHT AND OBESITY

E1 Obesity among years 1 and 6 primary school children in Selangor Darul Ehsan

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Mal J Nutr 2: 21-27, 1996

A study was conducted from March to June 1991 to determine the prevalence of obesity among primary school children in the State of Selangor. One School Health Team in each of the 9 Districts of Selangor participated in the collection of data, the whole project being coordinated by the Selangor State Health Department. A total of 28 rural and 24 urban schools were selected for the study, involving a total of 2,688 pupils in Standard 1 and Standard 6. The prevalence of obesity, using >120% of the reference weight-for-height as the criteria, varied considerably in the different districts, with an overall prevalence of 7.8% in the State. The proportion of boys affected (66.7%) was twice that among girls (33.3%). The prevalence of obesity of 9.8% in the urban schools was significantly higher than the 6.1% found for rural schools ($p<0.0001$). 151 (11.1%) were from Standard 6 and 59 (4.4%) were from Standard 1 ($p<0.0001$). It was also found that there was a significantly higher prevalence of obesity amongst primary 6 children ($p<0.0001$). Whilst the problem may not be as serious as that found in developed countries, the findings of this study should serve as an early warning to health authorities of the seriousness of the problem.

E2 Adults' perceptions of being overweight or obese: a focus group study

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Asia Pac J Clin Nutr 18(2): 257-264, 2008

The objective of this study was to explore the perception of, feelings and attitudes toward overweight or obesity, and the perceived barriers to weight loss among native adults from lower socio-economic background. A total of six gender- and ethnic-specific focus groups consisted of 38 overweight and obese purposefully and criterion selected adults (21 women and 17 men), participated in this study. An unstructured discussion guide based on the study objectives were used for the focus groups. The results showed that some participants perceived themselves as ugly, felt ashamed of their body size and were frustrated because they did not desire to be overweight. Due to their excess weight, most also expressed they were less effective in their work performances. Although some participants had negative attitudes toward themselves because of excess weight, this appeared to link to self-

stigmatization rather than anti-obesity discrimination. The participants remained in the Pre-contemplation stage of losing weight probably because of perceived barriers such as difficulty to resist eating, lack of knowhow and previous failed attempts to lose weight. Importantly, this study provided some evidence that individuals in the Pre-contemplation stage are unable to take action to lose weight, even if effective strategies are suggested.

E3 Body mass index and factors related to overweight among women workers in electronic factories in Peninsular Malaysia

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Asia Pac J Clin Nutr 13(3): 248- 254 248, 2004

Factors related to overweight were examined in a cross-sectional survey that included 1612 women workers from 10 large electronics assembly factories in Peninsular Malaysia. Respondents were Malaysian citizens, direct production workers below the supervisory level, and had worked at least a year in the factory where they were presently employed. Heights and weights were taken to calculate the body mass index (BMI). Weights and BMI increased with increasing age. After adjusting for age, odds ratios for overweight were significantly raised for married women in relation to not married women (OR 1.5, 95% CI=1.15-2.02), lower secondary education in relation to higher than upper secondary education (OR 1.8, 95% CI=1.06-3.14), monthly income RM800-999 (OR 1.7, 95% CI=1.21-2.45) and =RM1,000 (OR 1.8, 95% CI=1.23-2.72) in relation to <RM600, working in rotating shifts that included nightshifts (OR 1.6, 95% CI=1.28-2.06), and not staying in hostel (OR 1.4, 95% CI=1.02-1.88). In a logistic regression model with all variables included as covariates, the factors significantly associated with overweight were age, marital status, education, income, and working in rotating shifts. The overall

prevalence of overweight was 37.4%; the overall mean BMI was 24.2±5.4 kg/m2. Prevalence of overweight and mean BMI for younger age groups were similar to Malay women in the country-wide representative National Health and Morbidity Survey II, but the older age groups in this study had higher overweight prevalence and mean BMI than the national sample. Electronics women workers face a higher risk of overweight, and is an important group for nutrition intervention.

E4 Predisposition to obesity in humans: an evolutionary advantage turned deleterious

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International Journal of Food Sciences and Nutrition 45(3): 159 - 168, 1994

There is now substantial evidence indicating that a critical genetic determinant in the propensity to fatness and leanness resides in the way in which the metabolic machinery manages a surplus or a deficit in food intake. From an integrated analysis of past and new data on the pattern of lean and fat tissue deposition or mobilisation during experimental overfeeding, underfeeding and refeeding, this review brings into focus the main determinants of interindividual variability in the regulation of body composition, and discusses their importance in the capacity to adapt to intermittent food availability under conditions of subsistence, and upon their role in susceptibility to obesity in more affluent societies.

E5 Serum Lipid & Lipoprotein Profiles of Obese Chinese Children

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Med J Malaysia 51(1): 68-74, 1996

The serum lipid and lipoprotein levels of 59 obese Chinese children with a mean age of 13.0 years and mean relative weight of 164.2% were analysed. Between 40% to 54% of these children had elevated lipid and lipoprotein levels and about 78% had reduced high density lipoprotein (HDL) level when compared to healthy American and Japanese children. The obese children also had higher mean levels of total cholesterol (TC) and lower HDL compared to male adults in the local population. Those with elevated TC had higher mean relative weight (170% vs 159%, $p < 0.05$). In view of the close association between hyperlipidaemia and atherosclerosis, obese children should be carefully screened and managed to prevent long term morbidity and mortality of coronary artery disease.

E6 Obesity in Malaysia

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Obes Rev 3(3): 203-208, 2002

This study was undertaken to assess the recent data on Malaysian adult body weights and associations of ethnic differences in overweight and obesity with comorbid risk factors, and to examine measures of energy intake, energy expenditure, basal metabolic rate (BMR) and physical activity changes in urban and rural populations of normal weight. Three studies were included (1) a summary of a national health morbidity survey conducted in 1996 on nearly 29 000 adults > or =20 years of age; (2) a study comparing energy intake, BMR and physical activity levels (PALs) in 409 ethnically diverse, healthy adults drawn from a population of 1165 rural and urban subjects 18-60 years of age; and (3) an examination of the prevalence of obesity and comorbid risk factors that predict coronary heart disease and type 2 diabetes in 609 rural Malaysians aged 30-65 years. Overweight and obesity were calculated using body mass index (BMI) measures and World Health Organization (WHO) criteria. Energy intake was assessed using 3-d food records, BMR and PALs were assessed with Douglas bags and activity diaries, while hypertension, hyperlipidaemia and glucose intolerance were specified using standard criteria. The National Health Morbidity Survey data revealed that in adults, 20.7% were overweight and 5.8% obese (0.3% of whom had BMI values of >40.0 kg m(-2)); the prevalence of obesity was clearly greater in women than in men. In women, obesity rates were higher in Indian and Malay women than in Chinese women, while in men the Chinese recorded the highest obesity prevalences followed by the Malay and Indians. Studies on normal healthy subjects indicated that the energy intake of Indians was significantly lower than that of other ethnic groups. In women, Malays recorded a significantly higher energy intake than the other groups. Urban male subjects consumed significantly more energy than their rural counterparts, but this was not the case in women. In both men and women, fat intakes (%) were significantly higher in Chinese and urban subjects. Men were moderately active with the exception of the Dayaks. Chinese women were considerably less active than Chinese men. Chinese and Dayak women were less active than Malay and Indian women. In both men and women, Indians recorded the highest PALs. Hence, current nutrition and health surveys reveal that Malaysians are already affected by western health problems. The escalation of obesity, once thought to be an urban phenomenon, has now spread to the rural population at an alarming rate. As Malaysia proceeds rapidly towards a developed economy status, the health of its population will probably continue to deteriorate. Therefore, a national strategy needs to be developed to tackle both dietary and activity contributors to the excess weight gain of the Malaysian population.

E7 Prevalence of obesity and chronic energy deficiency (CED) in adult Malaysians

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Ma1 J Nutr 1:1-9, 1995

Anthropometry is the single most portable, easily applied, inexpensive and non-invasive method of assessing body composition. It reflects both health and nutrition and predicts performance, health and survival. The use of body mass index (BMI) as a measure of obesity has been widespread and has recently been promoted for assessment of chronic energy deficiency (CED) in adults. This report provides BMI values of 2636 adult males and 2111 adult females from the three main ethnic groups residing in urban areas and BMI of adult Malay and Dayak (380 males and 496 females) residing in rural areas in Peninsular Malaysia, Sabah and Sarawak. The percent prevalence of obesity and CED in males for the three ethnic groups were apparently quite similar. However, in the females, CED were higher in the Malays and Chinese while overweight problems were more serious in the Indians. Among the Malays, prevalence of CED for males and females were 7% and 11% in urban areas and 11% and 14% in rural areas, respectively. In the males, it is interesting to note that there is a two-fold difference between urban and rural, while a high prevalence of overweight women (20%) even in the rural areas should be viewed as a potential health problem of the future.

E8 Prevalence of overweight and obese school children aged between 7 to 16 years amongst the major 3 ethnic groups in Kuala Lumpur, Malaysia

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Asia Pacific J Clin Nutr 6(3): 172-174, 1997

6239 children aged 7 to 16 years, attending 22 primary and secondary schools in Kuala Lumpur, Malaysia, were screened using a self report questionnaire, with their heights and weights measured using a digital electronic SECA beam balance. The selection was done by a two staged stratified random sampling from a total of 226 schools in Kuala Lumpur. The racial distribution was 56.7% Malays, 33.8% Chinese and 8.1% Indians; 3.6% (n:222) of the children were identified as obese and 6% (n:373) identified as overweight. The definitions of obese and overweight were computed using growth charts of the National Centre for Health Statistics (NCHS) from the median of the reference population. There were no significant differences amongst the 3 major ethnic groups in the obese group. The differences were significant in the overweight group with the Indians most overweight, followed by the Chinese and the Malays.

E9 Abdominal obesity in Malaysian adults: National Health and Morbidity Survey III (NHMS III, 2006)

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Mal J Nutr 14(2): 125 - 135, 2008

Abdominal obesity (AO) is an independent risk factor for cardiovascular disease, hypertension and diabetes mellitus in adults. There is a lack of data on the magnitude and socio-demographic profile of AO among Malaysian adults at the national level. In the Third National Health and Morbidity Survey (NHMS III) conducted in 2006, AO of adults aged 18 years and above was determined based on the waist circumference as part of the nutritional status assessment. This article reports the prevalence of AO in relation to socio-economic factors and demographic characteristics of adult subjects. Out of a total of 33,465 eligible individuals 18 years and above, waist circumference was measured in 32,900 (98.3%) individuals. The prevalence of AO was assessed using the cut-off points recommended by World Health Organization. The mean waist circumference in men and women was 84.0cm [95% confidence interval (95% CI): 83.8, 84.3] and 80.3cm (95% CI: 80.1, 80.6) respectively. The national prevalence of AO was 17.4% (95% CI: 16.9, 17.9). The identified risks of AO were women (OR: 4.2, 95% CI: 3.8, 4.6), aged 50-59 years (OR: 5.6, 95% CI: 4.0, 7.7), Indians (OR: 3.0, 95% CI: 2.4, 3.8), housewives (OR: 1.4, 95% CI: 1.1, 1.7), subjects with primary education (OR: 1.3, 95% CI: 1.1, 1.5) and ever married (OR: 1.4, 95% CI: 1.2, 1.6). Being the largest population-based study on AO among Malaysians, these findings have important public health implications. There is an urgent need to revise public health policies and programmes aimed at prevention of abdominal obesity especially in the groups at risk.

E10 Trends in overweight and obese adults in Malaysia (1996-2009): a systematic review

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Obes Rev 11(6): 403 - 412, 2010

Like other nations experiencing rapid industrialization, urbanization and a nutrition transition, there is concern in Malaysia of a possible escalation in the prevalence of overweight and obesity. In 1996, the National Health and Morbidity Survey reported a 16.6% and 4.4% prevalence of overweight and obesity, respectively. In the following decade, there have been several national and community surveys on overweight and obesity in Malaysia. The objective of this systematic review is to describe the trend from 1996 to 2009 in the prevalence of overweight and obesity in adults in Malaysia nationally and by gender, age and race. Results indicate that there has been a small rise in overweight adults in the years 1996, 2003 and 2006 (20.7%, 26.7% and 29.1%) and a much more dramatic increase in obesity in 1996, 2003, 2004 and 2006 (5.5%, 12.2%, 12.3% and 14.0%). Evidence showed a greater risk for overweight and obesity among women compared with men. Based on the highest-quality studies, overweight and obesity levels were highest among adults 40-59 years old. Overweight levels were highest among Indians, followed by Malays, Chinese and Aboriginals, with less consistency across studies on the order of risk or obesity by ethnicity.

E11 Prevalence of Overweight among Malaysian adults from rural communities

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Asia Pac J Clin Nutr 8(4): 272-279, 1999

Objective: Assessment of the nutritional status of 4054 households from rural communities in Peninsular Malaysia was undertaken from 1992 to 1995. Body mass index (BMI) and waist-to-hip-ratio (WHR) were obtained from a self-selected sample of 1854 men and 2741 women aged = 18 years. The BMI and WHR results are presented according to gender, age groups and type of community as defined by the main occupation, namely, fishing, rice farming, estate work, rubber and coconut small-holding. The mean BMI for men and women of all age groups are 22.5 kg/m2 and 23.8 kg/m2, respectively. The mean BMI for both genders

increases with age between 18.0 and 49.9 years, after which the value declines. The prevalence of pre-obese (BMI = 25.0-29.9 kg/m2) is 19.8% for men and 28.0% for women. The prevalence of obese men and women (= 30.0 kg/m2) is 4.2% and 11.1%, respectively. The highest prevalence of pre-obese and obese men is found in the age groups of 30.0-49.9 years, while that for women is in the 40.0-49.9 years age group. The prevalence of pre-obesity and obesity is higher in women (22.5%) than men (5%) for all ages was found to show central obesity. The prevalence of overweight adults is higher when compared with previous studies on subjects from almost similar rural communities. This study indicated that overweight is on increase in rural communities, especially among female subjects.

E12 Prevalence of overweight among secondary school students in Klang District, Selangor

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Mal J Nutr 13(1): 1-8, 2007

Overweight and obesity place children and adolescents at increased risk of significant health problems, both during their early life and adult life. A crosssectional study was carried out to determine the prevalence of overweight among secondary school students aged 13-17 years in the Klang district and to determine the association between overweight and age, sex, ethnicity, religion and blood pressure. Random cluster proportionate to size sampling technique was used to select the respondents. Weight was recorded using TANITA model HD-309 and height was measured using SECA Body meter Model 208. A mercury sphygmomanometer was used to measure blood pressure manually. Statistical analysis was carried out using SPSS version 13. Out of the 3,333 respondents, 11.4% were found to be at risk of overweight and 8.2% were overweight. The prevalence of overweight was significantly higher in the males (10.6%) as compared to females (6.0%). Prevalence of overweight was highest in Malays (10.7%) followed by the Indians (7.1%) and the Chinese (5.9%). Prevalence of 'risk of overweight' was highest in the Indians (13.7%) followed by Chinese (12.0%) andMalays (9.8%). There was amoderate direct significant relationship between overweight and systolic blood pressure ($r=0.5$, $r2=0.25$, $p<0.001$) and also diastolic blood pressure ($r=0.42$, $r2=0.18$, $p<0.001$). The relationship between BMI and overweight was very weak ($r=0.11$, $r2=0.01$ and $df=3331$, $p<0.001$). In conclusion the prevalence of overweight among the secondary school students is high and there is a need for a comprehensive integrated population-based intervention program.

E13 Dietary and other factors associated with overweight among women workers in two electronics factories in Selangor

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Mal J Nutr 9(2): 105-124, 2003

This study was a cross-sectional survey conducted among 122 women workers employed in the electronics factories in the Ulu Klang Free Trade Zone (FTZ) and the Bangi FTZ, Selangor, Peninsular Malaysia. The purpose of the study was to examine the problem of overweight (>25.0 kg/m2) among this group of women, and factors (socio-demographic, work, exercise, and dietary) associated with overweight, and, to study the food intake pattern of the women in both the overweight and non-overweight groups. Data was collected using a set of questionnaires, while anthropometric measurements were obtained to calculate body mass index (BMI) and waist hip ratio (WHR). The results of the study indicated that 64.0% of the women were overweight (29.5% pre-obese, 34.5% obese). About one-tenth of the women (11.5%) had a WHR of above 0.85. From the bivariate analysis, it was found that women who were older, ever married, had lower educational level, had higher salary, not living in the hostel, involved in shiftwork, and trying to lose weight were more likely to be overweight. After adjusting for age, each of the above factors, except for educational level, remained significantly associated with overweight. Women's diet was found to be monotonous and lacking in variety as accessibility to and availability of a variety of food was a problem for them due to the nature of their work. They also had a sedentary lifestyle. Therefore, further research focusing on changing the poor dietary habits and sedentary lifestyle of the women workers is necessary to address the problem of overweight.

E14 Prevalance of obesity and overweight in Northeastern Peninsular Malaysia and their relationship with cardiovascular risk factors

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Southeast Asian J Trop Med Public Health. 27(2): 339-342, 1996

Height and body weight were measured in 2,284 subjects over 20 years old. The subjects were chosen by cluster sampling in 9 districts of Kelantan. Blood was drawn after an overnight fast for measurement of cholesterol (chol), triglyceride (TG), VLDL and HDL-Chol. Oral glucose tolerance test was performed with 75 g glucose. The overall prevalence of overweight [BMI (kg/m2) > or = 25-< or = 30] and obesity (BMI > 30) was 21.3% and 4.5% respectively. The overweight and obese were significantly younger than the lean subjects. The prevalence of hypercholesterolemia (chol > 5.2 mmol/l) in lean, overweight and obese subjects was 65.3%, 70.2% and 74.7%, respectively. Impaired glucose tolerance was found in 16.6% of the lean, 21.6% of the overweight and 32.0% of the obese subjects. Diabetes mellitus was found in 7.9% of the lean, 10.5% of the overweight and 6.7 of the obese subjects. 10.1% of lean, 13.2% of overweight and 23.3% of obese individuals were hypertensive. In conclusion, the high prevalence of overweight and obesity in Malaysia was associated with adverse lipid and glucose metabolism as well as poor blood pressure control.

E15 Prevalence of overweight and self-reported chronic diseases among residents in Pulau Kundur, Kelantan, Malaysia

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Southeast Asian J Trop Med Public Health. 39(1):162-167, 2008

This cross-sectional study was designed to determine the socio-demographic characteristics and prevalence of overweight/obesity and self-reported diabetes mellitus, hypertension and heart disease among the population in Pulau Kundur, Kota Bharu, Kelantan, Malaysia. This study was conducted in September 2005. We randomly selected 120 of 240 households in Pulau Kundur, Kota Bharu, Kelantan. Fifteen interviewers were trained to use a structured questionnaire to interview 348 adult respondents age 18 years and older in the selected houses. The mean age was 40.7 years; 52.7% were females and 99.4% were Malay. Sixty-two point seven percent were married and 50.9% of them had Ujian Penilaian Sekolah Rendah (UPSR) or less education. The mean head of family income was RM 532.4. The mean body mass index was 25.3. The overall prevalence of overweight/obesity, known hypertension, diabetes mellitus and heart disease were 49.1, 12.6, 7.8 and

Index measurement was used. Data was entered using SPSS 12.0 and analysed using STATA 8.0. The prevalence of overweight among secondary school students in Kota Bharu was 12.5% and there was no significant difference in self-esteem between overweight and non-overweight students. However, the findings may not be generalized to out-of-school youth and other ethnic groups in this country. Information on other modifiers, such as parental acceptance or lack of concern regarding the child' obesity was not elicited in this study. It is an important protective factor for self-esteem and need to be included in future studies.

E16 Obesity in Asia: prevalence and issues in assessment methodologies

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Asia Pacific J Clin Nutr 11(3): S694-S701, 2002

The dramatic changes in the lifestyle of many Asian communities, and the resultant changes in the food and nutrition issues facing the communities in the region have been documented by various investigators. Health authorities and researchers have given greater attention to the problem of overweight and obesity. Available data are lacking, but various estimates have indicated that the emerging problem of overweight amongst children cannot be ignored. Estimates of overweight by the World Health Organization (WHO) amongst preschool children in Asia in 1995 was around 2.9%. Data extracted from selected studies in individual Asian countries show much higher prevalences, ranging from 5% to 9% amongst several urban cities in Asia. In several other developing countries in the region, the prevalence is probably very low, with prevalences of less than 1%. There is thus considerable variation in this prevalence amongst the various countries. The problem of increasing overweight and obesity amongst adults in Asia has been highlighted for more than a decade. The database on the extent of the problem is far from being comprehensive, but various studies have pointed out the severity of the problem. Various reports in the 1990s have pointed out prevalences of overweight of over 20% and obesity of over 5% amongst urban population groups of the more developed countries in the region. It is also to be noted that there are also reports indicating that the most affluent societies in the region, such as Seoul and Tokyo, did not have the highest prevalence of overweight. There are also data on increasing prevalence of overweight among rural areas in the last 10 years. The situation for children is similar: there is considerable variation in the severity of the problem. In the Philippines National Surveys, for example, slightly lower prevalences have been reported. Countries in the region will continue to progress, accompanied by continued changes in lifestyle of communities. It is therefore of utmost importance to continue to monitor the nutritional status of communities. The lack of nationally representative data which is regularly updated is a major concern. The lack of data for certain age groups such as the adolescents and the elderly need to be addressed. One of the main obstacles in the formulation and effective implementation of intervention programs in developing countries is the lack of

comprehensive data on the extent of the problems in many cases and the causes of such problems specific to the communities concerned. In addition to the lack of good data, other concerns too need to be addressed. These include methodological issues such as the need for harmonization of methods in assessment of nutritional status for the various groups, the appropriateness of criteria for cut-offs, growth reference to be used, and association of overweight and obesity with comorbidities.

E17 A national study on the prevalence of obesity among 16,127 Malaysians

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Asia Pac J Clin Nutr 16(3): 561-566, 2007

A population-based cross-sectional study was conducted in all states of Malaysia with the aim to determine the prevalence of obesity among Malaysians aged fifteen years and above and factors associated. A stratified two stage cluster sampling design with proportional allocation was used. Trained interviewers using a standardized protocol obtained the weight and height measurements and other relevant information. Subjects with a body mass index = 30 kg/m2 were labelled as obese. The results show that the overall national prevalence of obesity among Malaysians aged 15 years old and above was 11.7% (95% CI = 11.1 - 12.4%). The prevalence of obesity was significantly higher in females (13.8%) as compared to 9.6% in males ($p < 0.0001$). Prevalence of obesity was highest amongst the Malays (13.6%) and Indians (13.5%) followed by the indigenous group of "Sarawak Bumiputra" (10.8%) and the Chinese (8.5%). The indigenous group of "Sabah Bumiputra" had the lowest prevalence of 7.3%. These differences are statistically significant ($p < 0.0001$). Logistic regression analysis results show that there was a significant association between obesity and age, gender, ethnicity urban/rural status and smoking status. The prevalence of obesity amongst those aged = 18 years old has markedly increased by 280% since the last National Health and Morbidity Survey in 1996. Conclusion: The overall prevalence of obesity in Malaysia is very high as compared to 1996. There is an urgent need for a comprehensive integrated population based intervention program to ameliorate the growing problem of obesity in Malaysians.

E18 Childhood obesity: contributing factors, consequences and intervention

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Mal J Nutr 10(1): 13-22, 2004

Childhood obesity has been growing at an alarming rate and is the most common nutritional problem among children in developed as well as in developing countries. It is associated with significant morbidity and mortality, including cardiovascular, respiratory, gastrointestinal, endocrine and psychosocial morbidities. This unhealthy trend will progress to adulthood and is expected to lead to huge economic costs in health and social security systems. Among the many factors which contribute to the increasing prevalence of childhood obesity include environment and genetic factors. This paper discusses the aetiology, consequences and necessary interventions for this problem.

E19 The prevalence and factors associated with obesity among adult women in Selangor, Malaysia

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Asia Pac Fam Med. 8(1):2, 2009

INTRODUCTION: The prevalence of obesity in developing countries especially among women is on the rise. This matter should be taken seriously because it can burden the health care systems and lower the quality of life. AIM: The purpose of this study was to determine the prevalence of obesity among adult women in Selangor and to determine factors associated with obesity among these women. METHODS: This community based cross sectional study was conducted in Selangor in January 2004. Multi stage stratified proportionate to size sampling method was used. Women aged 20-59 years old were included in this study. Data was collected using a questionnaire-guided interview method. The questionnaire consisted of questions on socio-demographic (age, ethnicity, religion, education level, occupation, monthly income, marital status), Obstetric & Gynaecology history, body mass index (BMI), and the Patient Health Questionnaire (PHQ-9). RESULTS: Out of 1032 women, 972 agreed to participate in this study, giving a response rate of 94.2%. The mean age was 37.91 +/- 10.91. The prevalence of obesity among the respondents was 16.7% (mean = 1.83 +/- 0.373). Obesity was found to be significantly associated with age (p = 0.013), ethnicity (p = 0.001), religion (p = 0.002), schooling (p = 0.020), educational level (p = 0.016), marital status (p = 0.001)

and the history of suffering a miscarriage within the past 6 months (p = 0.023). CONCLUSION: The prevalence of obesity among adult women in this study was high. This problem needs to be emphasized as the prevalence of obesity keeps increasing, and will continue to worsen unless appropriate preventive measures are taken.

E20 Obesity among schoolchildren in Kuala Selangor: a cross-sectional study

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Trop Biomed. 23(2): 148-154, 2006

Childhood obesity is an established problem in many countries and emerging in others. Epidemiological data on obesity in children is essential in order to plan public health policy and services. A study was conducted to determine the prevalence of obesity in schoolchildren in the fifth grade of elementary school (10-12 years old) in the district of Kuala Selangor. Ten schools of which five are in urban and five in rural areas were selected consisting of 699 eleven year old schoolchildren from the three major ethnic groups. Using international cut-off points for obesity, we report an overall prevalence of obesity of 7.2%. Prevalence of obesity in urban children is 7.2% whereas in rural children it is 7.0 %. Analysed by gender, there were 8.9% obese boys and 5.3% obese girls. Among the 3 major ethnic groups, the Malays had the highest prevalence of obesity at 9.3% followed by the Chinese with 6.6% while among Indians 3.0%. The data obtained from this study suggests that obesity in Kuala Selangor children is a cause for concern in urban and rural areas.

E21 Obesity and household food insecurity: evidence from a sample of rural households in Malaysia

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Eur J Clin Nutr 59(9): 1049-1058, 2005

Objective: The study examined nutritional outcomes related to body fat accumulation of food insecurity among women from selected rural communities in Malaysia. Design: Cross-sectional study. Setting: Rural communities (seven villages and two palm plantations) in a district with high percentage of welfare recipients. Subjects and Measurements: Malay (n¼140) and Indian (n¼60) women were interviewed and measured for demographic, socioeconomic, anthropometric, dietary and physical activity information. The women were measured for their body mass index and waist circumference (WC). Energy and nutrient intakes, food group intake and food variety score were analyzed from 24 h dietary recalls and food-frequency questionnaire. Daily physical activity of the women was examined as the number of hours spent in economic, domestic, leisure and sport activities. Results: Using the Radimer/Cornell Hunger and Food Insecurity Instrument, 58% of the women reported some degree of food insecurity (household insecure 14%, adult insecure 9.5% and child hunger 34.5%). In general, food-insecure women had lower years of education, household income and income per capita, more children and mothers as housewives. More than 50% of food-insecure women were overweight and obese than women from food-secure households (38%). Similarly, more food insecure women (32-47%) had at-risk WC (Z88 cm) than food-secure women (29%). Food-insecure women spent significantly more time in domestic and leisure activities than food-secure women. Overweight and abdominal adiposity among the women were associated with a number of independent variables, such as women as housewives, women with more children, larger household size, food insecurity, shorter time spent in economic activities, longer time spent in leisure activities and lower food variety score. After adjusting for factors that are related to both adiposity and food insecurity, women from food-insecure households were significantly more likely to have at-risk WC, but not obese. Conclusion: Among this sample of rural women, the relationship between food insecurity and obesity is a complex one, which involves the interaction with other factors. Nevertheless, given that obesity and food insecurity are of public health concerns in the developing nations, the association between the two should be further investigated.

DIET-RELATED NON-COMMUNICABLE DISEASES

F1 Prevalence of NIDDM and impaired glucose tolerance in aborigines and Malays in Malaysia and their relationship to sociodemographic, health, and nutritional factors

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Diabetes Care. 16(1): 68-75, 1993

OBJECTIVE: To determine the prevalence of diabetes mellitus and IGT in different ethnic groups living in the same physical environment and to find their relationship to nutritional status and dietary intake. RESEARCH DESIGN AND METHODS: The study was conducted among Malays and Orang Asli in six rural and urban locations in Malaysia. OGTTs were performed on 706 adult subjects > or = 18 yr of age. WHO criteria were used for diagnosing diabetes mellitus and IGT. RESULTS: The overall prevalence of diabetes mellitus and IGT among Orang Asli was 0.3 and 4.4% compared with 4.7 and 11.3%, respectively, among Malays. This increased prevalence of glucose intolerance among Malays was associated with higher levels of social development. Among rural Malays, the crude prevalence of diabetes in a traditional village was 2.8% and in the land scheme was 6.7%, whereas urban Malays had a prevalence of 8.2%. In contrast, the prevalence of IGT (10.5-14.8%) was higher among rural Malays, compared with 9.6% among urban Malays. Ethnic group, > or = 40 yr of age, an income > M$250, fewer daily activity, and obesity were associated with a higher prevalence of diabetes. CONCLUSIONS: Diabetes mellitus and IGT, which were more common among Malays than Orang Asli, were associated with more affluent life-styles and modernization.

F2 Changing concepts in lipid nutrition in health and disease

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Med J Malaysia 54(3): 408-427, 1999

Fat remains a hot topic because of concerns over associations between consumption of fats and the incidence of some chronic conditions including coronary artery disease, diabetes, cancer and obesity. Dietary fats serve multiple purposes. The effects of dietary fats generally reflect the collective influences of multiple fatty acids in the diet or food. This presentation highlights some recent developments on the role of dietary fats and oils in health and disease. Debate continues over the role of dietary modification in coronary prevention by lipid lowering. The degree to which a recommended diet will result in health benefits for an individual is difficult to predict, because the outcome will depend on the influence of other factors such as a person's genetic constitution, level of physical activity and total diet composition.

There can now be little doubt about the importance of genetic factors in the etiology of cardiovascular disease, diabetes, obesity and cancer. The importance of antioxidant status in the prevention of cardiovascular disease as well as many cancers is being increasingly recognised. It is now evident that not all saturated fatty acids are equally cholesterolemic. Recent accounts evaluating palm oil's effects on blood lipids and lipoproteins suggest that diets incorporating palm oil as the major dietary fat do not raise plasma total and LDL cholesterol levels to the extent expected from its fatty acid composition. Palm oil is endowed wih a good mixture of natural antioxidants and together with its balanced composition of the different classes of fatty acids, makes it safe, stable and versatile edible oil with many positive health and nutritional attributes. In recent times, adverse health concerns from the consumption of trans fatty acids arising from hydrogenation of oils and fats have been the subject of much discussion and controversy. Trans fatty acids when compared with cis fatty acids or unhydrogenated fats have been shown to lower serum HDL cholesterol, raise serum LDL cholesterol and when substituted for saturated fatty acids, increase lipoprotein Lp (a) level, an independent risk factor for the development of coronary heart disease. The idea of which foods, nutrients and supplements are "healthy" is often being amended as new scientific data is presented and then simplified for the consumers. What was once perceived as a healthy diet is often no longer considered as such and vice versa. Dietary recommendations have to change with time and the evidence available. Nutritional recommendations should encourage eating a great variety of nutrient sources within our food supply in moderation. Various lifestyle options to improve health should also be promoted.

F3 Knowledge of Diabetes Mellitus among diabetic and non-diabetic patients in Klinik Kesihatan Seremban

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Med J Malaysia 61(4): 399-404, 2006

The Malaysian Ministry of Health has undertaken various campaigns on healthy lifestyle and health promotion over the years. The impact of these campaigns has been mixed and not well documented. This cross-sectional study evaluated the knowledge level of patients with and without diabetes in a large urban polyclinic using a 41-item questionnaire. One hundred and forty-nine adults (83 with diabetes, 66 without diabetes) participated in this study. Patients with diabetes had higher overall knowledge scores than those without diabetes (81.8% vs 64.00%, $p < 0.001$). While the overall knowledge of patients without diabetes appeared to be acceptable, several areas of knowledge deficiency were identified in this group - areas that should be filled by the on-going health promotion activities.

F4 Glycaemic control of Type 2 diabetic patients on follow up at Hospital Universiti Sains Malaysia

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The Malaysian Journal of Medical Sciences 10(2): 40-49, 2003

Two hundred and eleven (211) patients with type 2 diabetes mellitus who were on treatment and monitored for complications at the Outpatient Diabetes Clinic in Hospital Universiti Sains Malaysia, Kubang Kerian between 2001 - 2002 were selected for the study. A structured questionnaire was administered to obtain their medical and family history. Physical examination was performed and fasting venous blood sample was collected for plasma glucose and A1C analysis. Of the total 211 patients, only 4 % were on diet treatment alone, 37 % of them were on mono therapy while 59 % were on combination of therapies. Fasting plasma glucose (FPG) > 7.2 mmol/L 7 % were observed in 60 % and 73 % of [3]and glycated hemoglobin (A1C) levels type 2 diabetic patients, respectively. Glycated haemoglobin level of 28 % of the subjects were < 7 %; 36 % were between 7 - 9 % and 36 % were more than 9 %. The worst glycaemic control was observed in Malay patients. A1C of Malay and non-Malay subjects were 8.7 ± 2.3 % and 7.7 ± 1.7 %, respectively. Younger patients (age group < 50 years) had significantly higher mean A1C than elderly patients. Duration of diabetes had a clear influence on glycaemic level. Patients with recently diagnosed diabetes (duration of disease < 5 years) had the best glycaemic control. In this study a large proportion of the patients had poor glycaemic control. The variables with significant effects on glycaemic control were ethnicity, age and duration of diabetes mellitus. Better treatment strategies and methods should be used to improve diabetes control and to reduce long-term complications of diabetes.

F5 Glycaemic control, lipid profile, blood pressure and body weight status among diabetics in rural Malaysia

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International Medical Journal, 8(2): 21-28, 2009

Introduction: Diabetes is associated with a high risk of cardiovascular disease. The management of blood glucose, dyslipidaemia and other modifable risk factor, is a key element in the multifactorial approach to prevent complications of type 2 diabetes. Materials and Methods: A cross sectional study was conducted to determine the level of glycaemic control, lipid profle, blood pressure and body

weight status among type 2 diabetics in rural Malaysia. A total of 237 diabetic subjects participated in this study. Physical examination was carried out, including measurements of height, weight, waist and hip circumferences, and systolic and diastolic blood pressure. Fasting venous blood samples were collected to determine the glucose level and lipid profle. Results: About 70% of the subjects had a high body mass index (BMI), equal to or above 25 kg/m2. More than 60% of the subjects had systolic blood pressure = 140 mmHg and/or diastolic = 90 mmHg. Mean fasting blood glucose was 9.84±4.54 mmol/L. Mean total cholesterol was 5.18±1.35 mmol/L. High density lipoprotein cholesterol (HDLC) and triglyceride (TG) and glucose levels were higher in male than in female, but not statistically signifcant ($p>0.05$). However, low density lipoprotein cholesterol (LDLC) was higher in females than males ($p<0.05$). Mean HDLC was below 1.0 mmol/L in all subjects. Conclusion: Glycaemic control, lipid profle, blood pressure and body weight status were not satisfactory and may increase the risk of microvascular and macrovascular complications among these subjects. Appropriate intervention programs should be mplemented for better diabetes control among rural subjects.

F6 Dietary management of hyperlipidaemia - a survey amongst Malaysian dietitians

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Mal J Nutr 117-130, 1997

Coronary Heart Disease (CHD) is recognised as an important public health problem in Malaysia. Hyperlipidaemia is one of the main risk factors related to CHD. The mainstay of treatment is diet therapy which should be maintained even if drug treatment is indicated. Since dietitians are the primary providers of dietary treatment to hyperlipidaemic patients, this retrospective study attempts to report the dietary approaches and methodologies adopted by Malaysian dietitians in managing their patients. A postal questionnaire covering various aspects of dietary management of hyperlipidaemia were sent to 47 dietitians practicing in private and government hospitals. A response rate of 53 % was elicited. The survey found that there was a disparity amongst the respondents in the approach to the dietary management of hyperlipidaemia in Malaysia. This was largely due to the absence of a standardised dietary protocol for general lipid lowering in patients with hyperlipidaemia.

F7 Prevalence of diabetes, hypertension and renal disease amongst railway workers in Malaysia

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Med J Malaysia. 45(1):8-13, 1990

A survey was done to determine the prevalence of diabetes mellitus, hypertension and renal disease, as well as extent of diabetic control, amongst the workers of Malaysian Railways. The prevalence of diabetes mellitus was high at 6.6%, with 3.8% of these being insulin dependent diabetes. The highest prevalence was in Indians (16.0%) followed by Chinese (4.9%) and Malays (3.0%). Using HbA1 measurements, diabetic control was poor in 70.6% of the diabetics. Hypertension was found in 37% and proteinuria in 35%. Renal impairment was present in 30% of the diabetics. This survey shows that diabetes, hypertension and renal disease are high amongst the railway workers in Malaysia.

F8 Changing Prevalence of Diabetes Mellitus amongst Rural Malays in Kuala Selangor over a 10-Year Period

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Med J Malaysia 51(1): 41-47, 1996

A cross-sectional study was carried out to determine the prevalence of diabetes mellitus and its relationship with age, physical activity, nutritional status and diet amongst rural Malays in Kuala Selangor. By simple random sampling, 360 subjects were selected for the study. Besides guided questionnaires, subjects also underwent a 2 hours post prandial (2HPP) test to determine the diabetic status as recommended by WHO. The crude prevalence of diabetes mellitus was 14.6% which increases with age. The prevalence of diabetes adjusted for age was 12.2%. Physical activity status seemed to be a significant risk factor for diabetes. A greater proportion of diabetics was obese and their mean fat intake was higher than normal subjects ($p < 0.05$). The prevalence of diabetes mellitus in this study was significantly higher compared with data from 1984 (3.9%), representing a marked increment of 212.8 per cent over a 10-year period.

F9 Cardiovascular mortality in Peninsular Malaysia: 1950-1989

Khoo KL, Tan H and Khoo TH

Medical Journal of Malaysia 46(1): 7-20, 1991

Mortality statistics of Peninsular Malaysia for the period 1950-1989 have been studied in relation to cardiovascular diseases, with particular emphasis on coronary heart disease as an important cause of death. It was observed that among six major disease groups reviewed, cardiovascular disease which occupied third place as a cause of death in 1950 emerged as the number one killer during the 1970s and has remained so since (with exception in 1980). In contrast, infectious diseases which ranked first in 1950 dropped to fourth position in 1980. Between 1960 and 1980, mortality due to cardiovascular diseases was higher in males than in females. This tendency became less apparent during 1985-1989. With reference to race, the incidence of cardiovascular deaths was highest in Indians followed by Chinese and Malays. Among the specific cardiovascular diseases, coronary heart and cerebrovascular diseases accounted for the main causes of mortality. Mortality due to coronary heart disease has increased by more than three fold over the last 40 years and is still rising. However, mortality incidence due to rheumatic heart disease and hypertension decreased during the same period. In 1965, mortality due to coronary heart disease was highest in the 55-59 age group. In recent years (1985-1989), it shifted to the older age group (i.e 65-69). There was a tendency for higher mortality due to coronary heart disease in males compared to females. Indians had a higher mortality due to coronary heart disease than Chinese and Malays.

F10 Blood pressure, body mass index, heart rate and levels of blood cholesterol and glucose of volunteers during national heart weeks, 1995-1997

Khoo KL, Tan H, Liew YM, Sambhi JS, Aljafri AM, Hatijah A

Heart Foundation Malaysia (Yayasan Jantung Malaysia), 35 Jalan Kia Peng, 50450 Kuala Lumpur

Med J Malaysia 55 (4): 439-450, 2000

The paper presents the results of a health screening programme conducted in 10 major centres in Malaysia - Kuala Lumpur, Penang, Ipoh, Johor Bahru, Alor Star, Kuala Terengganu, Malacca, Kota Bahru, Kuching and Kota Kinabalu during the National Heart Weeks, 1995-1997. There were 6,858 participants of both sexes aged between 6 years to 81 years old. The parameters involved in the screening programme were body mass index, blood pressure, heart rate, cholesterol and glucose. The following are the results of the study :-11. The mean and standard deviation for the body mass index (BMI), systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), total cholesterol (TC) and non fasting (random) blood glucose (GL) of the volunteers studied were 24.3(+/-)4.0 kg/m(2), 128.3 (+/-)21.1 mmHg, 79.6 (+/-)11.9 mmHg, 77.2 (+/-)12.1 bpm, 5.33 (+/-) 1.37

mmol/I and 5.11 (+/-)1.97 mmol/I respectively. 12. There was a rising trend for BMI, SBP, DBP, TC and GL with age. The HR was higher in the younger age group of those below 20 years. Males tended to have higher mean values than females except for HR which was similar in both sexes. 13. The Malays, Chinese and Indians seemed to have closely similar mean values for SBP, DBP and HR but the Indians possessed the highest BMI (25.62 [+/-] 3.90 kg/m[2]), and GL (5.41 [+/-] 2.43 mmol/I) among the three major ethnic groups. While the Ibans had highest TC (6.07 + 1.09 mmol/I), their GL level was the lowest (4.76 [+/-] 1.15 mmol/I). The Kadazans had the lowest TC level (4.94 [+/-] 1.39 mmol/I) among all the ethnic groups. 14. Among the participants screened, 31.9% were overweight (BMI > or = 25), 7.6% were obese (BMI > or = 30); 26.8% had raised SBP (> or = 140 mmHg) and 19.3% had raised DBP (> or = 90 mmHg); 13.6% of the participants had increased HR (> or = 90 bpm), 22% had raised TC (> or = 6.20 mmol/I) and 2% had raised GL (> or = 11.00 mmol/I). There was a higher prevalence for abnormal values with increasing age until between the ages of 60 or 70 years, when the values began to fall.15. Age was positively correlated with SBP (r=0.41***, df=4351), DBP (r=0.27***, df=4351), TC (r=0.22***, df=3303) and GL (r=0.16***, df=2442) but negatively correlated with HR (r=0.13***, df=4351). The BMI was positively correlated with SBP (r=0.11**, df=1637) but there was no correlation with HR (r=0.03 [NS], df=2771). The SBP and DBP were highly correlated with each other (r=0.75***, df=4351) and they also showed highly significant positive correlation (r=0.08*** - 0.13***, df=2441-3301) with TC and GL. TC was positively correlated with GL (r=0.05*, df=2319) but only at the 5% probability level.

F11 Screening for Blood Pressure, Cholesterol and Glucose during National Heart Weeks 1992-1994

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Heart Foundation Malaysia (Yayasan Jantung Malaysia), 4th Floor, 17-19, Jalan Medan Tuanku, 53000 Kuala Lumpur

Med J Malaysia 5: 307-315, 1996

This paper presents results of the National Heart Week health screening programme conducted in Kuala Lumpur, Penang and Kuantan during 1992-94. A total of 2,670 participants from Chinese, Malay, Indian and other ethnic groups of both genders aged between 10 to 86 years old were involved in the screening programme for blood pressure, cholesterol and glucose. From this study, the following findings were obtained. 1) The mean values for serum total cholesterol (TC), non-fasting (random) blood glucose (GL), systolic (SBP) and diastolic (DBP) blood pressures were 5.27 mmol/1, 5.71 mmol/1, 127.8 mmHg and 79.2 mmHg respectively. 2) There was a rising trend for TC, GL, SBP and DBP with age. 3) Males generally had higher mean values of TC, GL, SBP and DBP than females. 4) Malaysian Chinese appeared to have slightly lower TC and GL values as compared to the Malays and Indians. 5) Among the participants screened, 17.5% had raised TC (6.20 mmol/1 as cutoff value); 3.3% had raised GL (1.00 mmol/1 as cut-off value);

29.6% had raised SBP (140 mmHg as cut-off value) and 23.2% had raised DBP (90 mmHg as cut-off value). Participants with raised TC, GL, SBP and DBP also increased with age. 6) Participants from Kuala Lumpur had a slightly higher mean TC than those from Penang and Kuantan. 7) There was a gradual rise in mean TC values from 1992 to 1994. 8) Positive association between GL and SBP or DBP was detected. The implications of the above findings were discussed.

F12 Trends and dietary implications of some chronic non-communicable diseases in peninsular Malaysia

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Asia Pacific J Clin Nutr 1: 159-168, 1992

Non-communicable diseases with dietary implications, ischaemic heart disease, diabetes mellitus and cancers of the breast and colon are discussed in relation to their prevalence and mortality rates in Peninsular Malaysia during the past few decades. The mortality rate due to diseases of the circulatory system has more than doubled since 1970, deaths due to ischaemic heart disease being the major cause. The prevalence of diabetes mellitus has risen from 0.65% in 1960 to about 4% currently. The mortality risk for both ischaemic heart disease and diabetes is highest in the Indian compared to Malay and Chinese populations. The Chinese show the highest mortality rate for cancers of the breast and colon. This could reflect, partly, because more people especially in the urban areas are seeking treatment and improved diagnosis. Empirical dietary data indicate an increase in the prevalence of hypercholesterolaemia among urban adults and overweight among urban and rural adults. Aggregate data from food balance sheets indicate increased availability of energy intake from fats and oils, sugar, and animal products, with concomitant decline in available energy from plant products. Continued public health education on the important linkage between diet and disease is called for.

F13 Ethnic characteristics of coronary heart disease risk factors and mortality in peninsular Malaysia

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Asia Pacific J Clin Nutr 3: 93-98, 1994

The types and prevalence of coronary heart disease (CHD) risk factors vary somewhat among the three main ethnic groups in peninsular Malaysia. Indians consistently show the highest prevalence for hypercholesterolemia and diabetes mellitus. Among the Malays, a relatively high prevalence of hypertension and

hypertriglyceridemia have been reported. Overweight is also a risk factor among the Indians and Malays. In general, Chinese tend to have a lower prevalence for these CHD risk factors than the Indians and Malays. Parallel to the rapid socio-economic development and urbanization in recent decades is a rise in the percentage of deaths due to cardiovascular disease in peninsular Malaysia, that is from 1.8% of total deaths from all causes in 1950 to about 30% in 1991. Coronary heart disease accounts for40% of all cardiovascular diseases. The mortality rate for CHD has more than doubled between 1965 and 1991, from 24.6 per 100 000 to 57.2. While Indians have been showing the highest CHD mortality rate so far, that of the Malays has been increasing most rapidly since 1970, concomitant with the latter's increase in their proportion of the urban population in peninsular Malaysia.

F14 Cardiovascular epidemiology in the Asia-Pacific region

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Asia Pac J Clin Nutr. 10(2):76-80, 2001

By 2020, non-communicable diseases including cardiovascular diseases (CVD) are expected to account for seven out of every 10 deaths in the developing countries compared with less than half this value today. As a proportion of total deaths from all-causes, CVD in the Asia Pacific region ranges from less than 20% in countries such as Thailand, Philippines and Indonesia to 20-30% in urban China, Hong Kong, Japan, Korea and Malaysia. Countries such as New Zealand, Australia and Singapore have relatively high rates that exceed 30-35%. The latter countries also rank high for coronary heart disease (CHD) mortality rate (more than 150 deaths per 100,000). In contrast, death from cerebrovascular disease is higher among East Asian countries including Japan, China and Taiwan (more than 100 per 100,000). It is worth noting that a number of countries in the region with high proportions of deaths from CVD have undergone marked declining rates in recent decades. For example, in Australia, between 1986 and 1996, mortality from CHD in men and women aged 30-69 years declined by 46 and 51%, respectively. In Japan. stroke mortality dropped from a high level of 150 per 100,000 during the 1920s-1940s to the present level of approximately 100 per 100,000. Nonetheless, CVD mortality rate is reportedly on the rise in several countries in the region, including urban China, Malaysia, Korea and Taiwan. In China, CVD mortality increased as a proportion of total deaths from 12.8% in 1957 to 35.8% in 1990. The region is undergoing a rapid pace of urbanization, industrialization and major technological and lifestyle changes. Thus, monitoring the impact of these changes on cardiovascular risks is essential to enable the implementation of appropriate strategies towards countering the rise of CVD mortality.

F15 Nutrition and cardiovascular disease: an Asia Pacific perspective

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Asia Pacific J Clin Nutr 6(2): 122-142, 1997

Changes in the dietary intake patterns of countries in the Asia Pacific region are considered in relation to trends of cardiovascular disease mortality. Cardiovascular disease now constitutes the major cause of mortality in many of the countries of the region. The mortality rate for coronary heart disease (CHD) has been on the decline since the mid-1960s in countries such as Australia, New Zealand and Japan, while a decline in other countries, including Singapore and Hong Kong, appears to be occurring about two decades later after a delayed increase. In contrast, countries like Malaysia and China have had and continue an upward trend for CHD mortality. Nonetheless, the mortality rates due to CHD in New Zealand, Australia, Singapore followed by Hong Kong rank among the highest in the region. In China, Taiwan and Japan, death due to cerebrovascular disease remains a major cause of death, although the latter two countries have undergone a significant decline in stroke death rates since 1970.

The intakes of fat from land animal products, fish and vegetable oils, depending on fatty acid patterns and, possibly other constituents, are candidate contributors to the different atherogenic and thrombotic effects. Countries which have a higher mortality from CHD tend to have a higher intake of energy from fat and proportion of fat from animal products. These fat intakes may operate to increase hypercholesterolemia and overweight in various countries. Again, intakes of other food items and constituents used in the region such as soybeans, dietary antioxidants in fruits, vegetables, seeds, cereals, nuts and tea and alcohol consumption are candidate cardio-protectants.

The wide dietary scope of Asia Pacific populations, from diverse socio-cultural backgrounds, and at different levels of economic and technological development poses several analytic challenges and opportunities. Future research should improve the datasets and think laterally about pathogenesis and intervention.

F16 Risk factors among coronary heart disease patients in the National Heart Institute, Kuala Lumpur

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Mal J Nutr 3: 103-116, 1997

The objective of this study was to determine the levels of knowledge, attitudes and practices with regards to coronary heart disease (CHD) and its risk factors among CHD patients in the Institut Jantung Negara (National Heart Institute), Kuala Lumpur. All patients admitted for CHD during the study period between 5th May 1997 and 24th May 1997 were included in the study. A total of 105 patients were interviewed by using a pretested questionnaire. Four CHD risk factors were included in the study, namely dietary intake, smoking habit, alcohol intake and physical activity. The majority of the patients (92.4%) were above 45 years old. Most of them (85.7%) had at least one chronic health problem such as diabetes mellitus and hypertension before admission into IJN. Their average total blood cholesterol was 6.1 ± 1.3 mmol/L and 75.2% were hypercholesteromic (= 5.2 mmol/L). Mean systolic blood pressure was 151.2 ± 27.5 mmHg. The mean body mass index of the patients was 25.9 ± 3.9 kg/m2 and 58.1% were overweight (BMI = 25.0). Almost half of the patients (49.6%) had smoked before but only 8.6% still smoke. Out of the 56 non-Muslim patients, 9 of them (16.1%) consumed alcoholic drinks on a regular basis. Most of the patients reported walking as the only form of exercise that they do. Most of the patients consume rice, vegetables and fruits almost daily. This study indicated significant relationships between (i) knowledge level and attitude towards CHD risk factors ($r = 0.624$, $p < 0.001$), (ii) knowledge level and modifying practices related to CHD risk factors ($r = 0.316$, $p < 0.01$) and (iii) attitude and modifying practices ($r = 0.234$, $p < 0.05$). It is recommended that more information about coronary heart disease and its risk factors be disseminated to the public, not only to increase their knowledge, but also to modify their attittides towards leading a healthy lifestyle.

F17 Epidemiology of cardiovascular diseases in Malaysia

Lo EKC

Journal of the Malaysian Society of Health 6(1): 8-13, 1988

Development and progress has brought changes to the ecological system and the epidemiology of diseases in Malaysia. Incidence of communicable diseases has fallen, while that for non-communicable diseases like cardiovascular diseases (CVD), accidents, cancers and drug dependence has risen. Lack of reliable statistics and good epidemiological studies have hampered the understanding of CVD in Malaysia. Available data, however, indicate a rising trend of CVD, which rank first in the 10 principal causes of deaths and third in the 10 principal causes

of admissions in 1983. The estimated incidence of CVD for 1983 is 32.2 per 10,000 population, with an overall case fatality rate of 10.5%. The mortality due to CVD has risen from 3.0% to 27.9% of total medically certified and inspected deaths for 1965 and 1983 respectively. The epidemiology of CVD was described in terms of disease type, age, sex and race. Risk factors that are modifiable were discussed. Multifactorial approach to primordial prevention of CVD was advocated, and current activities contributing to CVD prevention and control in Malaysia were listed.

F18 A Study of the Fasting Diabetic Patients during the Month of Ramadan

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Med J Malaysia 45(1): 14-17, 1990

Twenty-two Muslim diabetic patients on oral hypoglycaemic agents were studied during the fasting month of Ramadan to determine the effect of fasting on their diabetic control. All the patients completed their fast during the month. Their mean (± standard deviation) blood glucose, serum fructosamine and body weight before the fasting month were 10.7 ± 4.6 mmol/1, 6.64 ± 3.64 mmol/1 and 60.5 ± 12.6 kg and by the end of the fasting month were 10.9 ± 4.4 mmol/1, 4.34 ± 1.08 mmol/1 and 59.8 ± 12.3 kg respectively. There was no significant difference between the blood glucose levels but there were significant reductions in the mean body weight and fructosamine values ($p = 0.01$ and $p = 0.03$ respectively). The mean decrease in body weight and fructosamine were 0.7 ± 1.3 kg and 2.29 ± 3.09 mmol/1 respectively. There were also statistically significant differences between the mean daily calorie content before the fasting and during the fasting month (1480 ± 326 vs. 1193 ± 378 Cal/day - $p = < 0.005$) and between the mean daily carbohydrate content (389 ± 298 vs. 187 ± 46 gm/day - $p < 0.005$). In conclusion, fasting was safe for diabetic patients on oral hypoglycaemic agents and it was associated with weight reduction and improvement in the overall diabetic control. This was most likely due to decrease in food intake.

F19 A prelimenary result of the cardiovascular risk factors intervention study (pikom study): diabetes mellitus, hypertension and their associated factors

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Malaysian Journal of Medical Sciences 12(1): 20-25, 2005

Cardiovascular disease (CVD) has been the number one cause of death since the last three decades in Malaysia and diabetes mellitus and hypertension are considered as major risk factors. A study to reduce risk factors for cardiovascular diseases in the community (PIKOM) through education and lifestyle changes was undertaken. The study population was from four different areas in Peninsular Malaysia - Kota Bharu and Bachok in Kelantan ; Raub in Pahang; Gunung Besout in Perak and Felda Palong in Negri Sembilan. The subjects invited to participate in this study ware aged between 30 - 65 years, did not have any debilitating illnesses and no known history of diabetes mellitus, hypertension or cardiovascular disease. Subjects were asked to come to the local clinic in a fasting state and after physical examination, blood was taken for plasma glucose and lipids. Oral glucose tolerance test (OGTT) was then performed. A total of 4,121 subjects participated in the study. The proportion of subjects with diabetes mellitus was highest in Felda Palong area (20.3%) and lowest in Raub area (7.1%). The proportion of subjects with hypertension was also highest in Felda Palong area (38.6%) and lowest in Raub area (29.1%). This could be attributable to the subjects in Felda Palong having the highest mean Body Mass Index (BMI) and Waist-to-Hip Ratio (WHR). There were significant associations between diabetes and hypertension with age and obesity. Subjects with diabetes mellitus and hypertension also had the highest mean age, BMI, WHR and plasma cholesterol. In conclusion, the proportion of patients with risk factors for CVD was high and intervention studies through education and lifestyle changes were being carried out to see their effectiveness.

F20 Diabetes mellitus in Malaysia

Mafauzy M.

Med J Malaysia. 61(4): 397-8, 2006

Diabetes mellitus is a common disease causing significant mortality and morbidity. It is a serious debilitating and deadly disease that has now reached epidemic proportions and the prevalence rates are expected to go even higher in the foreseeable future. Worldwide, in 1995 the number of people with diabetes was estimated to be 135 million; in the year 2000, it was 154 million and in the year 2025, it is expected to top 300 million people with the main increase being in the developing countries. The projected increase in the developed countries is 42% but in the developing countries, the increase is estimated to be 170%. In Malaysia, the First National Health and Morbidity Survey (NHMS 1) conducted in 1986 reported a prevalence of diabetes mellitus of 6.3% and in the Second National Health and Morbidity Survey (NHMS 2) in 1996, the prevalence had risen to 8.2%. In a study in Kelantan, the prevalence was reported to be higher at 10.5%. The World Health Organisation (WHO) has estimated that in 2030, Malaysia would have a total number of 2.48 million diabetics compared to 0.94 million in 2000 - a 164% increase.

F21 Prevalence of cardiovascular risk factors in a rural community in Mukim Dengkil, Selangor

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Mal J Nutr 10(1): 5-11, 2004

Hypertension and obesity are established and independent risk factors for cardiovascular diseases. There are important inter-relationships between these two factors that may explain the aetiology of coronary heart disease. To determine the prevalence of hypertension and obesity in a rural community setting in Malaysia, and to identify their associated factors, a cross-sectional study was conducted among residents aged 15 years and above in Mukim Dengkil, Selangor from June to October 1999. Sample size was 570, giving a response rate of 86.7%. Prevalence of hypertension was 26.8%, with the highest prevalence among those aged 60 years and above (57.3%), and 50 to 59 years old (53.3%). Factors found to be significantly associated with hypertension were male ($?^2$=4.71, df=1, $p<0.05$) and age (t=10.7, df=568, $p<0.01$). Prevalence of obesity was 11.4%, with the highest prevalence among those aged 40 to 49 years (22.7%) and 30 to 39 years (14.4%). The factors associated with obesity were age ($p<0.01$), female ($?^2$=12.45, df=1, $p<0.05$) and ethnicity (Fisher's Exact probability, $p<0.05$) with Chinese and Malays having a higher prevalence compared to other ethnic groups. However, there was no significant association between hypertension and obesity (OR=1.14, 95% CI=0.65, 2.02). The prevalence of hypertension and obesity in this study is high. There is a need for prevention programs for these risk factors in rural communities in Malaysia.

F22 Framingham risk scores and anthropometric measurements in predicting cardiovascular risks among Malay men

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Mal J Nutr 14 (1): 57 - 63, 2008

Framingham Risk Scores is an established method to predict an individual's 10- year risk for coronary heart disease (CHD). It provides a more precise delineation of risk which might lead to appropriate selection of therapy and opportunities for patient education and motivation. A Healthy Lifestyle Project was initiated to decrease the modifiable risk factors for CHD in a worksite in Kuala Lumpur. The participants were Malay men (n=186) working as security guards in a public university. Their mean age was 46.6 + 6.6 years. The majority had secondary education and were

married. The participants' 10-year risks based on the Framingham Risk Scores were 55.4%, 39.8% and 4.8% respectively for categories of low (< 10%), intermediate (10 to 20%) and high (>20%) risk. Their Framingham Risk Scores were then correlated with anthropometric measurements such as the Body Mass Index (BMI), waist circumference and waist-hip-ratio (WHR). All the anthropometric measurements had weak but significant correlation with the Framingham Risk Scores (WHR: r=0.26; waist circumference: r=0.23; BMI: r=0.16). In conclusion, 44.6% of our participants had more than 10% risk in developing CHD in the coming ten years. Hence, they are suitable target candidates for the promotion of a healthy lifestyle such as smoking cessation, weight control, healthy dietary patterns and increased physical activities. Indicators of abdominal obesity like WHR or waist circumference may be used to complement the Framingham Risk Scores for the prediction of CHD risk in this population.

F23 Diabetes mellitus in peninsular Malaysia: ethnic differences in prevalence and complications

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Ann Acad Med Singapore.14(2): 272-276, 1985

Estimated prevalence of diabetes mellitus in Malaysia was about 2%. Diabetes was most common in Indians especially males and least common in Chinese. There was a slight male preponderance seen in Malays and Indians. Positive family history was obtained in 14% of cases most commonly in Malays, almost 1/3 of whom had more than one family member with diabetes. Familial association was uncommon in Chinese. Over 50% of patients were overweight. Obesity was noted in nearly 70% of female Malays and Indians while the majority of Chinese were not overweight. More than 80% of patients were non insulin requiring. Youth onset diabetes was considered rare; those 10 years and below were estimated to be only 0.4% and below 20 years of age between 2%-4% of the diabetic population. Females were twice as common than males in this type of diabetes and familial association was greater. Malnutrition-related diabetes and pancreatic calcification were not well-documented but youth-onset non insulin requiring diabetics with mild symptoms but strong family history of diabetes were observed. More than half of hospital-based patients had evidence of complications, mainly amongst Malays and Indians. Hypertension was the most frequent associated disease followed by foot ulcers and ischaemic heart disease. Hypertension usually associated with chronic renal failure was most common amongst Malays while gangrenic ulcers and heart diseases were seen mainly in Indians. The major causes of death were chronic renal failure, myocardial infarction, ketoacidosis, stroke and septicaemia related to gangrene.

F24 Lipid peroxidation, uric acid and xanthine oxidase activity in essential hypertension: mysterious role of uric acid

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Mal. J. Med. Scien. 4(2): 52-58, 1997

This study was designed to determine, whether there is hyperuricaemia and increased xanthine oxidase activity in essential hypertensive patients in relation to increased free radical generation and to identify uric acid as one of the predictors of hypertension compared to the other blood pressure related factors such as cholesterol, urea and creatinine. Total fifty two mild to moderate hypertensive (male- 29, female- 23, treated- 45, utreated-7, mean age 50.41?10.73 yr.) and 52 normotensive (male-19, female-33, mean age 44.25?7.44 yr.) samples were studied. All the samples were selected without any family history of gout, hypertension, diabetes as well as any debilitating disease. Five ml or venous blood were collected, and plasma obtained by using EDTA were used for xanthine oxidase activity. Serum uric acid, urea and creatinine were measured by using auto analyser, while plasma xanthine oxidase were via spectrophotometry. Serum lipid peroxide were measured as thiobarbituric acid reaction product by spectrofluorometry. Computer program STATISTICA was used for overall data analysis. Results from our study showed that serum uric acid were consistently higher in hypertensive (H) compared to normotensive (N) [N: 301.33±80.19 μmol/l, H: 396.00±107.71 μmol/ ml; $p<0.001$]. Xanthine oxidase enzyme activity was significantly higher in normotensive than the hypertensive samples (N:2.43±1.12 nmol O2,/ ml plasma/ min, H:1.67±1.12nmol O2/ml plasma/ min: $p<0.001$). Lipid peroxides were significantly higher in hypertensive than the normal (N:3.31±0.33, H:4.49±0.2 nmol MDA equiv/ ml; $p<0.001$). For correlation study we found mean arterial pressure (MAP) significantly correlated with uric acid ($r=0.51$, $p<0.001$) and xanthine oxidase activity ($r=0.39$, $p<0.005$) in normal sample. Absence of similar correlation in hypertensive samples suggest that uric acid production in hypertensives may serve a different purpose. In conclusion from this study were found that hypertensives with a normal renal function have higher serum uric acid and lipid peroxide but low xanthine oxidase enzyme activity.

F25 A critical evaluation of high density lipoprotein cholesterol as an index of coronary artery disease risk in Malaysians

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Malaysian Journal of Nutrition 3 (1): 61-70, 1997

Fasting serum specimens from (a) 217 male and 46 female patients with coronary artery disease (CAD), aged 35-75 years, who had undergone angioplasty (PTCA) / coronary artery bypass graft (CABG), and (b) 160 apparently healthy controls (106 males, 54 females, aged 30-75 years), were assessed for serum lipid profile. Both sex and ethnicity significantly influenced the levels of serum high density lipoprotein cholesterol (HDLC); in the controls, females had higher HDLC levels than males (46.7 mg/dl vs 38.5 mg/dl, $p<0.00l$), while the Indian males possessed significantly lower HDLC values than the male Malay or Chinese. HDLC, triglycerides (TG) and the atherogenic index- LDLC/HDLC ratio were significantly different between the CAD patients and the healthy controls, while total cholesterol (TC) and LDLC did not seem to be of diagnostic value. Serum HDLC was lower in the CAD patients compared to the healthy controls in both sexes ($p<0.001$), either expressed as HDLC per se or as % HDLC. This observation combined with the odds ratio (OR) values of 0.24 and 0.28 for HDLC and % HDLC respectively in males, firmly establishes HDL as a protective factor of CAD in Malaysians. Significance testing for the X2 values associated with the OR values for the various lipid indices, together with the findings on the receiver-operating characteristices (ROC) curves, i.e. plots of sensitivity vs 1-specificity, indicated that HDLC, % HDLC and TQ were equally efficient as a means of risk assessment to CAD in Malaysians.

F26 Rural communities in nutritional transition: emergence of obesity, hypertension and hypercholesterolemia as public health problems in three kampungs in Bagan Datoh, Perak

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Mal J Nutr 1: 129-139, 1995

This paper highlights the marked presence of nutritional disorders in a sample (190 males, 237 females, aged 18-80 years) obtained from the adult population in three kampungs i.e. Pasang Api, Sungai Nipah Baroh and Sungai Balai Darat, in the Mukim of Bagan Datoh, Perak in 1992. All subjects (except pregnant females) were measured for blood pressure, weight, height, waist circumference, and hip

circumference from which the body mass index (BMI) and waist-hip ratios (WHR) were calculated. A random blood sample was obtained by finger-prick from each subject and analysed for total cholesterol (TC) and glucose, using the Reflotron compact analyser. Elevated means for BMI and WHR indicated that obesity (BMI =30.0) was a serious public health problem in these three kampungs, affecting about 5% of males and 14% of females. Another 24% of males and 46% of females had an overweight problem (BMI 25.0-29.9), indicating that on the average, about half the adult population in these kampungs were either overweight or obese. This contrasted with the situation a decade ago in similar-type kampungs in the Peninsula where underweight was the major nutritional disorder in adults, especially males. Overall, there was a shift of an underweight problem to one of overweight, as exemplified by increments of 2.0 to 3.0 BMI units in the adult population, with the phenomenon being more marked in the females. Hypertension (21%) and hyperglycaemia (6.5%) affected the males and females approximately equally. Female adults had higher mean plasma TC compared to males (204 versus 199 mg/dl); these means were some 20 mg/dl (0.52 mmol/L) higher than the corresponding means for adults in similar rural communitites in the early eighties, and approximate the corresponding means for present-day urban adults. The above findings serve to emphasise the nutritional transition undergoing in the rural communities in the Peninsula, viz, the marked emergence in these rural communities of nutritional disorders normally associated with affluent populations.

F27 Assessment of physical activity level among individuals with Type 2 Diabetes Mellitus at Cheras Health Clinic, Kuala Lumpur

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Mal J Nutr 16(1): 101 - 112, 2010

A cross-sectional study was carried out to assess the physical activity levels among patients with type 2 diabetes mellitus (DM) at Cheras Health Clinic in Kuala Lumpur. A total of 132 subjects (62 men and 70 women) aged 30 years and above participated in this study. Data was collected using an interview based questionnaire to obtain socio-demographic and health profile information. Physical activity was assessed using a shortened version of the International Physical Activity Questionnaire (IPAQ). Anthropometric measurements and body fat were also taken. Glycaemic status, that is, HbA1c, fasting blood sugar (FBS) and 2 hours post-prandial (2-HPP) were obtained from medical records. Results showed that the mean age of the patients was 51.9 + 5.8 years. The majority of patients had poor glycaemic control based on HbA1c (70.7%), FBS (71.9%) and 2HPP (85.4%). Patients who were unmarried and aged (60 years and above had a lower physical activity level ($p<0.05$). In the older age group, low physical activity was associated with poor

glycaemic control ($p<0.05$). Patients in the moderate and high physical activity level were motivated to perform physical activity so as to be healthy (68.1%). Low physical activity level among patients was due to lack of time (54.5%) and lack of energy (21.2%). In conclusion, physical activity levels of the patients were unsatisfactory and associated with poor glycaemic control, especially in the elderly. There is a need to encourage diabetic patients to undertake regular physical activity in order to achieve optimal glycaemic control.

F28 Body composition in the pathogenesis and management of diabetes: a Malaysian perspective

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Asia Pac J Clin Nutr 3: 33-39, 1994

There is an increasing prevalence of diabetes mellitus around the world associated with rapid sociocultural development and changing lifestyles. Increased prevalence of obesity, with a higher consumption of animal products and lower consumption of fruits and vegetables, increases the risk of diabetes mellitus and other chronic degenerative diseases. Insulin-dependent diabetes (IDD) is caused by insulin deficiency, whereas the main feature of non-insulin-dependent diabetes (NIDD) which accounts for more than 90% of diabetics, is hyperinsulinemia and insulin resistance, which may eventually lead to actual insulin deficiency. Hyperinsulinemia is undesirable because it increases the risk of developing vascular disease. In Malaysia, the prevalence of NIDD in some communities now exceeds 5%, and of impaired glucose tolerance 10%. Along with these increases in prevalence of hyperglycemia are increases in prevalence of overweight (BMI>25) and almost certainly abdominal fatness. In terms of management, nutrition is given priority. Insulin and hypoglycemic drugs (sulphonylureas or biguanides), where required, may adversely affect body composition if overused. Newer therapeutic strategies require greater attention to the underlying problem in NIDD of abdominal fatness by attention to the relevant nutritional factors, physical activity and other lifestyle factors like cigarette smoking and alcohol. The greater impact of obesity and diabetes on Malaysian women as opposed to men also needs to be addressed.

F29 Diabetic control among NIDDM patients in urban and rural areas in Malaysia

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Med J Malaysia.51(1): 48-51, 1996

Sixty three and fifty nine non-insulin dependent diabetes mellitus (NIDDM) patients in rural (land resettlement scheme) and urban areas respectively were studied to determine factors associated with diabetic control. The anthropometric and metabolic data (HbA1 and fructosamine levels) were analysed. After adjusting for gender, age, body mass index (BMI) and food intake, the fructosamine level which correlates with short term diabetic control, was significantly lower among patients in urban areas compared to patients in rural areas ($p < 0.05$). However, for longer term diabetic control (HbA1 level) the difference was not statistically significant ($p > 0.05$). The socio-economic status, level of education, BMI and types of food did not correlate with diabetic control in either group of patients. More diabetes education is needed together with socio-economic development and changes in lifestyles to enhance compliance towards health and dietary regimens and to achieve better metabolic control.

F30 Association between dietary fibre and cancer: A case-control study in Malaysia

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Mal J Nutr 10(2): 173-182, 2004

A case control study to determine the association of dietary fibre and cancer among Malaysians. It was conducted among 100 newly-diagnosed cancer patients admitted to the Radiotherapy and Oncology Ward, Hospital Kuala Lumpur. A total of 100 controls matched with the cases for age, sex and ethnic origin were selected from the Outpatient Health Clinic in Sentul. The subjects were interviewed to obtain information on their habitual dietary intakes and lifestyles. Family history of cancer, smoking habits, and alcohol consumption were found to be significant risk factors for cancer ($p<0.05$ for all parameters). The mean intake of total energy was higher among men with nasopharyngeal cancer and women with gastrointestinal cancer as compared to their controls ($p<0.05$ for both parameters). The percentage of energy contribution from fat was higher among cases (35%) than controls (32.1%).

The mean dietary fibre intake among cases (10.86 ± 8.90 g/d) was apparently lower than the controls (13.22 ± 5.99 g/d), with significant differences noted for breast cancer and also nasopharyngeal cancer. Women with low fibre intake (< 10g/d) had a 2.2 times higher risk of getting breast cancer. There is a need to educate the public to adhere to a wholesome diet, in particular to increase the consumption of high-fibre food for disease prevention.

F31 Relationship between selenium and breast cancer: a case-control study in the Klang Valley

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Singapore Med J 50(3): 265-269, 2009

Introduction: The purpose of this study was to assess the relationship between selenium status and intake among breast cancer patients from the Klang Valley. Methods: 64 cases and 127 controls were matched for age (range 30-65 years) and ethnicity, with an 80 percent study power. Subjects were interviewed to obtain information on their habitual dietary intakes, demographic data and medical history. Selenium status was determined from toenail and hair analysis using an inductively coupled plasma mass spectrometer.Results: The nutrient analysis showed that total energy and protein intake was significantly higher among controls (1,403 +/- 367 kcal/day, 75.6 +/- 33.2 g/day) as compared to cases (1,273 +/- 295 kcal/day, 60.9 +/- 19.1 g/day) (p-value is less than 0.05). The selenium intake among cases (78.47 +/- 25.34 µg/day) was significantly lower than the controls (89.34 +/- 36.85 µg/day) (p-value is less than 0.05). Breast cancer risk decreased with the increasing quartiles of selenium intake, with odds ratios (95 percent confidence interval) of 2.95 (1.22-7.12), 2.17 (1.13-4.19) and 1.71 (0.84-3.52), respectively. However, the association diminished after adjustment for confounding factors. Selenium in hair did not differ among cases and controls, but selenium status in the nails of controls was significantly higher as compared to cases (p-value is less than 0.05). Breast cancer risk decreased with the increasing quartiles of toenail selenium status as measured in the toenail and hair. Conclusion: Selenium intake and status was associated with breast cancer risk. Thus, it is essential for Malaysian women to achieve a good selenium status by consuming good food sources of selenium as a chemopreventive agent.

F32 Prevalence of metabolic syndrome among Malaysians using the international diabetes federation, national cholesterol education program and modified world health organization definitions

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Mal J Nutr 14 (1): 65 - 77, 2008

The World Health Organization (WHO), National Cholesterol Education Program Adults Treatment Panel III (NCEP ATP III) and International Diabetes Federation (IDF) have proposed different criteria to diagnose metabolic syndrome (MetS). However, there is no single definition to accurately diagnose MetS. The objective of this study is to estimate the prevalence of MetS using WHO, NCEP ATP III and IDF in the Malaysian community, and to determine the concordance between these definitions for MetS. 109 men and women aged > 30 years participated in the study, and the prevalence of MetS was determined according to the three definitions. Weight, height, body mass index (BMI), waist-hip circumference, blood pressure, blood lipid profile and plasma fasting glucose were measured. In order to determine the concordance between IDF and the other two definitions, the kappa index (k-test) was used. The prevalence of MetS (95% confidence interval) was 22.9% (22.8-23.1) by IDF definition, 16.5% (16.3-16.9) by NCEP ATP III definition and 6.4% (6.2-6.6) by modified WHO definition. The sensitivity and specificity of IDF against NCEP ATP III were 88.9% and 90.1% respectively, IDF against WHO definition were 85.7% and 81.4%. The k statistics for the agreement of the IDF definition was 68.3 ± 0.1 with the NCEP ATP III, and 30.5 ± 0.1 with the modified WHO definition. The prevalence of the MetS among respondents using the IDF definition was highest, followed by NCEP ATP III, and finally modified WHO definition. There was a good concordance between the IDF and NCEP ATP III definitions, and a low concordance between IDF and modified WHO definitions.

F33 Prevalence of hypertension among Chinese elderly and its relationship to behavioural and nutritional factors

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Med J Malaysia. 51(1):33-40, 1996

A cross-sectional study was carried out to determine the prevalence of hypertension in the Chinese elderly and to examine its relationship with various behavioural and nutritional risk factors. This study involved 243 Chinese aged 55 years and older in 2 randomly selected Chinese Villages in Seberang Prai Tengah, Penang. The study included an interview, anthropometric assessment and blood pressure measurement.

The prevalence of hypertension was 48.1% and out of this, 65 (55.6%) were on anti-hypertensive treatment. There was a significant rise in the prevalence with age. Hypertension was found to be inversely related to per capita income and physical activity ($p < 0.05$). Hypertension was significantly more common in smokers than non-smokers. Alcohol intake in the elderly was low and not related to hypertension. Obesity was significantly associated with hypertension only among the elderly aged 55-64 years. The dietary intake of sodium, potassium and calcium did not differ significantly between the hypertensive and normotensive elderly.

F34 Optimal cut-off levels to define obesity: body mass index and waist circumference, and their relationship to cardiovascular disease, dyslipidaemia, hypertension and diabetes in Malaysia

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Asia Pac J Clin Nutr. 18(2):209-216, 2009

Many studies in Asia have demonstrated that Asian populations may require lower cut-off levels for body mass index (BMI) and waist circumference to define obesity and abdominal obesity respectively, compared to western populations. Optimal cut-off levels for body mass index and waist circumference were determined to assess the relationship between the two anthropometric- and cardiovascular indices. Receiver operating characteristics analysis was used to determine the optimal cut-off levels. The study sample included 1833 subjects (mean age of 44+/-14 years) from 93 primary care clinics in Malaysia. Eight hundred and seventy two of the subjects were men and 960 were women. The optimal body mass index cut-off values predicting dyslipidaemia, hypertension, diabetes mellitus, or at least one cardiovascular risk factor varied from 23.5 to 25.5 kg/m2 in men and 24.9 to 27.4 kg/m2 in women. As for waist circumference, the optimal cut-off values varied from 83 to 92 cm in men and from 83 to 88 cm in women. The optimal cut-off values from our study showed that body mass index of 23.5 kg/m2 in men and 24.9 kg/m2 in women and waist circumference of 83 cm in men and women may be more suitable for defining the criteria for overweight or obesity among adults in Malaysia. Waist circumference may be a better indicator for the prediction of obesity-related cardiovascular risk factors in men and women compared to BMI. Further investigation using a bigger sample size in Asia needs to be done to confirm our findings.

F35 Racial differences in the fasting lipid profile of healthy malaysians

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Med J Malaysia 49(4): 355-363, 1994

The fasting lipid profile of a sample of Malays, Chinese and Indians in Peninsular Malaysia was studied to see whether these might explain differences in the rate of coronary heart disease mortality amongst the three ethnic groups. Fifty healthy subjects were studied from each of the three groups. They were matched for age, body mass index, gender and smoking habits, if any. The total cholesterol/HDL-cholesterol ratio and LDLcholesterol/HDL-cholesterol ratio were found to be statistically higher in the Indians than in the Malays and the Chinese. The differences between the Indians and the Chinese were statistically more significant than the differences between the Indians and the Malays. Our findings may partially explain the higher predisposition of the Indian community in Malaysia to CHD mortality and are consistent with those of other studies performed on Indian communities living outside the Indian sub-continent.

FOOD COMPOSITION DATABASES FOR NUTRIENTS AND NON-NUTRIENT COMPONENTS

G1 Assessment of antioxidant capacity and phenolic content of selected commercial beverages

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Mal J Nutr 13(2):149-159, 2007

This study was aimed at assessing the antioxidant capacity and phenolic (free, bound, and total) contents in selected commercial beverages. Three different types of beverages commonly available in Malaysian supermarkets namely, cocoa, coffee and tea were selected. Phenolic contents were determined using a Folin-Ciocalteu assay. Antioxidant capacity (ferric reducing power and scavenging activity) was determined using FRAP and TEAC assays. Based on analysis of variance, coffee showed the highest amount of free phenolic compounds and antioxidant capacity compared to cocoa and tea ($p < 0.05$). The major phenolic compound detected in coffee was chlorogenic acid. Cocoa showed higher phenolic content than tea. However, cocoa and tea have similar catechin content and possessed comparable antioxidant capacity. The free phenolic content in the three beverages was found to be highly correlated with antioxidant capacity. In addition, moderate correlation was observed between total phenolic content and antioxidant capacity. On the other hand, there was no significant contribution of bound phenolic compounds towards antioxidant capacity. The contribution of antioxidant capacity in these beverages could be due to phenolic compounds in the free form. The study indicated that the beverages studied possessed varying degrees of antioxidant capacity and phenolic contents.

G2 Phytochemicals and antioxidant activity of different parts of bambangan (Mangifera pajang) and tarap (Artocarpus odoratissimus)

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Food Chemistry 113(2): 479-483, 2009

Mangifera pajang (family: Anacardiaceae; local name: bambangan) and Artocarpus odoratissimus (familiy: Moraceae; local name: tarap) are popular edible fruits in Sabah, Malaysia. The flesh, kernel and peel from M. *pajang*; seed and flesh from A. *odoratissimus* were analysed for total antioxidant activity, total polyphenol, total flavonoid and total anthocyanins contents. M. *pajang* kernel extract displayed the highest free radical scavenging and ferric reducing activities. Total phenolic content

of the samples were in the range of 5.96-103.3 mg gallic acid equivalent/g. M. *pajang* kernel and M. *pajang* flesh contained the highest and lowest total flavonoid content with the values of 10.98 and 0.07 mg rutin equivalent/g, respectively. The antioxidant activities of extracts were significantly correlated with the total phenolic and flavonoid content (but not the anthocyanins content). The phytochemicals and antioxidant properties of M. *pajang* and *A. odoratissimus*, especially their by-products (kernel/seed), indicate that they may impart health benefits when consumed and should be regarded as a valuable source of antioxidant-rich nutraceuticals.

G3 Determination of vitamin C, ß-carotene and riboflavin contents in five green vegetables organically and conventionally grown

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Mal J Nutr 9(1): 31-39, 2003

As consumer interest in organically grown vegetables is increasing in Malaysia, there is a need to answer whether the vegetables are more nutritious than those conventionally grown. This study investigates commercially available vegetables grown organically and conventionally, purchased from retailers to analyse ß-carotene, vitamin C and riboflavin contents. Five types of green vegetables were selected, namely Chinese mustard (sawi) (Brassica juncea), Chinese kale (kai-lan) (Brassica alboglabra), lettuce (daun salad) (Lactuca sativa), spinach (bayam putih) (Amaranthus viridis) and swamp cabbage (kangkung) (Ipomoea aquatica). For vitamin analysis, a reverse-phase high performance liquid chromatography was used to identify and quantify ß -carotene, vitamin C and riboflavin. The findings showed that not all of the organically grown vegetables were higher in vitamins than that conventionally grown. This study found that only swamp cabbage grown organically was highest in ß -carotene, vitamin C and riboflavin contents among the entire samples studied. The various nutrients in organically grown vegetables need to be analysed for the generation of a database on nutritional value which is important for future research.

G4 Nutritional quality of protein concentrate prepared from Malaysian rice bran

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ASEAN Food Journal 13(1): 23-28, 2004

The nutritional quality of rice bran protein isolate (RBPI) was compared to the protein isolate (SPI). RBPI was prepared from defatted stabilized rice bran by

alkaline extraction and acid precipitation. The RBPI contained 68% crude protein. The nutritional quality of RBPI was evaluated by in-vitro protein digestibility (IVPD), nitrogen solubility (NS) and amino acids composition. The IVPD for RBPI was 94% which was 3% lower than SPI. The NS of RBPI at pHs 2, 4, 6, 8 and 10 were 17%, 5%, 23%, 29% and 33% respectively. There was no significant difference in NS between RBPI and SPI, but there were significant differences ($p < 0.05$) in amino acid content. RBPI prepared from Malaysian stabilized rice bran had good nutritional quality.

G5 Antioxidant activity and phenolic content of spinach species (Amaranthus sp.)

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Food Chemistry 94:47-52, 2006

The study was aimed to determine the antioxidant activity (total antioxidant and free radical-scavenging activities) and total phenolic content of Amaranthus sp. The effects of different blanching times (10 and 15 min) on antioxidant activity and phenolic content were also studied. Four types of Amaranthus species locally known as spinach, namely _bayam putih_ (Amaranthus paniculatus) (BP), 'bayam merah' (Amaranthus gangeticus) (BM), 'bayam itik' (Amaranthus blitum) (BI) and 'bayam panjang' (Amaranthus viridis) (BPG), were selected. Total antioxidant activity of water-soluble components in raw spinach was in the order of BI ˜ BM ˜ BPG > BP, whereas free radical-scavenging activity was in the order of BI > BPG > BM > BP. The total phenolic contents of BM and BP were significantly higher ($p < 0.05$) than other samples. All the studied spinach species possessed different antioxidant activities and phenolic contents. Antioxidant activities and phenolic contents of all the spinach were in the order of raw > blanched 10 min > blanched 15 min. Blanching up to 15 min may affect losses of antioxidant activity and phenolic content, depending on the species of spinach.

G6 Antioxidant capacity of methanolic and water extracts prepared from food-processing by-products

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Journal of the Science of Food and Agriculture 86(5): 778 -784, 2006

This study aims to evaluate the antioxidant capacity of mango peel, roselle seed, okara (by-product of soya milk industry), cocoa shell and pink guava (by-product

of pink guava industry) in comparison to 6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylic acid (Trolox). The ß-carotene bleaching, 1,1-diphenyl-2-picrylhydrazyl and reducing power assays were used to determine the antioxidant capacity of selected by-products by measuring the absorbance at 470, 520 and 700nm, respectively. The results showed that methanolic extracts of pink guava and cocoa shell exhibited the highest antioxidant activity and free radical scavenging activity compared to other studied samples. Roselle seed water extract exhibited the highest antioxidant activity and free radical scavenging when extracted with water. Pink guava possessed the highest reducing power in methanolic extract at a concentration of 0.16mg mL-1. At the same concentration, mango peel exhibited the highest reducing power when extracted with water. The present study shows that pink guava, roselle seed and cocoa shell are potential sources of antioxidant components that can be exploited as food preservative agents or nutraceuticals.

G7 Analysis of cocoa cotyledons albumin

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Asian Journal of Plant Sciences 2(13): 958-962, 2003

In cocoa cotyledon, storage albumin is abundantly present compared to other proteins. Two-dimensional electrophoresis (2-D IEF/SDS-PAGE) and native isoelectric focusing (native-IEF) techniques were used to analyse some of its biochemical characteristics. 2-D IEF/SDS-PAGE analysis by using commercially available immobilised pH gradient (IPG) gels in the first dimension for IEF exhibited reproducible patterns and high resolution of polypeptide patterns. The storage albumin (22 kDa) exhibited as a single form on 2-D IEF/SDS-PAGE with pI at around 4.6. An albumin was not resolved into multiple forms in IEF. The study found that there was similar analytical identity in storage albumin for all cultivars. This indicates that the storage albumin did not reflect genetic differences.

G8 Carnitine content in infant formulae from the local market

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Sains Malaysiana 27: 1-8, 1998

The contents of free, esterified and total carnitine in infant formulae for infants ages up to 6 months old were studied. The infant formulae analyzed were divided into two groups. The first group consisted of five cow's milk-based formulae (Brand

BSL-1 to BSL-5), and the other group consisted of five soy-based formulae (Brand BKS-I to BKS-5). This study found that all of the infant formulae except for three BKS formulas (BKS-3, BKS-4 and BKS-5) contained carnitine. The total and free carnitine concentrations were highest in BKS-I formula. BKS-1 is one of the formulae that has been fortified with camitine. Esterified carnitine content was highest in BSL-3 formula. Al-though carnitine was detected in many of the infant formulae analyzed, the total concentrations were much lower than in cow's or human milk.

G9 Vitamin E and fatty acid composition of blended palm oils

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Journal of Food, Agriculture & Environment 7(2): 256-262, 2009

Vitamin E content (ppm) (4 tocopherols and 3 tocotrienols without ß-tocotrienol) and fatty acid composition (FAC) of blended unsaturated oils [corn oil (CO), sesame oil (SO) and rice bran oil (RBO)] with palm olein (PO) at 1 to 1 ratio (v/v) were determined using HPLC and GC, respectively. The vitamin E content in blended oils was significantly different ($P<0.05$) from levels in the native oils that made the blending with values of 348.6±5.6, 452.0±3.2 and 2774.0±6.3 ppm respectively for PO-CO, PO-RBO and PO-SO. In general, blending of unsaturated oils with PO changed SFA, MUFA and PUFA content of the resulting oils in the range of 21-26, 34-37 and 34-41%, respectively that compatible to the NCEP recommendation. Thus, the use of blended unsaturated oils with palm olein could be beneficial and results in nutritionally balanced fatty acid oils, improved omega-6/omega-3 ratio and increased vitamin E level, particularly the tocotrienol. Finally the use of these blended oils may favor overall dietary nutrient adequacy.

G10 The nutritional value of some processed meat products in Malaysia

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Mal J Nutr 1: 83-94, 1995

Per capita consumption of meat and meat products in Malaysia more than doubled from 15.70 kg in 1970 to 35.71 kg in 1990. This increase in meat consumption is mainly due to the rapid development and wide acceptance of value added meat and poultry products amongst Malaysian consumers. Meat products such as burgers, sausages, hotdogs and nuggets are widely accepted and consumed by all ethnic

groups at home as well as in the fast food restaurants. The significant expansion of the fast food industry and the increase consumption of processed meat products makes it necessary for a re-evaluation of the nutritional quality of popular meat products currently available in the market. This review paper described the quality of some processed meat products, their proximate composition, meat quality, use of non meat proteins and binders, and the use of additives in the formulation of burgers, frankfurters, nuggets, bologna, chicken and beef balls. Preliminary results on the protein efficiency ratio of local meat products seemed favourable but this study is limited to only one laboratory. In vivo and in vitro protein digestibility studies indicated high values on the digestibility of locally manufactured meat products. Proximate analysis of the raw materials used in the formulation of such products showed many with high fat and low protein contents being utilized. The meat content was lower than the minimum amount stated by the food regulation. This paper concludes that due to lack of information and studies on the nutritional composition of processed meat products, concerned bodies should take positive steps to generate reliable data to elucidate the actual nutritional composition of such products. It is also observed that many by-products from the animal industry from non-conventional sources are increasingly being utilized in the manufacture of processed meat product.

G11 Protein quality of anchovy, mackerel and canned sardine samples

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Mal J Nutr 13(2): 171-177, 2007

The protein nutritive value of anchovy, mackerel and canned sardine samples together with casein as a reference formulation were evaluated. Proximate composition, protein quality and protein digestibility were determined. Procedures for evaluation included Protein Efficiency Ratio (PER) using the rat bioassay and in vivo Apparent Digestibility (AD). Rats fed with canned sardine diet had the highest mean body weight (154.8±12.28g) while rats fed with anchovy diet had the lowest mean body weight (145.27±15.89g) with significant differences between all the groups. Mean body weight of rats fed with selected fish diet was higher compared to rats fed with casein diet. For PER value, canned sardine has the highest value (2.48), followed by anchovy (2.46) and mackerel (2.34). PER value for all selected fish is lower than that for casein (3.14). Mackerel had the highest value of in vivo AD (96.99%), followed by casein (96.96%), canned sardine (96.88%) and anchovy (91.29%). In conclusion, among the types of fish compared, sardine had the highest protein quality while mackerel showed the highest digestibility.

G12 Nutritional and amino acid contents of differently treated roselle (Hibiscus sabdariffa L.) seeds

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Food Chemistry 111: 906-911, 2008

The effects of sun-drying and boiling sun-drying on the nutritional composition of Roselle (Hibiscus sabdariffa L.) seeds, grown from Malaysia, were investigated. The treatments were raw freeze-dried Roselle seeds (RRS), sun dried Roselle seeds (DRS) and boiled sun-dried Roselle seeds (BRS). Protein, lipids and dietary fibre were found to be high in all the treatments. The seeds, regarded as by-product of Roselle processing had 57.3% moisture. Raw freeze-dried, sun dried and boiled sun-dried seeds contained 6.81%, 9.9% and 9.8% moisture; 35.4%, 33.5% and 30.6% protein; 27.2%, 22.1% and 29.6% lipids; 2.3%, 13.0% and 4.0% available carbohydrate; 25.5%, 18.3%, and 19.2% total dietary fibre; and 7.4%, 7.5% and 6.6% ash, respectively. The carbohydrate, protein, lipids and moisture of RRS were significantly different ($p < 0.05$) from DRS and BRS. The predominant minerals in Roselle seeds were potassium (99-109 mg/100 g), magnesium (26-28 mg/ 100 g) and calcium (24-31 mg/100 g). The total dietary fibre of the seeds was within the acceptable range, with soluble and insoluble fibre ratios ranging from 1.2 to 3.3. The study detected 17 essential and nonessential amino acids. The seeds were rich in lysine (14-15 g/100 g), arginine (30-35 g/100 g), leucine (15.4-18.6 g/100 g), phenylalanine (11-12 g/100 g) and glutamic acid (21-24 g/100 g). The study indicated that Roselle seeds may serve as a potential source of functional ingredients.

G13 Antioxidant tea from leaves of Strobilanthes crispus

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Journal of Tropical Medicinal Plants 5(2): 199-204, 2004

Strobilanthes crispus (Acanthaceae) is locally known as "pecah kaca" or "jin batu" in Malaysia and "enyoh kilo", "kecibeling" or "kejibeling" in Indonesia. The details of herbal tea from Strobilanthes crispus, young and old leaves and assessment of their antioxidant activity, total phenolic content and elemental contents are reported.

G14 Bioaccessibility of carotenoids and tocopherols in Marine Microalgae, Nannochloropsis sp. and Chaetoceros sp.

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Mal J Nutr 15(1): 77-86, 2009

Microalgae can produce various natural products such as pigments, enzymes, unique fatty acids and vitamin that benefit humans. The objective of the study is to study the bioaccessibility of carotenoids (ß-carotene and lycopene) and vitamin E (a- and ß- tocopherol) of Nannochloropsis oculata and Chaetoceros calcitrans. Analyses were carried out for both the powdered forms of N. oculata and C. calcitrans, and the dried extract forms of N. oculata and C. calcitrans. In vitro digestion method together with RP-HPLC was used to determine the bioaccessibility of carotenoids and vitamin E for both forms of microalgae. Powdered form of N. oculata had the highest bioaccessibility of ß-carotene (28.0 ± 0.6 g kg-1), followed by dried extract N. oculata (21.5 ± 1.1 g kg-1), dried extract C. calcitrans (16.9 ± 0.1 g kg-1), and powdered C. calcitrans (15.6 ± 0.1 g kg-1). For lycopene, dried extract of N. oculata had the highest bioaccessibility of lycopene (42.6 ± 1.1 g kg-1), followed by dried extract C. calcitrans (41.9 ± 0.6 g kg-1), powdered C. calcitrans (39.7 ± 0.1 g kg-1) and powdered N. oculata (32.6 ± 0.7 g kg-1). Dried extract C. calcitrans had the highest bioaccessibility of a-tocopherol (72.1 ± 1.2 g kg-1). However, ß-tocopherol was not detected in both dried extract and powdered form of C. calcitrans. In conclusion, all samples in their dried extract forms were found to have significantly higher bioaccessibilities than their powdered forms. This may be due to the disruption of the food matrix contributing to a higher bioaccessibility of nutrients shown by the dried extract forms.

G15 Protein quality of Roselle (Hisbiscus sabdariffa L.) seeds

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ASEAN Food Journal 14(2):131-140, 2007

This study investigated the protein quality of two sets of Roselle seeds processed differently (dried and boiled). Twenty weanling Sprague Dawley rats were used to conduct the growth and nitrogen balance studies. Rats were fed with 10% (w/w) protein from dried (DS) and boiled (BS) Roselle seeds powder for 4 weeks. Casein was used in this study as a standard reference protein. There was a significantly higher ($p < 0.05$) food intake and weight gain by rats fed with BS compared with DS. In the growth study, there was no significant difference ($p < 0.05$) in protein

efficiency ratio (PER) and net protein ratio (NPR) of BS compared to DS, but it was significantly different with casein (CD). PER value of rats fed with DS was significantly lower ($p < 0.05$) than casein. In the nitrogen balance study, true nitrogen absorption (TNA) and nitrogen balance (NB) of BS group was significantly higher ($p < 0.05$) than DS group. However, apparent digestibility (AD), true digestibility (TD) and biological value (BV) for both diets was not significantly different. This study showed that the protein quality of dried Roselle seeds was similar to the Roselle seeds boiled at 100°C for 30 minutes.

G16 Penentuan Kandungan Nutrien dan Antinutrien dalam Kernel Biji Mangifera pajang Kostermans

Hasnah H and Mamot S

Jurnal Sains Kesihatan Malaysia 2(2): 1-11, 2004

Kajian ini dijalankan untuk menentukan kandungan nutrien dan antinutrien dalam kernel biji Mangifera pajang Kostermans (bambangan). Analisis proksimat untuk kernel biji bambangan menunjukkan komposisi nutriennya terdiri daripada 38.68% karbohidrat total, 3.08% protein, 4.79% gentian kasar, 9.85% lemak total, 2.23% abu total dan 41.38% air. Kernel ini juga mengandungi 2.04 mg sianogen glikosida/ 100 g sampel dan 0.64% tanin. Minyak yang diekstrak dari kernel biji bambangan telah menunjukkan ciri fizikokimia yang hampir sama seperti lemak koko. Takat lebur minyak ini adalah pada 34.87°C, indeks refraktif pada 1.458 dan nilai iodinnya adalah 32.97 mg iodin/100 g sampel lemak.

G17 Daidzein and genistein contents in tempeh and selected soy products

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Food Chemistry 115:1350-1356, 2009

The total isoflavones in tempeh and selected local soy products was determined. Raw tempeh contained 26 ± 6 mg daidzein (Da) and 28 ± 11 mg genestein (Ge) while fried tempeh contained 35 ± 11 mg Da and 31 ± 11 mg Ge in 100 g (wet basis). Total isoflavone content in 100 g of raw tempeh, based on a dry weight, was 205 ± 56 mg and significantly reduced to 113 ± 41 mg in 100 g of fried tempeh. Tempeh in batter was deep-fried for 30 min which reduced 45% of the total isoflavone content compared to the raw one. Raw tempeh contained the highest total content of isoflavone among the studied local soy products. Total isoflavone content in processed soy foods like egg tofu and home made soybean drink were significantly lower than other soy products studied.

G18 Assessment of mercury level in commonly consumed marine fishes in Malaysia

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Food Control 20(1):79-84, 2009

Twelve species of common marine fish consumed by Malaysians were collected from local wholesale market in Malaysia; the mercury concentrations in muscle and liver samples were determined by cold vapour atomic absorption spectrophotometry. The mercury concentration in the samples, expressed in µg g-1 dry weight. It was 0.45 for short-bodied mackerel, 0.04 for scad, 0.04 for narrow-bodied Spanish mackerel, 0.13 for black pomfret, 0.50 for long tail tuna, 0.03 for greasy grouper, 0.09 for chacunda gizzard shad, 0.06 for yellow-banded scad, 0.05 for eastern little tuna, 0.09 for delagoa treadfish bream, 0.10 for giant perch and 0.00 for sardine's muscle tissue. Among the fishes analyzed, long tail tuna had the highest level followed by short-bodied mackerel. Significantly lower levels ($P < 0.05$) of mercury were found in liver tissues. Total mercury concentration in liver tissues were as follow; 0.03 for short-bodied mackerel, 0.02 for scad, 0.05 for narrow-bodied Spanish mackerel, 0.10 for black pomfret, 0.49 for long tail tuna, 0.03 for greasy grouper, 0.03 for chacunda gizzard shad, 0.04 for yellow-banded scad, 0.02 for eastern little tuna, 0.09 for delagoa treadfish bream, 0.01 for giant perch and 0.01 for sardine. This study indicates that commonly consumed fish from Malaysia have concentrations of mercury below the permissible levels stated in the US FDA guidelines.

G19 The nutritional value of indigenous fruits and vegetables in Sarawak

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Asia pacific J Clin Nutr 8(1): 24 - 31, 1999

Teh proximate composition including mineral and vitamin contents of 16 fruits and 46 vegetables (leaves, fruits, palm hearts and shoots) of indigenous origin in Sarawak are provided. Fruits like dabai (Canarium adontophyllum), kembayau (Darcryodes rostrate f.Cuspidata), durian nyekak (Durio kutejensis) and durian kuning (Durio graveolens) are very nutritious with high values for energy, protein and potassium. Among the vegetables, the protein content of letup (Passiflora foetida), kepayang (Pangium Adule) and tubu (Pycnarrhena tumetacta) is high, ranging from 6 to 7%. The range of nutrients among foods of indigenous origin are generally comparable with those of many cultivated species except for vitamin C,

which is lower. Teh Kampung (Leucosyke capitellata) leaves are particularly high magnesium (626 mg/ 100 g). Some of the indigenous vegetable contain antinutritional factors. Kepayang has very high levels of hydrogen cyanide (1834 μg/g on dry basis) but this poison can be completely evaporated by boiling. Indigenous fruits and vegetables which are pesticide residue free are important food sources for rural populations. Nutritious indigenous fruits and vegetable have the potential to be promoted for wider use, domestication and commercialization.

G20 Oral antioxidant capacity and total phenolic content of Malaysian underutilized fruits

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J Food Comp and Anal 22: 388-393, 2009

The purpose of this study was to evaluate the antioxidant capacity (AC) and total phenolic content (TPC) of selected Malaysian underutilized fruits. The 58 underutilized fruits of 32 different species from 21 genera were analyzed for AC and TPC. AC was measured using b-carotene bleaching, ferric reducing antioxidant potential (FRAP) and 2,2-diphenyl-1-picryl hydrazyl (DPPH) assays, and TPC was determined using the Folin-Ciocalteu reagent assay. Our findings showed that the fruits from genera of Pometia, Averrhoa, Syzygium, Sallacca, Phyllanthus, Garcinia, Sandoricum and Maipighia had higher AC compared to other studied genera. Among the underutilized fruits, Sandoricum and Phyllanthus fruits contained the highest TPC (>2000 mg/100 g edible portion). The correlation between AC and TPC varied. The study indicated that some of these underutilized fruits have the potential to be sources of antioxidant components.

G21 Antioxidant properties of selected non-leafy vegetables

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Nutrition and Food Science 39(2):176-180, 2009

Purpose - The purpose of this paper is to determine the antioxidant properties (capacity and component) of four non-leafy vegetables. The correlation between the antioxidant capacity and its components of the studied vegetables was also assessed.

Design/methodology/approach - Winged beans, also known as four-angled bean (Psophocarpus tetragonolobus), French bean (Phaseolus vulgaris), string bean (Vigna sinensis) and snow pea (Pisum sativum) were selected as samples from among the common non-leafy vegetables consumed by Malaysians. These fresh vegetables were lyophilised and ground and their ethanolic extracts were prepared for antioxidant capacity assays and total phenolic, ß-carotene and ascorbic acid contents.

Findings - Among the vegetables, string beans showed the highest antioxidant capacity compared to the other vegetables studied ($p < 0.05$). The total phenolic, ascorbic acid and ß-carotene contents of snow peas were significantly higher ($p < 0.05$) than the other vegetables. There was a significant positive correlation between scavenging activity and antioxidant components studied. On the other hand, a negative correlation was found between antioxidant activity and its components of the studied vegetables.

Originality/value - Previous reports have indicated that vegetables contain high levels of antioxidants. However, data on antioxidant capacity of these non-leafy vegetables are still lacking. This research paper shows the non-leafy vegetables studied is a promising source of antioxidants with good antioxidant capacity. Beside that, along with the studied antioxidant components, other compounds in these vegetables could also contribute to their antioxidant capacity

G22 Antioxidative effects of cocoa shell, roselle seeds and a combination of both extracts on the susceptibility of cooked beef to lipid oxidation

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Journal of Food Technology 4(1): 10-15, 2006

This study was aimed to investigate the effects of cocoa shell (CS), roselle seeds (RS) and a combination of both extracts (CR) as compared to synthetic antioxidants (BHT and a-tocopherol) on lipid oxidation in cooked beef stored at 4°C for 14 days. Extracts and synthetic antioxidants were added into ground beef at a concentration of 7500 ppm. Progression of lipid oxidation was monitored by determining TBA numbers on days 1, 3, 7 and 14. Antioxidant and free radical scavenging activities of the extracts at a concentration of 7500 ppm were evaluated using b-carotene bleaching and DPPH free radical scavenging assays, respectively. Result showed that cooked beef treated with BHT and a-tocopherol exhibited significantly greater ($p < 0.05$) TBA numbers than those treated with the extracts throughout the course of study, indicating that cooked beef treated with the studied synthetic antioxidants are more susceptible to lipid oxidation. Based on TBA numbers, the study indicates that the extracts tested were more effective than BHT and a-tocopherol in inhibiting lipid oxidation in cooked-refrigerated beef. Moreover, phenolic compounds present in cocoa shell extract might be a potential candidate to reduce lipid oxidation of cooked-refrigerated beef.

G23 Total antioxidant activity and phenolic content in selected vegetables

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Food Chemistry 87(4): 581-586, 2004

This study was carried out to determine the total antioxidant activity and phenolic content of selected common vegetables. The effect of thermal treatment on antioxidant activity and phenolic content were also studied. Kale, spinach, cabbage, swamp cabbage and shallots were used in this study. Among all the vegetables (fresh and thermally treated), shallots showed the highest total antioxidant activity followed by spinach, swamp cabbage, cabbage and kale. Spinach had an exceptionally high total phenolic content, followed by swamp cabbage, kale, shallots and cabbage. Except for shallots and cabbage, the antioxidant activities of kale, spinach and swamp cabbage were significantly decreased ($p < 0:05$) after thermal treatment. Moreover, this study revealed that a 1-min thermal treatment significantly decreased ($p < 0:05$) the total phenolic content of all vegetables studied.

G24 Antioxidant Activity of Selected Commercial Seaweeds

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Mal J Nutr 8(2): 167-177, 2002

This study aims to evaluate the antioxidant activity (total antioxidant and free radical scavenging activities) of seaweeds commercially available in the Malaysian supermarket. Four types of seaweeds namely Nori (Porphyra sp.), Kumbu (Laminaria sp.), Wakame (Undaria sp.) and Hijiki (Hijikia sp.) were used in the study. The extracts were prepared with water and ethanol, respectively. The ß-carotene bleaching and 1,1-diphenyl-2-picrylhydrazyl (DPPH) assays were used to determine antioxidant properties of seaweeds by measuring the decrease in absorbance at 470 and 517 nm. In water extract, Kumbu showed the highest total antioxidant activity of 63% compared with other samples. Kumbu, Nori and Hijiki exhibited higher radical scavenging activity than Wakame when extracted with water. Wakame exhibited the highest antioxidant and free radical scavenging activities in ethanolic extract with 58% and EC50 = 0.42 mg/ml respectively. The results of ANOVA analysis show significant differences ($p<0.05$) in the means of total antioxidant and free radical scavenging activities of the seaweeds. The results showed that processed commercial seaweeds exhibited varying degrees of antioxidant properties.

G25 Roselle (Hibiscus sabdariffa L.) seeds - nutritional composition, protein quality and health benefits

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Food 2(1):1-16, 2008

Roselle (Hibiscus sabdariffa Linn) is a herbal shrub plant reported native to tropical Africa and grown in warm countries including Malaysia. This plant is grown for the calyces or petals of the flower which are mainly used to prepare herbal drink, beverages, jam and jellies. After removing the calyces, the velvety capsules containing the seeds are disposed as a by-product. In addition, it is a waste if the seeds are left untouched, without effort to exploit its usefulness and benefits. Moreover, with limited research on the usefulness of roselle seeds, no review paper on this topic has ever published. Thus, we took the initiative to prepare a review on this subject based on findings from most of our work from 2003-2007. In this paper, the most important aspects namely, nutritional composition, including antioxidant properties, protein quality and the effect of seeds on lipid profiles of hypercholesterolemic rats have been reviewed. Based on the compositional analysis, roselle seeds are rich in nutritional components especially proteins, oil and dietary fiber. The seeds are rich in lysine, arginine, leucine, phenylalanine and glutamic acid. The antioxidative effect of roselle seed extract increases when combined with other antioxidant compounds compared to when used alone. The protein quality of roselle seed powder prepared from dried and boiled seeds is similar. Roselle seeds were also reported to possess anti-hypercholesterolemia effects tested using an animal model. To exploit the seeds which contain high value health-promoting components as functional ingredients, their possible application in food products should be studied.

G26 Nutritional Composition, in vitro Antioxidant Activity and Artemia salina L. Lethality of Pulp and Seed of Tamarindus indica L. Extracts

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Mal J Nutr 15(1): 65-75, 2009

This study was designed to examine the nutritional composition, antioxidant activity and medium lethal concentration (LC50 value) of Tamarindus indica L. pulp and seed extracts in vitro. The extraction was set at 40°C, 60°C and 100°C for 12 hours, 6 hours and 15 minutes respectively to determine the optimum extraction parameter whereas the anti-oxidant activity of the extracts was measured using iron (III) reduction (FRAP) assay. Total phenolic content (TPC) of the extracts was estimated as gallic acid equivalent by Folin-Ciocalteau method. Toxicity potential of the extract was assessed in vitro by Artemia salina lethality test both in seed and pulp samples. The results showed that tamarind seed contained a higher percentage of carbohydrate, protein, fat and energy (15%, 82%, 95% and 33.13% respectively) than the pulp. On the other hand, the pulp demonstrated a high moisture (51.1%) and ash (34.84%) content than the seed. For the mineral analysis, tamarind seed contained higher Ca and C (1.0% and 50.73% respectively) than the pulp (0.27% and 40.40% respectively). No heavy metals were detected in both samples. Seed extracted at 60°C/6 hours and 100°C/15 minutes showed the highest TPC value and were significantly different ($p<0.05$) than the seed extracted at 40°C/12 hours. Anti-oxidant activity is positively correlated to the TPC value of the extracts ($R=0.991$). The pulp and seed extracted at 100°C/15 minutes showed the highest FRAP value among its groups (216.17 ± 14.06 μmol (Fe)/g and 659.74 ± 16.40 μmol (Fe)/g respectively). This study indicates that tamarind pulp and seed extracts possess beneficial antioxidant properties and the optimum extraction parameter is 100°C for 15 minutes. In Artemia salina lethality test, tamarind pulp caused significant mortality of the crustacean larvae with LC50 in the range of 26-28 μL/mL. Tamarind seed were not toxic to Artemia salina since the LC50 of the extracts was higher than 1000 μL/mL.

G27 Carotenoid content of underutilized tropical fruits

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Plant Foods for Human Nutrition 63(4):170-175, 2008

This study was conducted to evaluate the total carotene content (TCC) and beta carotene (BC) in the selected underutilized tropical fruits. TCC of underutilized fruits estimated by spectrophotometric method was in the range of 1.4-19.8 mg/100 g edible portion. The TCC of these fruits decreased in the order: Jentik-jentik>Durian Nyekak 2>Durian Nyekak 1>Cerapu 2>Cerapu 1>Tampoi Kuning>Bacang 1>Kuini>Jambu Mawar>Bacang 2>Durian Daun>Bacang 3>Tampoi Putih>Jambu Susu. BC contents estimated by HPLC method were highest in Jentik-jentik, followed by Cerapu 2, Durian Nyekak 2, Tampoi Kuning, Durian Nyekak 1, and Cerapu 1, which had a range of 68-92% of BC in TCC. These underutilized fruits have an acceptable amount of carotenoids that are potential antioxidant fruits.

G28 Determination of daidzein and genistein contents in Mangifera fruit

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Mal J Nutr 14(2): 189 - 198, 2008

The aim of this study was to determine the daidzein and genistein contents in Mangifera fruits. Three Mangifera species namely 'bacang' (Mangifera foetida), 'kuini' (M. odorata) and 'bambangan' (M. pajang) each from two different locations were selected. The extraction of isoflavones was carried out at 80oC for 30, 60 and 90 min. HPLC method was performed with a flow rate of 1.00 ml/min using three different separation columns to determine isoflavone contents. The Zorbax Eclipse RP C18 reverse-phase column was found to give the best resolution for isoflavone separation in Mangifera fruits. Moreover, extraction time of 90 min was found to increase the isoflavone aglycone contents. At optimised condition, 'kuini' had relatively high daidzein (9.4-10.5 mg/100 g) and genistein (1.6-1.7 mg/100 g) contents. Daidzein content of 'bambangan' (8.3-8.7 mg/100 g) was higher than 'bacang', but the genistein content of 'bambangan' (0.4-0.6 mg/100 g) was similar to that of 'bacang' (0.4-0.8 mg/100 g). However, there was a variation in daidzein and genistein contents in Mangifera fruits between two geographical locations.

G29 Antioxidant capacity and phenolic content of selected commercially available cruciferous vegetables

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Mal J Nutr 13(1): 71-80, 2007

Antioxidant activity, free radical scavenging activity and phenolic content of red cabbage (Brassica oleracea var. capitata rubra), Chinese cabbage (Brassica rapa pekinensis var cylindrica), green cabbage (Brassica oleracea var capitata), mustard cabbage (Brassica juncea var rugosa) and Chinese white cabbage (Brassica rapa var chinensis), grown in Malaysia, were evaluated. Red cabbage had the highest antioxidant activity and phenolic content compared to the other cruciferous vegetables studied ($p < 0.05$). The contributions of all cruciferous vegetables to the antioxidant activity was >79%. The radical scavenging activity was in the order of Chinese white cabbage > red cabbage > mustard cabbage > Chinese cabbage > green cabbage. There was a significant difference ($p < 0.05$) in the means of scavenging activity observed between cabbage, Chinese cabbage and Chinese mustard. Phenolic content was significantly different ($p < 0.05$) among all the cruciferous vegetables studied, and was in the order of red cabbage > Chinese white cabbage > green cabbage > Chinese cabbage >mustard cabbage. The study indicated that red cabbage possessed the highest antioxidant capacity and phenolic compounds concentration among all the cruciferous vegetables studied.

G30 Phenolics and theobromine contents of commercial dark, milk and white chocolates on the Malaysian markets

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Molecules 14(1): 200-209, 2009

Chocolate contains a wide range of antioxidants that includes soluble phenolic compounds (phenolic acids, catechin, epicatechin, and proanthocyanidins), insoluble polymeric phenolics and methylxanthines. The objective of this study was to determine phenolic and theobromine contents in dark (DC), milk (MC), and white (WC) chocolates commonly found in the Malaysian marketplace. Total phenolic and flavonoids were determined by means of a spectrometric assay, while catechin, epicatechin and theobromine were quantified using a reverse-phase HPLC method. Dark chocolates exhibited the highest phenolics and flavonoids contents, followed by milk and white chocolates. Catechin and epicatechin were major flavonoids detected in dark chocolates. Theobromine was detected in dark and milk chocolates, but not in white chocolates. A high correlation ($r = 0.93$) between total phenolic and flavonoid contents, indicating that the major phenolic compounds in dark chocolates belong to the flavonoid class. When nutrition and health promotion are of concern, dark chocolates would be recommended over milk and white chocolates owing to their higher contents of antioxidant phenolic compounds.

G31 Nutritional composition of edible seaweed Gracilaria changgi

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Food Chemistry 68 (1): 69-76, 2000

Gracilaria changgi, an edible seaweed was analyzed to determine its proximate chemical composition, mineral elements, vitamin C, ß-carotene, free fatty acid and amino acid contents. G. changgi showed vitamin A activity of 865 µg rectinol equivalents/100 g sample. It contained a higher composition of unsaturated fatty acids (74%), mainly the omega fatty acids and 26% of saturated fatty acids (mainly palmitic acid) and also relatively high levels of calcium and iron. Major amino acid components are glycine, arginine, alanine and glutamic acid. Among the essential amino acids assayed, lysine with a chemical score of 53% appeared to be the most limiting when compared with the essential amino acid pattern of egg protein. This study was conducted to create a nutritional data for G. changgi in order to popularize its consumption and utilization in Malaysia. Comparisons to corresponding nutrient values in several commonly consumed local vegetables were also made.

G32 Fatty Acid Composition of Five Malaysian Biscuits (Cream Crackers) With Special Reference to trans- Fatty Acids

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ASEAN Food Journal (14)3: 197-204, 2007

The fatty acid composition and trans fatty acids (TFA) contents of samples of five Malaysian cream crackers biscuit brands were determined by gas-liquid chromatography, using a 60m Supelco SP2340 fused silica capillary column and flame ionization detection. The identities of the fatty acids were established by comparing their retention times with authentic standards from Supelco. The results were expressed as relative percentages. The total saturated fatty acids (SFA) in the samples ranged from 48.90% to 54.87% of total fatty acids. As for the polyunsaturated fatty acids (PUFA), the total PUFA in the samples ranged from 9.97% to 11.73% of total fatty acids. Total trans fatty acids (TFA) ranged from 0.17% to 0.77% of total fatty acids. The monotrans 18:2 tc or 18:2 ct isomer content ranged from 0.07% to 0.10% of total fatty acids and the ditrans 18:2 isomer (9t, 12t) was not detected. The results indicate that all the fat sources of the 5 sample crackers biscuit brands were palm oil based.

G33 Omega-3 Fatty Acids: Potential Sources in the Malaysian Diet with the Goal Towards Achieving Recommended Nutrient Intakes

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Mal J Nutr 12(2): 181-188, 2006

Omega-3 fatty acid nutrition is widely recognised as essential to health and general well-being. However, health professionals and the general public in Malaysia may lack knowledge on the sources or the amounts of these essential fat components in foods. This paper attempts to correct this scenario by identifying the potential sources of omega-3 fatty acids [a-linolenic acid (ALA), or eicosapentaenoic acid (EPA) + docosahexaenoic acid (DHA)] in the Malaysian diet and calculating the amounts of these "nutrients" provided per serving of a wide variety of foods. The information generated provides Malaysian health professionals and consumers with options in food choices or meal planning with the goal towards achieving the recommended nutrient intakes for omega- 3 fatty acids. The findings in the present study revealed that the potential sources of omega-3 fatty acids in the Malaysian diet in decreasing order are: edible oils (ALA), fish and fish products (EPA+DHA), vegetables (ALA), meat and eggs (EPA+DHA), and milk/milk products (EPA+DHA). Edible oils which are exceptionally high in ALA such as flaxseed oil

and perilla oil are presently unavailable at local retail outlets and supermarkets. However, consumers can still meet the recommended nutrient intakes (RNIs) for omega-3 fatty acids of 0.3 to 1.2% energy (equivalent to 0.67g-2.67g) by choosing a wellbalanced diet prepared preferably with a cooking oil blend containing ALA, and one or more servings daily from at least three of the following food groups: (i) fish ("jelawat", "siakap", sardines, tuna, mackerel, salmon)/ seafoods (shrimps, crab)/meat, (ii) vegetables/soybean/ soybean-based products/ beans and peas, (iii) omega-3 enriched/fortified foods (eg. "omega-3 eggs"), and (iv) ready-to-drink omega-3 milk preparations/soybean milk.

G34 Determination of phytate, iron, zinc, calcium contents and their molar ratios in commonly consumed raw and prepared food in Malaysia

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Mal J Nutr 15(2): 213-222, 2009

The inhibitory effect of phytate on the bioavailability of iron, zinc and calcium was determined by measuring their molar ratios. A total of 29 food samples consisting of 12 rice and rice products, 5 wheat and wheat products, 5 grains and cereal based products and 7 different popular varieties of cooked rice and rice products were selected. The phytate content was analysed using anion-exchange chromatography whereas mineral contents were analysed using atomic absorption spectrophotometry (AAS). One-way ANOVA test was used to statistically analyse the mean difference between the phytate and mineral contents between the food group samples. In general, results show that cooked products have lower content of phytate and minerals as compared to raw products. This could be due to the influence of the cooking method on phytate and mineral content in the food. Based on one-way ANOVA test, there were no significant difference in phytate and zinc content between four food groups ($p>0.05$). Significant differences were found only in iron and calcium content ($p<0.05$). Of the 29 food samples, 25 food samples had a phytate/iron molar ratio > 1, 5 food samples had a phytate/zinc molar ratio > 15 and 23 food samples had a phytate/calcium molar ratio of 0.24. These results show that although many of the food samples analysed had high mineral content, the high phytate content may impair the bioavailability of the mineral in the body.

G35 Antioxidant Levels and Activities of Selected Seeds of Malaysian Tropical Fruits

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Mal J Nutr 16(1): 149-159, 2010

The aims of this study are to determine and compare the antioxidant levels and activities (i.e. primary and secondary) between selected seeds of Malaysian tropical fruits - guava (Psidium guajava), mango (Mangifera indica L.) and papaya (Carica papaya L.). Seeds are among byproducts from the processing of fruitsbased products. Instead of discarding seeds as waste, seeds with high potential as antioxidants could be utilised for commercial purposes. Accordingly, the selected seeds of Malaysian tropical fruits were tested in this study for total phenolic content (TPC), free radical scavenging activity by 1, 1- diphenyl-2-picrylhydrazyl (DPPH) assay and metal ion chelating effect by ferrous ion chelating (FIC) assay. Extraction of antioxidant compounds from sample was done with 70% ethanol. TPCs of the seeds were expressed as gallic acid equivalents (GAE) in mg per 100 g fresh seed weight. TPC assay showed that mango seeds had the highest TPC (i.e. 32 ± 0.001 mg GAE) followed by guava seeds (i.e. 20 ± 0.001 mg GAE) and papaya seeds (8 ± 0.003 mg GAE). For DPPH assay, IC50 data showed that mango seed extract scavenged 50% DPPH radicals at the lowest concentration (0.11 ± 0.01 mg/mL) followed by the positive control BHA (0.13 ± 0.01 mg/mL), guava seed extract (0.26 ± 0.01 mg/mL) and papaya seed extract (0.34 ± 0.01 mg/mL). Interestingly, all seed extracts showed higher free radical scavenging activities than BHA after sample concentration of 0.60 mg/mL. However, FIC assay indicated that metal ion chelating effects of all seed extracts were weaker than BHA suggesting that the fruit seeds are not sources of good metal ion chelators. Overall, present results suggest that TPC of the seeds show strong negative correlation with their primary antioxidant activity (r= -0.985, R2= 0.970), and not all compounds in extracts which could scavenge DPPH radicals are good metal ion chelators. Mango seeds relatively showed the highest antioxidant level and primary antioxidant activity followed by guava seeds and papaya seeds.

G36 Antioxidant capacity and phenolic content of cocoa beans

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Food Chemistry 100: 1523-1530, 2007

This study investigated the antioxidant capacity and total phenolic content of cocoa beans from different countries, namely Malaysia, Ghana, Ivory Coast and Sulawesi. The antioxidant capacity of water and ethanolic extracts prepared from cocoa beans was measured by three different assays. To estimate the total phenolic content, the assay using Folin-Ciocalteu reagent was used. The water extract showed the higher value of antioxidant activity based on b-carotene bleaching assay, while the ethanolic extract showed the highest scavenging and ferric reducing activities. Ghanaian cocoa beans showed the highest antioxidant and scavenging activities, followed by Ivory Coast, Malaysian and Sulawesian. However, Malaysian and Sulawesian beans exhibited the highest ferric reducing activity, compared to the other beans. The highest phenolic content was found in Malaysian beans, followed by Sulawesian, Ghanaian and Ivory Coast. A positive correlation existed for both ethanolic (r = 0.76) and water extracts (r = 0.78) between phenolic content and ferric reducing activity. Our results showed that antioxidant capacity and phenolic content of Malaysian cocoa beans were comparable to Ghanaian, Ivory Coast, and Sulawesian beans.

G37 Epicatechin content and antioxidant capacity of cocoa beans from four different countries

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African Journal of Biotechnology 9(7):1052-1059, 2010

Natural antioxidant has received more attention and to be part of daily diet. Cocoa beans is one of the main sources of polyphenols especially epicatechin. This study was conducted to investigate the relationship between antioxidant potential and epicatechin content of raw cocoa beans from different countries, namely Malaysia, Ghana, Cote d'Ivoire and Sulawesi (Indonesia). Antioxidant potential was determined using trolox-equivalent antioxidant capacity (TEAC) and ferric reducing antioxidant power (FRAP) assays. Reversed-phase high performance liquid chromatography (HPLC) was used to quantify the amount of epicatechin. The epicatechin content

of raw cocoa beans was in the range of 270-1235 mg/100 g cocoa beans. Based on the two assays, Sulawesian beans exhibited the highest antioxidant capacity followed by Malaysian, Ghanaian and Cote d'Ivoirian beans for both extracts. Both ethanolic (r = 0.92) and water (r = 0.90) extracts of cocoa beans showed a significant positive and high correlation between epicatechin and TEAC value. Similarly, FRAP assay also showed a positive and high correlation with epicatechin for both ethanolic (r = 0.84) and water (r = 0.79) extracts. Results indicated that antioxidant capacity using two different antioxidant assays exhibited a positive and high correlation with epicatechin content in cocoa beans. Thus, epicatechin content in cocoa beans could be responsible to the antioxidant capacity.

G38 Fatty acid composition and cholesterol content of selected marine fish in Malaysian waters

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Food Chemistry 73(1): 55-60, 2001

A consumer survey identified 10 species of most-preferred marine fish for daily consumption in Malaysia. Total lipids extracted from 10 species of the selected fish were analyzed for their total fat, fatty acids composition and cholesterol content. Most of the fish contained less than 6% lipid by weight and total cholesterol content was 37.1-49.1 mg/100g. The composition of fatty acids showed that total ?-3 poly unsaturated fatty acids (?-3 PUFA; 29.7-48.4%) were the highest, followed by other PUFA (27.7-40.0), ?-6 PUFA (11.0-20.0%), saturated fatty acid (3.63-11.4%), and finally, mono unsaturated fatty acid (MUFA; 1.37-9.12%). All samples showed a much higher content of ?-3 PUFA when compared to standard menhaden oil. Most of the fish had a higher ?-3/?-6 ratio (2.16 -4.14) than the standard menhaden oil (2.03) except for Four Finger Threadfin (1.50), Indian Mackerel (1.67) and Striped Sea Catfish (1.78). The ratio of PUFA/saturated of the samples ranged from 5.49 to 25.2.

G39 Dietary fiber composition of common vegetables and fruits in Malaysia

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Food Chemistry 37(1): 21-26, 1990

Dietary fiber analyses were carried out using Southgate's method (Southgate, 1978) on 15 types of leafy vegetables and five types each of fruit-vegetables, leguminous vegetables and fruits. The non-cellulosic fractions were always higher than the cellulosic and lignin fraction. Total dietary fiber contents were highest in leguminous

vegetables (3·3-6·8 g/100 g), followed by the leafy vegetables (1·2-4·8 g/100 g) and finally, the fruit-vegetables (1·4-4·2 g/100 g). The fiber contents of fruit samples were relatively low (1·5-2·9 g/100 g). In comparison with crude fiber values, the dietary fiber values were always higher.

G40 Determination of total antioxidant activity in three types of local vegetables shoots and the cytotoxic effect of their ethanolic extracts against different cancer cell lines

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Asia Pac J Clin Nutr.12(3): 292-295, 2003

Antioxidants play an important role in inhibiting and scavenging radicals, thus providing protection to humans against infections and degenerative diseases. Literature shows that the antioxidant activity is high on herbal and vegetable plants. Realizing the fact, this research was carried out to determine total antioxidant activity and the potential anticancer properties in three types of selected local vegetable shoots such as Diplazium esculentum (paku shoot), Manihot utillissima (tapioca shoot) and Sauropous androgynus (cekur manis). The research was also done to determine the effect of boiling, on total antioxidant activity whereby samples of fresh shoots are compared with samples of boiled shoots. In every case, antioxidant activity is compared to alpha-tocopherol and two methods of extraction used are the organic and the aqueous methods. Besides that, two research methods used were the ferric thiocyanate (FTC) and thiobarbituric acid (TBA) with absorbance of 500 nm and 532 nm respectively. Oneway ANOVA test at $P < 0.05$ determines significant differences between various samples. In the cytotoxic study, the ethanolic extract and several cell lines i.e. breast cancer (MDA-MB-231 and MCF-7), colon cancer (Caco-2), liver cancer (HepG2) and normal liver (Chang liver) were used. The IC50-value was determined by using the MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide) assay. The antioxidant study found that all the samples in both aqueous and organic extraction were significantly different. The total antioxidant activity values of aqueous extract in descending order are as follows : M. utilissima (fresh)> D. esculentum (fresh) > S.androgynus (fresh) > M.utilissima (boiled) > D. esculentum (boiled) > S.androgynus (boiled). It also was found that S.androgynus shoots ethanolic extract was able to inhibit the viability of the breast cancer cell lines, MDA-MB-231 with the IC subset 50 value of 53.33 microg/ml. However, S.androgynus shoots and D. esculentum shoots ethanolic extracts did not inhibit the viability of MDA-MB-231 cell line. While, the tapioca shoot ethanolic extract was able to inhibit the viability of MCF-7 cell line with the IC50 value of 52.49 microg/ml. S.androgynus shoots and D.esculentum shoots ethanolic extracts did not give an IC50 value against the MCF-7 cell line. S.androgynus, tapioca and D.esculentum shoots ethanolic extracts did not show

cytotoxic effect against the Caco-2 and HepG2. There was no IC50-value from any sample against Chang Liver cell line. In conclusion, the antioxidant activity of both fresh and boiled samples were higher than alpha-tocopherol, although fresh vegetable shoots were found to be higher in antioxidant activity compared to boiled shoots. This study also suggested that S.androgynus shoots and tapioca shoots have potential as an anticancer agent against certain breast tumours.

G41 Fatty acid composition of some Malaysian freshwater fish

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Food Chemistry 54(1): 45-49, 1995

Total lipids extracted from 20 species of freshwater fish in Malaysia were analyzed for their total fat and fatty acids composition. Most of the fish contained less than 20% lipid by weight. The composition of fatty acids showed that total monounsaturated fatty acids (17-53%) were the highest, followed by saturated (15-43%.) and polyunsaturated (12-25%). The total ?-6 fatty acids (2.43-26.2%) were found to be higher than the ?-3 (1-11%). Most of the fish had an ?-3/ ?-6 ratio of less than 1 except for Siamese Sepat (3.38), Black Siakap (2.20) and Tilapia (1.26).

G42 Determination of the glycaemic index of selected Malaysian foods

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International Medical Journal 13(4): 255-259, 2006

Objective: For the purpose of creating a database on the glycaemic index (GI) of common Malaysian foods we determined the GI of rice, banana, sweet potato and rice noodle. Design: An experimental study involving the measurement of the glycaemic responses of participants to the ingestion of rice, banana, sweet potato and rice noodle. Materials and Methods: Twelve healthy adults with a mean body mass index of 21.6 ± 1.6 participated in this study. GI was determined using a standard method recommended by FAO/WHO with white bread and adjusted relative to glucose. Results: The results showed that the mean GI of rice was 90 ± 12, rice noodle was 85 ± 15, sweet potato was 77 ± 12 and banana was 55 ± 12. There was significant difference in the mean incremental area under the curve

(IAUC) values between the foods ($P < 0.05$) and also between the subjects ($P < 0.01$), although there was significant difference in GI within the subjects ($P < 0.01$), there was no significant difference between the foods ($P = 0.09$). However there was significant heterogeneity among the mean GI values ($P < 0.05$), but that the only individual means, which differed from each other, were banana versus rice. Conclusion: We conclude that rice, rice noodle and sweet potato as high GI foods, whereas banana as a low GI food. This is the first study done to determine the GI of common Malaysian foods.

G43 Fatty acid composition and physicochemical properties in kekabu seed oil

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Sains Malaysiana 34(2): 117-120, 2005

(Ceiba pentandra) seeds oil was solvent extracted and analyzed for its physico-chemical properties. The crude lipid content of the seeds was found up to 25 % oil yield by using soxhlet extraction while water bath orbital shaker yielded only 20 % oil. The major fatty acid components were linoleic (C18:2 n6), palmitic (C16:0), oleic (C18:1) and stearic acids (C18:0) with 42.6%,20.9%,20.8% and 13.7% of total fatty acid content respectively. Linolenic acid (CI8:3 n3) was as the minor constituent which amounted only 1.9 %. The characteristics of the oil are discussed and compared with other commercial edible oil.

G44 Lead content of selected Malaysian foods

Siti Mizura S, Tee ES and Chong YH

ASEAN Food Journal, 3(1): 25-29, 1987

Considerable amount of attention has been directed towards determining the levels of lead in foods and beverages, since these are important sources of lead exposure. However, there have been few studies into the extent of lead contamination of Malaysian foods. A total of 80 food items from 11 food groups were studied. Samples were analysed using the organic extraction and spectrophotometric procedure. A fair amount of variation in lead level between multiple samples of a food item as well as between food items were observed, with levels ranging from 0 to 9.69 ppm. However, most foods were found to contain less than 2 ppm of lead, which is a common legal limit for lead content of foodstuffs for many countries. Results obtained are indicative of the contamination level in the foods studied.

G45 Chemical composition and biological activity of the Centipeda Minima (Asteraceae)

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Mal J Nutr 13(1): 81-87, 2007

The antimicrobial activity of the Centipeda minima L. (Asteraceae) extract was evaluated against seven microorganisms using the disc diffusion method. The extract showed a broad spectrum of antimicrobial activity against all the tested bacterial strains, especially Enterobacter aerogenes, Klebsiella pneumonia, Staphylococcus aureus and Yersinia enterocolitica. The chemical composition of the extract obtained from Centipeda minima was analysed by GC-MS. Twentythree compounds, constituting about 84.75 % of the total extract, were identified. The main constituents were palmitic acid (7.47%), (Z,Z)-9-,12-octadecatrienoic acid (6.52%), (Z,Z,Z)-9-,12-octadecatrienoic acid (7.01%), phytol (7.01%), naptho[2.3-b]furan-2-(3H)-on (6.21%), 1-(1,2,3,4,7,7a-hexahydro- 1,4,4,5-tetramethyl-1,3a-ethano-3aH-inden-6-yl)etanon (7.95%), 1,3,5-tri-tertbutyl- benzene (4.52%), (3Z)-2-methyl-3-octen-2-ol (5.95%) and Artemisia ketone (4.98%). The extract was also tested against brine shrimp for toxicity. There was no significant toxicity as it only recorded a LC50 value of 4.92 mg/ml. The study shows that the extract is a good antimicrobial agent with potential applications in public health against diseases.

G46 Natural Antioxidants: Piper sarmentosum (Kadok) and Morinda elliptica (Mengkudu)

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Mal J Nutr 9(1): 41-51, 2003

The antioxidant activity of two edible medicinal plants commonly used in Malaysian traditional medicine i.e. Piper sarmentosum (kadok) and Morinda elliptica (mengkudu) were tested for antioxidant activity. The methanolic leave extracts of kadok and mengkudu, at 250ug/ml, were tested using the Xanthine/Xanthine Oxidase (X/XOD) Superoxide Scavenging assay. Both extracts showed high superoxide scavenging assay, 88% and 80% respectively compared to superoxide dismutase (SOD) standard. The crude extracts were further fractionated using column chromatography and tested for superoxide scavenging activity, to obtain antioxidant active fractions. Two active fractions were obtained from kadok, PsFr6-71.3%, PsFr7-71.3%, and one active fraction from mengkudu, MeFr3-86.6%. These active fractions were compared against 14 phenolic compound standards. After a series

of HPLC analysis of samples and standards, a natural antioxidant compound was identified in kadok and mengkudu i.e. Naringenin (4',5,7-Trihydroxyflavanone) with 75.7% superoxide scavenging activity. Naringenin is a highly potent natural antioxidant that has been reported in the raw materials of larch and grapefruit extracts. Thus, kadok and mengkudu which contain Naringenin, could be used as antioxidant dietary supplements.

G47 Proximate and mineral composition in chicken sausages

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Sains Malaysiana 26(3&4): 31-37 1997

A total of 13 samples of sausages were analyzed for proximate composition and mineral (sodium, calcium, potassium, phosphorus and iron) content. The sausages were of UKM formulation, local brand and imported brand. Results from proximate analyses indicated water content ranged between 58.18--71.30g/100g, protein 11.4-16.52g/100g, fat 8.19-22.87g/100g, carbohydrate 2.00-10.2g/100g, ash 1.52-2.99g/100g and fiber 0.69-2. 199/100g. In comparing the three groups of sausages no significant differences were found for water, fat and carbohydrate contents, while the ash and protein contents of the local brand were lower ($p<0.05$) compared to the other two formula-tions. UKM formulated sausages contain the least fibre. Overall the average values for sodium and phosphorus of local brand sausages were found to be lowest while calcium, potassium and iron were lowest for UKM formulated sausages.

G48 Fatty Acids Composition in Several Malay Foods Based on Chicken, Beef, Fish and Egg

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Sains Malaysiana 38(4): 489-497, 2009

A survey on fat intake and fatty acid in the diet was carried out among Malay population in Klang Valley. The objective of this study was to determine the fatty acid content of chicken, meat, fish and egg dishes consumed by the subjects surved. Food sample obtained from subject were analyzed for fatty acid content using gas chromatography. Result from food sample analysed showed the mean content of saturated fatty acid (SFA) (Fish 3.06±1.85 g/100g, egg 2.64±1.68 g/100g and meat 2.50±2.42 g/100g) and monounsaturated fatty acid (MUFA) of the fish (2.34±2.16

g/100g), egg (2.49±1.37 g/100g) and meat (2.31±2.27 g/100g) dishes were high, while the mean value of polyunsaturated fatty acid in fish dishes (0.82±0.57 g/100g) were higher compared to chicken (0.7±0.29 g/100g), meat (0.43±0.63 g/100g) and egg dishes (0.43±0.43 g/100g). All dishes did not have balanced ?6:?3 ratio. As a conclusion, dishes that contained high polyunsaturated fatty acid and balanced ?6:?3 is a healthy diet.

G49 Carotenoid composition and content of Malaysian vegetables and fruits by the AOAC and HPLC methods

Tee ES and Lim CL

Food Chemistry 41(3): 309-339, 1991

The beta-carotene of forty vegetables and fourteen fruits were determined using the AOAC open-column (magnesia and Hyflo Super Cel mixture) chromatographic method and compared with a newly developed reverse-phase HPLC method, in which carotenoids were separated isocratically on an octadecylsilane (C 18) column using a ternary mixture of acetonitrile, methanol and ethyl acetate. Results obtained showed that the AOAC method gave falsely elevated for samples containing alfa-carotene, as well as those with very low beta-carotene concentrations. On the other hand, the HPLC method successfully separated and quantitated the major carotenoids present; namely, lutein, cryptoxanthin, lycopene, gamma- and alpha-carotenes in addition to beta-carotene. The carotenoid composition of most of the green vegetables was rather consistent, comprising only lutein and beta-carotene. In contrast, there was no clear pattern of caroteniods present in the other vegetables and fruits, where several other carotenoids were detected in varying proportions. The vitamin A activity, expressed as ug of retinol equivalent, alpha- and beta-carotenes) detected. Most of the green leafy vegetables, including several local vegetables, had high RE. Several green non-leafy and other vegetables were found to have low and medium RE. None of the fruits studied may be said to have high vitamin A activity. RE calculated on the basis of results from the AOAC method was found to be erroneously low for samples with significant proportions of pro-vitamin A carotenoids other than beta-carotene, and falsely elevated for those with alpha-carotene. Total carotenoids concentrations can be estimated by taking absorbance readings of sample extracts directly in a spectrophotometer or by the HPLC method. The study clearly shows that the HPLC method would give a more complete picture of the carotenoid composition as well as a more accurate quantitation of the vitamin A value of the vegetables and fruits. The nutritional significance of the findings is obvious since these foods are important sources of vitamin A for the majority of the communities in the country.

G50 Re-analysis of vitamin A values of selected Malaysian foods of animal origin by the AOAC and HPLC methods

Tee ES and Lim CL

Food Chemistry 45: 289-296, 1992

Vitamin A values of 40 foods of animal origin from various food groups and several processed foods were studied using a newly developed reverse-phase, high performance liquid chromatography (HPLC) method. Carotenoids and retinol were separated isocratically on an octadecylsilane (C18) column using a ternary mixture of acetonitrile, methanol and ethyl acetate. Two detectors connected in series were used to detect and quantify carotenoids simultaneously at 436 nm and retinol at 313 nm in a single chromatographic run. All samples were also simultaneously determined using the Association of Official Analytical Chemists (AOAC) open-column (alumina) chromatographic method. The AOAC method was found to give significantly higher retinol contents in the foods studied, due to the presence of other pigments that gave falsely elevated absorbance readings. Although there was no statistically significant difference in beta-carotene contents given by the HPLC and AOAC methods, there were more food with higher results given by the latter method. Beta-carotene contents were generally low; only in seven foods did the carotene contribute more than 50% of the total vitamin A value. The contribution of other provitamin A carotenoids is probably insignificant. Thus, the total vitamin A activity of these foods was mainly contributed by retinol. The proposed HPLC method has been shown to be applicable to the determination of carotenoids and retinoids in foods of animal origin.

G51 Carotenoid composition and content of legumes, tubers and starchy roots by HPLC

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Mal J Nutr 1: 63-74, 1995

As part of a series of studies on the analytical and nutritional aspects of carotenoids and retinoids in foods, seventeen types of legumes and their products and 9 tubers and starchy roots were studied for their carotenoid composition and content by HPLC. All samples were saponified and subsequently chromatographed using a reverse-phase HPLC method previously developed in this laboratory in which carotenoids were separated isocratically on an octadecylsilane (C18) column using a ternary mixture of acetonitrile, methanol and ethyl acetate (88:10:2) as the mobile phase. Carotenoid peaks obtained were tentatively identified using 6 reference standards similarly chromatographed. The HPLC method used enabled the separation

and quantitation of the major carotenoids present, namely, lutein, cryptoxanthin, lycopene, ?-, a- and ß-carotenes. For most of the legumes, the major carotenoids detected were ß-carotene, lutein and cryptoxanthin. Lutein was found in all the legumes studied, and was clearly the major carotenoid in most of the legumes, followed by unidentified carotenoids, ß-carotene and cryptoxanthi. The other carotenoids were encountered infrequently and at low levels. The starchy roots and tubers gave a different carotenoid composition from those obtained for the legumes: lycopene and ß-carotene were detected in all the samples except in sago. There was no clear pattern of carotenoids present in the samples studied. Compared with the vegetables and fruits, the carotenoid concentration in legumes, tubers and roots were found to be much lower. None of the items studied can be said to be good sources of vitamin A. Nevertheless, they are still of nutritional import flee, if consumed in significant amounts.

G52 Nutrient composition of selected cooked and processed snack foods

Tee ES, Siti Mizura S, Anuar A, Kuladevan R, Young SI, Khor SC and Chin SK

Pertanika, 12(1):15-25, 1989

Nutrient composition of 27 cooked snack foods and 19 processed snacks was determined. The cooked foods were mostly cereal based, made from wheat flour, rice or rice flour, and almost all of them were traditional Malaysian kuih or dishes. The processed snacks studied were chocolate, cereal, tuber, fish and prawn products. The levels of 19 nutrients were tabulated, expressed as per 100 g edible portion. Selected nutrients in each servings or packet of the foods were also presented. The paper is intended as a contribution to the knowledge on nutrient composition of local snack foods, for which information is still greatly lacking. The number of foods studied is only a fraction of the total number available. More work in this area will have to be carried out, to meet the increasing demand for such data.

G53 Nutrient composition of Malaysian marine fishes

Tee ES, Siti Mizura S, Kuladevan R, Young SI and Khor SC

ASEAN Food Journal, 3(2): 67-71, 1987

Duplicate samples of 50 species of marine fishes, from 31 families, commonly available in the local markets were studied for their nutrient composition. Moisture, protein, fat and ash were determined, from which carbohydrate and energy content were calculated. Five minerals, viz. Calcium, phosphorus, iron, sodium and potassium were analyzed. The vitamins assayed were retinol and carotene, thiamine, riboflavin, niacin and ascorbic acid. Results obtained were tabulated, grouped according to the families of the fishes. A separate table listed the names of the fishes in Bahasa Malaysia. There did not appear to be large variations in the proximate composition

of the fishes, except for fat. Minerals and vitamins, although showing larger variations between the different species, also exhibited similar general trends. These fishes, with their high nutritive value are considered important items in the diet of many communities in the region. It is important to continue to take steps to ensure that these foods are made available to the poor who need them most - at prices they can afford.

G54 Comparison of total phenolic contents and antioxidant activities of turmeric leaf, pandan leaf and torch ginger flower

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International Food Research Journal 17: 417-423, 2010

Synthetic antioxidants are added to food in the powdered form to preserve it. However these compounds posed serious health concern since they have been associated with causing cancer. Thus using fresh herbs with antioxidant activities would be good alternative. The objectives of this study were to evaluate andmcompare the total phenolic contents and antioxidant activities of both powdered and fresh forms of turmeric leaf, pandan leaf and torch ginger flower. Total phenolic content (TPC) was assayed based on the redox reaction between Folin-Ciocalteu with phenolics in the sample extracts. Antioxidant activity (AA) was assayed using the ß-carotene linoleate model system and the percentage of antioxidant activity was calculated from the values of degradation rate. Scavenging activity (SA) was assayed using the DPPH radical scavenging model system whereby EC50 value was determined from the plotted graph of scavenging activity against the concentration of sample extracts. Analyses revealed that powdered forms of turmeric leaf, pandan leaf and torch ginger flower had higher TPC (2013.09 ± 5.13, 1784.25 ± 7.59 and 1937.42 ± 6.61 mg GAE/100g, respectively) than their respective fresh forms (348.75 ± 1.26, 356.42 ± 1.32 and 211.59 ± 6.29 mg GAE/100g, respectively). Similarly, powdered forms of turmeric leaf, pandan leaf and torch ginger flower possessed better AA (64.31 ± 0.99, 65.09 ± 0.74 and 11.80 ± 0.40 %, respectively) than their respective fresh forms (24.93 ± 0.71, 16.91 ± 0.70 and 1.45 ± 0.10 %, respectively). Powdered forms of turmeric leaf, pandan leaf and torch ginger flower were also better radical scavenger as compared to their respective fresh forms. In conclusion, all samples in their powdered forms have high total phenolic contents, antioxidant and scavenging activities than their respective fresh forms.

G55 Fatty acid and amino acid composition of three local Malaysian Channa spp. fish

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Food Chemistry 97(4): 674-678, 2006

The objective of this current study was to analyze the biochemical compositions of three Malaysian Channa spp. fish. The proximate analysis revealed that the protein content of Channa lucius, Channa micropeltes and Channa striatus was 19.9%, 22.1%, 23.0% (% of dry weight), respectively. The total lipid content was generally high, ranging from 5.7% to 11.9% and crude ash ranged from 1.0% to 1.8%. The major amino acids were glutamic acid, aspartic acid and lysine, ranging from 9.7% to 21.7%, and the most abundant fatty acid in Channa spp. was C16:0, ranging from 25.6% to 30.4%. The other major fatty acids detected were C22:6, C18:1 and C18:0. The level of arachidonic acid (C20:4) was unusually high in C. striatus (19.02%). The levels of DHA in these fish would also explain the use of Channa spp., especially C. striatus, which has been used for centuries for reducing pain, inflammation and promote wound healing in Malaysia.

CLINICAL NUTRITION/ INTERVENTION TRIALS

H1 Evaluation of the total parenteral nutrition service at Universiti Sains Malaysia Hospital

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European e-Journal of Clinical Nutrition and Metabolism 2(6): e111-e115, 2007

Background & aims: Total parenteral nutrition (TPN) has been practised in Universiti Sains Malaysia Hospital (HUSM), Malaysia, since 1986. Unfortunately, there are no published data on the cost, complications and outcomes of patients treated with TPN in HUSM. This study was carried out to evaluate the cost, complications and outcomes of TPN. Methods: Retrospective data were obtained from patient medical records, and 215 TPN cases from 2003 to 2005 were evaluated. The data were analyzed using SPSS version 11. Results: The demographics of the TPN cases were neonates 22.8%, pediatric 11%, adults 64.6%, males 52.6%, females 46.1%. Malays comprise 87.4%, Chinese 6.0% and Indians 1.9%. The average cost for TPN in neonates is RM 98±46, pediatric RM 210±121 and adult RM 398±103. TPN-associated complications were electrolyte complications (56.5%), acid-base imbalance (5.5%), renal complications (14.5%), liver complications (12.4%), hyperglycemia (9%), hyperlipidemia (0.7%) and hypoglycemia (0.7%). The outcomes were that 71.2% cases tolerated oral nutrition and 1.8% expired. The study showed a significant difference in the cost of TPN in each group of patients (P=0.000). Conclusion: The cost and outcomes of TPN services in HUSM were similar to other centers, however, it was associated with relatively high TPN-related complications.

H2 Effect of therapeutic lifestyle changes on insulin sensitivity of non-obese hyperlipidemic subjects: preliminary report

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J Atheroscler Thromb. 14(3):122-127, 2007

AIM: To determine the effects of lipid lowering by TLC on insulin sensitivity and secretory status of non-obese normoglycemic hyperlipidemic subjects. METHODS: An intervention study was undertaken on 16 non-obese normoglycemic hyperlipidemic subjects. They underwent 6 months of a TLC regimen. Their insulin sensitivity and lipid status were assessed at baseline and after six months. A control group containing 16 age, sex and body mass index (BMI) matched normolipidemic subjects was also enrolled to compare the change in lipid levels and insulin sensitivity in the hyperlipidemic subjects. RESULTS: The intervention showed

significant reductions in insulin resistance (HOMA-IR reduced from 3.8 to 1.4, $p<0.001$) and improvement of insulin sensitivity (HOMA%S increased from 50.1% to 121.2%, $p=0.004$) in hyperlipidemic subjects with associated reductions in lipid levels. CONCLUSION: Lipid lowering in non-obese hyperlipidemic subjects may be associated with improvement of insulin sensitivity.

H3 Evaluation of the bacteriological contamination of a closed feeding system for enteral nutrition

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Med J Malaysia 49(1): 62-67, 1994

A closed enteral delivery system consisting of a cardboard tetrapack containing the sterile ready-to-use liquid feed and an independent sterile administration set, has been devised. We found bacterial contamination within 24 hours in this system in patients on ventilatory support in intensive care. This emphasizes the need for meticulous care.

H4 Bacterial infection of central venous catheters in short-term total parenteral nutrition

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Med J Malaysia 53(1): 10-15, 1998

Fourteen severely ill ventilated patients in an intensive care unit, requiring short-term total parenteral nutrition were examined for catheter related infection. Microbiological analysis using Maki's SQ technique was carried out on catheter exit site, catheter hub, proximal subcutaneous segment of catheter and catheter tip. Qualitative cultures were carried out on total parenteral nutrition and peripheral blood samples. Twenty-six of 29 catheters removed (90%) were culture positive but only 7 catheters were related to positive blood cultures, giving a catheter-related bacteremia (CRB) rate of 24%. Haematogenous seeding was strongly implicated in 7/29 (24%) of catheters. Patients' skin flora appeared to be the main source of catheter-related infection. The organisms isolated for patients with CRB included coagulase-negative staphylococci, Acinetobacter and Klebsiella. It is suggested that to control infective complications of central venous catheters, emphasis should be focused on specialised intravenous therapy teams and the use of strict protocols for insertion and care of central lines.

H5 The ethnic characteristics and prevalence of diabetes mellitus, hypertension and hyperlipidaemia in patients who underwent coronary artery bypass grafting in Hospital Universiti Kebangsaan Malaysia

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Med J Malaysia 57(4): 460-466, 2002

A retrospective study was done on 302 patients who had undergone coronary artery bypass grafting (CABG) in Hospital Universiti Kebangsaan Malaysia -46.0% were Chinese, 40.1% were Malays and 11.6% were Indians. Overall and irrespective of race and sex, the prevalence of diabetes mellitus, hypertension and hyperlipidaemia was 45.7%, 78.8% and 89.1% respectively indicating that hyperlipidaemia was the most prevalent risk factor amongst this cohort. The Indians had the highest prevalence of the three risk factors. The Chinese and the Malays most frequently presented with the combination of hypertension and hyperlipidaemia.

H6 Reduction of DNA damage in older healthy adults by Tri E Tocotrienol supplementation

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Nutrition. 24(1): 1-10, 2008

OBJECTIVE: The free radical theory of aging (FRTA) suggests that free radicals are the leading cause of deteriorating physiologic function during senescence. Free radicals attack cellular structures or molecules such as DNA resulting in various modifications to the DNA structures. Accumulation of unrepaired DNA contributes to a variety of disorders associated with the aging process. METHODS: A randomized, double-blinded placebo-controlled study was undertaken to evaluate the effect of Tri E Tocotrienol on DNA damage. Sixty four subjects 37-78 y old completed the study. A daily dose of 160 mg of Tri E Tocotrienol was given for 6 months. Blood samples were analyzed for DNA damage using comet assay, frequency of sister chromatid exchange (SCE), and chromosome 4 aberrations. RESULTS: Results showed a significant reduction in DNA damage as measured by comet assay after 3 mo ($P < 0.01$) and remained low at 6 mo ($P < 0.01$). The frequency of SCE was also reduced after 6 mo of supplementation ($P < 0.05$), albeit more markedly in the >50 y-old group ($P < 0.01$) whereas urinary 8-hydroxy-2'-

deoxyguanosine (8-OHdG) levels were significantly reduced ($P < 0.05$). A strong positive correlation was observed between SCE with age, whereas weak positive correlations were observed in DNA damage and 8-OHdG, which were reduced with supplementation. However, no translocation or a stable insertion was observed in chromosome 4. CONCLUSION: Tri E Tocotrienol supplementation may be beneficial by reducing DNA damage as indicated by a reduction in DNA damage, SCE frequency, and urinary 8-OHdG.

H7 Traditional medicine and food supplement in rheumatic diseases

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Med J Malaysia 57(3): 283-291, 2002

This was a prospective survey using a standard questionnaire to determine the prevalence of use of oral traditional medicine and food supplements among patients with rheumatic diseases. Among the 141 patients surveyed, we found that 69% of the patients were consuming food supplements, 35% were using traditional medicine and 45% had used traditional medicine at some time or other. Females were more likely to use food supplements ($p < 0017$); especially among those with higher education ($p < 0.036$). There was no statistical difference between those who had ever consumed compared to those who never used traditional medicines. The Chinese were more likely than others to be using traditional medicine ($p < 0.007$). Vitamin C and B were the most commonly used food supplements. More than two thirds of the patients obtained their traditional medicine from non-medical personnel. More than half of them used 2 or more types of traditional medicine for more than two months. Spending on traditional medicine was noted to be modest with 73% spending less than one hundred ringgit a month for their traditional treatment. Doctors need to be aware of the possible interactions between these 'selfmedications' and the conventionally prescribed medication.

H8 Dyslipidaemic pattern of patients with type 2 diabetes mellitus

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Malaysian Journal of Medical Sciences 11(1): 44-51, 2004

The aim of the study was to define dyslipidaemic pattern among type 2 diabetic patients using American Diabetes Association guidelines for the classification of lipoprotein concentrations into CVD risk categories. The total number screened was 211 type 2 diabetic patients who were on treatment between 2001 - 2002 for diabetes at the Outpatient Diabetes Clinic in HUSM Kubang Kerian. Fasting venous blood samples were analysed for plasma glucose, glycated hemoglobin and

serum lipids. Type 2 diabetic patients with high, borderline, and low risk LDL cholesterol level were 62 %, 25 %, and 10 %, respectively. There were 26 % patients in the high risk HDL cholesterol group, 31 % were in the borderline risk group, and 43 % were in the low risk group. Only 3 % and 25 % of patients had triglycerides concentration in the high and borderline risk categories, respectively, but 72 % had low risk triglycerides levels. More female and younger subjects than men and older subjects had HDL cholesterol in high and borderline risk categories. The percentages of patients with triglycerides values at high and borderline high risk category were higher in poor and acceptable glycaemic control groups than good glycaemic control group. The most prevalent dyslipidaemia pattern was an isolated LDL cholesterol increase, which was observed in 35 % of the patients. The second most common pattern of dyslipidaemia was a combination of LDL cholesterol above goal with HDL cholesterol below target, which was observed in 30 % patients. Patients with established dyslipidaemia will require advice regarding diet, exercise and improvement in glycaemic control. An active strategy of early detection and drug treatment for dyslipidaemia is needed for type 2 diabetic patients.

H9 Postprandial metabolic fate of tocotrienol-rich vitamin E differs significantly from that of a-tocopherol

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Am J Clin Nutr 84:835-42, 2006

Background: The detection of tocotrienols in human plasma has proven elusive, and it is hypothesized that they are rapidly assimilated and redistributed in various mammalian tissues. Objective: The primary study objective was to evaluate the postprandial fate of tocotrienols and a-tocopherol in human plasma and lipoproteins. Design: Seven healthy volunteers (4 males, 3 females) were administered a single dose of vitamin E [1011 mg palm tocotrienol-rich fraction (TRF) or 1074 mg a-tocopherol] after a 7-d conditioning period with a tocotrienol-free diet. Blood was sampled at baseline (fasted) and 2, 4, 5, 6, 8, and 24 h after supplementation. Concentrations of tocopherol and tocotrienol isomers in plasma, triacylglycerol-rich particles (TRPs), LDLs, and HDLs were measured at each interval. Results: After intervention with TRF, plasma tocotrienols peaked at 4 h (4.79 ±1.2 μg/mL), whereas a-tocopherol peaked at 6 h (13.46 ± 1.68 μg/mL). Although tocotrienols were similarly detected in TRPs, LDLs, and HDLs, tocotrienol concentrations were significantly lower than a-tocopherol concentrations. In comparison, plasma_-tocopherol peaked at 8 h (24.3±5.22μg/mL) during the a-tocopherol treatment and emerged as the major vitamin E isomer detected in plasma and lipoproteins during

both the TRF and the a-tocopherol treatments. Conclusions: Tocotrienols are detected in postprandial plasma, albeit in significantly lower concentrations than is a-tocopherol. This finding confirms previous observations that, in the fasted state, tocotrienols are not detected in plasma. Tocotrienol transport in lipoproteins appears to follow complex biochemically mediated pathways within the lipoprotein cascade.

H10 Cholesterolaemic effect of palmitic acid in relation to other dietary fatty acids

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Asia Pac J Clin Nutr 11(Suppl): S401-S407, 2002

The effect of dietary intake of high palmitic acid levels in combination with other fatty acids in normal subjects was assessed. Palmitic acid (10% of energy) was fed in conjunction with decreasing levels of linoleic acid to determine if a threshold level of linoleic acid prevented palmitic acid from being hypercholesterolaemic. Healthy subjects received each of the diet treatments for 21 days, followed by washout periods of 7 days. In a second experiment, the effect of exchanging palmitic acid for trans fatty acids on plasma lipoprotein cholesterol levels and on rates for endogenous synthesis of cholesterol in normal subjects was investigated. Diet treatment lasted for 30 days. On day 30 of each diet treatment, a priming dose of deuterium was consumed, followed by a subsequent blood sample at 24 h. Blood cholesterol fractions were isolated and analysed by isotope ratio mass spectrometry to measure cholesterol fractional synthetic rates. In the first experiment, total plasma cholesterol levels increased as the percentage of linoleic acid decreased. The data indicated that high levels of palmitic acid were not hypercholesterolaemic if intake of linoleic acid was greater than 4.5% of energy. When the diet contained trans fatty acids plasma total and low-density lipoprotein-cholesterol increased and cholesterol synthesis increased with a decrease in high-density lipoprotein-cholesterol.

H11 Validation of a field technique for the measurement of energy expenditure: factorial method versus continuous respirometry

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American Journal of Clinical Nutrition 44, 596-602, 1986

The field technique for measuring daily energy expenditure, using activity diary plus short-term indirect calorimetry, was validated with a room respirometer. Eleven male and 14 female subjects spent 24-h periods in the respirometer and kept an

activity diary to the nearest minute. Subsequently, the energy cost of the recorded activities was measured in duplicate, and 24-h expenditure was calculated. Over the 42 24-h measurements the mean value by the factorial field method was within 1% of that from continuous indirect calorimetry. However, the error in individual daily expenditure ranged from -17% to +25%. Correction of the error involved in using calculated BMR for the cost of sleeping resulted in a 5% mean underestimation of the daily value. The factorial method is, therefore, too inaccurate for the estimation of individual daily expenditures but provides a close estimate of the true energy expenditure for population groups.

H12 Absorption of calcium from milk and tempeh consumed by postmenopausal Malay women using the dual stable isotope technique

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Int J Food Sci Nutr 61(2): 125-137, 2010

Assessment of calcium bioavailability from non-dairy foods containing moderate amounts of calcium is especially important in populations that have habitually low dairy consumption. Absorption of calcium from milk and tempeh (a traditional fermented soy product) was compared in a sample of Malay subjects. A randomized, crossover design was utilized to assess calcium absorption in 20 postmenopausal women from either a glass of milk (114 g) or from a meal of tempeh (206 g); each containing 130 mg calcium. At each study of Phase 1 (mid-July) and Phase 2 (mid-August), intravenous (42)Ca and oral (44)Ca were administered and calcium absorption was measured in 24-h urine collections post-dosing; with a 1-month washout period between phases. Absorption of calcium from tempeh did not differ significantly from milk (36.9 +/- 10.6% vs. 34.3 +/- 8.6%, respectively). Due to differences in the calcium content of tempeh, four servings of this product would be needed to get the same amount of absorbed calcium as that obtained from a 4-ounce glass of milk. Tempeh may provide readily available calcium for this population of women at risk for low bone mass.

H13 Selenium and thyroid function

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Sains Malaysiana 30: 153-165, 2001

Pengukuran selenium dan fungsi tiroid telah dilakukan terhadap 442 orang penduduk di lima buah kampung orang Asli di pedalaman Pahang dan Perak. Pengukuran isipadu kelenjar tiroid ditentukan menggunakan alat ultrasound. Serum diambil bagi pengukuran selenium, TSH dan T4 manakala sampel urin dikumpul bagi pengukuran iodin. Min paras selenium adalah 4.082 ± 1.922 ppm (Julat 0.244 - 9.030 ppm). Kajian menunjukkan terdapat perbezaan yang bererti di antara paras selenium kanak-kanak dan dewasa ($p<0.0001$) dan di antara remaja dan dewasa ($p<0.05$). Perbezaan paras selenium adalah bererti ($p < 0.0001$) di antara lima kampung tersebut iaitu Pos Tual (5.638 + 0.332 ppm), Pos Legap (4.545 + 1.794 ppm), Pos Perwor (4.412 + 1.180 ppm), Pos Sinderut (3.910 + 2.082 ppm) dan Pos Bertang (0.890 + 0.331 ppm). Perbezaan yang bererti didapati antara isipadu goiter ($p<0.0001$) dan T4 ($p<0.0001$) menurut umur. Korelasi yang bererti juga terdapat di antara selenium dengan isipadu tiroid (Korelasi Pearson, $r= -0.1664$, $p=0.0051$) dan selenium dengan T4 (Korelasi Pearson $r=0.1789$, $p=0.0027$). Ini menunjukkan kekurangan selenium berkorelasi dengan peningkatan isipadu kelenjar tiroid dan kekurangan hormon tiroksin.

H14 Obesity in primary care patients in Kelantan, Malaysia: prevalence, and patients' knowledge and attitudes

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Southeast Asian J Trop Med Public Health. 27(4):776-779, 1996

This study measured the body mass index (BMI), and assessed attitudes and knowledge about obesity, of 197 male and 217 female patients aged 20-59 years attending the primary care clinic of the university hospital in Kelantan, Malaysia. There was no significant difference between the mean BMI of males (23.7) and females (24.2). In the overweight group (BMI 25-29.9) were 60 men (30%) and 66 women (30%). In the obese group (BMI 30 and above) were 12 men (6%) and 22 women (10%). Both diabetes mellitus and hypertension were associated with significantly higher BMI's. Knowledge about obesity was lacking. Sixty-three (15%) failed to recognize that obesity is bad for health. When asked the causes of obesity, 88 (21%) failed to mention either diet or lack of exercise. "Being happy" was suggested as a cause by 32 (8%). When asked if certain foods would cause obesity if eaten in excess, 45 (11%) said "No" for fatty foods, and 164 (40%) said "No" for sweet foods. Concerning appearance, 30 (15%) men regarded an obese man as normal or even handsome, while 49 (23%) women regarded an obese woman as normal or beautiful. Obesity is common among our adult patients, and is associated with some of their common health problems. However, a substantial minority do not regard obesity as unhealthy, do not relate it to diet or lack of exercise, do not recognize important groups of fattening foods, and do not regard obesity as unattractive.

H15 Sub-Clinical Eating Disorder, Polycystic Ovary Syndrome - Is There Any Connection Between These Two Conditions Through Leptin - A Twin Study

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Med J Malaysia 60(4): 441-446, 2005

The genetic property of sub-clinical eating behaviour (SEB) and the link between SEB and polycystic ovary syndrome (PCOS) has been studied before but the role of leptin within this connection has never been investigated. The objective of this study was 1) to study the genetic property of SEB, 2) to find a link between leptin, SEB and PCOS. 154 (77 pairs) female-female Iranian twins including 96 MZ individuals (48 pairs) and 58 DZ individuals (29 pairs) participated in the study. Clinical, bio-chemical and ultrasound tools were used to diagnose polycystic ovary syndrome. BITE questionnaire was filled out for subjects. 8% of subjects were diagnosed for sub-clinical eating disorder. No significant difference was found between intraclass correlation of MZ and DZ ($z = 0.57$, $P = 0.569$). Serum leptin level correlated significantly with bulimia score ($P < 0.007$). The mean ($\pm$ SD) values for bulimia score was found to be higher among PCOS positive subjects (3.27 ± 5.51) in comparison with PCOS negative subjects (2.06 ± 4.48) ($P < 0.001$). The genetic property of sub-clinical eating disorder was not confirmed as shared environment might have played a major role in likeness of DZ twins as well as MZ. Leptin is linked with both sub-clinical eating disorder and PCOS.

H16 Phytochemicals, antioxidant properties and anticancer investigations of the different parts of several gingers species (Boesenbergia rotunda, Boesenbergia pulchella var attenuata and Boesenbergia armeniaca)

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Journal of Medicine Plants Research 4(1): 27-32, 2010

Extracts (methanol) of the leaves, stem and rhizome of Boesenbergia species were studied for their phytochemical consituents, total phenolics and flavonoid contents, antioxidant as well as anticancer properties. The plants revealed the presence of

polyphenols such as quercetin, kaempferol, rutin, naringin, hesperidin, caffeic acid, p-coumaric acid, ferulic acid, sinapic acid, chlorogenic acid, gallic acid, luteolin and diosmin by using High Performance Liquid Chromatographic (HPLC). It was indicated with significant composition of hesperidin and naringin in B.pilchella attenuata (leaves and stem); quercetin and kaempferol in B.rotunda; luteolin in B. Armeniaca. The results of antioxidant assesssments conducted were similiar to the trend of total phenolic and flavonoid contents: B.pulchella var attenuata> B.rotunda> B.armeniaca. In the cytotoxicity assay, B.rotunda showed the most prominent and promising result as medicinal plant. It showed positive antiproliferative effect against five cancer cell lines: ovarian (CaOV3), breast (MDA-MB-231 and MCF-7), cervical (HeLa) and colon (HT-29) cancer cell lines with 3-(4,5- dimethylthiazol-2-yl)-2, 5-diphenyltrtrazolium bromide (MTT) assay conducted. In addition, the rhizome of B.pulchella var attenuata and B.armeniaca shown positive result in cytotoxicity assay tested against breast cancer (MCF-7). Thus, the Boesenbergia speices investigated would be a promising anticancer remedy for breast cancer.

H17 Perspectives on the Nutritional Management of Renal Disease in Asia: People, Practice, and Programs

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Journal of Renal Nutrition 17(1): 93-96, 2007

The high prevalence of end-stage renal disease (ESRD) in many Asian countries is attributed to diabetes and hypertension. Health care expenditure in relation to per capita income and government share of this expenditure vary among Asian countries and are affected by large populations and the poverty factor. The impact of ESRD on nutritional management in Asia reveals the need for clinicians to balance the requirements for higher standards of dietetic practice as they implement optimal care algorithms with the goal of improving outcomes, against the backdrop of staffing limitations, limited expertise in renal nutrition practice, and cultural diversity among Asian people. This paper discusses current aspects of dietetic practice and the likelihood that a change in practice is required if dietitians are to play an active role in preventing or slowing down ESRD.

H18 Objective and Subjective Nutritional Assessment of Patients with Cancer in Palliative Care

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American Journal of Hospice and Palliative Medicine 27(2): 117-126, 2010

This study aimed to evaluate the nutritional status of patients with cancer in palliative care and to examine the interrelationship between objective and subjective nutritional assessment measures. Patients' nutritional status in a palliative care unit of a Malaysian government hospital and a hospice facility were assessed using anthropometric measurements, weight loss at 1/6 months, and the scored patient-generated subjective global assessment (PG-SGA). Moderate-to-severe malnutrition was observed in a range from 31% to 69% using both measurements. Common nutritional impact symptoms were pain, xerostomia, and anorexia. Patient-generated subjective global assessment scores were significantly correlated with anthropometric measurements ($P < .050$). The PG-SGA is equally informative as objective indicators and is recommended as a quickly applied tool for nutritional status assessment of patients with cancer in palliative care.

H19 Outcome of moderate to severe malnutrition following persistent diarrhoea - a hospital based retrospective study

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Med J Malaysia 63(3): 229-236, 2008

We aimed to determine the outcome of nutritional intervention in children with moderate to severe malnutrition following persistent diarrhoea (PD), referred to a tertiary referral unit in Malaysia.Thirty one (44%) of the 71 children (median age 19 months) with PD had moderate to severe malnutrition on admission. Fifty three (75%) required dietary modification and 15 (21%) needed parenteral nutrition (PN, median duration 96 days). Of the 70 patients in whom remission of diarrhoea could be ascertained, 64 (91%) achieved remission. Three required home PN. At three months after discharge, there was a significant improvement in the mean weight for height z-score as compared to the original score at initial presentation (from -1.83 ± 1.77 to -0.80 ± 1.17; $p < 0.001$), although 12 (22%) of the 55 patients in whom nutritional status could be ascertained still had moderate to severe malnutrition. In conclusion, moderate to severe malnutrition was a common complication following PD resulting from diverse causes.With appropriate therapy, remission can be achieved in majority of patients, although a small number of patients needed home PN because of persistance of diarrhoea.

H20 Influence of dietary fat on plasma lipid profiles of Malaysian adolescents

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American Journal of Clinical Nutrition 53: 1010S-1014S, 199 l

We studied the effects of saturated (palm 01cm) and polyunsaturated (soybean oil) cooking oils on the lipid profiles of Malaysian male adolescents eating normal Malaysian diets for 5 wk. Diets cooked with palm olein did not significantly alter plasma total-cholesterol, LDL cholesterol, and HDL cholesterol concentrations or the ratio of total cholesterol to HDL cholesterol compared with diets cooked with soybean oil. However, the diet cooked with palm olein significantly increased apolipoprotein A-I (1 1%) and apolipoprotein B (9%) concentrations. Unexpectedly, soybean-oil-cooked diets caused a significant increase (47%) in plasma triglycerides compared with palm-olein-cooked diets. We conclude that palm olein, when used as cooking oil, has no detrimental effects on plasma lipid profiles in Malaysian adolescents.

H21 Energy density and weight of food effect short-term caloric compensation in men

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Physiol Behav. 87(4): 679-86, 2006

OBJECTIVE: The purpose of the study was to examine the effect of energy density and food weight (volume) on subsequent intake. DESIGN: Sixteen lean men were each studied four times during a 2-d protocol at the Rowett's Human Nutrition Unit. On day 1, subjects were fed a mandatory diet at 1.6 x resting metabolic rate (RMR). On day 2, during the mandatory morning period (08.30-12.30) subjects consumed a fixed breakfast (08.30) plus a snack (10.30) in one of four treatments [with values in weight (kg), ED (kJ/100g), Energy (MJ)]: (i) zero intake, 0:0:0 (ii) low energy density (LED), 0.615: 400: 2.46; (iii) high energy density (HED), 0.615: 800: 4.92; (iv) 2 x LED, 1.225: 400: 4.91. From 12.30, throughout the remainder of the day, subjects had ad libitum access to 15 high-protein, 15 high-fat and 15 high-carbohydrate foods. Motivation to eat was tracked hourly using 100 mm line scales. RESULTS: ANOVA showed subjects were hungrier after the zero and LED treatments in the mandatory period ($p<0.001$). Lunch time EI was 5.0, 3.1, 4.2 and 3.2 MJ on the zero, HED, LED and 2 x LED treatments, respectively ($p<0.001$). Total ad libitum EI was 11.7, 9.6, 10.3 and 9.5 MJ/d, respectively ($p=0.033$). Total ad libitum plus mandatory intakes amounted to 11.7, 14.5, 12.6 and 14.4 MJ/d,

respectively (p=0.001). Corresponding food intakes were 2.18, 2.39, 2.51 and 3.06 kg/d, respectively (p<0.001). CONCLUSIONS: The present study showed that subjects respond to both the amount of food eaten in the morning and to the energy density of those foods. However, compensation was only partial and short-term. Subjects only compensated EI by approximately 40% and that compensation only occurred at the next meal.

H22 Diet and Lifestyle Intervention among Patients with Colorectal Adenomas: Rational and Design of a Malaysian Study

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Asia Pacific Journal of Cancer Prevention 6: 553-560, 2006

Comprehensive evaluation of the large body of consistent evidence from laboratory, epidemiologic and clinical studies has led to the conclusion that modification of the dietary and lifestyle patterns of populations has considerable potential for reducing cancer risk. This paper describes a randomized-controlled trial involving a diet and lifestyle intervention for patients with history of colorectal adenomas. The primary aim of this trial is to evaluate the effectiveness of the intervention period and the second year of the study allowing for post-intevention follow-up. Subjects found to fit the inclusion criteria are recruited and randomized to two groups: the intervetion group and the control group. The intervention group subjects will attend a monthly lecture-discussion session for 10 months and small group counseling on modification of lifestyle behavior and diet as well as receive educational materials which were adapted from the WCRF Diet and Health Recommendations for Cancer Prevention. Control subjects will be provided with the usual care given to such patients. On ehundred and sixteen patients who were diagnosed with colorectal adenomatous polyps in the previous twelve months at the Hospital Kuala Lumpur have already been enrolled in this trial. Baseline data collection is on-going.

H23 Kepekatan Urin Fluorida dan Fluorosis Gigi di Kalangan Pelajar Sekolah Menengah, Pahang Darul Makmur

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Sains Malaysiana 33(1): 109-127, 2004

Kajian ini mengkaji prevalen fluorosis gigi dan kepekatan urin fluorida di kalangan pelajar sekolah. Seramai 84 orang pelajar Melayu yang berumur di antara 16 dan 17 tahun dari sebuah Sekolah Menengah Kebangsaan di dalam daerah Kuala Lipis, Pahang, telah dipilih sebagai responden. Pemilihan kumpulan responden adalah berdasarkan kepada pendedahan terhadap fluorida melalui sistem bekalan air. Seramai 52 orang pelajar yang tinggal di kawasan yang mendapat bekalan air berfluorida manakala 32 orang responden lagi tinggal di kawasan yang tidak mendapat bekalan air berfluorida (kumpulan perbandingan) telah dipilih menjadi sampel kajian. Objektif kajian ialah untuk mengenalpasti hubungan di antara kepekatan urin fluorida dengan fluorosis gigi dan membandingkan angkubah-angkubah ini di antara 2 kumpulan responden. Kepekatan urin fluorida diukur menggunakan elektrod khusus ion fluorida. Fluorosis gigi dikenalpasti melalui pemeriksaan fizikal gigi menggunakan Indeks Permukaan Gigi Untuk Fluorosis (TSIF). Hasil kajian menunjukkan tidak ada perbezaan yang signifikan di antara kepekatan urin fluorida (mg/L) ($t=0.186$, $p=0.853$), kepekatan urin fluorida (mg/g kreatinin) ($t=0.069$, $p=0.945$) dan fluorosis gigi (skor TSIF) ($t=0.288$, $p=0.774$) di antara 2 kumpulan responden. Terdapat korelasi positif yang signifikan di antara kepekatan urin jluorida (mg/L) ($r=0.425$, $p<0.00l$), kepekatan urin fluorida (mg/g kreatinin) ($r=0.252$, $p=0.021$) dengan flourosis gigi (skor TSIF). Ujian regresi berganda menunjukkan flourosis gigi (skor TSIF) mempunyai hubungan signifikan dengan kepekatan urin fluorida ($b=0.0.61$, $p=0.028$) dan bilangan gelas minuman kegemaran diminum sehari ($b=0.071$, $p=0.003$). Sebagai rumusan, kepekatan urin fluorida yang mewakili kadar pendedahan responden terhadap fluorida mempunyai hubungan yang signifikan dengan fluorosis gigi yang merupakan indikator biologi kepada sejarah pendedahan tinggi terhadap fluorida. Kadar dan kesan pendedahan tinggi terhadap fluorida juga didapati tidak banyak berbeza di antara responden meskipun menerima bekalan air dari sistem bekalan air yang berbeza. Ini bermakna, responden tidak hanya terdedah kepada fluorida melalui bekalan air minum yang dibekalkan oleh pihak berkuasa tetapi juga terdedah kepada faktor yang lain iaitu pengambilan air minuman seperti air berkarbonat dan jus buah-buahan.

H24 Role of vitamin e on oxidative stress in smokers

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Malaysian Journal of Medical Sciences 9(2): 34-42, 2002

Cigarette smoke contains numerous oxygen free radicals that when inhaled, overwhelm antioxidant defenses and produce a condition of oxidative stress. This study investigated whether or not supplementation with vitamin E can affect the state of oxidative stress in healthy smokers. In this randomised double blind trial, 32 smokers received 200 mg of vitamin E or placebo daily for 8 weeks. All smokers in the vitamin E group completed the trial whilst only nine in the placebo group completed the trial. Plasma vitamin E concentrations increased significantly [P<0.02] in the vitamin E group. The release of malondialdehyde [MDA] from erythrocytes was not significantly different between the two groups at baseline and was clearly reduced [P<0.01] after 8 weeks of vitamin E supplementation. Vitamin E increased erythrocyte superoxide dismutase activity [P<0.02] and decreased gluthathione peroxidase activity [P<0.02]. No changes were detected in plasma MDA. We conclude that daily supplementation with 200 mg of vitamin E for 8 weeks improved the oxidative stress state in smokers.

H25 Comparison of palm-olein and olive oil: effects on plasma lipids and vitamin E in young adults

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American Journal of Clinical Nutrition 61:1043-1051, 1995

Twenty-one healthy normocholesterolemic young adults, men and women, completed a randomized 30-d/30-d crossover comparison of the effect of palmolein and olive oil on plasma lipids. The subjects were free-living volunteers who changed to low-fat diets to which one of the test oils was added (used as a spread, for baking, or for frying) in turn. Complete food records were kept throughout: the test oils were compared at 17% of total dietary energy. Under the conditions of this experiment plasma total and low-density-lipoprotein (LDL) cholesterol were almost identical with the two oils, so that when the palmitic acid (16:0) in palm oil replaced oleic acid (18:1) in olive oil the expected increase in LDL cholesterol was not seen. These results indicate that 16:0, though saturated, is not always a plasma cholesterol-raising fatty acid. Palmolein is rich in vitamin E, a-tocopherol, and especially tocotrienols, but the latter were barely detectable in plasma.

H26 Acute effects of acarbose on post-prandial glucose and triglycerides in type 2 diabetics following intake of different Malaysian foods

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Asia Pacific J Clin Nutr 9(1): 41-45, 2000

Acarbose inhibits intestinal alpha-glucosidases resulting in diminished and delayed postprandial hyperglycaemia (PPH). Studies on effects of acarbose on postprandial lipaemia (PPL) have been inconclusive. Little is known about the effects of acarbose on PPH and PPL following intake of a polysaccharide diet. We studied 30 type 2 diabetic patients on dietary and/or oral hypoglycaemic agent(s). Thirty patients were recruited for food A (nasi lemak), 28 for food B (mee goreng) and 28 for food C (roti telur), which represent the typical diets of the three main races in Malaysia. Serial blood samples were taken at 15 min before and up to 240 min after each food intake, without acarbose. Subsequently, three doses of 50 mg acarbose were given orally and the same procedure was repeated the following day. There were significantly lower mean increments in plasma glucose levels after compared to before acarbose treatment 30, 45 and 60 min for food A and at 30, 45, 60, 120, 180 and 240 min for food C, but no significant difference was noted for food B. There was a significantly lower mean fasting glucose level after compared with before acarbose treatment following intake of food A and C but not food B. Short-term treatment with acarbose caused significant diminished and delayed PPH response with food A and C but not with food B. Acarbose was more effective in reducing PPH response in polysaccharide foods with a higher and earlier postprandial glucose peak than in those with a lower and lagged peak. There were no significant differences in the mean fasting or postprandial triglyceride levels before and after acarbose treatment, following intake of all three foods for up to 4 hours. Depending on the food absorption pattern, overnight low dose treatment with acarbose leads to diminished fasting and peak plasma glucose levels, and delayed PPH but insignificant reduction in postprandial lipaemia in poorly controlled type 2 diabetics following intake of racially different Malaysian food.

H27 Nonhypercholesterolemic effects of a palm-oil diet in Malaysian volunteers

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Institute for Medical Research, Kuala Lumpur, Malaysia.

Am J Clin Nutr 53: lOl5S-1020S, 1991

The effects on serum lipids of diets prepared with palm olein, corn oil, and coconut oil supplying -'-75% of the fat calories were compared in three matched groups of healthy volunteers (61 males, 22 females, aged 20-34 y). Group I received a coconut-palm-coconut dietary sequence; group II, coconutcorn-coconut; and group III, coconut oil during all three 5-wk dietary periods. Compared with entry-level values, coconut oil raised the serum total cholesterol concentration > 10% in all three groups. Subsequent feeding of palm olein or corn oil significantly reduced the total cholesterol (- 19%, -36%), the LDL cholesterol (-20%, -42%) and the HDL cholesterol (-20%, -26%) concentrations, respectively. Whereas the entry level of the ratio ofLDL to HDL was not appreciably altered by coconut oil, this ratio was decreased 8% by palm olein and 25% by corn oil. Serum triglycerides were unaffected during the palm-olein period but were significantly reduced during the corn-oil period.

H28 Replacing coconut santan with palm oil santan: impact on dietary C12-16 saturated fatty acids, serum total cholesterol, and cardiovascular risk

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Mal J Nutr 4: 65-72, 1998

The theoretical impact of the use of coconut cream (santan) powder and palm oil santan powder on the dietary levels of C12-16 saturated fatty acids (SFAs) and linoleic acid (18:2), and on serum total cholesterol (TC), was evaluated holding non-santan dietary variables constant. The prediction was based on a 2,300-kcal hypothetical diet, containing one santan-based dish or snack in each of the 5 daily meals with fat contributing 30% of total calories, while the santan contributed a total of 14% kcal (36g). Replacing coconut santan with palm oil santan reduced the overall dietary C12-16 SFAs from 10.8% kcal to 4.8% kcal (i.e. -6.0% kcal) and the virtual removal of lauric (12:0) + myristic (14:0) acids, while palmitic acid (16:0) rose by 3.3% kcal, and the polyunsaturated linoleic acid (18:2) increased by 1.13% kcal. Applying the Hegsted equation to these dietary fatty acid (FA) changes, predicted a serum TC reduction of 24 -31 mg/dL (0.62- 0.80 mM/L), with the hypocholesterolemic effect being influenced by the low-density lipoprotein receptor (LDLr) "set-point" of the individual(s) concerned. Thus, the prediction indicated that replacing coconut santan with palm oil santan in santan-based Malaysian dishes or snacks would have a significant beneficial impact on serum TC and hence, cardiovascular risk.

H29 Prevalence of Coronary Risk Factors: Fisherman vs Non-fisherman in Tumpat Kelantan

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Sains Malaysiana 29: 11-18, 2000

A cross-sectional study was conducted amongst 223 subjects consisting of 176 fishermen and 51 non-fishermen in Tumpat Kelantan. The objective was to compare the prevalence of coronary heart disease (CHD) risk factors between them. Questionnaires were used to obtain the socio-economic status whilst clinical assessments were carried out to determine the nutritional and health status of the population. It was found that fishermen had lower socio- economic status as compared to non-fisherman. Prevalence of poverty among fishermen was 71.4% and 36.8% had no formal education. Three main coronary heart disease risk factors found to be high were smoking (76%), HDL-cholesterol < 35mg/dl (95.8%) and hypertension (28.8%). The preva-lence of risk factors were higher among fishermen as compared to non-fisherman. Calories and nutrients intake were low in the two groups. Calorie and protein intake for fishermen were lower ($p<0.05$) compared to non-fishermen. The study showed that 46.6% fishermen had two CHD risk factors and 24.1% had three or more as compared to non-fishermen (33.3% and 33.3% respectively). Only 8.3% fishermen and 15.2% non fishermen did not have any risk factor. There was a significant difference ($p<0.05$) in number of risk factors according to age group. This study indicated that fishermen have a potential to develop coronary heart diseases thus preventive meas-ures should be instituted as soon as possible in order to alleviate those problems.

H30 Diabetes Mellitus in a Malaysian Teaching Hospital : Prevalence of Diabetes Mellitus and Frequency of Testing for Hypercholesterolaemia, Proteinuria and HbA1c

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Med J Malaysia 57(2): 195-200, 2002

We examined the prevalence of diabetes among inpatients in our hospital, the relationship of the diagnoses on admission to diabetes, and the frequency of testing for HbA1c as a marker of long-term glycaemic control, proteinuria, and hypercholesterolaemia. In addition, patients with raised laboratory plasma glucose without a known history of diabetes mellitus, were studied to see if there had been further evaluation. The overall prevalence of diabetes in our hospital was 25.3% with the highest prevalence found (37.8%) on medical wards. 10.5% of admissions

were due directly to diabetes and a further 58.9% of patients were admitted with illnesses which were significantly related to diabetes. Overall testing rates for HbA1c , proteinuria and hypercholesterolaemia were less than ideal (51.6, 73.4 and 45.5% respectively). Less than 50% of patients without previously diagnosed diabetes but with high plasma glucose values had further evaluation for diabetes. In conclusion, this study has detected a high overall prevalence of diabetes among inpatients in an urban Malaysian hospital. Rates of testing for HbA1c , proteinuria and hypercholesterolaemia, are disappointingly low, as is further evaluation of patients without known diabetes, but with elevated glucose values. More effective measures to improve the delivery of inpatient diabetes care are needed.

H31 Blood Glucose and Glycosylated Haemoglobin in Malays and Aborigines in Malaysia

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Med J Malaysia 51(2): 179-187, 1996

Fasting blood glucose (FBG) and glycosylated haemoglobin (HbA1) were determined in 1,136 subjects aged 7 and above amongst the Aborigines and Malays living in three different socio-economic environments in Malaysia. FBG was measured using a Reflotron glucose analyzer and HbA1 by a microcolorimetric method. There was no difference in FBG between Aborigines and Malay children aged between 7-17 years old. However, there was a significant difference in the mean FBG between the two races amongst the adults (p=0.0007). The Malays who lived in rural and urban areas had a higher percentage of subjects with FBG more than 6 mmol/1 compared to Aborigines at all locations. For HbA1, significant differences between races were found in both cholesterol in adults. However, using multiple regression, only age, gender, and skinfold thickness correlated with FBG. Body mass index was an important predictor for HbA1 in children whereas in adults, HbA1 levels were only a function of age and socio-economic factors.

H32 Lowering of serum cholesterol in hypercholesterolemic humans by tocotrienols (palmvitee)

Qureshi AA, Qureshi N, Wright JJK, Shen Z, Kramer G, Gapor A, Chong YH, DeWITT G, Ong ASH, Peterson DM and Bradlow BA

American Journal of Clinical Nutrition, 53:1021S-1026S, 1991

A double-blind, crossover, 8-week study was conducted to compare effects of the tocotrienol-enriched fraction of palm oil (200 mg palmvitee capsules/day) with those of 300 mg corn oil/day on serum lipids of hypercholesterolemic human subjects (serum cholesterol 6.21-8.02 mmol/L). Concentrations of serum cholesterol (-

15%), LDL cholesterol (-8%), Apo B (-10%), thromboxane (-25%), platelet factor 4 (-16%), and glucose (-12%) decreased significantly only in the 15 subjects given palmvitee during the initial 4 weeks. The crossover confirmed these actions of palmvitee. There was a carry over effect of palmvitee. Serum cholesterol concentrations of seven hypercholesterolemic subjects (>7.84 mmol/L) decreased 31% during a 4-week period in which they were given 200 mg gamma-tocotrienol/ day. This indicates that gamma-tocotrienol may be the most potent cholesterol inhibitor in palmvitee capsules. The results of this pilot study are very encouraging.

H33 Abdominal obesity increased breast cancer risk

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Jurnal Sains Kesihatan Malaysia 5(2): 17-28, 2007

A case-control study was carried out to examine the association between adiposity and body composition with risk of breast cancer among 71 newly diagnosed breast cancer cases and 138 controls. Anthropometric parameters included height, weight, waist and hip circumference, fasting blood glucose and blood pressures were measured on the subjects. Body composition was measured using bioelectrical impedance analysis (Maltron BF906). Result showed that the mean body mass index (BMI) among cases were 26.0 ± 4.8 kg/m2 and 25.3 ± 4.5 kg/m2 for control group (P > 0.05). A total of 71% of the cases and 40% of the control had abdominal obesity (waist circumference = 80 cm) [OR = 3.4 (95% CI = 1.7 6.9)] (p < 0.05). Pre menopausal women have four times higher risk [Adjusted odds ratio OR = 4.3 (95% CI = 1.8-10.3)]. Percent of body fat was slightly higher in cases (36.4 ± 4.7%) compared to controls (35.3 ± 4.4%) but the difference was not significant. The mean of fat free mass (FFM) in controls was 38.8 ± 5.7 kg and 38.9 ± 5.5 kg in cases. A weak positive correlation was shown between age and BMI (r = 0.179, p = 0.010), waist circumference (r = 0.218, p = 0.002), waist hip ratio (WHR) (r = 0.233, p = 0.001) and percent body fat (r = 0.330, p = 0.000). In conclusion, abdominal obesity increased breast cancer risk, especially among premenopausal women. This type of obesity and percentage of body fat was also found to increase with age. It is essential for women to maintain a normal waist line through healthy lifestyle in order to reduce breast cancer risk.

H34 Comparative evaluation of cytotoxic effects of milk from various species on leukemia cell lines

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Malaysian Journal of Medicine and Health Sciences 2(1): 1-10, 2006

Objective: Previous studies have shown milk to contain cancer inhibitors. In this context, this study was conducted to screen the potential cytotoxic properties of four different types of milk, namely cow's milk, goats's milk, mare's milk and human milk. Methods: In evaluating the cytotocix properties of milk, two different human leukemia cell lines namely,raji and CEM-SS were used. The treated and untreated cells of milk were cultured at 37°C in 5% CO2 for 5 days according to standard guidelines. The CellTiter 96® aqueous (MTA) assay was carried out on the first, third and fifth days to measure cell viability. The percentage of cell viability waas determined by comparing the optical density of the treated cells against the untreated controls. One-way ANOVA at $p<0.05$, duncan's multiple range test and independent T-test were carried out to determine the mean count differences of cell viability between and within cow's milk, goat's milk, mare's milk and human milk. Result: interestingly, only mare's milk was found to cause statistically significant cytotoxicity on both the raji ($p<0.05$) and CEM-SS ($p<0.05$) cells at 10% dilution. The cells treated with cow's milk, goat's milk and and human milk showed no significant difference in cell viability when compared to the untreated controls where cell growth effects were observed instead. In addition, the cells treated with mare's milk underwent morphological changes that were indicative of apoptosis. Conclusion: the findings of this study show that among the four types of milk, mare's milk appears to possess cytotoxic properties against leukemia cell lines.

H35 Obesity and risk of colorectal adenomatous polyps: a case-control study in Hospital Kuala Lumpur

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Mal J Nutr 15(1): 1 - 10, 2009

Colorectal adenomas are precursor lesions of colorectal cancer. Several studies have proposed that obesity is a risk factor for colorectal adenoma. This case-control study examined the relationship between body mass index (BMI), waist circumference, waistto- hip ratio (WHR), body fat percentage and colorectal adenomatous polyps (CRA) in patients who have had a colonoscopy at the Hospital Kuala Lumpur (HKL). Fifty-nine patients (42 males and 17 females) positively identified as having CRA and 59 polypfree subjects were recruited as controls (33 males and 26 females). A pre-tested questionnaire was used to collect socio-economic information, while anthropometric measurements were determined directly by established methods. The mean BMI of female case subjects was significantly higher than control females (25.63 + 4.87 kg/m2 vs. 23.86 + 3.70 kg/m2, $p<0.05$) but the difference in BMI was not significant in men. The mean WHR of male subjects was significantly higher in the case group (0.92 + 0.07 vs. 0.90 + 0.06, $p<0.05$). After adjusting for confounders, waist circumference was the only indicator that was found to significantly increase the risk for CRA in women (OR = 6.349, 95% CI = 1.063 - 37.919). Higher BMI, WHR and body fat percentage showed a non-significant risk in female subjects. In men, none of the obesity indicators were found to be significant risk factors for CRA. These findings suggest that abdominal obesity may be a contributing factor to CRA risk particularly in women. A prospective study is needed to confirm the role of obesity in the development of CRA in Malaysians.

H36 Nutritional Status and the Risk for Colorectal Adenomas: A Case-Control Study in Hospital Kuala Lumpur, Malaysia

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Pak J Nutr 9 (3): 269-278, 2010

The most important and possible risk factor of colorectal adenomas is the individual's nutritional status. The role of nutritional status in the aetiology of colorectal adenomas remains an area of active investigation, as the exact relationship between nutritional status and colorectal adenomas remains unclear. The objective of this case-control was to determine the nutritional status of subjects with colorectal adenomas as compared with healthy subjects at Hospital Kuala Lumpur over a period of one year. A total of 118 subjects were recruited (n case = 59 and n control = 59). A pre-tested questionnaire was used to collect socio-demographic information and dietary intake. Lipid profile was determined using standard Roche diagnostic kits. The data were analyzed using SPSS version 12.0. The intake of beta-carotene, alphacarotene, lycopene, vitamin A and crude fiber found to be significantly different between the groups ($p<0.05$),while beta-carotene, alpha-carotene, lycopene, vitamin C, vitamin D, vitamin E and crude fiber

significantlymreduced the risk. Although the percentages intake of nutrient achieved according to RNI were below the recommended value, percentages of RNI achieved for vitamin C, D, E and folate were found to be significantly different between male subjects ($p<0.05$). Our results support the notion that certain nutritional factors are of importance for the development of these pre-cancerous lesions. Identification of risk factors through this case-control study should be able to supplement the available data in order to develop an intervention package that focuses on multiple risk factors to reduce the chances for developing colorectal adenomas or colorectal cancer.

H37 Arterial Compliance and vitamin E blood levels with a self emulsifying preparation of tocotrienol rich vitamin E

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Arch Pharm Res 31 (9): 1212-1217, 2008

The tocotrienol vitamin E has potent antioxidant property, however absorption is low due to high lipid solubility. A self emulsifying preparation of tocotrienol rich vitamin E (SF-TRE) had been reported to increase their bioavailability. This randomized, placebo controlled, blinded end point clinical study aimed to determine the effects of 50, 100 and 200 mg daily of SF-TRE and placebo for two months on arterial compliance and vitamin E blood levels. Assessment of arterial compliance by carotid femoral pulse wave velocity (PWV) and augmentation index (AI), plasma vitamin E, serum total cholesterol and low density lipoprotein cholesterol were taken before and after 2 months' treatment in 36 healthy males. Un-supplemented tocotrienol levels were low, after treatment, all SF-TRE treated groups had significantly higher plasma a, d and d tocotrienol concentrations compared to placebo. Augmentation index change from baseline to end of treatment for groups placebo, 50, 100, and 200 mg were 2.22±1.54, -6.59±2.84, -8.72±3.77, and -6.27±2.67% respectively ($p=0.049$, 0.049, and 0.047 respectively). Groups 100 and 200 mg showed significant improvement after treatment with pulse wave velocity reductions of 0.77 m/s and 0.65 m/s respectively ($p=0.007$ and $p=0.002$). There was no effect of SF-TRE on serum lipids. We conclude that there was a trend towards improvement in arterial compliance with 2 months' of SF-TRE.

H38 Antioxidant intake and status, and oxidative stress in relation to breast cancer risk: a case-control study

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Asian Pac J Cancer Prev. 9(2): 343-349, 2008

A case control study was carried out to investigate associations between breast cancer risk, antioxidant status and oxidative stress among women in Klang Valley and Selangor. A total of 57 newly diagnosed cases aged 30 to 66 years old participated and were matched for age and ethnicity with 139 controls with no diagnosis of cancer or other chronic diseases. An interview based questionnaire designed to collect information on demographic and socioeconomic status, as well as reproductive, medical and dietary history was used. Anthropometric measurements including weight, height, waist and hip circumference were made and a 10 ml fasting venous blood sample was taken for glucose testing and analysis of plasma vitamin antioxidants and malondialdehyde. Hair and toenail samples were taken for selenium analysis. Results showed that the mean intake of vitamin A, vitamin E and selenium among cases (606.8 +/- 334.8 microg/d, 6.1 +/- 2.4 g/d, 56.9 +/- 16.2 microg/d) was lower than controls (724.7 +/- 414 microg/day, 6.9 +/- 3.0 g/d, 60.8 +/- 17.5 microg/d, respectively) ($p<0.05$ for all parameters). A similar trend was noted for plasma vitamin A and E and also selenium in hair and toenails. Poor antioxidant status as indicated by low plasma vitamin A (<284.3 microg/l or <366.3 microg/l) increased risk of breast cancer by approximately two fold, whilst low plasma vitamin E (<2.5 mg/dl, <2.8 mg/dl and <3.1 mg/dl) increased the risk by two to three fold [Adjusted OR 2.97 (95% CI 1.38-3.48), 2.32 (95% CI 1.07-2.41) and 2.12 (95% CI 1.00-4.21)]. Cases had a greater level of malondialdehyde 4.4 +/- 1.1 mmol/g protein), an indicator of oxidative stress, as compared to controls (3.2 +/- 1.7 mmol/g protein) ($p<0.05$). A high level of MDA (> or = 4.8 mmol/g protein) was associated with breast cancer [Adjusted OR 6.82 (95% CI 1.95-23.9)]. It is concluded that a poor antioxidant status and high oxidative stress are associated with breast cancer risk. Thus, it is essential for Malaysian women to obtain a good antioxidant status by consuming a diet rich in vitamins A and E as well as selenium and adopt healthy behaviour to reduce oxidative stress in order to prevent breast cancer.

H39 Impact of nutritional status on the quality of life of advanced cancer patients in hospice home care

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Asian Pac J Cancer Prev.10(6):1003-1009, 2009

BACKGROUND: Cancer patients frequently experience malnutrition and this is an important factor in impaired quality of life. OBJECTIVE: This cross-sectional study examined the association between global quality of life and its various subscales with nutritional status among 61 (33 females and 28 males) advanced cancer patients cared for by selected hospices in peninsular Malaysia. METHODS: The Patient Generated-Subjective Global Assessment (PG-SGA) and the Hospice Quality of Life Index (HQLI) were used to assess nutritional status and quality of life, respectively. RESULTS: Nine (14.7%) patients were well-nourished, 32 (52.5%) were moderately or suspected of being malnourished while 20 (32.8%) of them were severely malnourished. The total HQLI mean score for these patients was 189.9-/+51.7, with possible scores ranging from 0 to 280. The most problem areas in these patients were in the domain of functional well-being and the least problems were found in the social/spiritual domain. PG-SGA scores significantly correlated with total quality of life scores ($r2= 0.38$, $p<0.05$), psychophysiological well-being ($r2= 0.37$, $p<0.05$), functional well-being ($r2= 0.42$, $p<0.05$) and social/spiritual well-being ($r2= 0.07$, $p<0.05$). Thus, patients with a higher PG-SGA score or poorer nutritional status exhibited a lower quality of life. CONCLUSION: Advanced cancer patients with poor nutritional status have a diminished quality of life. These findings suggest that there is a need for a comprehensive nutritional intervention for improving nutritional status and quality of life in terminally ill cancer patients under hospice care.

H40 Dietary palmitic acid results in lower serum cholesterol than does a Iauric-myristic acid combination in normolipemic humans

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Am J Clin Nutr: 59:841-6, 1994

In a double-blind crossover study, 17 normo-cholesterolemic male volunteers were fed carefully designed whole-food diets in which 5% of energy was exchanged between palmitic (16:0) and launic + myristic acids (12:0 + 14:0) whereas all other fatty acids were held constant. Resident males received each diet during separate 4-wk periods. The test diets supplied i30% of energy as fat and 200 mg cholesterol/

d. Compared with the 12:0 + 14:0-richdiet, the 16:0-nichdietproduceda9% lower serum cholesterol concentration, reflected primarily by a lower (I 1 %) low-density-lipoprotein-cholesterol concentration and, to a lesser extent, high-density-lipoprotein cholesterol. No diet-induced changes were noted in the cholesterol content of other lipoproteins, nor did exchange of saturated fatty acids affect the triglyceride concentration in serum or lipoprotein fractions. These data indicate that a dietary 12:0 + 14:0 combination produces a higher serum cholesterol concentration than does 16:0 in healthy normo-cholesterolemic young men fed a low-cholesterol diet.

H41 Trans (Elaidic) Fatty Acids Adversely Affect the Lipoprotein Profile Relative to Specific Saturated Fatty Acids in Humans1,2

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J. Nutr. 127: 514S-520S, 1997

Although dietary trans fatty acids can affect plasma lipoproteins negatively in humans, no direct comparison with specific saturated fatty acids has been reported, even though trans fatty acids were designed to replace saturates in foods and food processing. In this study, dietary trans 18:1 [elaidic acid at 5.5% energy(en)] was specifically exchanged for cis 18:1, 16:0 or 12:0 / 14:0 in 27 male and female subjects consuming moderate fat (31% en), low cholesterol (.225 mg/d) whole food diets during 4-wk diet periods in a crossover design. The trans-rich fat significantly elevated total cholesterol and LDL cholesterol relative to the 16:0-rich and 18:1-rich fats and uniquely depressed HDL cholesterol relative to all of the fats tested. Trans fatty acids also elevated lipoprotein (a) [Lp(a)] values relative to all dietary treatments. Furthermore, identical effects on lipoproteins were elicited by 16:0 and cis 18:1 in these subjects. The current results suggest that elaidic acid, one of the principal trans isomers produced during industrial hydrogenation of edible oils, adversely affects plasma lipoproteins. Thus, the negative effect of elaidic acid on the lipoprotein profile of humans appears to be unmatched by any other natural fatty acid(s).

H42 Relationship between selenium and breast cancer: a case-control study in the Klang Valley

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Singapore Med J 50(3): 265-269, 2009

The purpose of this study was to assess the relationship between selenium status and intake among breast cancer patients from the Klang Valley. Methods: 64 cases and 127 controls were matched for age (range 30-65 years) and ethnicity, with an 80 percent study power. Subjects were interviewed to obtain information on their habitual dietary intakes, demographic data and medical history. Selenium status was determined from toenail and hair analysis using an inductively coupled plasma mass spectrometer. Results: The nutrient analysis showed that total energy and protein intake was significantly higher among controls (1,403 +/- 367 kcal/day, 75.6 +/- 33.2 g/day) as compared to cases (1,273 +/- 295 kcal/day, 60.9 +/- 19.1 g/day) (p-value is less than 0.05). The selenium intake among cases (78.47 +/- 25.34 µg/day) was significantly lower than the controls (89.34 +/- 36.85 µg/day) (p-value is less than 0.05). Breast cancer risk decreased with the increasing quartiles of selenium intake, with odds ratios (95 percent confidence interval) of 2.95 (1.22-7.12), 2.17 (1.13-4.19) and 1.71 (0.84-3.52), respectively. However, the association diminished after adjustment for confounding factors. Selenium in hair did not differ among cases and controls, but selenium status in the nails of controls was significantly higher as compared to cases (p-value is less than 0.05). Breast cancer risk decreased with the increasing quartiles of toenail selenium status as measured in the toenail and hair. Conclusion: Selenium intake and status was associated with breast cancer risk. Thus, it is essential for Malaysian women to achieve a good selenium status by consuming good food sources of selenium as a chemopreventive agent.

H43 Changes in nutritional, functional status and quality of life of copd out-patients after a pulmonary rehabilitation programme in HUKM: a Pilot Study

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Mal J Nutr 14(2): 151 - 162, 2008

This quasi-experimental study was carried out to evaluate the effectiveness of an eight-week multi-disciplinary pulmonary rehabilitation programme in improving nutritional and functional status and quality of life of COPD out patients at Hospital Universiti Kebangsaan Malaysia. A total of 9 COPD outpatients aged 40 years and above (6 men and 3 women) completed at least 50% of 16 sessions of an eight-week pulmonary rehabilitation programme. Their nutritional and functional status and rating of quality of life were measured at baseline (0 day) and after 8 weeks and these were compared to those of the control group matched for age, comprising 13 subjects (11 men and 2 women). Nutritional status was determined using anthropometry, body composition (Bioelectrical Impedance Analysis) and three-day food record. Assessment of appetite for food was also carried out using the Simplified Nutritional Assessment Questionnaire (SNAQ). Functional status was assessed using the Pulmonary Functional Status and Dyspnea Questionnaire-modified version (PFSDQ-M). The handgrip strength was also measured using handgrip dynamometer. The SF36 questionnaire was used to measure the quality of life of the subjects. There was a reduction in dyspnea (-49.0%, $p<0.05$) and fatigue (-47.8%, $p<0.05$) in men after the intervention programme, as compared to their controls (dyspnea -2.9% and fatigue 8.9%). Quality of life in this group was also significantly improved by 31.8% ($p<0.05$) as compared to their controls (-3.0%, $p>0.05$). Similar trends were noted for the women, although the difference was not significant. No significant changes were seen in nutritional status assessed by anthropometry, dietary intake and appetite. However, there was a trend of increased nutrient intake and SNAQ score in the intervention group as compared to control. An eight-week pulmonary rehabilitation programme was effective in improving the functional status particularly in men, by reducing dyspnea and fatigue; and also improving their quality of life, but was not effective in changing the nutritional status.

H44 A Prospective Study on Malnutrition and Duration of Hospitalisation among Hospitalised Geriatric Patients Admitted to Surgical and Medical Wards of Hospital Universiti Kebangsaan Malaysia

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Mal J Nutr 8(1): 55-62, 2002

Elderly people are known to be at a greater risk of malnutrition, particularly those having diseases or illnesses. A prospective study was undertaken on 92 hospitalised geriatric patients (45.6% males), aged 60 to 89 years old, admitted to surgical and medical wards at Hospital Universiti Kebangsaan Malaysia (HUKM). The study aimed to assess malnutrition at admission, day 3 and day 7 of hospitalisation, and its relation with length of stay in the wards. Malnutrition was assessed using anthropometrics and biochemical indicators. Although the majority of subjects had a normal Body Mass Index (BMI), 10.9% had Chronic Energy Deficiency (CED) and 38% were overweight. A total of 10% subjects had muscle wasting as assessed by Mid-upper Arm Circumference (MUAC). Biochemical tests indicated that women subjects were more likely to have hypoalbuminaemia ($p < 0.05$) whilst, men were at risk of anaemia ($p < 0.05$). Throughout hospitalisation, there was a significant reduction in body weight, biceps skinfold thickness, calf circumference, MUAC, percentage of body fat and body mass index (BMI) in both males and females ($p < 0.05$ for all parameters). Biochemical tests on a sub sample of subjects indicated that 71.4% had hypoalbuminaemia and 39.6% were anaemic. Subjects diagnosed with cancer, had loss of appetite or had poor nutritional status as assessed by BMI or MUAC on admission were more likely to be hospitalised longer than or equal to 7 days ($p < 0.05$ for all parameters). Serum albumin levels at admission correlated positively with MUAC values both on admission ($r = 0.608$, $p < 0.01$) and at clay seven of hospitalisation ($r = 0.906$, $p < 0.05$). There is a need to screen elderly patients at high risk of malnutrition at admission in order to reduce the length of stay and increase their health and nutritional status.

H45 Effect of a palm-oil--vitamin E concentrate on the serum and lipoprotein lipids in humans

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American Journal of Clinical Nutrition l99l; 53: l027S-30S.

The effect of a capsulated palm-oil-vitamin E concentrate (palmvitee) on human serum and lipoprotein lipids was assessed. Each palmvitee capsule contains 1 8, i-42, and '-240 mg of tocopherols, tocotrienols, and palm olein, respectively. All volunteers took one palmvitee capsule per day for 30 consecutive days. Overnight fasting blood was taken from each volunteer before and after the experiment. Serum lipids and lipoproteins were analyzed by using the enzymatic CHOD-PAP method. Our results showed that palmvitee lowered both serum total cholesterol (TC) and low-density-lipoprotein cholesterol (LDL-C) concentrations in all the volunteers. The magnitude of reduction of serum TC ranged from 5.0% to 35.9% whereas the reduction of LDL-C values ranged from 0.9% to 37.0% when compared with their respective starting values. The effect of palmvitee on triglycerides (TGs) and HDL-C was not consistent. Our results show that the palmvitee has a hypocholesterolemic effect.

H46 Effect of a palm-oil vitamin E concentrate on the serum and lipoprotein lipids in humans

Tan DT, Khor HT, Low WHS, Ahmad A and Gapor A

American Journal of Clinical Nutrition, 53:1027S-1030S, 1991

The effect of a capsulated palm-oil vitamin E concentrate (palmvitee) on human serum and lipoprotein lipids was assessed. Each palmvitee capsule contains ~18, ~42, and ~240 mp og tocopherols, tocotrienols, and palm olein, respectively. All volunteers took one palmvitee capsule per day for 30 consecutive days. Overnight fasting blood was taken from each volunteer before and after the experiment. Serum lipids and lipoproteins were analysed by using the CHOD-PAP method. Results showed that palmvitee lowered both serum total cholesterol (TC) and low-density-lipoprotein cholesterol (LDL-C) concentrations in all the volunteers. The magnitude of reduction of serum TC ranged from 5.0% to 35.9% whereas the reduction of LDL-C values ranged from 0.9% to 37.0% when compared with their respective starting values. The effect of triglycerides (TGs) and HDL-C was not consistent. Results obtained showed that the palmvitee has a hypocholesterolemic effect.

H47 Metabolic syndrome and its characteristics among obese patients attending an obesity clinic

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Asia Pacific J Clin Nutr 11(3): S694-S701, 2002

Introduction: The increased prevalence of metabolic syndrome worldwide is closely related to the rising obesity epidemic. The objectives of the study were to determine the prevalence and identify the associated and prognostic factors that influence the risk of metabolic syndrome among obese patients attending the Obesity Clinic at Hospital Universiti Sains Malaysia. Methods: A study was conducted involving 102 obese persons who attended the Obesity Clinic from January 1 to December 31, 2005. Metabolic syndrome was defined according to the International Diabetes Federation criteria. Results: The overall prevalence of metabolic syndrome among obese patients was 40.2 percent. The prevalence was higher in females (43.7 percent) than in males (32.3 percent). The prevalence of metabolic syndrome was noted to increase with increasing body mass index class, from class 1 to class 2. However, the prevalence was lower in obesity class 3. The prevalence of metabolic comorbidities of raised blood pressure, reduced high density lipoprotein, high triglyceride and raised fasting blood glucose was 42, 40, 36 and 17 percent, respectively. A quarter of obese patients in this study had no other comorbidity. Based on logistic regression multivariable analysis, age was the only significant associated factor that influenced the risk of having metabolic syndrome. Conclusion: The prevalence of metabolic syndrome was high and the highest comorbidity was high blood pressure. Age was the only significant risk factor of having this syndrome.

H48 A Follow-Up Study On The Effects Of A Milk Supplement On Bone Mineral Density Of Postmenopausal Chinese Women In Malaysia

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The Journal of Nutrition, Health & Aging 11(1): 69-73, 2007

A previous study on a randomized controlled trial in 173 postmenopausal Chinese women in Kuala Lumpur showed that milk supplementation was effective to reduce bone loss at the total body, lumbar spine, femoral neck and total hip compared to the control group on a usual diet (Chee et al. 2003). Objective: The objective was to determine whether the results were sustained after the conclusion of the study. Design: A follow-up study, 18 months after a randomized controlled trial of milk supplementation was concluded. A total of 139 participants were followed up 21 months after the study ended. Bone mineral density (BMD) was measured at the total body, lumbar spine, femoral neck and total hip by dual energy X-ray absorptiometry, and anthropometric measurements as well as changes in dietary habits were measured. Results: At the follow-up, the milk supplement group did not show significant bone loss from baseline at most sites (mean differences ± SE) (total body 0.42±0.25%, femoral neck 0.44±0.58%, total hip -0.06±0.46%), unlike the control group (total body -1.07± 0.28% $p<0.005$, femoral neck -1.49±0.56% $p<0.05$, total hip -0.89±0.57% $p<0.05$). However, both the milk and control groups showed bone loss from baseline at the lumbar spine (milk -2.01%, control -3.29%, $p>0.05$). The calcium intake of the milk group remained significantly higher than the control group (milk 710 mg/day, control 466 mg/day, $p<0.005$) despite discontinuation of the milk supplement. Conclusions: The results showed that some of the beneficial effects of a milk supplement were still evident at follow-up and it was possible to motivate subjects to adopt a positive change in dietary calcium intake after intervention.

H49 Insulin-like growth factor-I and fast growth-hormone levels in mild and moderately malnourished children

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Asia Pacific J Clin Nutr 207-210, 1992

Insulin-like growth factor-I (IGF-I)and fasting growth hormone levels were measured in a group of 255 children (163 males and 92 females. age ranged 6-17 years) of varying pubertal development and body mass index (BMI); well-nourished (BMI>18). Mildly-malnourished (BMI=15-18) and moderately-malnourished (BMI<15). In well-nourished children IGF-I levels increased significantly ($P = 0.02$) with pubertal development. where girls at Tanner 5 had significantly higher ($p = 0.03$) IGF-I levels than the boys. Whilst there was no change in fasting GH levels with nutritional status, IGF-I levels of prepubertal boys and girls decreased significantly with BMI ($P<0.001$ and $P = 0.01$ respectively). Hence measurement of IGF-I levels is a sensitive biochemical index in the assessment of mild and moderate form of malnutrition in prepubertal children.

H50 Effects of iodine deficiency on insulin-like growth factor-I, insulin-like growth factor-binding protein-3 levels and height attainment in malnourished children

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Clin Endocrinol (Oxf). 45(1): 79-83, 1996

Objective: The expression and synthesis of IGF-I and IGFBP-3 have been shown to be regulated by hormones and nutrition. We study the effects of malnutrition and iodine deficiency on these growth factors and the height attainment of a group of children. DESIGN: We measured serum IGF-I and IGFBP-3 levels in a group of Malaysian aborigine children from three jungle settlements; Sinderut and Pos Lanai are known for iodine deficiency and endemic goitre, and Gombak is an iodine replete area with better socioeconomic status. Patients: A total of 246 children were studied, 188 in the age group 4-10 years and 88 in the age group 11-15 years. Measurements: All children were assessed anthropometrically and height standard deviation score (SDS) were calculated using the CDC Anthropometric Software package. Malnutrition was confirmed clinically and according to the WHO definition of malnutrition. IGF-I and IGFBP-3 were determined by radioimmunoassay, and T4 and TSH by immunoradiometric assay. Results: Based on the height SDS, Sinderut and Pos Lanai children were significantly more malnourished and stunted than the Gombak children P = 0.0001). T4 levels were significantly lower (P = 0.0001) amongst the 4-10-years old Sinderut (81 +/- 2 nmol/l) than in Pos Lanai (101 +/- 3 nmol/l) or Gombak (123 +/- 3 nmol/l) children. Similar findings were also seen in the older children; mean T4 levels of those from Sinderut and Pos Lanai (83 +/ - 3 and 88 +/- 4 nmol/l respectively), were low (P = 0.0001) compared to Gombak (118 +/- 3 nmol/l). Conversely, TSH levels in both age groups of Sinderut children were significantly elevated (P = 0.0001) (3.5 +/- 0.2 and 3.9 +/- 0.3 mU/l respectively) compared to age-matched groups from Pos Lanal (2.1 +/- 0.1 and 2.2 +/- 0.2 mU/l respectively) and Gombak (1.5 +/- 0.1 and 1.5 +/- 0.2 mU/l respectively). IGF-I and IGFBP-3 correlated significantly with the height SDS of the children, In both the 4-10 (r = 0.400, P = 0.0001 and r = 0.365, P = 0.0001 respectively) and 11-15 years age groups (r = 0.324, P = 0.002 and r = 0.533, P = 0.0001 respectively). Correlation between IGFBP-3 and T4 levels was more significant in the younger children (r = 0.412, P = 0.0001). Association between IGF-I and T4 levels was significant only in the 4-10 years age group (r = 0.237, P = 0.001). Conclusions: Varying duration and degree of exposure to malnutrition and iodine deficiency resulted in different mean levels of T4, TSH, IGF-I and IGFBP-3 in the three areas. The strong positive associations between IGF-I and IGFBP-3 levels and height SDS suggest that these biochemical measurements are indeed useful indicators of growth and nutritional status in children. The significant correlations between T4 and IGFBP-3 and IGF-1 suggests the importance of thyroid hormones in regulating the synthesis of these growth factors. The age-related increase of these growth factors even amongst malnourished, iodine deficient children implies that age-matched reference ranges are essential for proper evaluation of laboratory results.

H51 Acute effect of low and high glycemic index meals on post-prandial glycemia and insulin responses in patients with type 2 diabetes mellitus

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Malaysian Journal of Medicine and Health Sciences 5(1): 11-20, 2009

Introduction: Post-prandial hyperglycemia is an important independent risk factor in the development of cardiovascular disease in diabetes. This randomized cross-over study was conducted to compare the post-prandial glycemic and insulin responses to both high and low glycemic with established T2DM (16 males, 25 females, Age=55 + 10 years and manner. Both test meals were separated by one week washout periods. The meals contained almost the same amount of energy and macronutrients with the exception of the GI values (High GI=70 vs Low GI = 36). Venous blood was taken through an indwelling catheter periodically at 0, 30, 60, 90, 120, 150, and 180 minutes respectively. The incremental area under the curve (iAUC) was used to calculate the post-prandial glycemia and insulin excursion over the 3-hour period. Results: The low GI meal induced lower glycemic responses at times 30, 60, 90, and 120 minutes (mean + SE; low GI = 8.1 + 0.4, 8.9 + 0.4, 8.9 + 0.4 and 8.5 + 0.4 mml/1 vs high GI = 9.1 + 0.4, 10.7 + 0.4, 11.0 + 0.5 and 9.7 + 0.5 mmol/l) and reduced the insulin levels at time 60, 90, 120 and 150 minutes (mean + SE; low GI = 8.1 + 0.4, 9.1 + 0.4, 8.9 + 0.4 and 8.5 + 0.4 mmol/l) vs high GI = 9.1 + 0.4, 10.7 + 0.4, 11.0 + 0.5 mmol/l) and reduced the insulin level at time 60, 90, 120 and 150 minutes (mean + SE; low GI = 17.1 + 1.7, 21.1 + 2.0, 20.4 + 1.7, 18.5 + 1.8 vs high GI = 25.0 + 2.5, 31.2 + 2.9, 29.8 + 3.0 and 23.0 + 2.3 μIU/ml) ($p<0.05$). The area under the glycemic (mean + SE: low GI = 215.93 + 15.9 mmol/L/minute vs high GI = 419.52 + 317 μIU/min) curves were lower after the low GI than high GI meal respectively ($p<0.05$). Conclusion : The low GI meal has the ability to reduce the post-prandial hyperglycermia as well insulin responses in type 2 diabetes patients.

H52 A study of blood glucose response following temperate and tropical fruit ingestion in healthy adults

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Mal J Nutr 11(1): 47-57, 2005

Fruits are well known to have high nutritional values. However, the response in blood glucose level varies with different fruits. To date, data has not been compiled to rank local fruits according to their blood glucose response. Therefore, this randomised experimental study was carried out to determine the blood glucose response after consuming ten types of tropical fruits (mango, rambutan, longan, sapodilla, jackfruit, watermelon, papaya and banana of three varieties, brangan, rastali andmas) and four types of temperate fruits (red apple, orange, grape and green pear). A total of 72 healthy subjects randomly divided into groups of 12 to 20 subjects (mean age: 21.5+0.6 years, mean BMI: 21.13+1.49 kgm-2) were requested to consume test fruits or reference food (glucose)after an overnight fasting on separate occasions. Each test fruit and theglucose contained 50g of carbohydrates. Finger-prick blood samples were obtained at 0 (fasting), 15, 30 60, 90 and 120 min after consuming each fruit. The blood glucose response was obtained by calculating area under the curve (AUC). The AUC ranged between 57.59+10 mmol.min/L and 313.2 mmol.min/L, with glucose showing the highest AUC ($p<0.05$) compared to all fruits tested. Banana gives the highest blood glucose response while green pear showed the lowest. The fruits ranked in descending order based on the AUC values were longan, followed by rambutan, grapes, watermelon, orange, papaya, jackfruit, sapodilla, mango and red apple. Tropical fruits had significantly higher AUC than temperate fruits ($p<0.05$). Overall, bananas demonstrated the largest rise in postprandial blood glucose response (62%) when compared to glucose while green pear showed the lowest response (18%). This preliminary data could be used as a recommendation to diabetic patients for optimum blood glucose control

H53 The effect of low glycemic index bread eaten with different fillings on blood glucose response in healthy individuals

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Jurnal Sains Kesihatan Malaysia 6(1):1-10, 2008

White and whole meal breads have been classified as high glycemic index (GI) foods which in turn produce the greatest rise in blood glucose. One of the commercial bread products in Malaysia known as Brown breads (BB) has been recently marketed as a healthy choice for diabetics due to its low GI value. This study was conducted to examine the effect of BB when eaten with different fillings on blood glucose response among healthy individuals and to describe the influences

of these fillings in reducing blood glucose response. Five test meals using BB (BB eaten with baked beans, BB eaten with seaweeds) had been prepared for this study. Postprandial blood glucose response was determined for each test meal and reference food (glucose) that contained 50 g carbohydrate respectively. A total of 21 healthy subjects were recruited by advertisement to participate. Only 20 subjects (15 males, 5 females, Mean + SD Age : 24.4 + 3.7 years; BMI 23.4 + 3.0 kgm-2) completed this study. After an overnight fast, subject consumed BB eaten with fillings according to the assigned group given and three repeated test of reference food (glucose). Fasting capillary blood glucose samples were taken at time 0 and at 15, 30, 45, 60, 90 and 120 min respectively after the meal began. The blood glucose response was obtained by calculating the incremental area under the curve (AUC). Blood glucose response after consuming reference food (251.8 + 12.1 mmol.min/L) was significantly higher than all the test meals ($p < 0.05$). Among the test meals, BB eaten with baked beans produced the highest rise in blood glucose (97.0 + 16.9 mmol.min/L) whereas BB eaten with seaweeds demonstrated the lowest response in blood glucose (33.3 + 6.5 mmol.min/L) and the difference was statistically significant ($p < 0.05$). The postprandial blood glucose response after ingestion of BB when eaten with vegetable was 73.3 + 19.1 mmol.min/L followed by BB with apple (58.9 + 12.2 mmol.min/L) and BB eaten with roast chicken (56.5 + 10.1 mmol.min/L). Generally, BB when eaten with fillings produced a slow rise in blood glucose response that the reference food. Combining this BB with filling had the effect of reducing the postprandial blood glucose further.

H54 A low-GI diet is associated with a short-term improvement of glycaemic control in Asian patients with type 2 diabetes

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Diabetes Obes Metab 11(4): 387-396, 2009

AIMS: The aim of this study is to compare the efficacy of low glycaemic index (GI) vs. conventional carbohydrate exchange (CCE) dietary advice on glycaemic control and metabolic parameters in patients with type 2 diabetes. METHODS: A total of 104 patients with type 2 diabetes were randomly assigned to either a low GI (GI) or CCE dietary advice over a 12-week period. The primary end-point was glycaemic control as assessed by glycated haemoglobin A1c (HbA1c), fructosamine level and plasma glucose. The secondary end-points were anthropometric measurements and metabolic parameters that include blood pressure, lipid profile and insulin levels. The oral antidiabetic medications remained unchanged throughout the duration of the study. RESULTS: A low-GI diet was associated with significant changes in the fructosamine level (DeltaGI = -0.20 +/- 0.03; DeltaCCE = -0.08 +/- 0.03 mmol/l, $p < 0.01$) and waist circumference (DeltaGI group = -1.88 +/- 0.30 cm; DeltaCCE group: -0.36 +/- 0.4 cm, $p < 0.05$) at week 4. At week 12, the changes in fasting glucose (DeltaGI = -0.03 +/- 0.3; DeltaCCE = 0.7 +/- 0.3 mmol/

l; p < 0.05) and waist circumference (DeltaGI = -2.35 +/- 0.47 cm; DeltaCCE group = -0.66 +/- 0.46 cm; p < 0.05) in the GI group was significantly lower than the CCE group. With the low-GI diet, the changes in postprandial glycaemia at time 0, 60, 150 and 180 min after consuming the standard test meal was lower than with the CCE diet (p < 0.05). No significant differences were found between the groups for the remaining parameters that were measured. CONCLUSIONS: Use of a low-GI diet resulted in significant changes of serum fructosamine level, plasma glucose and waist circumference in Asian patients with type 2 diabetes over a 12-week period compared with those following a CCE diet. The effect on HbA1c and other metabolic parameters was not significantly different between the two study groups but the improvement within the GI group was more pronounced and of clinical benefit.

H55 The effects of exclusion of dietary egg and milk in the management of asthmatic children: a pilot study

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J R Soc Promot Health. 124(2):74-80, 2004

Current understanding of the use of exclusion diets in the management of asthma in children is limited and controversial. The aim of this study was to examine the effects of excluding eggs and milk on the occurrence of symptoms in children with asthma and involved 22 children aged between three and 14 years clinically diagnosed as having mild to moderate disease. The investigation was single blind and prospective, and parents were given the option of volunteering to join the 'experiment' group, avoiding eggs, milk and their products for eight weeks, or the 'control' group, who consumed their customary food. Thirteen children were recruited to the experimental group and nine to the control group. A trained paediatrician at the beginning and end of the study period assessed the children. A seven-day assessment of food intake was made before, during and immediately after the period of dietary intervention in both groups. A blood sample was taken from each child for determination of food specific antibodies and in those children who could do so, the peak expiratory flow rate (PEFR) was measured. Based on the recommended nutrient intake (RNI), the mean percentage energy intake of the children in the experimental group was significantly lower (p < 0.05) in the experimental group. After the eight-week study period and compared with baseline values, the mean serum anti-ovalbumin IgG and anti-beta lactoglobulin IgG concentrations were statistically significantly reduced (p < 0.05) for both in the experimental group. In contrast, the values for anti-ovalbumin IgG in the control

group were significantly increased and those for anti-beta lactoglobulin IgG were practically unchanged. The total IgE values were unchanged in both groups. Over the study period, the PEFR in those children in the experimental group able to perform the test was significantly increased, but no such change was noted in the children in the control group who could do the test. These results suggest that even over the short time period of eight weeks, an egg- and milk-free diet can reduce atopic symptoms and improve lung function in asthmatic children.

H56 Plasma Vitamin C and Tocotrienols changes in response to dietary supplementation among young male adults

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Clin Ter 161 (2): 121-124, 2010

Background and Aims. Intake of the antioxidant vitamins C and E lowers the oxidative stress. The study aimed to determine plasma concentrations of vitamin C and tocotrienols after supplementation of both vitamins in young male adults. Materials and Methods. A total of 64 police recruits were randomly assigned to one of these groups: (a) 500 mg vitamin C (Vitamin C), (b) 200 mg Tocovid(Tocotrienol), (c) combination of 500 mg vitamin C and 200 mg Tocovid (Combination) or (d) placebo (Placebo) for eight-weeks of supplementation followed by six-week washout period. Results. In Combination group, mean plasma vitamin C concentration significantly increased from baseline 2.86 ± 1.19 mg/L to 10.37 ± 1.29 mg/L and 15.63 ± 1.27 mg/L after four- and eight-week supplementation, respectively. The corresponding figures for a-, d- and ?-tocotrienols were 9.9 ± 2.5 ng/ml to 104.1 ± 19.8 ng/ml and 112.8 ± 38.0 ng/ml; 2.5 ± 0.9 ng/ml to 29.9 ± 7.0 ng/ml and 17.9 ± 4.7ng/ml; 19.2 ± 3.1 ng/ml to 75.2 ± 24.1 ng/ml and 161.7 ± 49.9 ng/ml, respectively. In Vitamin C group, plasma vitamin C concentrations were significantly increased. Conversely, concentration of plasma vitamin C in Tocotrienol group increased from baseline of 2.72 ± 0.20mg/L to 6.80 ± 0.63mg/L and 8.9 ± 0.77 mg/L respectively. Plasma concentrations of a-, d- and ?-tocotrienols in this group significantly elevated. After 6-week washout period, all the elevated concentrations returned to basal levels. Conclusion. The study showed a good bioavailability of these vitamins and increment was due to supplementation.

H57 Determinants of linear growth in Malaysian children with cerebral palsy

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J Paediatr Child Health. 37(4): 376-381, 2001

OBJECTIVE: To compare the linear growth and nutritional parameters of a group of Malaysian children with cerebral palsy (CP) against a group of controls, and to determine the nutritional, medical and sociodemographic factors associated with poor growth in children with CP. METHODOLOGY: The linear growth of 101 children with CP and of their healthy controls matched for age, sex and ethnicity was measured using upper-arm length (UAL). Nutritional parameters of weight, triceps skin-fold thickness and mid-arm circumference were also measured. Total caloric intake was assessed using a 24-h recall of a 3-day food intake and calculated as a percentage of the Recommended Daily Allowance. Multiple regression analysis was used to determine nutritional, medical and sociodemographic factors associated with poor growth (using z-scores of UAL) in children with CP. RESULTS: Compared with the controls, children with CP had significantly lower mean UAL measurements (difference between means -1.1, 95% confidence interval -1.65 to - 0.59), weight (difference between means -6.0, 95% CI -7.66 to -4.34), mid-arm circumference (difference between means -1.3, 95% CI -2.06 to -0.56) and triceps skin-fold thickness (difference between means -2.5, 95% CI -3.5 to -1.43). Factors associated with low z-scores of UAL were a lower percentage of median weight ($P < 0.001$), tube feeding ($P < 0.001$) and increasing age ($P < 0.001$). CONCLUSION: A large proportion of Malaysian children with CP have poor nutritional status and linear growth. Nutritional assessment and management at an early age might help this group of children achieve adequate growth.

H58 The supplementation of levothyroxine among indigenous people in endemic goitre areas: The impact of therapy

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Asia Pacific J Clin Nutr 7(2): 138 - 150, 1998

In order to study the effect of levothyroxine in the treatment of endemic goitre, a longitudinal study was conducted among the Aborigines in Lanai Post and Sinderut Post, situated in an iodine-deficient area located in the district of Kuala Lipis, Pahang. All subject in the treatment group (Lanai Post) were given 100 μg of levothyroxine per day and were followed for 1 ½ years. A total of 311 subjects were examined at baseline, 323 on the first, 256 on the second, 239 on the third and 184 on the fourth visit following levothyroxine supplementation. Goitre prevalence, thyroid hormones, was significantly reduced in the treatment group (baseline 42.8%) vs final visit 13.0%, $P < 0.0001$); however, no significant difference was noted in the control group. Total T4 levels were increased in the treatment group ($P< 0.0001$). Thyroid-stimulating hormone levels increased in the treatment group following 1 year of intervention, while no significant changes were observed in the control group. As for the thyroid, both groups showed a significant increment following the intervention ($P<0.0001$). With respect to the nutritional status, the treatment group showed a significant increase in body weight following the intervention ($P<0.00001$). Although there was no statistical difference in the waist-hip ratio in the treatment group, there has been a significant reduction observed after 1 year of intervention. At 1 year, a reduction in skinfold thickness was noted in the treatment group while only the triceps and subscapular were increased in the control group. The body fat was decreased in the treatment group following 1 year of intervention ($P<0.0001$). No particular trend was noted in the urinary iodine excretion in the treatment group, but surprisingly, the levels were increase in the control group ($P<0.0001$). A significant increase in both systolic and diastolic blood pressures was observed in the treatment group following 1 year of intervention, but the controls showed a reduction in the systolic blood pressure ($P<0.0001$). Both group showed a remarkable increase in mental performance, with a more pronounced effect in the treatment group ($P<0.05$). The correction of iodine deficiency by levothyroxine supplementation has a short-term beneficial effect in reducing the prevalence of goitre and improving the mental ability among the Aborigines in endemic areas; however, proper monitoring and close supervision are needed to maintain compliance.

EXPERIMENTAL NUTRITION

I1 Antioxidant and anti-proliferation effects of five essential oils from local medicinal plants on selected cancer cell lines

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Clinical Biochemistry 5(1): 200

Plants from tropical regions are considered to be sources for the screening of anticancer and antioxidant agents. Five essential oils were extracted from local medicinal plants, Citrus microcarpa (musk lime), Melaleuca alternifolia (tea tree), Pogostemon cablin (patchouli), Melaleuca cajuputi (cajuput) and Cymbopogon nardus (citronella) for this research. It was hypothesized that these five essential oils have anti-proliferative effect towards human breast and ovarian cancer cell lines and possess antioxidant properties. This study was conducted with the aims to evaluate the effects of these five essential oils towards human breast (MCF-7 and MDA-MB-231) and ovarian (Caov-3) cancer cell lines and their antioxidant activity. Cell growth inhibition was determined using MTT asssay. The cell lines were treated with concentration range of 20-100 µg/ml of the five essential oils. Control without treatment was included. This assay was performed to obtain dose-response relationship between the concentrations of the essential oils and the percentage cell viability of cancer cells. Statistical differences were assessed by two -way ANOVA, with $p< 0.05$ as significant. The antioxidant activity of five essential oils was assayed by 1 -diphenyl-2-picrylhydrazyl (DPPH) assay. An aliquot of each essential oil (20 µl) was used. Statistical differences were assessed by one-way ANOVA and $p<0.05$ was considered significant. The IC50 value obtained for tea tree, patchouli, cajuput and citronella essential oils on MCF-7 cells were 81.33 ± 11.02, 63.67 ± 2.08, 65.00 ± 15.59 and 56.33 ± 5.77 µg/ml. Whereas on MDA cells were 84.67 ± 4.16, 70.33 ± 5.51, 68.33 ± 18.61 and 33.67 ± 8.08µg/ml and on Caov-3 cells were 63.33 ± 4.62, 35.33 ± 10.97, 80.00 ± 18.00 and 64.67 ± 12.06 µg/ml. IC50 of musk lime essential oils could not be obtained within yhe concentration range on all the cell lines. For DPPH assay, Ip ???? % of the five essential oils in the same sequence were 14.79 ± 3.26%, 15.85 ± 1.17 %, 39.53 ± 2.06%, 29.21 ± 1.74% and 82.61 ± 0.84%, respectively. IC50 of citronella essential oil was the lowest on both breast cencer cell lines and patchouli essential oil was the lowest on the ovarian on the ovarian cancer cell lines. Therefore, citronella was the most effective in breast cancer while patchouli was the most effective in anti-proliferation of ovarian cancer among the essential oils. The citronella essential oils had the highest antioxidant activity while musk lime essential oils possessed the lowest antioxidant activity among the five essential oils. Therefore, four essential oils had anti-proliferation effects on human breast and ovarian cancer cells with different IC50 except musk lime essential oils. All the five essential oils exhibited considerable amount of antioxidant properties.

I2 The Effects of Sitosterol and Stigmasterol Isolated from Strobilanthes crispus on Caspase-apoptotic Pathway in Selected Cancer Cell Lines

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Malaysian Journal of Clinical Biochemistry 5(1) 2010

Phytosterols are fats present in all plants, including fruits and vegetables. Sitosterol and stigmasterol, main dietry phytosterols found in plants, may have the potential effect for prevention and therapy against human cancer. Sitosterol and stigmasterol were extracted from Strobilanthes crispus, commonly known as "pecah beling" or "jin batu" in Malaysia. The anti-proliferation effects of sitosterol and stigmasterol were evaluated using (3-[4,5-dimethythiazol-2-yl]-2, 5-diphenyltetrazoliumbromide) (MTT) assay against non-oestrogen rsponsive breast cancer cell (MDA-MB-231), oestrogen-responsive breast cancer cell (MCF-7), cercival cancer cell (HeLa) and ovarian cancer cell (Caov-3). Whereas, the caspase-3-apoptptic pathway activitions of sitosterol and stigmasterol were evaluated using BD ApoAlert Casepase-3 colorimetric assay kits against MDA-MB-231 and MCF-7 cells. From MTT assay, treatments of sitosterol and stigmasterol in increasing concentration gradient (0, 20, 40, 60, 80, 100 μM) resulted in a dose-dependent growth inhibition in selected cancer cells. Therefore, the IC50 value was determined for all the cancer cell lines. Sitosterol displayed the strongest anti-proliferative effect on MDA-MB-231 followed by Caov-3 and MCF-7 with IC50 values of 40.667 ± 11.719, 69.000 ± 6.245 and 93.000 ± 1.732 μM, respectively. Stigmastreol displayed the strongest anti-proliferative effect on MDA-MB-231 followed by HeLa, MCF-7 and Caov-3 with IC50 values of 45.000 ± 1.732, 50.333 ± 8.505, 85.000 ± 5.568 and 85.333 ± 9.019 μM, respectively. However, treatment of sitosterol and stigmasterol in IC100 resulted in caspase-3 activation in apooptosis in both MDA-MB-231 and MCF-7. Therefore, unit caspase activity was determined. Sitosterol resulted in caspase-3-apoptotic pathway activation against MDA-MB-231 and MCF-7 cells with values of 7.263 and 2.123 unit caspase activities, respectively. Whereas, stigmasterol resulted in caspase-3-apoptotic pathway activation against MDA-MB-231 and MCF-7 with values of 2.291 and 0.810 unit caspase activity, respectively. Two-way AVOVA test was used as a statistical test to analyze the result for MTT assays.

I3 Effect of Ficus deltoidea Aqueous Extract on Blood Glucose Level in Normal and Mild Diabetic Rats

Adam Z, Hamid M, Ismail A & Khamis S

Jurnal Sains Kesihatan Malaysia 5 (2): 9-16, 2007

Ficus deltoidea, which is locally known as mas cotek, has been traditionally believed to have hypoglycaemic activity. In this study, hypoglycaemic activity of aqueous extract of Ficus deltoidea in normal and mild diabetic rats (streptozotocin induced) was evaluated. The extract was administered orally at different doses (100, 500 and 1000 mg/kg) to both groups in fasting and post prandial state. The result shows that the aqueous extract of Ficus deltoidea did not have any hypoglycaemic activity in normal rats as well as in fasting mild diabetic group. In post prandial mild diabetic rats, aqueous extract of Ficus deltoidea at the dose of 1000 mg/kg show hypoglycaemic activity after 2 ($p < 0.01$), 4 ($p < 0.05$) and 6 ($p < 0.01$) hours extract administration. Metformin,
500 mg/kg also shows hypoglycaemic activity after 2 ($p < 0.05$), 4 ($p < 0.01$) and 6 ($p < 0.01$) hours administration. Therefore, we suggested that mechanism of action of the Ficus deltoidea aqueous extract maybe through enhancement of glucose uptake to muscle tissue and reduce hepatic gluconeogenesis.

I4 Short-term repeated dose biochemical effects of cath edulis (khat) crude extract administration in rats

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International Journal of Tropical Medicine 3 (2): 19-25, 2008

The leaves of khat (catha edulis) are reported to have stimulating and pleasurable effects and are chewed habitually by people of East Africa and Arabian Peninsula. Due to various effects of khat te present study was undertaken to evaluated the short-term reapted dose effects of freeza dried khat leaves crude extract administration to male Sprague-Dawley rats. In this study, the effects of catha leaves extract oral administration on diploma concentration of Malonyldialdehyde (MDA), triglycerides, cholesterol, HDL-cholesterol, LDL-cholesterol, uric acid, albumin and testosterone and liver enzymes activities were examined. Four groups of rats were exposed to 0, 500, 1000 and 2000 mg kg ?? body weight/day for 6 consecutive weeks. Our results demonstrated that food consumption and body changes were non-signficantly different relative to the control. There were no significant effects observed on the level of plasma MDA, cholesterol, triglycerides,

HDL-cholesterol, uric acid, albumin, liver enzymes or Acid Phosphatase (ACP) in the treatment groups relative to the control. Administration of freeze dried crude caths edulis leaves extract for 6 weeks was found to increase plasma testostrone levels in the two high doses treatment groups (1000 and 2000 mg kg?? body weight in more than 2 folds, while it was non-significantly increased in the 500 mg kg?? body weight treatment group, as compared to control. The data indicated that at the doses and time period teated, catha freeza dried crude extract could be considered as aphrodisiac. Moreover, it did not produce any sibnificant effect on the normal biological markers of liver toxicity or prostatic adverse effects.

I5 Genotoxic effect of Catha edulis (khat) crude extract after sub-chronic administration in rats

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Environmental Toxicology and Pharmacology 25: 298-303, 2008

The aim of this studywas to evaluate the genotoxic of a crude extract of khat (Catha edulis, Forsk) leaves in rats. Two groups were fed khat crude extract, 1000 and 2000 mg/kg body weight, for 90 days and were compared with a control group. The alkaline (pH>13) version of comet assay was used in this study. However, no previous published work has been undertaken and showed the effect of khat on DNA migration in the comet assay. To compare the comet assay results with another geetic endpoint, blood samples were analyzed for chromosomal aberrations. These results showed no DNA damage detected using comet assay in both the khat treated groups, while the results of chromosomal aberrations assay showed a significant increase ($P<0.05$) in the 2000mg/kg body weight treated group compared to the control group.

I6 Prenatal caffeine exposure modifies development and reflexes of neonates and anxiety of young adult mice

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Sains Malaysiana 25(1): 99-109, 1996

The effects of prenatal caffeine exposure were examined on the morphological development and early development of reflexes in the mice pups, and further, the anxiety was also studied in the weaned mice using the plus-maze test. It was found that the postnatal body weight gain of the treated pups declined significantly. The normal eye-opening and hair appearance were also affected in the pups due to caffeine treatment. Measurement of early development of sensory motor reflexes in the pups showed that during the first week, caffeine had significantly stimulated the righting reflex, cliff avoidance and rotating reflexes with interaction between age and treatment doses. It was found in the plus-maze test that caffeine had significantly reduced the percentages of time spent as well as the entries into the open arms indicating for an anxiogenic action of caffeine in the young adult mouse. Also, caffeine stimulated the locomotor activity in the mouse as exemplified by an increase in the total number of arm entries in the plus-maze task. The present data support the basic conclusion that prenatal caffeine has a direct in utero action on the reflexes of the developing mouse pups and the anxiogenic action produced in them is longer lasting in nature.

I7 Effect of cacao liquor extract on tumor marker enzymes during chemical hepatocarcinogenesis in rats

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J Med Food. 7(1): 7-12, 2004

This study investigated the effect of cacao liquor extract (CLE) on tumor marker enzymes--alkaline phosphatase (ALP), gamma-glutamyl transpeptidase (GGT), glutathione-S-transferase (GST), and glutathione reductase (GR) activities--in plasma and/or liver of hepatocarcinogenic rats, which were induced with diethylnitrosamine and 2-acetylaminofluorene. Twenty-nine male Sprague-Dawley rats (weighing 150-330 g) were divided into four groups (n = 6-8): normal control group (N), normal group + CLE (NE), cancer group (C), and cancer group + CLE (CE). Analysis of variance showed significant differences ($P<.05$) in the specific activities of ALP, GGT, and GST between the C and N groups. However, GR activity for the C group was not significantly different compared with the N group. In the CE group, the specific activities of ALP, GGT, GST, and GR were significantly lower ($P<.05$) compared with the C group. The findings showed that

CLE could lower the activity of tumor marker enzymes of rats during hepatocarcinogenesis. Based on the results obtained, polyphenol compounds present in the cacao liquor, extracted by using ethanol, have the potential in decreasing the severity of hepatocarcinogenesis.

I8 Lipid Lowering Effect of Antioxidant Alpha-Lipoic Acid in Experimental Atherosclerosis

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J Clin Biochem Nutr. 43(2): 88-94, 2008

Accumulating data demonstrated that hypercholesterolemia and oxidative stress play an important role in the development of atherosclerosis. In the present study, a protective activity of alpha-lipoic acid; a metabolic antioxidant in hypercholesterolemic-induced animals was investigated. Eighteen adult male New Zealand White (NZW) rabbit were segregated into three groups labelled as group N, HCD and ALA (n = 6). Group N (normal control) was fed with normal chow, the rest (HCD and ALA) were fed with 100 g/head/day of 1% cholesterol rich diet to induce hypercholesterolemia. Four point two mg/body weight of alpha lipoic acid was concomintantly supplemented to the ALA group. Drinking water was given ad-libitum. The study was designed for 10 weeks. Blood sampling was taken from the ear lobe vein at the beginning, week 5 and week 10. Plasma was prepared for lipid profile estimation and microsomal lipid peroxidation index indicated with malondialdehyde (MDA) formation. At the end of the experiment, the animals were sacrificed and the aorta were excised for intimal lesion analysis. The plasma total cholesterol (TC) and low density lipoprotein (LDL) levels were found to be significantly low in ALA group compared to that of the HCD group ($p<0.05$). Similarly, low level of MDA ($p<0.05$) in ALA group was observed compared to that of the HCD group showing a significant reduction of lipid peroxidation activity. Histomorphometric intimal lesion analysis of the aorta showing less of atheromatous plaque formation in alpha lipoic acid supplemented group ($p<0.05$) compared to HCD group. These findings suggested that alpha lipoic acid posses a dual lipid lowering and anti-atherosclerotic properties indicated with low plasma TC and LDL levels and reduction of athero-lesion formation in hypercholesterolemic-induced rabbits.

I9 Tocotrienols and α-Tocopherol Reduced Acute and Chronic Lung Lipid Peroxidation Induced by Paraquat in Rats

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Pakistan Journal of Nutrition 4(2): 97-100, 2005

The effect of dietary tocotrienols and α -tocopherol acetate supplementation on paraquat-induced lung toxicity was investigated in rats. The administration of a single dose of paraquat (20 mg/kg, i.p.) to rats increased lung malondialdehyde (MDA) levels and produced lung edema. Tocotrienols (150 mg/kg pellet) or α -tocopherol (34 mg/kg pellet) supplementation of two months significantly reduced lung MDA levels in rats exposed to paraquat but lung edema was unaffected. However lower doses of tocotrienols in the diet did not significantly lower lung MDA levels compared with the unsupplemented controls. Our results showed that dietary supplementation of tocotrienols and α -tocopherol provides protection against paraquat toxicity possibly through their antioxidant property.

I10 Long-term tocotrienol supplementation and glutathione-dependent enzymes during hepatocarcinogenesis in the rat

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Asia Pacific J Clin Nutr 2: 129-134, 1993

The effects of long-term administration of tocotrienol on hepatocarcinogenesis in rats induced by diethyl nitrosamine (DEN) and 2-acetylaminofluorene (AAF) were investigated by the determination of plasma and liver gamma-glutamyl transpeptidase (GGT), cytosolic glutathione reductase (GSSG-Rx), glutathione peroxidase (GSH-Px) and glutathione S-transferase (GST). Twenty-eight male Rattus norwegicus rats (120-160g) were divided according to treatments into four groups: control group, tocotrienol - supplemented diet group (30mg/kg food), DEN/AAF-treated group and DEN/AAF treated plus tocotrienol-supplemented-diet group (30mg/kg food). The rats were sacrificed after nine months.

The results obtained indicated no difference in the morphology and histology of the livers of control and tocotrienol-treated rats. Greyish-white neoplastic nodules (two per liver) were found in all the DEN/ AAF treated rats (n-10) whereas only one nodule was found in one of the carcinogen treated rats receiving tocotrienol supplementation (n-6). Histological examination showed obvious cellular damage for both the DEN/AAF-treated rats and the tocotrienol-supplemented rats but were less severe in the latter.

Treatment with DEN/AAF caused increases in GGT, GSH-Px, GST and GSSG-Rx activities when compared to controls. These increases were also observed when tocotrienol was supplemented with DEN/AAF but the increases were less when compared to the rats receiving DEN/AAF only.

I11 Content of carnitine in plasma and liver of rats supplemented with carnitine and aflatoxin bi treatment

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Sains Malaysiana 30: 135-141, 2001

The effects of carnitine supplementation and a single dose of aflatoxin B1 (AFB_1) on the concentrations of carnitine in plasma and liver of rats were investigated. Twenty male Sprague-Dawley rats were divided into four groups, namely nonsupplemented control INSC), nonsupplemented control + AFB_1 (NSA), carnitine supplemented control (CSC) and carnitine supplemented control + AFB_1 (CSA). Rats were fed Purina Rat Chow containing 0.4% L-carnitine for CSC and CSA groups or chow without added carnitine for NSA and NSC groups for 6 weeks. The NSA and CSA animals were given a single dose of [JH]AFB_1 (l mg/kg) 6 h before sacrificing. It was found that the plasma of carnitine supplemented rats (CSC and CSA) contained higher nonesterified carnitine (NEC), acid insoluble acylcarnitine (AlAC) and total carnitine than the non-supplemented rats (NSC and NSA). AFBI had no significant effect on plasma carnitine concentrations, but significantly increased all the carnitine fractions except for AIAC in the liver. In conclusion, carnitine supplementation was found to increase carnitine concentrations in both plasma and liver, while AFB1 treatment increased liver carnitine levels only.

I12 Anti-hypertensive effect of pink guava (Psidium guajava) puree on Spontaneous Hypertensive Rats.

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International Food Research Journal 17: 89-96, 2010

The objective of this study was to determine the physicochemical properties of pink guava (Psidium guajava) puree and its anti-hypertensive effect on Spontaneous Hypertensive Rats (SHR). Antioxidant activities of pink guava puree in water and ethanol extracts, based on 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay, were 1.43±0.04 mg/gfm and 0.28±0.01 mg/gfm, respectively. A total of 24 male SHRs were divided into a control group, CG, and 3 treatment dosage groups [low dose group, LDG (0.5 g/kg body weight/day), medium dose group, MDG (1.0 g/kg body weight/day), and high dose group, HDG (2.0 g/kg body weight/day)]. Final body weights for treatment dosage groups were lower [MDG (313.01±31.25 g), HDG (318.56±17.96 g), LDG (320.01±22.70 g)] compared to CG (331.08±41.29 g). Final systolic blood pressure values from the beginning and the end of the experiment in MDG and HDG were 231-179 mmHg and 246-169mm Hg, respectively. These results were significantly lower when compared with CG (241-223 mmHg) from the beginning until the end of the experiment. As a conclusion, these results showed that pink guava puree has anti-hypertensive properties.

I13 Zinc intake during pregnancy increases the proliferation at ventricular zone of the newborn brain

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Nutr Neurosci. 12(1): 9-12, 2009

Neurogenesis involves cell proliferation, cell cycle arrest, differentiation, migration and the natural developmental death of the neural precursors. These processes are highly co-ordinated and governed by cell-cycle genes and neural transcription factors. Zn plays a crucial role as a functional and structural component of enzymes and transcription factors and components of the intracellular signaling pathway associated with the regulation of cell proliferation. The influence of additional Zn intake during pregnancy on the neuronal proliferation at ventricular zone of the developing fetus has been studied. Pups delivered by the group of mice provided

with drinking water with 4.0 mM Zn supplement throughout pregnancy contained an increased number of proliferating neurons in the ventricular zone at P0 compared to those delivered by the mice provided with drinking water without any Zn supplement. This finding provides direct evidence to support the notion that maternal Zn levels influence the development of the nervous system of the offspring.

I14 Dietary fats and oils in cardiac arrythmia in rats

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American Journal of Clinical Nutrition 53: l047S-1049S, l991

The effect of long-term feeding of various dietary fats and oils on cardiac arrhythmia was studied in an animal model ofsudden cardiac death. After confirmation that a dietary supplement of saturated animal fat (SF) increased the animals' susceptibility to develop cardiac arrhythmia under ischemic stress whereas the polyunsaturated fatty acids of sunflower seed oil (SSO) reduced this susceptibility, we found that diets supplemented with either chemically refined palm oil (P0-I) or physically refined palm oil (P0-Il) gave results that were generally intermediate in value between the SF and the 550 groups. However, during reperfusion of a previously ischemic heart, both P0-I- and P0-Il-supplemented diets appeared to be as effective as 550 in reducing ventricular premature beats. In addition, the incidence of animals displaying severe ventricular fibrillation was much less after palm-oil feeding than it was after SF feeding. These preliminary results warrant further investigation of the potential antiarrhythmic effects ofcommercial palm oil.

I15 Effects of feeding fat during pregnancy and lactation on growth performance, milk composition and very low density lipoprotein composition in rats

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Mal J Nutr 8(2): 125 - 135, 2002

The effects of dietary fat during pregnancy and lactation on growth performance of pups, milk composition and very low density lipoprotein composition in rats were studied. A total of 33 dams were used in this study and each litter was adjusted to 8 pups per dam. The dams were fed on high fat (150 g fat/kg diet, HF), medium fat (75 g fat/kg of diet, MF) and low fat (2.5 g fat/kg diet, LF) diets. The body

weights of dams increased during pregnancy and decreased after pregnancy. The HF pups had a higher body weight and higher weight gain than those of LF pups. The amount of feed intake of HF dams was significantly higher than LF and MF dams. The HF dams had significantly higher milk fat and water concentrations than LF dams. The milk protein was not significantly different among the treatment groups. All dams showed hypertriacylglycerolaemia in their very low density lipoprotein (VLDL) in late pregnancy. The VLDL-protein concentrations increased during the first week after parturition. The HF dams showed a greater response to the dietary fat than that of LF and MF dams. The findings suggest that addition of fat in the diet during pregnancy and lactation may improve the milk quality through modifying the composition of VLDL contents, leading to better growth of pups.

I16 A low-budget and easy-to-operate room respirometer for measuring daily energy expenditure in man1'2

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Am J Clin Nutr 48: 1367-1374, 1988

Accurate assessment ofenergy requirements ofhumans under various physiological, pathological, and environmental conditions is hampered by the high cost of techniques for measuring daily energy expenditure. A room respirometer novel in its low cost of construction and simplicity of operation is described, together with an appreciation of errors and assumptions. It is suitable for measurements ofdaily energy expenditure in humans with an accuracy of ± 1.5% and can be reproduced without difficulty in both developed and developing countries.

I17 Structure-Activity Relationship of Xanthones from Mesua daphnifolia and Garcinia nitida towards Human Estrogen Receptor Negative Breast Cancer Cell Line

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J Natural Product Sciences 11(4): 220-224, 2005

Extensive chemical studies on the stem bark extracts of two Guttifereous plants namely Mesua daphnifolia and Garcinia nitida have led to the isolation of eight xanthones. Mesua daphnifolia gave cudraxanthone G (1), ananixanthone (2), 1,3,5-trihydroxy-4-methoxyxanthone (3) and euxanthone (4) while Garcinia nitida gave

inophyllin B (5), 1,3,7-trihydroxy-2,4-bis (3-methylbut-2-enyl)xanthone (6), 3-isomangostin (7) and rubraxanthone (8). All these compounds were assayed against the MDA-MB-231 (human estrogen receptor negative breast cancer) cells. A structure-activity relationship study showed that stucturally, all the 1,3-oxygenated xanthones which carried unsaturated prenyl side chains (either 3-methylbut-2-enyl or 1,1-dimethyl-2-propenyl) at carbons C-2 and C-4 in the xanthone ring A are essential for the outstanding activities in the assay.

I18 Hypoglycemic and Antioxidant Effects of Honey Supplementation in Streptozotocin-induced Diabetic Rats

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Int J Vitam Nutr Res. 80(1):74-82, 2010

Objectives: Oxidative stress plays a crucial role in the development of diabetic complications. The aims of this study were to investigate whether honey could reduce hyperglycemia and ameliorate oxidative stress in kidneys of streptozotocin-induced diabetic rats. Methods: Diabetes was induced by a single dose of STZ (60 mg/kg; i. p.). Diabetic rats were randomly grouped and administered distilled water (0.5 mL/day) and honey (0.2 g/kg/day, 1.2 g/kg/day and 2.4 g/kg/day) by oral gavage for four weeks. Each group consisted of six rats. Results: Total antioxidant status (TAS), activities of catalase (CAT), glutathione peroxidase (GPx), glutathione reductase (GR), and glutathione-S-transferase (GST) were significantly reduced, while superoxide dismutase (SOD) activity was up-regulated in kidneys of diabetic rats. Lipid peroxidation (TBARS) and fasting plasma glucose (FPG) were significantly elevated while body weight was reduced in diabetic rats. Honey significantly increased body weight, TAS, activities of CAT, GPx, GR, and GST in diabetic rats. It significantly restored SOD activity, and reduced FPG and TBARS levels in diabetic rats. Histopathological examinations of the kidneys revealed that mesangial matrix expansion and thickening of glomerular basement membrane were reduced in the honey-treated diabetic rats. Conclusions: Honey exerts a hypoglycemic effect and ameliorates oxidative stress in kidneys of streptozotocin-induced diabetic rats.

I19 Effects of consumption of edible oils for a period of 4 months on the ultrastructure of the aorta of spontaneously hypertensive rats

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Asia Pacific Journal of Clinical Nutrition 8(2): 106 - 112, 1999

Edible oils have different effects on lipid profiles and on the propensity for producing lipid peroxidation products. These two properties of edible oils can affect arterial structure, ultimately leading to atherosclerosis. Hypertension is said to be a predisposing factor for atherosclerosis and can accelerate its process. This paper investigates the effects of three edible oils, namely soya bean oil, palm oil and ghee, on the ultrastructure of the aortas of spontaneously hypertensive rats at the end of a 4 month feeding period. It was found that ghee produced significant structural changes to the aortic wall when compared with palm oil or soya bean oil, and that no noticeable structural differences were seen to occur on the aortas of the palm oil-fed and soya bean oil-fed groups of rats. This study suggests that the consumption of ghee, rather than palm or soya bean oil, is more likely to lead to the development of atherosclerosis.

I20 The effect of 5-week exercise program on oxidative stress and response to acute exercise among sedentary subjects

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Jurnal Sains Kesihatan Malaysia 5(2): 39-52, 2007

Physical training is associated with oxidative stress and improvement in blood antioxidant status. In this study, we investigated the effects of training on plasma malondialdehyde (MDA) and 4-hydroxynonenal (4-HNE) as markers of lipid peroxidation, superoxide dismutase (SOD) activity, and ascorbic acid (AA) after a single bout of acute exercise. Twelve healthy, untrained young adult men were recruited for 5 weeks of aerobic training period. They were subjected to a rope-skipping exercise for 20 minutes at the intensity of 65-80% of heart rate reserve, thrice weekly. They also had to perform a single, acute bout of the same axercise protocol prior to and after training period. Venous blood samples were collected at resting condition (BL), immediately (0 h) and 24 hours (24 h) post acute exercise on both single bout sessions. Results showed that the pattern changes of oxidative stress response are quite similar on both acute sessions. The acute bouts of rope-skipping is associated with a significant increased ($p = 0.001$) in lipid peroxidation markers immediately after cessation of exercise, with a concomitant increases in antioxidant levels, albeit higher when compared to pre-training values ($p = 0.001$). These changes were followed by a significant decreased ($p = 0.001$) in all parameters, towards resting values, 24 hours thereafter. The training program seemed to induce a significant increase in MDA and 4-HNE but also enhanced the antioxidant defense system namely SOD and AA among the untrained subjects.

I21 Effects of defatted dried roselle (Hibiscus sabdariffa L.) seed powder on lipid profiles of hypercholesterolemia rats

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Journal of the Science of Food and Agriculture 88:1043-1050, 2008

In vivo investigations were made of the effect of defatted dried roselle seed powder (DRS) on the lipid profiles of rats with induced hypercholesterolemia. The two-batch sample consisted of 23 and 20 Sprague-Dawley male rats randomly divided into four groups and fed with four different diets. The first batch of rats was fed with normal, hypercholesterol, hypercholesterol + 10 g kg-1 (w/w) DRS and hypercholesterol + 20 g kg-1 (w/w) DRS diets. The second batch of rats was fed with normal, hypercholesterol, hypercholesterol + 50 g kg-1 (w/w) DRS and hypercholesterol + 150 g kg-1 (w/w) DRS diets. Treatments were given for a total of 5 weeks. Results indicated that the addition of 10 g kg-1 and 20 g kg-1 of DRS did not significantly lower the plasma total cholesterol (TC) levels. In contrast, 50 g kg-1 and 150g kg-1 DRS significantly lowered ($P < 0.05$) the TC and low density lipoprotein cholesterol (LDL-C) levels. The addition of 50 g kg-1 and 150 g kg-1 DRS showed potential hypocholesterolemic effects. Furthermore, these findings indicated that protein, lipid and dietary fibre were high in the seed powder.

I22 The protective role of zinc in palm kernel cake (PKC) toxicity in Sheep

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Mal J Nutr 1: 75-82, 1995

Male Malin x Polled Dorset crossbred sheep were stall-fed with grass (10%) and PKC (90%) and supplemented with either zinc at 500 ug/g, as zinc sulfate (PKC+Zn group) or zinc (113 ug/g) and ammonium molybdate (500 ug/g) (PKC+Zn+Mo group) or unsupplemented diet (PKC group) for 20 weeks. Another group which acts as a control was fed with a diet consisting of corn and fish meal (2 0%) and grass (80%). The animals were monitored daily and the body weights were recorded at a period of two weeks intervals throughout the trial. Blood samples were also collected for mineral analysis. At the end of the trial the animals were slaughtered. The carcasses were examined for gross lesions, whilst the right liver lobes and renal cortex were isolated for histopathological evaluation and mineral analysis. All animals in the PKC group died before the end of the trial with the main clinical signs of generalised jaundice and haemoglobinuria. The kidneys were firm, enlarged and reddened or darkened. Histologically, the hepatocytes were

swollen, vacuolated and necrotized, particularly at the periacinar zone. Hepatic fibrosis was observed at the periportal zone. Cellular swelling, vacuolation and necrosis were found in the tubular epithelial cells of the renal cortex. Neither clinical signs nor gross or remarkable histological lesions were observed in the other groups of animals. The hepatic, renal and blood copper levels In the PKC group were elevated when compared to the control. Addition of zinc either with or without ammonium molybdate in PKC diet inhibit the copper content in the organs, however the zinc contents were increased. The average daily gain of the PKC group was remained consistent to those of the other groups, except it was reduced starting at about 1 to 2 weeks prior to death. It was concluded that feeding PKC In excess in sheep can cause chronic copper toxicity. However, this effect can be prevented by dietary zinc supplementation either with or without ammonium molybdate.

I23 Dietary zinc treatment for chronic copper intoxication in palm kernel cake (PKC) fed sheep

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Mal J Nutr 2: 196-206, 1996

Thirty, 4 month-old male Maim x Polled Dorset crossbred sheep were allocated into 6 groups of 5 animals each. Four groups of animals were stall-fed with basal diet of 90% palm kernel cake (PKC) and 10% grass (G) for 16 weeks. One group of the animal was slaughtered at the end of the 16 weeks feeding trial (PKC group), whilst the other three groups were further fed with either the same diet (PKC+PKC group) or fed with a new diet consisting of 30% corn and 10% fish meals (CF) and grass (60%) either with (PKC+CF+Zn group) or without (PKC+CF group) zinc supplementation (500 μg/g Zn as zinc sulfate) for another 16 weeks and were slaughtered at the end of the feeding trial, The other two groups which act as controls were fed with corn (30%) and fish meals (10%) and grass (60%), and were slaughtered at weeks 16 (CF group) and 32 (CF+CF group) of the trial. The blood, right and left liver, renal cortex and medulla, pancreas, bile and urine of all animals were analysed for copper and zinc contents using an atomic absorption spectrophotometer. The liver and kidney were also fixed in 10% buffered formalin for histopathological examination. The study showed that neither clinical signs nor gross lesions of copper or zinc toxicity were observed throughout the trial. However, the copper concentration in both the right and left liver of PKC fed sheep at weeks 16 and 32 rose to about 3 times that of the controls and remained high in both the PKC+CF and PKC+CF+Zn groups. A similar pattern of copper concentration was observed in the blood. The copper and zinc contents in the renal

cortex and medulla, pancreas, bile and urine remained low in all groups. The zinc content in the liver of PKC+CF+Zn group was significantly increased. Histologically, moderate hepatic lesions were observed in the PKC fed sheep at week 32. The lesions were milder in the other groups especially in the PKC+CF+Zn group. No significant renal lesions was recorded in all groups. It was concluded that the usage of dietary zinc supplementation (500 μg/g) in the treatment of PKC toxicity in sheep was unsatisfactory. The ability of Malin x Polled Dorset crossbred sheep to tolerate the high copper content in PKC at least during the first 16 weeks of the feeding trial may provide more avenue in the utilization of PKC as a major feed ingredient in sheep.

I24 Ekstrak Akues Gynura procumbens menurunkan aras glukosa darah dan meningkatkan kualiti sperma tikus teraruh diabetis

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Sains Malaysiana 37(4): 435-441, 2008

Diabetis mellitus merupakan sejenis penyakit metabolik yang disebabkan oleh peningkatan aras glukosa darah serta memberi kesan komplikasi terhadap kesihatan. Peningkatan aras glukosa dalam darah berpunca daripada kegagalan penghasilan insulin yang berperanan dalam mengawalatur aras glukosa darah. Lebih 90 peratus pesakit diabetis turut mengalami masalah gangguan fungsi seksual lelaki seperti penurunan libido, impoten dan infertiliti di mana kesemua masalah ini adalah disebabkan oleh kegagalan testis yang berkaitan dengan ciri hiperglisemia pesakit diabetis itu sendiri. Infertiliti merujuk kepada ketidaksuburan sperma atau ketidakupayaan individu untuk menghasilkan sperma yang normal. Kajian ini dijalankan untuk melihat potensi ekstrak akues Gynura procumbens (GP) untuk menurunkan aras glukosa darah serta meningkatkan kualiti sperma tikus jantan strain Sprague dawley teraruh diabetis. Tikus diaruh diabetik melalui suntikan intravena streptozotocin (STZ), 65 mg/kg. Kualiti sperma ditentukan berdasarkan parameter berbeza yang dikaji iaitu bilangan, motiliti dan peratus mortaliti sperma. Tikus-tikus ini dibahagi kepada dua kumpulan iaitu normal dan diabetik. Setiap kumpulan ini dibahagi kepada 2 sub kumpulan dengan perlakuan yang berbeza iaitu kawalan (n=5) dan dos 50 mg/kg (n=5) di mana tikus ini diberikan rawatan selama 10 hari berturut-turut menggunakan ekstrak akues GP melalui kaedah suap paksa. Hasil menunjukkan rawatan dengan ekstrak GP menurunkan aras glukosa darah tikus diabetik daripada 15.08 ± 1.878 mmol/L kepada 10.42 ± 2.71 mmol/L secara signifikan ($p<0.05$). Rawatan dengan ekstrak GP turut meningkatkan bilangan sperma normal dalam tikus diabetik secara signifikan ($p<0.05$). Bilangan sperma normal dalam tikus diabetik yang diberi rawatan ekstrak ialah (50.23 ± 3.12) × 107

berbanding tikus kawalan diabetik (39.93 ± 8.06) × 107. Sebanyak 38.5% tikus kawalan diabetik menghasilkan motiliti sperma gred d iaitu sperma tidak bergerak (immotil). Walau bagaimanapun, tikus diabetik yang diberi rawatan ekstrak GP menunjukkan penurunan sperma dalam gred d kepada 30.48% serta peningkatan sperma gred a iaitu sperma bergerak paling pantas daripada 31.25% kepada 34.86%. Tikus diabetik yang dirawat dengan ekstrak GP menunjukkan penurunan secara signifikan ($p<0.05$) dalam peratusan mortaliti sperma iaitu daripada 50.09 ± 14.34% kepada 30.57 ± 4.61%. Hasil ini menunjukkan ekstrak akues Gynura procumbens dapat menurunkan aras glukosa darah, merawat ketidaksuburan serta meningkatkan spermatogenesis pada tikus diabetik jantan.

I25 Detection of vancomycin-resistant enterococcus spp. (vre) from poultry

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Malaysian Journal of Medical Sciences 8(1): 53-58, 2001

Twenty-eight isolates of E. faecalis and 5 isolates of E. hirae were isolated from chicken samples obtained from markets in Sri Serdang, Selangor. They were tested for susceptibility to vancomycin and other antimicrobial agents. All of the isolates showed multiple resistance to the antibiotic tested. All Enterococcus spp. Were resistant (100%) to ceftaxidime, cephalothin, erythromycin, gentamicin, kanamycin, nalidixic acid and streptomycin. Resistance was also observed to norfloxacin (97%), tetracycline (91%), penicillin (85%), bacitracin (82%), chloramphenicol (61%) and the least resistance was to ampicillin (27%). High prevalence to vancomycin resistance was detected among the E. faecalis (27of 28) and E. hirae (4 of 5) isolates. The multiple antibiotic resistance index ranging between 0.64 to 1.0 showed that all strains tested originated from high-risk contamination. Plasmid profile analysis of Enterococcus spp. revealed plasmid DNA bands ranging in size from 1.3 to 35.8 megadalton but some isolates were plasmidless. No correlation could be made between plasmid patterns and antibiotic resistance.

I26 The potential of the coelomic fluid in sea cucumber as an antioxidant

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Mal J Nutr 5: 55-59, 1999

In a biological system the product of free-radical induced-lipid peroxidation are conjugated dienes (CDs), lipid peroxides and malondialdehyde (MDA). Its control depends on antioxidant activities. Antioxidant defend the body system by controlling the damage caused by the free radicals. This paper describes lipid peroxidation

process and antioxidant activities present in three species of holothuroid obtained from the coastal waters of Terengganu, Malaysia. Among the three species studied, the coelomic fluid of Bohadschia mamorata vitiensis contained the highest level of protein (7.24 + 0.04)g/L. The coelomic fluid of Stichopus badionotus Selenka contained the highest level of superoxide dismutase (SOD) (9.46 + 0.99)X 105 IU/g protein, MDA (16.46 + 1.28)nmol/g protein and total antioxidant activities (AOA) (58.81 + 5.70) %. In Stichopus variegatus Semper the coelomic fluid only demonstrated the highest level of CDs (94.19 + 11.34) RU/g protein compared with the other two species. This preliminary study indicated that some form of antioxidant activities are present in the coelomic fluid of holothuroids.

I27 Effect of dietary cholesterol, trans and saturated fatty acids on serum lipoproteins in non-human primates

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Asia Pacific J Clin Nutr 11(Suppl): S408-S415, 2002

Nine cynomolgus monkeys were rotated randomly through four dietary treatments with each treatment lasting 6 weeks. A wash-out period of 4 weeks was maintained between each dietary rotation. The animals were fed diets containing 32% energy fat derived from palm olein (POL), lauric-myristic-rich oil blend (LM), American Heart Association (AHA) rich oil blend and hydrogenated soybean oil blend (trans). Diets were fed with (phase 1) or without (phase 2) the addition of dietary cholesterol (0.1%). In phase 1, when animals were fed without dietary cholesterol, plasma total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C) was significantly raised and high-density lipoprotein cholesterol (HDL-C) was significantly depressed by the trans diets relative to all other dietary treatments. The resulting LDL-C/HDL-C ratio was also significantly increased. The LM diet increased TC significantly relative to the AHA diet while LDL-C was significantly increased compared to both POL and AHA. Apolipoprotein (apo) B was not affected significantly by these dietary treatments. Apo A1 was significantly increased by POL relative to all other dietary treatments. The trans diet reduced apo A1 and the resulting apo B/A1 ratio was increased significantly by trans relative to all other dietary treatments. Addition of 0.1% dietary cholesterol to these diets almost doubled the plasma TC and LDL-C in all dietary treatments. However, HDL-C was only marginally higher with the addition of dietary cholesterol. The LM + C (cholesterol added) diet resulted in the highest TC and LDL-C that was significant compared to all other dietary treatments. Trans + C increased TC compared to POL + C and AHA + C diets while increases in the LDL-C did not attain significance. The addition of dietary cholesterol did not affect HDL-C between treatments whereas plasma triglycerides were significantly increased by the trans + C diet relative to all other treatments. Both the trans + C and LM + C diets increased apo

B and decreased apo A1 relative to the POL + C and AHA + C diets. The resulting apo B/A1 ratio was similarly altered. These results affirm that the lauric + myristic acid combination, along with trans fatty acids, increased lipoprotein-associated coronary heart disease risk factors compared to either POL or AHA.

I28 Serum lipids of castrated rats given hormonal replacement and fed diets with added soybean oil or palm oil

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Asia Pacific J Clin Nutr 4: 244-248, 1995

The effects of castration with/ without testosterone replacement in male rats, and ovarectomy with oestrogen replacement in female rats, on serum lipids were studied. Simultaneous feeding with diets fortified with 20% weight/ weight (w/ w) soybean oil (Sb) or palm oil (P0) were done to determine the influence of these oils on serum lipids in castrated and sex hormone replaced rats. Two month old male and female Rattus norwegicus rats were given the above treatment for 4 months, and their sera assayed for lipid profile. Castration increased HDL-cholesterol (HDLchol) and total cholesterol (Tchol) concentrations. Testosterone or oestrogen replacement in male and female rats respectively increased HDLchol and decreased LDL-cholesterol (LDLchol) concentrations. Testosterone replacement also decreased Tchol concentration back to noncastrated levels, and reduced serum triglycerides (TG) to lower than non-castrated levels. Addition of Sb or P0 to the diet increased the LDLchol in the testosterone or oestrogen replaced male and female rats, but there was no difference between the two groups. P0 raised serum TG of the testosterone replaced group compared to control and Sb groups. In conclusion, testosterone and oestrogen were found to have favourable effects on serum lipids. Sb and P0 did not differ in their effects on lipoprotein cholesterol and Tchol, but P0 raised serum TG as compared to Sb.

I29 Palm Vitamin E Protects Bone against Dexamethasone-Induced Osteoporosis in Male Rats

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Med J Malaysia 57(2): 133-141, 2002

The aim of this study was to determine the effects of palm oil-derived vitamin E on glucocorticoid-induced osteoporosis. Three-month old male Wistar rats were

adrenalectomised to remove circulating glucocorticoids. The animals were then administered with Dexamethasone 120 µg/kg body weight/day. Treatment with palm vitamin E prevented the loss in regional and whole body bone mineral density seen in the Dexamethasone treated animals. Palm vitamin E improved femoral length and calcium content in the Dexamethasone treated animals. The results confirmed that palm oil-derived vitamin E was effective in preventing glucocorticoid-induced osteoporosis

I30 Genetic and dietary influences on the levels of diet-induced thermogenesis and energy balance in adult mice

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Ann Nutr Metab 30(3): 189-195, 1986

Genetic and dietary influences on energy balance and diet-induced thermogenesis were investigated in 5 strains of adult mice fed either a stock diet or a varied and palatable cafeteria diet for 4 weeks. Compared to their stock-fed controls, the total metabolisable energy intake of mice fed a cafeteria diet increased by 60, 45, 28, 50 and 35% in the ob/+ or +/+, C57BL/6, DBA/2, BALB/C and CFLP strains, respectively, while energy expenditure, over the entire period, was increased by 53, 21, 24, 53 and 34%, respectively. The results show the presence of diet-induced thermogenesis in most strains studied, and also indicate that variations in food intake were more strongly determined by diet, whereas variations in energy efficiencies were more strongly influenced by genetics.

I31 Intra-strain Differences in Young Rats Fed on Cafeteria Diet as Determined by Calorimeter and Comparative Carcass Techniques

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Pertanika 8(2): 187 -195, 1985

The effects of cafeteria feeding on body composition, metabolizable energy (ME) intake and energy expenditure ofyoung Sprague Dawley rats obtained from two different colonies (SDQEC and SDCR) were studied. The ME intake increased significantly ($P < 0.01$) from 21% in SDQEC to 31% in SDCR cafeteriajed rats, with a significant change ($P < 0.05$) in body weight and body fat in the latter but not the former. This mild hyperphagia induced a significant increase ($P < 0.01$) in energy expenditure in cafeteriajed rats as compared to their respective controls. These results confirm the presence of intra-strain variations and reaffirm the validity of the carcass comparative technique for estimating energy expenditure in rats.

I32 Effect of nicardipine on fasting plasma lipids and apolipoproteins in male New Zealand White rabbits

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Malaysian Journal of Medical Sciences 6(2): 5-11, 1999

The effect of nicardipine on fasting plasma lipid profiles was studied in rabbits given a 2% cholesterol diet. Twenty four New Zealand White rabbits (2.2 - 2.8 kg) were divided into 3 groups. Group 1 (control) was fed a normal diet, group II (HC) was fed a 2% cholesterol diet and group III (HC+NICA) was fed a 2% cholesterol diet with nicardipine treatment (0.5mg kg-1 body weight twice daily intramuscularly for 10 weeks). The following parameters which included fasting plasma total cholesterol, triglycerides, HDL cholesterol and apolipoprotein A and B were measured before and after 10 weeks of study. In the present study we observed that a 2% cholesterol diet caused a significant increase in plasma total cholesterol, LDL cholesterol, HDL cholesterol and triglycerides. However, the increase in total cholesterol and LDL cholesterol were not prevented by treatment with nicardipine. Nicardipine appeared to cause further increase in HDL cholesterol and prevented further rise in plasma triglycerides after 10 weeks of treatment.

I33 Effects of cocoa extract on glucometabolism, oxidative stress, and antioxidant enzymes in obese-diabetic (Ob-db) rats

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J Agric Food Chem. 56(17): 7877-7884, 2008

In this present study, we investigated the effects of cocoa extract containing polyphenols and methylxanthines prepared from cocoa powder on the biochemical parameters of obese-diabetic (Ob-db) rats. Obese-diabetic (Ob-db) rats were developed using a high-fat diet (49% fat, 32% carbohydrate, and 19% protein from total energy, kcal) for 3 months, followed by a low dose (35 mg/kg body weight) streptozotocin (STZ) injection. Cocoa extract (600 mg/kg body weight/day) was given to the rats for 4 weeks. The results indicated that there were no significant differences in fasting plasma glucose and insulin level after 4 weeks of cocoa extract administration. Oral glucose tolerance test revealed that cocoa supplementation in Ob-db rats significantly ($p < 0.05$) reduced plasma glucose at 60 and 90 min compared to unsupplemented Ob-db rats. Plasma free fatty acid and oxidative stress biomarker (8-isoprostane) were significantly ($p < 0.05$) reduced after cocoa supplementation. Superoxide dismutase activity was enhanced in Ob-db compared to that in nonsupplemented rats. However, no change was observed in catalase activity. The results showed that cocoa supplementation had an effect

on postprandial glucose control but not for long term (4 weeks). Moreover, cocoa supplementation could reduce circulating plasma free fatty acid and 8-isoprostane and may enhance the antioxidant defense system.

I34 Effects of cocoa extract containing polyphenols and methylxanthines on biochemical parameters of obese-diabetic rats

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Previous studies have indicated that cocoa extract possesses hypoglycaemic and hypocholesterolaemic properties in streptozotocin-induced diabetic rats. However, there has been limited research on the effects of cocoa extract on obese-diabetic (Ob-db) rats that mimic human diabetes syndrome. Hence this study was initiated to determine the effect of cocoa extract containing polyphenols and methylxanthines on several biochemical parameters, namely glucose level, insulin sensitivity and lipid profiles of Ob-db rats. Intake of cocoa extract supplemented with polyphenols (2.17mg epicatechin, 1.52mg catechin, 0.25mg dimer and 0.13 mg trimer g-1 cocoa extract) and methylxanthines (3.55 mg caffeine and 2.22mg theobromine g-1 cocoa extract) for 4 weeks significantly ($P < 0.05$) reduced the plasma total cholesterol, triglycerides and low-density lipoprotein cholesterol of obese-diabetic rats (Ob-db + cocoa) compared with non-supplemented animals (Ob-db). Short-term (acute) supplementation of cocoa extract significantly ($P < 0.05$) reduced the plasma glucose level at 60 and 90min compared with untreated rats as assessed by the oral glucose tolerance test. However, no significant differences were observed in plasma glucose level, insulin level and insulin sensitivity after chronic (4 weeks) cocoa extract supplementation. The results of this study suggest that cocoa extract possesses hypocholesterolaemic properties and can exert a transient glucose-lowering effect but not long-term glucose control.

I35 Survival of bifidobacteria and other selected intestinal bacteria in TPY medium supplemented with curcumin as assessed in vitro

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The growth of two Bifidobacterium strains (Bifidobacterium longum BB536, Bifidobacterium pseudocatenulatum G4) and other selected intestinal bacteria (Lactobacillus acidophilus, Lactobacillus casei shirota, Enterococcus faecalis JCM 5803 and Escherichia coli K-12) were studied in TPY medium containing various concentrations of curcumin (0.025, 0.050, 0.075 and 0.1% (w/v). Viable cell counts of the bacteria and their respective pH medium were determined during incubation period of 12h, 24h, 36h and 48h incubated at 37oC. In the presence of curcumin, cultures showed various degrees of growth inhibition compared to in TPY medium without curcumin. E. faecalis and B. longum BB536 were survived better than the other bacteria tested. Among the bacteria tested, L. acidophilus recorded the most sensitive to curcumin. The presence of curcumin did not change the pH of the medium as compared to the basal TPY. The ability of the bacteria to degrade curcumin after 48h incubation was studied using spectrophotometric method measured at 400.4 nm wavelength. The overall percentage reduction of 0.025, 0.050, 0.075 and 0.1% of curcumin by the bacteria tested was 56-60, 18-24, 15-16 and 12-14, respectively.

I36 Chronic Intake of Red Palm Olein and Palm Olein Produce Beneficial Effects on Plasma Lipid Profile in Rats

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Pakistan Journal of Nutrition 4 (2): 89-96, 2005

Palm olein (PO) and red palm olein (RPO) are rich in tocopherols and tocotrienols. In addition, RPO also contains a high content of carotene. This study was to determine the effect of chronic intake of diets containing palm oils, varying in their vitamin E and carotene contents, on lipid profile in rats. Weaning male Wistar rats were fed either 18% RPO, 18% PO or 18% vitamin E-stripped palm olein (SPO) for 12 weeks. Plasma total cholesterol (TC), triglyceride (TG), high density lipoprotein cholesterol (HDL) and low density lipoprotein cholesterol (LDL) were measured at weeks 4, 8 and 12. Feeding the different types of palm oil did not affect TC and HDL from week 4 through week 12, but there were reductions in TG in all dietary groups at week 12 compared to week 4 but differences between groups were not observed. The RPO group had lower LDL at week 12 (vs weeks 4 and 8) but LDL was not reduced in the PO and SPO groups. TC/HDL was reduced in the RPO group at week 12 compared to both weeks 4 and 8, but the PO group only reduced this ratio at week 12 compared to week 4. This finding suggests that chronic feeding of diets high in palm oils did not cause any detrimental effects on blood lipid profile. In addition, red palm olein which is rich in antioxidants in the forms of vitamin E and carotene, showed better effect in terms of reduction in LDL and TC/HDL.

I37 Nutritional Composition, in vitro Antioxidant Activity and Artemia salina L. Lethality of Pulp and Seed of Tamarindus indica L. Extracts

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Mal J Nutr 15(1): 65-75, 2009

This study was designed to examine the nutritional composition, antioxidant activity and medium lethal concentration (LC50 value) of Tamarindus indica L. pulp and seed extracts in vitro. The extraction was set at 40°C, 60°C and 100°C for 12 hours, 6 hours and 15 minutes respectively to determine the optimum extraction parameter whereas the anti-oxidant activity of the extracts was measured using iron (III) reduction (FRAP) assay. Total phenolic content (TPC) of the extracts was estimated as gallic acid equivalent by Folin-Ciocalteau method. Toxicity potential of the extract was assessed in vitro by Artemia salina lethality test both in seed and pulp samples. The results showed that tamarind seed contained a higher percentage of carbohydrate, protein, fat and energy (15%, 82%, 95% and 33.13% respectively) than the pulp. On the other hand, the pulp demonstrated a high moisture (51.1%) and ash (34.84%) content than the seed. For the mineral analysis, tamarind seed contained higher Ca and C (1.0% and 50.73% respectively) than the pulp (0.27% and 40.40% respectively). No heavy metals were detected in both samples. Seed extracted at 60°C/6 hours and 100°C/15 minutes showed the highest TPC value and were significantly different ($p<0.05$) than the seed extracted at 40°C/12 hours. Anti-oxidant activity is positively correlated to the TPC value of the extracts ($R=0.991$). The pulp and seed extracted at 100°C/15 minutes showed the highest FRAP value among its groups (216.17 ± 14.06 μmol (Fe)/g and 659.74 ± 16.40 μmol (Fe)/g respectively). This study indicates that tamarind pulp and seed extracts possess beneficial antioxidant properties and the optimum extraction parameter is 100°C for 15 minutes. In Artemia salina lethality test, tamarind pulp caused significant mortality of the crustacean larvae with LC50 in the range of 26-28 μL/mL. Tamarind seed were not toxic to Artemia salina since the LC50 of the extracts was higher than 1000 μL/mL.

I38 Lipidaemic effects of tocotrienols, tocopherols and squalene: studies in the hamster

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Asia Pacific J Clin Nutr 6(1): 36-40, 1997

Syrian Golden hamsters have been widely used as a experimental model for the investigation of the aetiology and development of atherosclerosis and cardiovascular disease. The responses of the hamster to dietary fat manipulations are in many ways similar to that observed in humans. The lipidaemic effect of a tocotrienol rich fraction (TRF) from palm oil on human trials has not been consistent. In this study, the cholesterolaemic effect of tocotrienols and tocopherols were differentiated by using pure tocotrienols (that were isolated from palm oil fatty acid distillate) and pure commercial tocopherols and squalene. A palm oil triacylglycerol fraction (POTG), free of all unsaponifiable matter, was used as the dietary fat in different feeding experiments. Tocotrienols added at 162 ppm to POTG (POTG-T3L)

significantly (P<0.05) lowered serum total cholesterol (TC) level as compared to that of the POTG group; but the serum LDL-C , HDL-C and TG levels of the POTG-T3L group were not significantly lower than that of the POTG group (P>0.05). Increasing the level of tocotrienol supplementation to the diet (POTG-T3H) appeared to raise rather then reduce the serum TC, LDL-C and HDL-C levels as compared to that of POTG-T3L group. This observation that lower level of tocotrienol supplementation appeared to exhibit stronger hypocholesterolaemic effect than a higher level of tocotrienol supplementation is interesting; but its explanation is not yet forthcoming. When tocopherols were supplemented at 72 ppm to the POTG diet it was observed that the serum TC, LDL-C and HDL-C levels were all somewhat increased when compared to that of the POTG group. These results suggest that tocotrienols and tocopherols may have opposite cholesterolaemic effects in the hamster, and further experiments need to clarify the mode of action of these vitamin E isomers. In our second series of experiments the cholesterolaemic effects of tocotrienols and tocopherols were studied in the presence of squalene, a key intermediate in the cholesterol synthesis pathway and a controversial cholesterol lowering agent. Squalene added to the diet at 0.1% level significantly lowered (P<0.05) serum TC level when compared to that of the POTG group. The LDL-C, HDL-C and TG levels appeared to be lowered by the squalene supplementation also but the differences between the POTG-SQ and POTG groups were not statistically significant (P>0.05). When tocotrienols or tocopherols were added to the squalene-containing POTG diets, the serum TC and LDL-C levels were further reduced (P<0.01) when compared to that of the POTG and POTG-SQ groups. The HDL-C and TG levels were not affected by tocotrienol or tocopherol supplementation in the presence of squalene. These results indicate that in the presence of tocotrienols and squalene POTG exhibit hypocholesterolaemic action whereas tocopherols may have a hypercholesterolaemic effect in the hamster.

I39 Effects of a herbal drink on cycling endurance performance

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Malaysian Journal of Medical Sciences 10(1): 78-85, 2003

In this study, we examined the effects of acute ingestion of a herbal drink (H) or a coloured water placebo (P) on physiological responses and performance during cycling exercise. Eight healthy and trained male young cyclists (age: 16.0±0.5years) exercised on a cycle ergometer at 72.0±0.8% of the maximal oxygen consumption (VO2max) until exhaustion in a room maintained at 23.9±0.2 oC and 64.2±1.6% relative humidity on two occasions, 1-week apart. During each exercise bout, subjects received 3ml.kg-1 body weight of H or P every 20 minutes in a doubleblind randomised study design. There was no significant difference between H and P trials in the total work time to exhaustion (84.5±5.1 and 82.3±5.6 min respectively). Changes in heart rate, oxygen consumption, plasma glucose concentrations, plasma lactate concentrations, rectal temperature, respiratory exchange ratio and energy

expenditure were similar with both type of drinks. Loss of plasma volume was also similar with both drinks. Herbal drink elicited similar physiological responses, thermoregularity responses and exercise performances during endurance cycling when compared to the placebo ingestion. Thus, it can be concluded that the ingredient in the herbal drink did not provide any added advantage to cycling endurance performance.

I40 Germinated brown rice (GBR) reduces the incidence of aberrant crypt foci with the involvement of ß-catenin and COX-2 in azoxymethane-induced colon cancer in rats

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Nutrition Journal 9: 16, 2010

Chemoprevention has become an important area in cancer research due to the failure of current therapeutic modalities. Epidemiological and preclinical studies have demonstrated that nutrition plays a vital role in the etiology of cancer. This study was conducted to determine the chemopreventive effects of germinated brown rice (GBR) in rats induced with colon cancer. GBR is brown rice that has been claimed to be richer in nutrients compared to the common white rice. The male Sprague Dawley rats (6 weeks of age) were randomly divided into 5 groups: (G1) positive control (with colon cancer, unfed with GBR), (G2) fed with 2.5 g/kg of GBR (GBR (g)/weight of rat (kg)), (G3) fed with 5 g/kg of GBR, (G4) fed with 10 g/kg of GBR and (G5) negative control (without colon cancer, unfed with GBR). GBR was administered orally once daily via gavage after injection of 15 mg/kg of body weight of azoxymethane (AOM) once a week for two weeks, intraperitonially. After 8 weeks of treatment, animals were sacrificed and colons were removed. Colonic aberrant crypt foci (ACF) were evaluated histopathologically. Total number of ACF and AC, and multicrypt of ACF, and the expression of ß-catenin and COX-2 reduced significantly ($p < 0.05$) in all the groups treated with GBR (G2, G3 and G4) compared to the control group (G1). Spearman rank correlation test showed significant positive linear relationship between total ß-catenin and COX-2 score (Spearman's rho = 0.616, p = 0.0001). It is demonstrated that GBR inhibits the development of total number of ACF and AC, and multicrypt of ACF, reduces the expression of ß-catenin and COX-2, and thus can be a promising dietary supplement in prevention of colon cancer.

I41 The effect of different milks and milk proteins on the growth of Bifidobacterium infantis ATCC 27920 in vitro

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Mal J Nutr 5:61-70, 1999

Bifidobacteria is a well known bacteria that is found in abundance in the intestine of infants which provides several health and nutritional benefits. Realizing the many benefits of bifidobacteria to human, this study has been conducted with the objective to determine the growth promotional effect of different types of milk and milk proteins on Bifidobacterium species. One strains of Bifiodobacterium species that is B. infantis was used to study the growth promoting effect of human milk, cow's milk, goat's milk, milk based infant formula, soy-based infant formula, lactoferrin (1 mg/ml), lactoperoxidase (1p~g/ml), lysozyme (1 mg/ml) and the mixture of these three proteins. The growth promotion assay was done using the 96-well culture plates which consists of 200 (1 Trypticase-Peptone-Yeast extract (TPY) medium, 50 4 sample and 10 1il of bacteria inoculum. Control consists of PBS instead of the samples. The assay was incubated anaerobically at 370C for 18 hours before being spread on the agar plate containing TPY medium with agar. Comparison was made between the mean count (log cfu/ml) of different types of milks, between infant formula and between milk proteins. From the results, Oneway ANOVA test at $P<0.05$ showed that there was significant differences in the mean counts (log cfu/ml) between the milks ($P = 0.0000$). A similar trend was observed in the mean count (log cfu/mI) between the infant formulas ($P = 0.0$ 124) and also between the milk proteins ($P = 0.0005$). Duncan Multiple Range tests showed that there was significant differences between all the milks and control and among the milks themselves. There was however, no significant difference among the two types of infant formulas. The milk proteins also showed significant differences between the proteins and control and among themselves except for lysozyme which showed no significant differences with lactoferrin. This study showed that the growth of B. infantis could be promoted by different kinds of milks and milk proteins in vitro. Comparing the differences in growth promoting effect between samples and control indicated that human milk has the highest growth promoting effect followed by cow's milk and the mixture of the three milk prtoeins. Lysozyme showed the lowest in term of differences in percentage of growth promoting effect among all these samples. In conclusion the findings of this study supported that human milk ios the best milk choice for infant in comparison to other types of milk in promoting the growth of bifidobacteria. In additon, this tudy also found that milk protein when used in combination may show better growth promoiotive effect than when used singly.

I42 Effects of calcium supplementation on iron bioavailability from spirulina

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Nutrition and Food Science 36(6):429-437, 2006

Purpose – The purpose of this study is to determine the effect of calcium supplementation on the iron bioavailability from spirulina (SP) and ferrous sulphate (FE) as reference in iron deficient rats. Design/methodology/approach - Sixty-four weanling male Sprague-Dawley rats were first depleted of iron by giving low iron diet for a period of 28 days. The anaemic rats were repleted with iron sources from SP, spirulina+CaCO3 (SPC), FE, FeSO4+CaCO3 (FEC), normal diet (ND), normal diet+CaCO3 (NDC) for 21 days. Iron level of FE supplementation was twice the level of that in SP supplementation. Haematological variables were measured on the last day of preexperimental period and at the end of the repletion period.
Findings - Paired samples t-test at P,0.05 showed that haemoglobin (Hb) and haematocrit (Ht) was increased in all the groups. The diet with added calcium did not significantly inhibit haemoglobin repletion after 21 days in SP and FE. The haemoglobin repletion efficiency (HRE) was significantly higher in rats fed with SP compared to FE (P.0.05). The presence of calcium did not significantly reduce the HRE of these groups.
Originality/value - This paper provides information on effects of additional calcium on iron bioavailability from SP as the intake of dietary supplementation is increasing worldwide.

I43 The effects of iron supplementation in preweaning piglets

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Mal J Nutr 7(1&2): 41-49, 2001

The trial was carried out at a commercial pig farm in Bukit Pelanduk, Negeri Sembilan, Malaysia. The objective of the study was to assess the efficacy of supplemental iron in drinking water and iron in paste form in comparison with the

iron dextran injection. A total of 12 litters were used divided into three treatments : iron dextran injection (ID), Fedexx" - iron in paste form (IP) and Opti-iron" - iron in drinking water (IW). Hemoglobin level and growth performance parameters were monitored weekly over a period of 28 days. ID piglets had significantly higher ($p < 0.05$) body weight and weekly weight gain compared with IW piglets at 21 and 28 days of age whereas no significant different ($p > 0.05$) results were found between IP and IW piglets. Hemoglobin level from days 0 to 28 showed statistical difference ($p > 0.05$) between piglets in IP and IW groups. Mild anemia was found in IP piglets but not for ID and IW piglets compared with normal value (> 9 g/dL). Hemoglobin (Hb) levels were positively correlated ($p < 0.05$, $r = .47$) with body weight at 28 days of age. In conclusion, pigs supplemented with iron in paste form and drinking water had poorer growth performance than iron dextran injection piglets. Piglets given iron in paste form had mild anemia. It is advisable to give multiple doses of oral iron to piglets in order to prevent iron deficiency anemia. During the first 4 weeks of life, the body weights of the piglets increased by up to 5-fold. The dietary requirement for iron during this period is 7 mg per day but only 1 mg per day can be supplied by the sow's milk (Cunha, 1977; Miller & Ullrey, 1997; Roberts, 1998). The need to provide the piglets with an adequate amount of iron before weaning is therefore imperative because sow's milk alone will not meet the iron requirements of rapid growth and expanding blood volume (Hannan, 1971). Several different methods can be used to offer iron to preweaning piglets. The most common administration method for iron in piglets is through an intramuscular injection of iron dextran complex at 3 days of age. A single dose of 200 mg/ml iron-dextran is effective against iron deficiency anemia. However, the method is very stressful to the piglets. They will suffer more pain if a greater dosage of iron is given intramuscularly. Furthermore, poor iron injection techniques may cause considerable trauma to the muscles, staining of hams or create abscesses and lead to downgrading of the carcasses (Roberts, 1998). Since there are several drawbacks to the iron injection, alternative methods need to be considered in intensive farming i.e. supply iron orally (Miller & Ullrey, 1997). The oral administration of iron has two advantages: cost and the fact that absorption is regulated by the intestinal mucosae. However, oral administration requires multiple doses. This is because a single dose may not be sufficient to protect the piglets from iron deficiency anemia for the first 4 weeks post-partum. The iron bioavailability in oral iron depends greatly on iron status of animals (Amine et al., 1972; Susan & Wright, 1985). In addition, dietary factors such as amino acids and protein sources (Martinez et al., 1981), pectin content, phytate (Morris & Ellis, 1982) and the other minerals (Elvehjem & Hart, 1932; Hedges & Kornegay, 1973; Suttle & Mills, 1966) may also influence the bioavailability of iron. Oral iron can be given as paste or drinking water. Early administration of oral iron within the first few days of life will meet the iron needs of the suckling pig. However, it is critical to administer early before gut closure to large molecules (Harmon et al., 1974; Thoren-Tolling, 1975). This study was conducted to determine the efficacy of iron supplementation in drinking water or paste form in comparison with the injection of iron compounds in suckling pigs.

I44 The Effect of calcium, ascorbic acid and tannic acid on iron availability from Arthrospira Platensis by Caco-2 Cell Model

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Mal J Nutr 11(2): 177-188, 2005

There are several dietary factors that are known to affect the bioavailability of iron such as protein, calcium, ascorbic acid, polyphenol and phytate. The aim of this study was to determine iron bioavailability from spirulina (Arthrospira platensis) in the presence of calcium, ascorbic acid (AA) and tannic acid (TA). The experiments were conducted using in vitro digestion/Caco-2 cell culture system. Comparison was made with ferrous sulphate (FeSO4) as a reference. At low calcium concentrations (1:05, 1:10, 1:15, 1:20 Fe:Ca molar ratios), iron bioavailability from spirulina was significantly better than from FeSO4. However, at higher calcium concentrations (1:37, 1:75, 1:149 Fe:Ca molar ratios), iron bioavailability from spirulina was found to be similar to that from FeSO4. Addition of ascorbic acid of different concentrations (1:0.5, 1:1, 1:1.5 and 1:2 Fe:AA molar ratios) increased iron availability from FeSO4 more than from spirulina. The concentrations of tannic acid (1:1, 1:1.4 and 1:2 Fe:TA molar ratios) used in this study reduced iron availability from spirulina but not from FeSO4. Iron from spirulina by itself is highly bioavailable but consumers should be aware of factors that could inhibit its bioavailability.

I45 Kesan pemberian ekstrak Buah Mengkudu (Morinda citrifolia Linn.) ke atas kualiti sperma dan histologi Testis Mencit

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Sains Malaysiana 33(2): 89-96, 2004

Mengkudu (Morinda citrifolia Linn.) adalah tumbuhan ubatan yang terkenal. Bahagian buah, daun dan akarnya digunakan secara meluas dalam perubatan tradisional. Kajian ini dijalankan untuk menentukan kesan pemberian ekstrak berakua buah M. citrifolia (dos 25mg/kg, 50 mg/kg dan 100 mg/kg berat tubuh mencit selama 30 hari) ke atas kuantiti sperma dan histologi testis mencit. Data daripada kajian ini menunjukkan bilangan sperma epididimis, mortaliti, motiliti dan morfologi sperma mencit kajian tidak berbeza berbanding kumpulan kawalan. Proses spermatogenesis juga tidak terjejas dengan pemberian M. citrifolia. Keputusan kajian ini mencadangkan ekstrak berakua M .citrifolia (sehingga 100 mg/kg) tidak mendatangkan kesan terhadap kualiti sperma dan spermatogenesis mencit.

I46 Kesan In Vivo Ekstrak Daun Centella asiatica ke atas Histologi Testis dan Kualiti Sperma Mencit

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Sains Malaysiana 33(2): 97-103, 2004

Kesan ekstrak berakua daun Centella asiatica telah dikaji ke atas proses spermatogenesis dan kualiti sperma mencit. Kajian dijalankan dengan memberikan tiga dos C. asiatica secara oral masing-masing; 25mg/kg, 50mg/ kg and 100mg/kg berat tubuh mencit setiap hari selama empat minggu. Kumpulan kawalan diberikan larutan salin normal (0.9% NaCl). Pengurangan dalam bilangan dan motiliti sperma yang ketara telah diperhatikan pada semua kumpulan mencit yang diberikan ekstrak C. asiatica. Walau bagaimanapun pemberian ekstrak C. asiatica tidak mendatangkan kesan terhadap mortaliti dan morfologi sperma. Kajian histologi pula menunjukkan terdapat kesan perencatan sel-sel spermatogenik testis pada dos C. asiatica 100mg/ kg di mana lumen pada tubul seminiferus hanya dipenuhi dengan sel-sel spermatosit dan spermatid. Hasil kajian menunjukkan tumbuhan ini mempunyai kesan antispermatogenik pada mencit. Oleh itu dicadangkan bahawa ekstrak daun C. asiatica mempunyai aktiviti antikesuburan pada mencit jantan.

I47 Blood and Urine Profiles of Spontaneous Hypertensive Rats Supplemented with Pink Guava (Psidium guajava) Puree

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Sains Malaysiana 38(6): 929-934, 2009

The objectives of this study were to investigate the effects of pink guava (Psidium guajava) puree on blood and urine profiles of Spontaneous Hypertensive Rats (SHR). Twenty-four male SHR rats were divided into four groups (control, CG (distilled water); low dosage group, LDG (0.5 g/kg body weight); medium dosage group, MDG (1.0 g/kg body weight); and high dosage group, HDG (2.0g/kg body weight)). The rats were given pink guava puree via force-feeding and fed ad libitum for 28 days in individual cages. Organ weights and serum lipid profiles were not significantly different between the groups. Blood glucose value (mmol/l) for MDG (5.53±0.69) was significantly higher than CG (4.53±0.39) and LDG (4.80±0.54). Blood chemistry analysis showed no significant difference in total antioxidant status, urea, alkaline phosphate and globulin between the groups. There were significant differences in the blood hematology, concentrations total bilirubin, gamma-glutamyl

transpeptidase (GGT), total protein, albumin and albumin:globulin ratio between CG and treated groups. LDG's red blood cell (10.95±0.57 ×1012/l) and platelet (941.17±139.0 ×109/l) were higher compared to CG (10.05±0.63×1012/l; 858.83±163.4 ×109/l) respectively. LDG (3.51 umol/l) had lower total bilirubin concentration than CG (4.25 umol/l). GGT level was significantly higher in HDG (8.67 U/l) compared to CG and MDG (7.00 U/l). Albumin:globulin ratio values were significantly lower in CG (1.50) than MDG (1.36) and HDG (1.37). In conclusion, this study shows pink guava (Psidium guajava) puree supplementation did not have significant effects on serum lipid and urine profiles, organ weight and blood glucose concentration of SHR.

I48 Effect of vitamin E on plasma malondialdehyde, antioxidant enzyme levels and the rates of wound closures during wound healing in normal and diabetic rats

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Vitamin E is composed of various subfamilies that include tocopherols and tocotrienols. These compounds have antioxidant properties but differ in structure, dietary source and potency. In this study we evaluated the efficacy of a-tocopherol as an antioxidant and its role in wound closure in normal and streptozotocin-induced diabetic rats. The healing of 6 cm linear incisions created on the back of each male Sprague-Dawley rat (250-300 g) was monitored by measuring the length of the wounds daily. The rats were divided into two categories; normal and streptozotocin-induced diabetic rats. For each category, the animals were further divided into two groups; those untreated and those receiving 200 mg/kg bodyweight a-tocopherols daily by oral gavage. All rats were fed standard food and water ad libitum. Blood samples were taken at 0, 5 and 10 days after the wounds were created for the determination of malondialdehyde levels and red cell superoxide dismutase, catalase and glutathione peroxidase activities. The results showed that a-tocopherol reduced plasma malondialdehyde levels, increased glutathione peroxidase activity and accelerated the rate of wound closure in treated rats.

I49 The use of Caco-2 cells as an in vitro method to study bioavailability of iron

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Mal J Nutr 5:31-45, 1999

Iron absorption is essential for the maintenance of iron levels in the body, since excretion is poorly regulated. Dietary factors can influence iron absorption including low molecular weight substances such as ascorbic acid which has been shown to enhance iron transport across mucosal cell monolayers. Both in vivo and in vitro work may be carried out to study iron absorption. Studies in vivo have the drawback of dealing with a complex system in which it is difficult to determine the relative importance of different factors. In vitro cell culture models could overcome this difficulty but attempts to establish differentiated enterocyte cell lines in culture have not been successful. However the Caco-2 line, derived from a colon carcinoma, is able to differentiate spontaneously when grown in standard culture conditions. The differentiated cells polarized, formed microvilli and T-junctions associated with the duodenal enterocytes brush border. This cell line thus represents an appropriate model for the study of transport mechanisms related to the intestinal barrier and can be used to study the absorption of nutrients especially iron in relation to dietary intake in particular pertaining to dietary factors that may affect absorption. In this work we have therefore used differentiated Caco-2 cells grown in bicameral chambers as a intestinal cell model to study the absorption of iron from different sources and compared it with INT 407 cells. Transfer of iron across the monolayers in the apical-to-basolateral direction has been found to be greater from feric lactoferrin than from iron citrate, while very little transport occurred from Fe-transferrin. It is concluded that in this in vitro study lactoferrin but not transferrin enhances mucosal iron transport. More importanty this study has also shown that Caco-2 can be used as an in vitro method to investigate not only iron bioavailability but can be applied to other minerals as well.

I50 Inhibitory effects of Bifidobacterium asteroids and lactoferrin on the growth of E. coli 2520 in vitro and in vivo

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Asia Pacific J Clin Nutr 7(3/4): 329-336, 1998

Diarrhea is one of the leading caoses of illness and death among children in the developing countries. It is an important caose of malnutrition which in turn results in serious growth impairment. Continued breast feeding and ORS therapy during

episodes of diarrhea seem to be the most effective way to minimize the risk of malnutrition. Alternatively, rice porridge that is widely consumed in Asian and South-East Asian countries has also been suggested by WHO to be a suitable food. In addition, supplementing the porridge with lactoferrin, an iron-binding protein and bifidobacteria may be functional in inhibiting the the growth of these diarrheal-causing pathogens. Hence, this study was conducted with the objective of determining the effect of lactoferrin and bifidobacteria, either alone or together added to rice porridge, on the growth of a pathogenic Escherichia coli 2520 strain. In vitro study was conducted in a 96-well plate with each well containing a 250 µl mixture of rice porridge, lactoferrin or apolactoferrin and bacterial cultures of E. coli and B. asteroids. Both human and bovine lactoferrin at difference concentrations were used. E. coli was applied at 103 cfu/g while B. asteroids was at concentration 106 cfu/g. Colony counting was done on TPY and MacConkey agar plates for B. asteroids and E. coli, respectively. Results showed that both B. asteroids alone and apolactoferrin alone were found to inhibit the growth of E. coli significantly ($P < 0.5$). Inhibitory effect of apolactoferrin was demonstrated much ealier (6 h) than that of B. asteroids (24 h). Saturated lactoferrin even at highest concentration did not display any inhibititory effect. However, in vivo study using 250 mice infected orally with E. coli 2520 demonstrated that not only apolactoferrin and B. asteroids but lactoferrin either alone or together with B. asteroids could reduce the fecal and colonic E. coli counts significantly ($P < 0.5$). In conclusion, this study supports the proposal that the addition of lactoferrin, apolactoferrin and B. asteroids, alone or together as a mixture, could possibly be used as a method to reduce anteric infection, as well as fulfilling the nutrient requirement for children episodes of diarrhea.

I51 Hypocholesterolemic effect of red pitaya (Hylocereus sp) on hypercholesterolemia induced rats

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International Food Research Journal 16: 431-440, 2009

This study was carried out itoevaluate the total phenolic content and anti-oxidant activity of methanolic extract of red pitaya, and hypocholesterol effect of red pitaya (Hylocereuc sp.) on lipid profiles status on hypercholesterolemia induced rats. From the analysis, total phenolic content iin red pitaya is 46.06 ± 1.77 mg GAE/100 g fresh

weight and antioxidant activity is 76.10% using FTC method. TBA analysis also showed red pitaya extract had high antioxidant effect (72.90%). An in-vivo study also showed red pitaya has hypocholesterolemic effect on induced hypercholesterolemia rats. After 11 weeks of study, total blood cholesterol significant decrease ($p<0.05$) in the groups supplement with red pitaya. The total cholesterol (TC) level for group PFI were reduced from 3.356 mmol/L to 1.707 mmol/L (49.14%), group PF2 reduced from3.435 mmol/L (56.72%) and group PF3 reduced from 3.448 mmol/L to 1.412 mmol/L (599.06%) as compare to baseline respectively. The mean total cholesterol level in both negative (N-5.12%) and positive controls (group HC-13.79%) were not significantly different ($p<0.05$). the mean triglycerides (TG) level for all groups had shown a reduction ($p<0.05$) with value of 23.87% (group N), 22.674% (group HC), 42.81% (group PFI), 52.82% (group PF2) and 59.52% (group PF3) as compare to baseline levels. The mean HDL level increased by about 2.12% (group N), 19.31% (group PF1), 21.93% (group PF2) and much higher increase in group PF3 (34.42%). The mean LDL decreased by about 39.06% (PF3), 15.10% (PF2), 1.5% (PF1) and 4.33% (group N). The positive control has showed significantly increase with the mean value for 25.68%. In conclusion, all groups that received red pitaya supplementation has high antioxidant properties and showed a good results in managing of lipid profile. It was suggested that the consumption of red pitaya demonstrated the potential to reduce dyslipidemia and play a role in the prevention of cardiovascular disease.

I52 Cytotoxicity, cell cycle arrest, and apoptosis in breast cancer cell lines exposed to an extract of the seed kernel of Mangifera pajang (bambangan)

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Food and Chemical Taxicology 48:1688-1697, 2010

An extract of mangifera pajang kernel has been previously found to contain a high content of antioxidant phytochemicals. The present research was conducted to investigate the anticancer potential of this kernel extract. The result showed that the kernel crude extract induced cytotoxicity in MCF-7 (hormone-dependent breast cancer) cells and MDA-MB-231 (non-hormone dependent breast cancer) cells with IC50 values of 23 and 3.05 μg/ml, respectively. The kernel extract induced cell cycle arrest in MCF-7 cells at the sub-G1 (apoptosis)arrest after 48 and 72 h of incubation. Staining with Annexin V-FITC and propidium iodide revealed that this appotosis occurred early in both cell types. 36 h for MCF-7 cells and 24h for MDA-MB-231 cells, with 14.0% and 16.5% of the cells respectively undergoing apoptosis

at these times. This apoptosis appeared to be dependent on caspase-2 and -3 in MCF-7 cells, and on caspase-2, -3 and -9 in MDA-MB-231 cells. These findings suggest that M. Pajang kernel extract has potential as a potent cytotoxic agent against breast cancer cell lines.

I53 Antiproliferative Properties and Antioxidant Activity of Various Types of Strobilanthes crispus Tea

Abu Bakar MF, Teh AH , Rahmat A , Othman F , Hashim N and Fakurazi S

International Journal of Cancer Research 2 (2): 152-158, 2006

Regarding to the promising pharmacotherapeutic properties of Strobilanthes crispus (Acanthaceae) plant, we report here, the development of nutraceutical herbal tea from S. crispus young and old leaves and evaluate the potential antiproliferative properties and antioxidant activity in vitro. Unfermented and fermented tea (Camellia sinensis) preparation was applied for development of S. crispus tea. Antiproliferative properties of S. crispus tea extracts were determined by the microculture tetrazolium salt (MTT) assay against human breast cancer cell lines (hormone dependent, MCF-7; non-hormone dependent, MDA-MB-231). The results showed that S. crispus tea only inhibit the proliferation of human hormone dependent breast cancer cell lines (MCF-7) but not the non-hormone dependent breast cancer cell lines (MDA-MB-231). The antioxidant activity was determined using FRAP (Ferric Reducing/Antioxidant Power) and DPPH free radical scavenging assay. The results showed that the hot water extract of S. crispus tea showed high antioxidant activity especially S. crispus unfermented tea from old leaves. But the tea from the leaves of C. sinensis displayed better antioxidant activity.

I54 Palm-tocotrienol rich fraction (TRF) is a more effective inhibitor of LDL oxidation and endothelial cell lipid peroxidation than α-tocopherol in vitro

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Food Research International 36(5): 405-413, 2003

Comparative protective effects of palm tocotrienol rich fractions (TRF) and α-tocopherol on the copper-induced oxidation of plasma low density lipoprotein (LDL) and indices of lipid peroxidation in human umbilical vein endothelial cells (HUVEC) were investigated. LDL (100 μg protein/ml) was incubated at 37 °C with 1 μM $CuSO_4$ with or without the presence of 50 μM (TRF) or 50 μM α-tocopherol.

Aliquots were collected at 0,1,2,3,6,9,12 and 24 h and thiobarbituric acid reactive substances (TBARS) determined. In the absence of antioxidant, TBARS increased significantly in LDL reaching a maximum after 6 h. α-Tocopherol and TRF delayed TBARs formation by 6 h with a maximum effect after 12 h. The rate of TBARs formation with TRF was significantly slower than with α-tocopherol, indicating a higher antioxidant efficacy for TRF. Low density lipoprotein isolated from volunteers consuming low or high polyunsaturated fatty acid (PUFA) diets were similarly incubated with 1 μM $CuSO_4$ with or without 50 μM TRF or 50 μM α-tocopherol. LDL oxidation was not significantly different between low and high PUFA groups. However, LDL treated with TRF was better protected against copper-induced oxidation than that treated with a-tocopherol. In HUVEC pre-incubated with 100 μM arachidonic acid, 25 μM TRF treatment decreased TBARS by ~73% compared to ~50% with 25 μM of α-tocopherol. Higher concentrations of TRF did not further decrease TBARS formation in the medium. However, treatment with higher concentrations of α-tocopherol again increased TBARS formation. Formation of conjugated diene in HUVEC subjected to arachidonic acid (ARA)-induced oxidative stress was decreased equally with either 10 μM TRF or 25 μM α-tocopherol. Results suggest that TRF is a more potent antioxidant than α-tocopherol, at least in vitro.

I55 In-vitro digestibility and functionality of heated and defated oilseed flours

Chaudry MA, Bibi N, Amal B and Jamil QM

Sains Malaysiana 32: 157-169, 2003

Defatted oilseed protein flours of soybean (DSYF), rapeseed (DRF), sunflower (DSF) and peanut (DPF) were heated in an electric oven at 100oC for 5 and 10 minutes. Maximum nitrogen solubility (NS) was recorded in DPF (72%). The NS was decreased as a result of heat treatment in case of DRF and DSF. The in-vitro digestibility (IVD) decreased in DPF and no effect was found on IVD of DSYF samples. In case of DSF samples increase in IVD was more at 5 minutes treatment than that of 10 minutes treatment. Maximum foaming capacity (FC) was observed in DSF (66.5 ml/g) and minimum in DRF (56.0 ml/g) in unheated samples. No effect of heat treatment was found on FC of DRF samples and FC increased in case of DSF samples. In case of DRF, very little effect was noted on FC. Heat treatment had an overall increasing effect on oil absorption, however, more reduction in oil absorption capacity was found in DSF and DPF than DRF and DSYF. It was concluded that certain functional properties can be enhanced by heat treatment while others can be decreased which might be beneficial for specific product formulation.

I56 Palm oil-enriched diets reduced plasma Lp(a) in volunteers with abnormally high concentrations: involvement of decreased triglyceride-rich APO(a)

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Nutrition Research 22(7): 769-784, 2002

Although plasma Lp(a) concentration is thought to be genectically determined, several studies have shown that certain dietary oils such as palm and fish oils can reduce its concentration in plasma. The present study, therefore, was conducted to identify possible mechanism whereby these dietary fat modifications lowered plasma Lp(a) concentration. Eleven healthy subjects with plasma Lp(a) concentrations >30 mg/dl received a palm oil diet (65% total fat intake) for 4 weeks. Blood samples were taken 12 hours pre-prandially and 4 hours post-prandially, for baseline assays prior to consumption of experimental diets, and at 2 week intervals thereafter. Individuals were therefore deemed to be their own controls. Pre- and post-prandial total Lp(a) decreased by 10% ($P < 0.001$) and 7% respectively at the end of the study compared to baseline values. Plasma samples were separated into triglyceride-rich particle-(TRP)-apo(a) and cholesterol ester (CE) Lp(a) fractions by ultra-centrifugation. Individual contributions to the significant decrease in pre-prandial total Lp(a) concentrations were determined. Post-prandial TRP-apo(a) concentrations at week 4 were decreased compared to baseline (week 0). 10 subjects showed decreases of 0.25 mg/dl to 3.5 mg/dl. At week 0, post-prandial CE-Lp(a) concentrations were higher than pre-prandial levels. In contrast, at week 4 the post-prandial CE-Lp(a) levels were lower compared to respective pre-prandial levels. Increased pre-prandial concentrations of 0.6 to 12.5 mg/dl in 7 of the subjects and decreases in post-prandial concentrations of 0.1 to 27 mg/dl in 8 of the subjects at week 4 compared to week 0 were similar to changes observed in plasma TRP-apo(a) concentrations. This suggested that both fractions (TRP-apo(a) and CE-Lp(a)), contributed to the observed changes in total Lp(a) concentrations. Reductions in post-prandial total Lp(a) concentrations were most likely due to changes in post-prandial TRP-apo(a). Reciprocal changes in apo(a) between the TRP- and CE-Lp(a) fractions, particularly during the post-prandial phase, were also determined. No consistent relationships between the apo(a) content in the two fractions were observed but the mean ratio of TRP-apo(a) to CE-Lp(a) fraction was 1:50 in the pre-prandial states and ~1:25 in the post-prandial states suggesting an increased preference of post-prandial apo(a) for TRP. The significance of these changes to total plasma Lp(a) concentration and to vascular disease risk is unclear at present.

I57 Inhibition of Proliferation of Estrogen Receptor-Negative MDA-MB-435 and -Positive MCF-7 Human Breast Cancer Cells by Palm Oil Tocotrienols and Tamoxifen, Alone and in Combination

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Journal of Nutrition 127: 544S-548S, 1997

Tocotrienols are a form of vitamin E, having an unsaturated isoprenoid side-chain rather than the saturated side-chain of tocopherols. The tocotrienol-rich fraction (TRF) from palm oil contains a-tocopherol and a mixture of α-, γ- and δ-tocotrienols. Earlier studies have shown that tocotrienols display anticancer activity. We previously reported that TRF, α-, γ- and δ-tocotrienols inhibited proliferation of estrogen receptor-negative MDAMB-435 human breast cancer cells with 50% inhibitory concentrations (IC50) of 180, 90, 30 and 90 mg/mL, respectively, whereas a-tocopherol had no effect at concentrations up to 500 mg/mL. Further experiments with estrogen receptor-positive MCF-7 cells showed that tocotrienols also inhibited their proliferation, as measured by [3H] thymidine incorporation. The IC50s for TRF, α-tocopherol, α-, ?- and δ-tocotrienols were 4, 125, 6, 2 and 2 mg/mL, respectively. Tamoxifen, a widely used synthetic antiestrogen inhibits the growth of MCF-7 cells with an IC50 of 0.04 mg/mL. We tested 1:1 combinations of TRF, α-tocopherol and the individual tocotrienols with tamoxifen in both cell lines. In the MDA-MB-435 cells, all of the combinations were found to be synergistic. In the MCF-7 cells, only 1:1 combinations of g- or d-tocotrienol with tamoxifen showed a synergistic inhibitory effect on the proliferative rate and growth of the cells. The inhibition by tocotrienols was not overcome by addition of excess estradiol to the medium. These results suggest that tocotrienols are effective inhibitors of both estrogen receptornegative and -positive cells and that combinations with tamoxifen should be considered as a possible improvement in breast cancer therapy.

I58 The Effects of Repeatedly Heated Frying Oil and High Cholesterol Diet on the Bone in Ovariectomised Rats

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Mal J Nutr 13(1): 89-99, 2007

The use of repeatedly heated frying oils and intake of high cholesterol diet have been linked to bone damage. The aim of this study is to determine the combined effects of taking repeatedly heated frying oils (palm or soy oil) and high cholesterol diet on the dynamic histomorphometric parameters of bone. Ovariectomised rats were used as animal model of post-menopausal osteoporosis. After six months of treatment, Double-labeled Surface (dLS/BS), Mineralising surface (MS/BS) and Bone Formation Rate (BFR/BS) of ovariectomised rats (OvxC) were significantly reduced compared to the normal control group. Additions of fresh or once-heated palm or soy oil into high cholesterol diet seem to have improved the dynamic parameters towards the normal control values. However, when these oils were repeatedly heated, the protective effects were lost and the dynamic parameters except MS/BS dropped back towards the ovariectomised-control values.

I59 The effect of vitamin E tocotrienols from palm oil on chemically induced mammary carcinogenesis in female rats

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Nutrition Research 12(1): 63-75, 1992

In the DMBA induced rat mammary tumor model, palm oil appeared to be less tumourigenic than corn oil, soybean oil, beef tallow and lard. Palm oil is a rich source of tocotrienols which have been reported to have antitumour activity against certain types of transplantable murine tumors. Results of the present experiments showed that palm oil stripped of its vitamin E tocopherols and tocotrienols (EFPO) enhanced tumorigenesis compared to palm oil containing vitamin E. In view of this a second experiment was designed to determine whether addition of a tocotrienol rich fraction (TRF) of palm oil to corn oil was able to inhibit development of mammary tumors in the DMBA treated rat model. One hundred female Sprague Dawley rats at 50 days of age were treated with a single dose of 5 mg of DMBA. They were

then divided into 5 groups and fed semi-synthetic diets containing 20% by weight (40 en%) of either corn oil (CO), refined bleached and deodorized palm oil (RBDPO), corn oil + 500 ppm TRF, corn oil + 1000 ppm TRF or CO + 135 ppm α-tocopherol. The experiment was terminated 5 months after DMBA treatment. The RBD palm oil group had the lowest tumor incidence, tumor count and tumors per rat compared to animals fed the CO diet. This suggests that CO has a greater tumor promoting effect than palm oil. Supplementation of TRF at 500 ppm to corn oil did not provide protection. However at the higher concentration of 1000 ppm of TRF, the corn oil fed animals had significantly greater median latency period, lower tumor incidence and tumor count than the corn oil fed group as well as the group supplemented with either 500 ppm of TRF or 135 ppm α-tocopherol. The results appear to indicate that supplementation of corn oil with adequate amounts of TRF may give some protection against the cancer promoting effect of corn oil. The results also suggest that the favourable effects observed on a palm oil diet maybe attributed to the presence of naturally occurring tocotrienols in palm oil.

I60 Interactive effects of dietary palm oil concentration and water temperature on lipid digestibility in rainbow trout, Oncorhynchus mykiss.

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Lipids. 38(10):1031-1038, 2003

An experiment was conducted to evaluate the interactive effects of dietary crude palm oil (CPO) concentration and water temperature on lipid and FA digestibility in rainbow trout. Four isolipidic diets with 0, 5, 10, or 20% (w/w) CPO, at the expense of fish oil, were formulated and fed to groups of trout maintained at water temperatures of 7, 10, or 15 degrees C. The apparent digestibility (AD) of the FA, measured using yttrium oxide as an inert marker, decreased with increasing chain length and increased with increasing unsaturation within each temperature regimen irrespective of CPO level fed to the fish. PUFA of the n-3 series were preferentially absorbed compared to n-6 PUFA in all diet and temperature treatments. Except for a few minor FA, a significant ($P < 0.05$) interaction between diet and temperature effects on FA digestibility was found. Increasing dietary levels of CPO lead to significant reductions in the AD of saturates and, to a lesser extent, also of the other FA. Lowering water temperature reduced total saturated FA digestibility in trout regardless of CPO level. Based on the lipid class composition of trout feces, this reduction in AD of saturates was due in part to the increasing resistance of dietary TAG to digestion. Increasing CPO level and decreasing water temperature significantly increased TAG content in trout fecal lipids, with saturates constituting more than 60% of the FA composition. Total monoene and PUFA digestibilities were not significantly affected by water temperature in fish fed up to 10% CPO in their diet. The potential impact of reduced lipid and FA digestibility in cold-water fish fed diets supplemented with high levels of CPO on fish growth performance requires further research.

I61 Rhaphidophora decursiva leaves: Phenolic content and antioxidant activity

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J Trop Agric and Fd Sc 37(1): 61-66, 2009

Total phenolic content (TPC) and antioxidant activity (AA) of Rhaphidophora decursiva (Roxb.) Schott leaves extracted with methanol and water were studied. The TPC was assessed using Folin-Ciocalteu method. Meanwhile, the antioxidant activity was estimated using b-carotene bleaching, 2,2-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging, and ferric reducing antioxidant power (FRAP) assay. Butylated hydroxytoluene (BHT) was used to compare its AA with the other extracts. It was found that the total AA of methanol extracts was higher than that of BHT. Significant differences were found in the scavenging activity, EC50 value and TPC between the water and methanol extracts. No significant relationship ($p>0.05$) between TPC and AA as measured by b-carotene bleaching and DPPH radical scavenging methods for both water and methanol extracts. However, TPC and AA as measured by FRAP assay did show a significant relationships at $p<0.01$ level. This study showed that the methanol extracts of the plant possess both higher TPC and AA compared to that of water extracts, and this was supported by the consistent results showed by all antioxidant activity assays. The antioxidant properties of the plant may have originated not only from phenolic but also from the non-phenolic compounds which possess high antioxidant activity.

I62 Vitamin E Deficiency Reduced Lumbar Bone Calcium Content in Female Rats

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Med J Malaysia 59(5): 623-630, 2004

Vitamin E deficiency has been found to impair bone calcification. This study was done to determine the effects of vitamin E deficiency and supplementation on parathyroid hormone, i.e. the hormone involved in bone regulation. Female Sprague-Dawley rats were divided into 4 groups : 1) normal rat chow (RC), 2) vitamin E deficiency (VED), vitamin E deficient rats supplemented with 3) 60mg/kg α-tocotrienol (ATT) and 4) 60 mg/kg α-tocopherol (ATF). Treatment was carried out for 3 months. Vitamin E deficiency caused hypocalcaemia during the first month of the treatment period, increased the parathyroid hormone level in the second month and decreased the bone calcium content in the 4th lumbar bone at the end of the

treatment. Vitamin E supplementation (ATT and ATF) failed to improve these conditions. The bone formation marker, osteocalcin and the bone resorption marker, deoxypyridinoline did not change throughout the study period. In conclusion, vitamin E deficiency impaired bone calcium homeostasis with subsequent secondary hyperparathyroidism and vertebral bone loss. Replacing the vitamin E with pure ATF or pure ATT alone failed to correct the changes seen.

I63 Beneficial lipid-lowering effects of pink guava puree in high fat diet induced-obese rats

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Mal J Nutr 16(1): 171-185, 2010

A study was carried out to determine the anti-obesity effects of pink guava (Psidium guajava) puree in high fat diet (HFD) induced-obese rats. Thirty male Sprague-Dawley rats were divided into 5 groups: control negative (CN), fed normal rat pellet; control positive (CP), low, medium and high dosage group (LDG, MDG, HDG) were fed HFD, respectively. CN and CP group were given distilled water; meanwhile treated group were given the aqueous puree dissolved in distilled water administered orally for six weeks. The results obtained showed that pink guava puree significantly decreased the body weight and systolic blood pressure of HFD induced-obese rats as compared to control. Blood glucose values for treated groups (4.3-4.9 mmol/L) were significantly lower as compared to CN and CP (5.7 and 5.8 mmol/L) respectively. HDG showed a significant reduction in 34.47% total cholesterol (TC) levels followed by MDG (23.30%) and LDG (22.33%). Triglycerides (TG) levels for all treated groups especially HDG (43.59%) showed significant difference as compared to control. High density lipoprotein-cholesterol (HDL-C) levels showed an increase in the treated group as compared to control. Low density lipoprotein-cholesterol (LDL-C) levels significantly decrease in HDG (69.70%), MDG (39.40%) and LDG (37.12%) as compared to control. Kidney function tests showed significant changes in urea concentrations in treated groups as compared to control. Liver function tests showed significant differences in globulin, A:G ratio, alanine aminotransferase (ALT), lactate dehydrogenase (LDH) and CK-Nac in treated groups as compared to control. Specific enzyme activities of glutathione peroxidase (GPx) was significantly higher in LDG (2787.50±266.36 U/L), MDG (2819.50±262.04 U/L) and HDG (2897.33±674.97 U/L) respectively, as compared to CN (2184.50±816.59 U/L) and CP (2610.17±61.63 U/L). Significant differences were also seen in superoxidase dismutase (SOD) activities in treated groups as compared to control. In conclusion, this study demonstrates that pink guava puree showed anti-obesity properties and high enzyme activities.

I64 New predictive equations for estimation of basal metabolic rates of adolescents: tropics versus temperate.

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Forum Nutr. 56:250-253, 2003

The energy and nutritional requirements of adolescents are influenced primarily by the growth spurt that occurs at puberty, and also by the need to maintain adequate levels of physical activity. Predictions of BMR have gained attention since the publication of the FAO/WHO/UNU (1985) expert consultation report, which adopted the principle of relying on energy expenditure rather than energy intake to derive requirement of individuals. While the report predicts BMR accurately in many individuals from temperate climate, they are said to be less accurate in predicting BMR in populations living in the tropics. The collation of worldwide data on basal metabolism indicated that, relative to adults, there was a paucity of data in other age groups including the adolescents. Although several BMR studies among children had been reported in the 90's, the data in normal weight children are almost exclusively from small control groups in obesity studies. Furthermore, we know little as to whether BMR of children differs in differing climatic conditions. This paper presents predictive equations for estimating BMR from a two-centre study, Bangi (Malaysia) and Oxford (UK) and to compare the results with the currently used predictive equations.

I65 Antihyperglycemic, Hypolipidemic and Antioxidant Enzymes Effect of Strobilanthes crispus Juice in Normal and Streptozotocin-Induced Diabetic Male and Female Rats

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International Journal of Pharmacology 5(3): 200-207, 2009

The aim of the present study was to investigate the effect of Strobilanthes crispus juice on glucose, lipid profile, glutathione peroxidase and superoxide dismutase in normal and streptozotocin-induced diabetic male and female albino Sprague-Dawley rats. This study was conducted on normal and streptozotocin-induced diabetic male and female Sprague-Dawley rats fed with basal diet and S. crispus juice with different doses 1.0, 1.5 and 2.0 mL k^{-1} b.wt. for 30 days. The results showed that significant ($p<0.05$) decrease in serum glucose levels in male and female diabetic and normal rats with treated S. crispus juice (1.0, 1.5 and 2.0 mL k^{-1} b.wt.). Cholesterol and triglyceride level significantly ($p<0.05$) decreased in diabetic rats treated with 1.0, 1.5 and 2.0 mL k^{-1} b.wt. of S. crispus juice. Cholesterol, triglyceride and LDL-cholesterol level showed reduction in treated male and female normal rats. HDL-cholesterol showed the increasing but not

significant ($p<0.05$) difference in treated diabetic and normal male and female rats. Glutathione peroxidase and superoxide dismutase activities significantly ($p<0.05$) increased in treated diabetic and normal male and female rats. In conclusion, S. crispus juice possesses antihyperglycemic, hypolipidemic and antioxidant effect in streptozotocin-induced diabetic rats. Thus, S. crispus juice could be the alternative treatment for lowering glucose, cholesterol and triglyceride for diabetic patients in the future.

I66 A comparison between tocopherol and tocotrienol effects on gastric parameters in rats exposed to stress

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Asia Pac J Clin Nutr 14(4): 358-365, 2005

Rats exposed to stress developed various changes in the gastrointestinal tract and hormones. The present study was designed to compare the impact of tocopherol and tocotrienol on changes that influence gastric and hormonal parameters important in maintaining gastric mucosal integrity in rats exposed to restrain stress. These include gastric acidity, gastric tissue content of parameters such as malondialdehyde, prostaglandin E2 (PGE2), serum levels of gastrin and glucagon-like peptide-1 (GLP-1). Sixty male Sprague-Dawley rats (200-250g) were randomly divided into three equal sized groups, a control group which received a normal rat diet (RC) and two treatment groups each receiving a vitamin deficient diet with oral supplementation of either tocopherol (TF) or tocotrienol (TT) at 60mg/kg body weight. Blood samples were taken from half the number of rats (non-stressed group) after a treatment period of 28 days before they were killed. The remaining half was subjected to experimental restraint-stress, at 2 hours daily for 4 consecutive days (stressed groups), on the fourth day, blood samples were taken and the rats killed. The findings showed that the gastric acid concentration and serum gastrin level in stressed rats were significantly ($P<0.05$) reduced compared to the nonstressed rats in the control and TF groups. However, the gastric acidity and gastrin levels in the TT group were comparable in stressed and non-stressed rats. These findings suggest that tocotrienol is able to preserve the gastric acidity and serum gastrin level which are usually altered in stressed conditions. The PGE2 content and the plasma GLP-1 level were, however, comparable in all stressed and non-stressed groups indicating that these parameters were not altered in stress and that supplementation with TF or TT had no effect on the gastric PGE2 content or the GLP-1 level. The malondialdehyde, an indicator of lipid peroxidation was higher from gastric tissues in the stressed groups compared to the non-stressed groups. These findings implicated that free radicals may play a role in the development of gastric injury in stress and supplementation with either TF or TT was able to reduce

the lipid peroxidation levels compared to the control rats. We conclude that both tocopherol and tocotrienol are comparable in their gastroprotective ability against damage by free radicals generated in stress conditions, but only tocotrienol has the ability to block the stress-induced changes in the gastric acidity and gastrin level.

I67 Antioxidant Protective Effect of Glibenclamide and Metformin in Combination with Honey in Pancreas of Streptozotocin-Induced Diabetic Rats

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Int. J. Mol. Sci. 11: 2056-2066, 2010

Hyperglycemia exerts toxic effects on the pancreatic ß-cells. This study investigated the hypothesis that the common antidiabetic drugs glibenclamide and metformin, in combination with tualang honey, offer additional protection for the pancreas of streptozotocin (STZ)-induced diabetic rats against oxidative stress and damage. Diabetes was induced in male Sprague Dawley rats by a single dose of STZ (60 mg/kg; ip). Diabetic rats had significantly elevated levels of lipid peroxidation (TBARS), up-regulated activities of superoxide dismutase (SOD) and glutathione peroxidase (GPx) while catalase (CAT) activity was significantly reduced. Glibenclamide and metformin produced no significant effects on TBARS and antioxidant enzymes except GPx in diabetic rats. In contrast the combination of glibenclamide, metformin and honey significantly up-regulated CAT activity and down-regulated GPx activity while TBARS levels were significantly reduced.

I68 Effects of a Herbal Ergogenic Drink on Cycling Performance in Young Cyclists

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Mal J Nutr 7(1&2): 33-40, 2001

It is essential to replace fluids lost so as to remain well hydrated during exercise. The intake of fluids is considered a physiological ergogenic aid to enhance exercise performance. There are currently several products in the market that are believed to have ergogenic properties which act as fluid replacement drinks during exercise. One such drink available in the Malaysian market is 'AgroMas®' herbal drink whose efficacy is yet to be proven. The purpose of this study was, therefore, to evaluate the effects of acute ingestion of this herbal drink (H) or a coloured water placebo (P) on cycling performance. Nine healthy and trained young male cyclists (age: 16.2 ± 0.5 years) exercised on a cycle ergometer at 71.9 ± 0.7% of maximal oxygen consumption (VO2max) until exhaustion on two occasions at 1-week intervals. During each exercise bout, subjects received 3ml kg-1 body weight of H or P every 20 min in a double-blind randomised study design. There was no significant difference between H and P trials in the total work time to exhaustion (83.7 ± 4.6 and 81.5 ± 5.0 min respectively). Changes in oxygen consumption, heart rate and perceived rate of exertion were similar for both types of drinks. These results demonstrate that the herbal drink and the placebo elicited similar physiological responses and exercise performance during endurance cycling. It is therefore concluded that AgroMas® herbal drink and water ingestion resulted in a similar ergogenic response on cycling performance in young cyclists.

I69 The effects of Berberis vulgaris aqueous extract on apoptosis and trace elements properties in Hepatocarcinogenesis rats

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Malaysian Journal of Clinical Biochemistry 5(1), 2010

Berberis vulgaris is the most significant European representative of the Berberidaceae and has been used extensively as a medicinal plant in taditional medicine. The effect Berberis vulgaris aqueous extract in hepatocarcinogenesis rats was studied to investigate the apoptosis and antioxidant elements properties. Sprague dawley rats

were randomly divided into 2 groups, normal and cancerous. Each group was futher sub-divided into 4 groups. The first group acts as normal control while the others were treated with 25, 50 and 100 mg/kg of Berberis vulgaris extract and were considered as NC, NC25, NC50 and NC100 respectively. The first group of cancerous rats acts as cancer control while the others were treated with 25, 50 and 100 mg/kg of Berberis vulgaris extract and considered as C, C25, C50 and C100 respectively. Results showed that microscopic observations of the TUNEL-positive apoptosis cells were significantly different ($p<0.05$) between cancer control (C) and normal control (NC) group. The results indicate that increasing concentrarion of Berberis vulgaris aqueous extract in cancer treated groups (C25, C50 and C100) showed an increasing significant different ($p<0.05$) of TUNEL-positive apotosis cells compared to cancer control group (C). The level of antioxidant elements observed was variable. Sodium and chloride level were significantly diefferent ($p<0.05$) in cancer control group (C) compared to normal control group (NC). These results suggest that apotosis levvel was increased by Berberis vulgaris extract concentration in cancerous groups. The Berberis vulgaris extract may play a prominent role in promoting apotosis upon the treatment of cancerous groups (C50, C100) and it is does dependent.

I70 Iron availability from Spirulina (Arthrospira platensis) using two in vitro Digestion Methods with the Caco-2 Cell Culture System

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ASEAN Food Journal 13(2):93-101, 2004

This study assessed the availability of iron from Arthrospira platensis (spirulina) using two different in vitro digestion methods combined with the Caco-2 cell culture system. Comparison was made between cultured spirulina and commercial spirulina while ferrous sulphate (FeSO4) was used as a reference. The two in vitro digestion methods were dialysis and centrifugation. Dialysis involved a dialysis bag (12,000-14,000 molecular weight cut-off) to obtain dialyzable iron compared to centrifugation at 15,000 x g for 5 mins at the end of digestion to obtain soluble iron. Both the contents of the dialysis bag and supernatants after the centrifugation were applied to Caco-2 cell monolayers. For both cultured and commercial spirulina, the centrifugation method yielded higher results for both soluble iron and the amount of iron being transported across the Caco-2 cells, compared to the dialysis method. However for FeSO4, the amount of soluble iron and transported iron did not differ significantly between the dialysis and centrifugation methods. The iron availability from spirulina measured by different in vitro digestion methods varied, possibly due to the way iron is complexed in spirulina.

I71 Toxicological Evaluation of Dried Kacangma Herb (Leonurus sibiricus) in Rats

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Sains Malaysiana 38(4): 499-509, 2009

Kacangma (Leonurus sibiricus L.) is a popular traditional herb that has been consumed for decades by the people of Sarawak as a herbal medicine or culinary ingredient. The toxicity of dried kacangma herb on Sprague Dawley male and female rats was evaluated through 90-day sub-chronic studies. The rats were fed kacangma at the rate of 0.5 (low dose), 5 (medium dose) and 25 (high dose) g/kg body weight. The control groups of rats received only the commercial rat pellet. Minor treatment-related effects were observed for body weights, organ weights and the lipid profile parameters and these did not appear to be of toxicological significance. In the sub-chronic toxicity studies, some indications of renal and liver toxicity were evident in the medium and high dose groups when plasma creatinine and liver enzymes were found to be higher when compared with the control and the low dose groups. The hematology study reveals statistically significant mild anemia in rats from the medium and high dose groups as indicated by decreases in hemoglobin, red blood cell count and packed cell volume (hematocrit value). Administration of kacangma herb at medium and high dose was also found to cause adverse effects in histopathological structure of the liver and kidney of both male and female rats. However, low dose group showed no significant differences compared to the control. Therefore, it is considered safe and less chance of developing toxicity if the herb is consumed at the dose of 0.5 g/kg body weight as observed throughout the 90 days period of sub-chronic study.

I72 Plasmid-mediated streptomycin resistance of listeria monocytogenes

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Mal J Med Scien 8(1): 59-62, 2001

A strain of streptomycin-resistant Listeria monocytogenes LM35 isolated from imported frozen beef was examined in this study. In conjugation studies, the L. monocytogenes LM35 strain harbouring two plasmids of 54, 3.0, 2.8 and 2.7 kilobase was used as the donor and streptomycin-sensitive and plasmidless L. monocytogenes LM65 and LM100 strains as the recipients. Streptomycin resistance was transferred to L. monocytogenes LM65 and LM100 strains at frequencies of

3.3 x 10-8 and 1.2 x 10-9 per input donor cells, respectively. In both occasions, we also observed the concomitant transfer of the donor's 54 kilobase plasmid. These results suggest that streptomycin resistance in L. monocytogenes LM35 was mediated by the 54 kilobase plasmid.

I73 Dietary γ-Tocopherol attenuates the impact of γ-Tocotrienol on Hepatic 3-Hydroxy-3-Methylglutaryl Coenzyme A Reductase activity in chickens

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J. Nutr 126: 389-394, 1996

The concentration-dependent impact of γ-tocotrienol on serum cholesterol can be traced to the posttranscriptional down-regulation of 3-hydroxy-3-methylglutaryl coenzyme A reductase activity. γ-Tocotrienol also suppresses tumor growth. Palmvitee, the tocopherol and tocotrienol-rich fraction of palm oil, is the sole commercial source of γ -tocotrienol. Contrary to the universal findings of the efficacy of γ -tocotrienol there are conflicting reports of the impact of Palmvitee on 3-hydroxy-3-methylglutaryl coenzyme A reductase activity, serum cholesterol concentrations and tumor development. These conflicting reports led us to examine the impact of α-tocopherol on the cholesterolsuppressive action of γ -tocotrienol. Control and experimental diets were fed to groups of White Leghorn chickens (n = 10) for 26 d. The control diet was supplemented with 21 nmol a-tocopherol/g. All experimental diets provided 141 nmol of blended tocols/g diet. The γ -tocopherol and γ -tocotrienol concentrations of the experimental diets ranged from 21 to 141 and 0 to 120 nmol/g, respectively. We now report that including a-tocopherol in tocol blends containing adequate γ -tocotrienol to suppress 3-hydroxy-3-methylglutaryl coenzyme A reductase activity results in an attenuation of the tocotrienol action (P < 0.001). A summary of results from studies utilizing different Palmvitee preparations shows that effective preparations consist of 15-20% γ -tocopherol and ~60% γ - (and δ-) tocotrienol, whereas less effective preparations consist of 5:30% γ - tocopherol and 45% 7 γ - (and δ-) tocotrienol.

I74 Long-term administration of tocotrienols and tumor-marker enzyme activities during hepatocarcinogenesis in rats

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Nutrition. 9(3): 229-32, 1993

The effects of long-term administration of tocotrienol on hepatocarcinogenesis in rats induced by diethylnitrosamine (DEN) and 2-acetylaminofluorene (AAF) were investigated by determining the activities of gamma-glutamyl transpeptidase (GGT), alkaline phosphatase (ALP), glutathione S-transferases (GSTs), and glutathione (GSH) levels in blood and liver. Twenty-eight male 7- to 8-wk-old Rattus norwegicus rats, weighing 120-160 g, were used in this study. The rats were divided into four treatment groups: a control group on a basal diet, a group fed a basal diet supplemented with tocotrienol (30 mg/kg food), a group treated with DEN/AAF, and a group treated with DEN/AAF and fed a diet supplemented with tocotrienol (30 mg/kg food). Blood was collected monthly, and GGT, ALP, and GSH levels were determined. The rats were killed after 9 mo, and the livers were examined morphologically. Grayish white nodules (2/liver) were found in all the DEN/AAF-treated rats (n = 10), but only one of the rats treated with DEN/AAF and supplemented with tocotrienol (n = 6) had liver nodules. A significant increase in the level of blood and liver GSH, ALP, and GGT activities was observed in the DEN/AAF-treated rats. Liver GSTs were similarly increased with DEN/AAF treatment. Tocotrienol supplementation attenuated the impact of the carcinogens in the rats.

I75 Comparison between the effect of soybean and goat's milk on tumor-marker enzyme activities during hepatocarcinogenesis in rats

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Malaysian Journal of Medical Sciences 8(1): 41-45, 2001

Milk is a physiological fluid which has high nutritional value and soybean has strong antioxidant characteristics which is believed to inhibit carcinogenesis. The objective of this study was to investigate the effects of administration of soybean and goat's milk on hepatocarcinogenesis in rats (fed with diethylnitrosamine; DEN and acetylaminofluorene; AAF) by determining the activities of plasma gammaglutamyl transpeptidase (GGT) and alkaline phosphatase (ALP). Thirty-six rats from the species Sprague-Dawley were divided into 6 groups : control, DEN/AAF, soybean, DEN/AAF with soybean treatment, goat's milk and DEN/AAF with goat's milk treatment. Soybean and goat's milk administrations were given 5 ml/day. The rats were sacrificed after 8 weeks and the blood was collected. Treatment with DEN/

AAF caused an increase in ALP and GGT levels and a decrease in weight significantly ($p<0.05$). ALP and GGT activities decreased significantly after administration of soybean and goat's milk ($p<0.05$). Administration of goat's milk and soybean alone did not cause any changes in the enzyme activities. Comparison between the effect of soybean and goat's milk in reducing the enzyme activities (ALP and GGT) did not give significant values ($p>0.05$). However, a decrease in weight was observed in the rats given soybean as well as goat's milk. The results obtained suggested that soybean and goat's milk may work as anti cancer agents in hepatocarcinogenesis although further studies are required to further elucidate this aspect.

I76 Effect of pre-germination time of brown rice on serum cholesterol levels of hypercholesterolaemic rats

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J Sci Food Agric. 90(2): 245-51, 2010

Brown rice is unpolished rice with immeasurable benefits for human health. Brown rice (BR) and pre-germinated brown rice (PGBR) are known to contain various functional compounds such as gamma-oryzanol, dietary fibre and gamma-aminobutyric acid (GABA). In the present study, the experimental diets containing BR and PGBR (24, 48 h pre-germination) were used to investigate the influence of pre-germination time of brown rice on blood cholesterol in Sprague-Dawley male rats. RESULTS: Hypercholesterolaemia and elevation of LDL-cholesterol were successfully ameliorated by the experimental diets containing BR and PGBR (24 and 48h pre-germination). As compared to the control sample, the pre-germination time had a significant ($P < 0.05$) effect on blood cholesterol of Sprague-Dawley male rats. It was also found that the significantly ($P < 0.05$) better effect on lipid profile of hypercholesterolaemic rats was observed by prolonging the pre-germination time. As compared to non-germinated brown rice, the germinated brown rice showed the higher cardio-protective effect on hypercholesterolaemic Sprague-Dawley male rats. CONCLUSION: The present study suggests that the changes of blood cholesterol can be mainly modulated by using the PGBR rather than BR. The prolonging of pre-germination time led to an increase in the bioactive components, thereby providing a more efficient functional diet affecting the high blood cholesterol. This study suggests that PGBR can be used instead of BR and polished rice in the human diet.

I77 Protective effect of polyphenol-rich extract prepared from Malaysian cocoa (Theobroma cacao) on glucose levels and lipid profiles in streptozotocin-induced diabetic rats

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Journal of the Science of Food and Agriculture 88: 1442-1447, 2008

Cocoa beans are used for preparing cocoa liquor and cocoa powder, which are the main ingredients of cocoa-based products. Previous studies have reported the health benefits of cocoa polyphenols in reducing the risk of cardiovascular diseases. However, there is no report on the efficacy of cocoa polyphenols on diabetes mellitus. Therefore this study was designed to evaluate the protective effect of cocoa polyphenol-rich extract (CE) on glucose levels and lipid profiles in streptozotocin (STZ)-induced diabetic rats. Male Sprague-Dawley rats were divided into diabetic control, diabetic CE and diabetic glibenclamide groups. Three different dosages of CE (10, 20 and 30mg per 100 g body weight) were administered orally once a day for 1 week before STZ injection and for 3 weeks thereafter. The results showed that CE could normalize the body weight loss caused by STZ. In the 20mg CE-pretreated group there was a 143% increase in plasma glucose levels, compared with a 226% increase in diabetic control rats. CE could also normalise total cholesterol, triglycerides and high-density lipoprotein cholesterol at the end of the experiment compared with the baseline. The present study suggests that pretreatment with CE from roasted cocoa beans could prevent the development of diabetes induced by STZ injection in rats.

I78 The effect of Malaysian cocoa extract on glucose levels and lipid profiles in diabetic rats

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J Ethnopharmacol. 98(1-2):55-60, 2005

The present study aims to investigate the effect of cocoa extract on serum glucose levels and lipid profiles in streptozotocin-diabetic rats. Cocoa extract (contained 285.6 mg total polyphenol per gram extract) was prepared from fermented and roasted (140 degrees C, 20 min) beans by extracting using 80% ethanol in the ratio of 1-10. The extract of three dosages (1, 2, and 3%) was fed to normal and diabetic

rats for a period of 4 weeks. In hyperglycaemic group, cocoa extract (1 and 3%) diets were found to significantly lower ($p<0.05$) the serum glucose levels compared to the control. Furthermore, supplementation of 1 and 3% cocoa extract had significantly reduced ($p<0.05$) the level of total cholesterol in diabetic rats. In addition, 1, 2, and 3% cocoa extract diets had significantly lowered ($p<0.05$) the total triglycerides. Interestingly, this study found that serum HDL-cholesterol had increased significantly ($p<0.05$) in diabetic rats fed with 2% cocoa extract, while the LDL-cholesterol had decreased significantly ($p<0.05$) in the 1% treated group. These results indicate that cocoa extract may possess potential hypoglycaemic and hypocholestrolemic effects on serum glucose levels and lipid profiles, respectively. The results also found that the effect of cocoa extract was dose-dependent.

I79 Comparative effects of dietary corn oil, safflower oil, fish oil and palm oil on metabolism of ethanol and carnitine in the rat

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Journal of the American College of Nutrition 21(3): 233-238, 2002

Objective: This study was launched to determine comparative effects of corn oil (CO), safflower oil (SO), fish oil (FO) and palm oil (PO) on carnitine status and ethanol metabolism in rats.

Methods: Twenty-four male Sprague-Dawley rats (300 g bw) were randomly divided into four groups (n _6) and fed a semisynthetic diets containing fat as oils listed above. Blood and 24 hour urine samples were collected before and after dietary treatment and acute ethanol administration. Samples were analyzed for blood-ethanol concentration (BEC) and carnitine species.

Results: The diets containing FO and PO retarded ethanol metabolism compared to the diets containing CO and SO. The effect of these dietary fats on carnitine species in plasma and urine was varied before and after dietary treatment and following a single oral ethanol dose. The liver carnitine content was higher in the PO group after dietary and ethanol treatment.

Conclusion: It is concluded that attenuation of ethanol clearance was related to unique fatty acid makeup of the oils that in part may be attributed to the composite ratio of saturated to unsaturated fatty acids in the oils.

I80 Potential anticancer effect of red spinach (Amaranthus gangeticus) extract

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Asia Pac J Clin Nutr.13(4):396-400, 2004

The objective of this study was to determine the anti cancer effects of red spinach (Amaranthus gangeticus Linn) in vitro and in vivo. For in vitro study, microtitration cytotoxic assay was done using 3-(4,5-dimethylthiazol-2-il)-2,5-diphenil tetrazolium bromide (MTT) kit assay. Results showed that aqueous extract of A gangeticus inhibited the proliferation of liver cancer cell line (HepG2) and breast cancer cell line (MCF-7). The IC(50) values were 93.8 mu g/ml and 98.8 mu g/ml for HepG2 and MCF-7, respectively. The inhibitory effect was also observed in colon cancer cell line (Caco-2), but a lower percentage compared to HepG2 and MCF-7. For normal cell line (Chang Liver), there was no inhibitory effect. In the in vivo study, hepatocarcinogenesis was monitored in rats according to Solt and Farber (1976) without partial hepatectomy. Assay of tumour marker enzymes such as glutathione S-transferase (GST), gamma-glutamyl transpeptidase (GGT), uridyl diphosphoglucuronyl transferase (UDPGT) and alkaline phosphatase (ALP) were carried out to determine the severity of hepatocarcinogenesis. The result found that supplementation of 5%, 7.5% and 10% of A. gangeticus aqueous extract to normal rats did not show any significant difference towards normal control ($P < 0.05$). The exposure of the rats to chemical carcinogens diethylnitrosamine (DEN) and 2-acetylaminofluorene (AAF) showed a significant increase in specific enzyme activity of GGT, GST, UDPGT and ALP compared to normal control ($P < 0.05$). However, it was found that the supplementation of A. gangeticus aqueous extract in 5%, 7.5% and 10% to cancer-induced rats could inhibit the activity of all tumour marker enzymes especially at 10% ($P < 0.05$). Supplementation of anti cancer drug glycyrrhizin at suggested dose (0.005%) did not show any suppressive effect towards cancer control ($P < 0.05$). In conclusion, A. gangeticus showed anticancer potential in in vitro and in vivo studies.

I81 Keseimbangan cecair badan semasa senaman dalam keadaan berhaba

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Malaysian Journal of Medical Sciences 10(2): 4-19, 2003

Major sporting events in Asia are commonly staged in hot environments where the average daytime temperature is generally 29-31°C with the average relative humidity ranging from 80-95%. Exercise capacity and exercise performance are reduced when the ambient temperature is high and it has major implications for

competitors as well as for spectators and officials. Prolonged exercise leads to progressive water and electrolyte loss from the body as sweat is secreted to promote heat loss. The rate of sweating depends on many factors and increases in proportion to work rate and environmental temperature and humidity. Sweat rates are highly variable and can exceed 2L.h-1 for prolonged periods in high heat. Since dehydration will impair exercise capacity and can pose a risk to health, the intake of fluid during exercise to offset sweat losses is important. Carbohydrate-electrolyte fluid ingestion during exercise has the dual role of providing a source of carbohydrate fuel to supplement the body's limited stores and of supplying water and electrolytes to replace the losses incurred by sweating. The composition of the drinks to be taken will be influenced by the relative importance of the need to supply fuel and water which, is in turn depends on the intensity and duration of exercise activity, the ambient temperature and humidity. Carbohydrate-electrolyte solutions appear to be more effective in improving performance than plain water. There is no advantage to fluid intake during exercise of less than 30-minute duration. Complete restoration of fluid balance after exercise is an important part of the recovery process and becomes even more important in hot, humid conditions. If a second bout of exercise has to be performed after a relatively short interval, the speed of rehydration becomes of crucial importance. Rehydration after exercise requires not only replacement of volume losses, but also replacement of some electrolytes, primarily sodium. Studies show that rehydration after exercise can be achieved only if sweat electrolyte losses as well as water are replaced. Drinks with low sodium content are ineffective at rehydration and they will only reduce the stimulus to drink. Addition of small amount of carbohydrate to the rehydrating drinks may improve the rate of intestinal uptake of sodium and water and will improve palatability. The volume of the rehydration beverage consumed should be greater than the volume of sweat lost to provide the ongoing obligatory urine losses and palatability of the beverage is a major issue when a large volume of fluid has to be consumed.

I82 Vitamin C and aloe vera supplementation protects from chemical hepatocarcinogenesis in the rat

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Nutrition. 14(11-12):846-852, 1998

The effects of vitamin C and aloe vera gel extract supplementation on induced hepatocarcinogenesis in male Sprague-Dawley rats (120-150 g) by diethylnitrosamine (DEN) and 2-acetylaminofluorene (AAF) was investigated. The severity of the carcinogenesis process was determined by measuring gamma-glutamyl transpeptidase (GGT) and the placental form of glutathione S-transferase (GSTP) histochemically in situ and in plasma and liver fractions. In addition, plasma alkaline phosphatase (ALP) and liver microsomal uridine diphosphate glucuronyl transferase

(UDPGT) activity were also determined. Administration of DEN/AAF caused an increase in the surface area and number of enzyme-positive foci (both GGT and GSTP) compared with control. Supplementation of vitamin C or aloe vera gel extract to the cancer-induced rats suppressed this increase significantly ($P < 0.05$; $P < 0.001$). Increases in liver UDPGT, GGT, and GSTP activities were also observed with cancer induction that were again suppressed with either vitamin C or aloe vera gel supplementation. Plasma GGT in the DEN/AAF rats were determined monthly for the duration of the experiment and found to be reduced as early as 1 mo with aloe vera gel supplementation and 2 mo with vitamin C supplementation. In conclusion, vitamin C and aloe vera gel extract supplementation were found to be able to reduce the severity of chemical hepatocarcinogenesis.

I83 Production of L2 lipase by Bacillus sp. strain L2: nutritional and physical factors

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J Basic Microbiol. 47(5): 406-412, 2007

A thermophilic bacterium, Bacillus sp. strain L2 was isolated from a hot spring in Perak, Malaysia. An extracellular lipase activity was detected through plate and broth assays at 70 degrees C after 28 h of incubation. The L2 lipase production was growth dependent as revealed by a number of factors affecting the secretion of extracelullar lipase. As for nutritional factors, casamino acids, trehalose, $Ca(^{2+})$ and Tween 60 were found to be more effective for lipase production. The optimum physical condition for L2 lipase production was obtained at 70 degrees C after 28 h of cultivation time, at pH 7.0, 150 rpm of agitation rate and 1% of starting inoculum size. The activity staining of crude L2 lipase revealed a clearing zone at 39 kDa.

I84 DNA damaging effect of selected salted and fermented food products against chang liver cell

R Sharif, Ghazali AR & Rajab NORF

Jurnal Sains Kesihatan Malaysia 5(2): 63-77, 2007

DNA damaging effect of the salted and fermented food products (salted fishes, dried shrimps and shrimp pastes) collected from three different locations in Malacca namely Pantai Puteri, Batang Tiga and Kelemak on the DNA of the Chang liver cells were evaluated via Alkaline Comet Assay. Treatment at 62.5 mg/ml following 24 hours of incubation was used based on the preliminary cytotoxicity data. Percentage of damage to the DNA was calculated using software for scoring based on the tail moment and tail intensity (severity of the DNA damage). Hydrogen peroxide was used as positive control at 0.1 mM following 30 minutes

of incubation in 4 C. The result showed that the methanol extracts of shrimp pastes and salted fish from Pantai Puteri, exhibited a higher DNA damage (shrimp pastes - TM - 8.33 ± 2.19; TI - 31.67 ± 5.84, salted fishes - TM - 2.25 ± 0.86; TI - 9.25 ± 1.55) and were expressed as (shrimp pastes) 56.66 ± 8.74% of DNA damage and methanol salted fish extracts from the same location showed 13.00 ± 2.84% DNA damage on Chang liver cells compared to the other extracts. Values for methanol extract of shrimp pastes from Pantai Puteri were comparable to the positive control - Hydrogen peroxide (TM - 9.50 ± 1.50; TI - 30.50 ± 2.50). On the other hand, aqueous salted fishes extract from Pantai Puteri (TM - 1.33 ± 0.42; TI - 8.67 ± 2.42) and shrimp pastes extracts from Kelemak (methanol extract - TM - 1.75 ± 0.15; TI - 7.50 ± 0.50, aqueous extract - TM - 1.00 ± 0.00; TI - 5.00 ± 0.00) showed slightly high value for tail intensity as compared to negative control (TM - 0.29 ± 0.05; TI - 2.50 ± 0.29). Values for methanol extracts of shrimp pastes from Pantai Puteri were comparable to the positive control (TM - 9.50 ± 1.50; TI - 30.50 ± 2.50). In conclusion, our results demonstrate genotoxic damage induced by few salted and fermented food extracts in Chang liver cell.

I85 Fluid Balance and Exercise Performance

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Mal J Nutr 9(1): 53-74, 2003

Major sporting events in Malaysia are commonly staged in hot environments where the average daytime temperature is generally in the range of 29 to 31°C with the average relative humidity ranging from 80 to 95%. Exercise capacity and exercise performance are reduced when the ambient temperature is high and it has major implications for competitors as well as for spectators and officials. Prolonged exercise leads to progressive water and electrolyte loss from the body as sweat is secreted to promote heat loss. The rate of sweating depends on many factors and increases in proportion to work rate and environmental temperature and humidity. Sweat rates are highly variable and can exceed 2L.h-1 for prolonged periods in high heat. Since dehydration will impair exercise capacity and can pose a risk to health, the intake of fluid during exercise to offset sweat losses is important. Carbohydrate-electrolyte fluid ingestion during exercise has the dual role of providing a source of carbohydrate fuel to supplement the body's limited stores and of supplying water and electrolytes to replace the losses incurred by sweating. The composition of the drinks to be taken will be influenced by the relative importance of the need to supply fuel and water which, in turn depends on the intensity and duration of exercise activity, the ambient temperature, and humidity. Carbohydrate-electrolyte solutions appear to be more effective in improving performance than plain water. There is no advantage to fluid intake during exercise of less than 30-minute duration. Complete restoration of fluid balance after exercise is an important part of the recovery process and becomes even more important in hot, humid conditions. If a

second bout of exercise has to be performed after a relatively short interval, the speed of rehydration becomes of crucial importance. Rehydration after exercise requires not only replacement of volume losses, but also replacement of some electrolytes, primarily sodium. Studies show that rehydration after exercise can be achieved only if sweat electrolyte losses as well as water are replaced. Drinks with low sodium content are ineffective at rehydration and they will only reduce the stimulus to drink. Addition of smalls amounts of carbohydrate to the rehydrating drinks may improve the rate of intestinal uptake of sodium and water and will improve palatability. The volume of the rehydration beverage consumed should be greater than the volume of sweat lost to provide the ongoing obligatory urine losses. Palatability of the beverage is a major issue when a large volume of fluid has to be consumed.

I86 The effects of palm vitamin e supplementation on glycemic control and lipid profile in streptozotocin-induced diabetic rats

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Jurnal Sains Kesihatan Malaysia Jilid 3(1) 2005

In this study, the effects of palm vitamin E (PV) supplementation on glycemic control and lipid profile in diabetic-induce Sprague-Dawley rats have been evaluated. Diabetes in the rats was induced by a single intravenous streptozotocin (50 mg/kg body weight). The diabetic rats were divided into two groups; supplemented with 200 mg/kg body weight/day of PV and non-supplemented with PV (No PV group). Non-diabetic rats (NDM) formed the control group and only received saline injection. After eight weeks of daily supplementation, PV significantly lowered the fasting blood glucose (FBG) and glycosylated haemoglobin (HbA1c) levels ($p<0.01$) as compared with No PV group. However, these levels were still significantly higher than the control group ($p<0.001$). PV supplementation group also showed significantly lower levels of plasma total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C) ($p<0.001$) and higher level of highdensity lipoprotein cholesterol (HDL-C) ($p<0.001$) as compared with No PV group. In conclusion, this study suggested that PV may be effective in controlling glycemic status and improving dyslipidemia in streptozotocin-induced diabetic rats and has the potential in reducing cardiovascular complication due to diabetes mellitus.

I87 Serum Testosterone Levels and Body Weight Gain of Male Rabbits Fed with Morinda citrifolia Fruit Juice

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Mal J Nutr 11(1): 59-68, 2005

Morinda citrifolia, popularly known as noni, has been reported to possess antidiabetic, antiseptic and antibiotic properties, as well as hypotensive and anticoagulant activities. M. citrifolia was also reported to possess immunomodulation characteristics, anticancer activity and may also be useful as an aphrodisiac. The effects of Morinda citrifolia fruit juice on serum testosterone concentration and body weight of twelve New Zealand White male rabbits were studied for 8 weeks. Three groups of rabbits (n = 3 each) were treated orally with dosages of 200 mg/kg, 400 mg/kg and 800 mg/kg of the fruit juice respectively. Another group of rabbits (n = 3) served as control. Body weights of rabbits were measured daily. Serum testosterone levels were determined every fifth day using enzyme immunoassay method. The results obtained showed that in all groups, serum testosterone level decreased as compared to the baseline values, but the changes were not statistically significant. Body weight gain was also not significantly different among all treatment groups. There was a negative association (r = - 0.365) between serum testosterone level and body weight of rabbits in the control group. However, the changes in serum testosterone level were not significantly correlated with the changes in body weight of rabbits in the treatment groups. The findings suggest that feeding Morinda citirolia juice to male rabbits for a short duration did not produce any significant changes to serum testosterone and body weight gain.

I88 Effects of L-Arginine on the Reproductive System of Male Rabbits

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Mal J Nutr 12(2): 201-211, 2006

L-arginine is an amino acid, which serves as the sole substrate for nitric oxide (NO) synthesis with the concomitant formation of L-citrulline in biologic system. NO has been demonstrated to be involved in smooth muscle relaxation and vasodilation, immune regulation and neurotransmission. It also has an important function as both intercellular and intracellular signals in many physiological systems, including the reproductive system where NO mediates penis erection. This study was undertaken

to determine the effects of L-arginine on sperm motility, sperm count, and the nitric oxide level in the seminal plasma. Twelve sexually matured male rabbits (Oryctolagus cuniculus) were randomly divided into four groups with three rabbits each, which were control, low, medium, and high concentration groups. The treatment groups were force-fed with 100mg/kg, 200mg/kg, and 300mg/kg body weight of L-arginine for four weeks, whereas the control group was force-fed with water. Semen samples were collected every three days alternatively for a week before starting treatment and then after four weeks of treatment. Pre-treatment and post-treatment results were compared. Semen samples were collected using artificial vaginas from each group for sperm analysis such as sperm motility, sperm count and NO level in seminal plasma. Sperm motility and sperm count were analysed manually under microscope (twenty power objective), using a Makler counting chamber. NO levels in the seminal plasma were determined using Griess reaction. The results obtained from this study showed that oral consumption of L-arginine exerted a significant ($p<0.05$) effect in decreasing sperm motility in all treatment groups but showed a significant ($p<0.05$) increase in sperm count (25.5%) in group 3 (200 mg/kg of L-arginine). This experiment also showed that there was a significant ($p<0.05$) increase in NO concentration with L-arginine consumption. The levels of NO concentration were significantly correlated ($r = 0.624$) to L-arginine consumption. Besides, there was a significant ($p<0.05$) positive correlation ($r = 0.584$) between NO concentrations with sperm count. However, there was a significant negative correlation ($r = -0.775$) between NO concentrations with sperm motility. Thus, data suggests that oral consumption of L-arginine can increase NO level, which in turn increases sperm count but exerts a reduction in sperm motility.

I89 Modulation of human lipids and lipoproteins by dietary palm oil and palm olein: a review

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Asia Pacific J Clin Nutr 6(1): 12-16, 1997

Several human clinical trials have now evaluated palm oil's effects on blood lipids and lipoproteins. These studies suggest that palm oil and palm olein diets do not raise plasma TC and LDL-cholesterol levels to the extent expected from its fatty acid composition. With maximum substitution of palm oil in a Western type diet some coronary heart disease risk factors were beneficially modulated: HDL2-cholesterol was significantly increased while the apolipoprotein B/A1 ratio was beneficially lowered by palm oil. Comparison of palm olein with a variety of monounsaturated edible oils including rapeseed, canola, and olive oils has shown that plasma and LDL-cholesterol were not elevated by palm olein. To focus these findings, specific fatty acid effects have been evaluated. Myristic acid may be the most potent cholesterol raising saturated fatty acid. Palmitic acid effects were largely comparable to the monounsaturated oleic acid in normolipidaemic subjects while trans fatty acids detrimentally increased plasma cholesterol, LDL-cholesterol, lipoprotein

Lp(a) and lowered the beneficial HDL-cholesterol. Apart from these fatty acids there is evidence that the tocotrienols in palm oil products may have a hypocholesterolaemic effect. This is mediated by the ability of the tocotrienols to suppress HMG-CoA reductase. These new findings on palm oil merit a scientific reexamination of the classical saturated fat-lipid hypothesis and its role in lipoprotein regulation.

I90 Impact of saturated and trans fatty acid enriched oil blends on atherosclerosis in rabbits fed cholesterol-free diets

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Asia Pacific J Clin Nutr 6(1): 31-35, 1997

Thirty six-male New Zealand White rabbits subdivided into four dietary groups (9 animals per group) were fed high fat (36% en), cholesterol-free diets for nine months. The dietary oil blends were formulated to contain high levels of the target fatty acids namely trans-rich (partially hydrogenated soybean oil; TRANS), cis monounsaturated-rich (rapeseed, sunflower seed oil and palm olein; MONO), palmitic-rich (palm olein; POL) and lauric-myristic rich (coconut, palm kernel and corn oils; LM). Ad libitum feeding of the rabbits resulted in normal growth throughout the nine months and no differences in the final body weights of the animals were evident at autopsy. Plasma total cholesterol was significantly elevated only by the LM enriched diet compared with all other treatments; values were comparable between the other three treatment groups. Changes in the total cholesterol were not reflected in the VLDL and LDL lipoproteins. However, HDL-cholesterol was significantly lowered by the TRANS diet compared with all other dietary groups. HDL-cholesterol was also significantly increased by the LM diet in comparison to the POL-diet. Both adipose and liver triglyceride fatty acid compositions tended to reflect the type of fatty acids fed the animals. Trans fatty acids were evident only in animals fed the trans diet and it was apparent that the trans fatty acids competed with linoleic acid for incorporation into these tissues. Increased concentrations of lauric and myristic fatty acids in the LM-fed animals were also evident. In the POL and high MONO fed rabbits, palmitic and oleic fatty acids (respectively) were concentrated in the adipose and liver. The diets, however, failed to induce severe atherosclerosis in this study. This can be explained, in part, by the lack of dietary cholesterol and the use of plant (rather than animal) proteins in our dietary formulations. The effect of these important atherosclerosis modulators in association with these fatty acids requires further evaluation.

I91 Inhibitory effect of palm oil on cancer progression

Sundram K

ASEAN Food Journal 4(3): 87-91, 1989

Female Sprague Dawley rats were treated with the chemical carcinogen, dimethyl benzantracen and fed diets containing 20% crude or processed palm oils and compared with corn and soyabean oils. It was found that tumour incidence was more rapid and enhanced in the polyunsaturated corn and soyabean oil fed rats compared to the palm oil group. Tumour yield in all three palm oil diets was also significantly lower than either corn or soyabean oil diets. It was suggested that the inhibitory effects observed for palm oil could be due to the carotenoids (in crude palm oil) and tocopherols and tocotrienols present in these oils acting as natural anti-oxidants.

I92 Stearic acid-rich interesterified fat and trans-rich fat raise the LDL/HDL ratio and plasma glucose relative to palm olein in humans

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Food Technology & Nutrition Research Unit, Malaysian Palm Oil Board, Kuala Lumpur, Malaysia.

Nutr Metab 4:3, 2007

BACKGROUND: Dietary trans-rich and interesterified fats were compared to an unmodified saturated fat for their relative impact on blood lipids and plasma glucose. Each fat had melting characteristics, plasticity and solids fat content suitable for use as hardstock in margarine and other solid fat formulations. METHODS: Thirty human volunteers were fed complete, whole food diets during 4 wk periods, where total fat (approximately 31% daily energy, >70% from the test fats) and fatty acid composition were tightly controlled. A crossover design was used with 3 randomly-assigned diet rotations and repeated-measures analysis. One test fat rotation was based on palm olein (POL) and provided 12.0 percent of energy (%en) as palmitic acid (16:0); a second contained trans-rich partially hydrogenated soybean oil (PHSO) and provided 3.2 %en as trans fatty acids plus 6.5 %en as 16:0, while the third used an interesterified fat (IE) and provided 12.5 %en as stearic acid (18:0). After 4 wk the plasma lipoproteins, fatty acid profile, as well as fasting glucose and insulin were assessed. In addition, after 2 wk into each period an 8 h postprandial challenge was initiated in a subset of 19 subjects who consumed a meal containing 53 g of test fat. RESULTS: After 4 wk, both PHSO and IE fats significantly elevated both the LDL/HDL ratio and fasting blood glucose, the latter almost 20% in the IE group relative to POL. Fasting 4 wk insulin was 10% lower after PHSO ($p > 0.05$) and 22% lower after IE ($p < 0.001$) compared to POL. For the postprandial study the glucose incremental area under the curve (IAUC) following the IE meal was 40% greater than after either other meal ($p < 0.001$), and was linked to relatively depressed insulin and C-peptide ($p < 0.05$). CONCLUSION: Both PHSO and IE fats altered the metabolism of lipoproteins and glucose relative to an unmodified saturated fat when fed to humans under identical circumstances.

I93 The effect of cellulose on crystal formation in the kidneys of guinea pigs fed diet rich in calcium and sodium

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Mal J Nutr 2: 79-86, 1996

Our earlier report showed that diet rich in calcium and sodium fed to guinea pigs can be urolithogenic. In this study, we investigated the effect of adding 3% or 15% cellulose as a source of fiber into similar diet to asses the formation of kidney calculus. From the result, animals fed diet with 3% cellulose showed a relatively high concentration of urinary oxalate, urate and large number of crystals in the kidneys. When the cellulose level was raised to 15%, the concentrations of urinary calcium, urate and the number of crystals formed in the kidneys were lowered. We therefore, conclude that high fiber diet may be beneficial in reducing the incidence of kidney stones of calcium origin.

I94 Dose-Dependent Cholesterolemic Activity of Tocotrienols and a-Tocopherol

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Mal J Nutr 8(2): 157-166, 2002

Tocotrienols and tocopherols are isoforms of vitamin E. Vitamin E may exhibit antioxidant, prooxidant and non-antioxidant activities depending upon circumstances. In this study, the effect of tocotrienols and α-tocopherol on the activities of HMG CoA reductase and cholesterol 7 α-hydroxylase was investigated. Pure tocotrienols were isolated from palm fatty acid distillate and pure α-tocopherol was obtained commercially. Guinea pigs were treated with different dosages of tocotrienols and α-tocopherol. After the treatment period, animals were sacrificed and liver microsomes were prepared. HMG CoA reductase and cholesterol 7α-hydroxylase were assayed using tracer techniques. Our results showed that the effects of tocotrienols and α-tocopherol on the activities of both the enzymes were dose-dependent. At low dosages, both tocotrienols and α-tocopherol exhibited an inhibitory effect on both the enzymes. Moreover, tocotrienols were a much stronger inhibitors than a-tocopherol. At high dosages, on the other hand, tocotrienols and α-tocopherol showed opposite effects on the enzymes. While tocotrienols continued to exhibit an inhibitory effect, α-tocopherol actually exhibited a stimulatory effect on both the enzymes. A possible explanation for this observation is suggested.

I95 Random amplified polymorphic DNA analysis to differentiate strains of vibrio vulnificus isolated from cockles and shrimps

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The Malaysian Journal of Medical Sciences 7(1): 41-46, 2000

A random amplified polymorphic DNA (RAPD) fingerprinting method has been developed to differentiate Vibrio vulnificus strains isolated. Twenty-nine strains isolated from cockles and twenty-one strains isolated from shrimps were analyzed. A total of 10 primers were screened with Vibrio vulnificus strains to identify those capable of generating DNA polymorphisms and two primers were selected. Primer GEN 1-50-01 and GEN 1-50-08 produced polymorphisms in most strains tested, with the band sizes ranging from 10.0 to 0.25 kb pair. Dendrogram analysis showed that primer GEN 1-50-01 produced 10 clusters and 24 single strains at a 40% similarity, whereas primer GEN 1-50-08 produced 11 clusters and 20 single strains at a 40% similarity. This study revealed the potential use of PCR fingerprinting in epidemiological studies.

I96 Effect of tocotrienols on hepatocarcinogenesis induced by 2-acetylaminofluorene in rats

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American Journal of Clinical Nutrition 53:1076S-108lS, 1991

The effects of tocotrienols on hepatocarcinogenesis in rats fed with 2-acetylaminofluorene (AAF) were followed morphologically and histologically for a period of 20 wk. No differences between treated and control rats in the morphology and histology oftheir livers was observed. Cell damage was extensive in the livers ofAAF-treated rats but less extensive in the AAF-tocotrienols-treated rats when compared with normal and tocotrienols-treated rats. 2-Acetylaminofluorene significantly increases the activities of both plasma and liver microsomal 'γ-glutarnyltranspeptidase (GGT) and liver microsomal UDP-glucuronyltransferase

(UDP-GT). Tocotrienols administered together with AAF significantly decrease the activities of plasma GGT after 12 and 20 wk ($p < 0.0 1$, $p < 0.002$, respectively) and liver microsomal UDP-GT after 20 wk ($p < 0.02$) when compared with the controls and with rats treated only with tocotrienols. Liver microsomal GGT also showed a similar pattern to liver microsomal UDP-GT but the decrease was not significant. These results suggest that tocotrienols administered to AAFtreated rats reduce the severity of hepatocarcinogenesis.

I97 Lipid Profile, Apparent Digestibility and Protein Efficiency Ratio of Sprague Dawley Rats Fed with Red Palm Fat Diets

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ASEAN Food Journal. 14(3): 153-160, 2007

Processed meat products, such as burgers, sausages, meatballs, salami and nuggets are currently popular with urban consumers. However, in general, they are high in cholesterol, total lipid and saturated fatty acids. Four beef burger formulations were prepared, each containing 15% fat from either beef fat (control), palm fat (PF), red PF or a blend of PF and red PF at a ratio of 1:1 at 15% fat. A rat assay was carried out to determine lipid profile, apparent digestibility (AD) and protein efficiency ratio (PER) of rats fed with beef burger diets containing palm based fats. Treatment with PF and red PF beef burger diets did not affect the total cholesterol concentration but resulted in higher HDL-cholesterol concentration in their blood serum. The rats fed with dried burger diets containing PF and red PF had higher AD value (90.0% and 89.3%, respectively) and was not significantly different ($P < 0.05$) compared to the group fed with dried burger containing beef fat (90.7) over the 10 days experimental diet period. PER values of all treatments except for casein were not significantly different ($P < 0.05$). There was also no difference ($P < 0.05$) in food intake and body weight gain between all rats fed with dried burger containing different types of palm based fats. In summary, the utilization of PF and red PF in beef burger increased the HDLcholesterol and had no effect on the concentration of total cholesterol in rat blood serum. Addition of palm based fats into beef burgers did not change AD and PER.

I98 Absence of apo b r3500q mutation among Kelantanese Malays with hyperlipidaemia

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The Malaysian Journal of Medical Sciences 7(1): 16-21, 2000

Familial defective apolipoprotein B-100 (FDB) is an autosomal dominant genetic disorder associated with hypercholesterolaemia and premature coronary heart

disease. FDB is caused by mutations in and around the codon 3500 of the apolipoprotein B (apo B) gene. Apo B R3500Q mutation is the first apo B mutation known to be associated with FDB and it is the most frequently reported apo B mutation in several different populations. The objective of the present study was to determine the association of apo B R3500Q mutation with elevated plasma cholesterol concentration in Kelantanese population in which both hypercholesterolaemia and coronary heart disease are common. Sixty-two Malay subjects with hyperlipidaemia, attending the lipid clinic at Hospital Universiti Sains Malaysia, Kelantan, were selected for this study. The DNA samples were analysed for the presence of apo B R3500Q mutation by polymerase chain reaction-based restriction fragment analysis method using mutagenic primers. This mutation was not detected in the subjects selected for this study. Apo B R3500Q mutation does not appear to be a common cause of hypercholesterolaemia in Kelantanese Malays.

I99 Carnitine alters binding of aflatoxin to DNA and proteins in rat hepatocytes and cell-free systems

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J Nutr. 131: 1903-1908, 2001

The objective of this study was to determine effects of L-carnitine on aflatoxin B_1 (AFB_1)-DNA adduct formation in isolated rat hepatocytes, its dose response, specificity and mode of action. All experiments were conducted in either freshly isolated rat hepatocytes or cell-free systems. There was negative linear correlation between the dosage of carnitine and formation of [^{3}H]AFB_1-DNA adducts in the hepatocytes; however, the partitioning of AFB_1 into cellular compartments was not affected by carnitine. The attenuating effect of carnitine on AFB_1-DNA adduct formation was also present in a cell-free system, but there was lack of specificity because acetylcarnitine and γ-aminobutyric acid (GABA) were equally effective. Carnitine appears to interfere with bioactivation of AFB_1 and binding of AFB1-epoxide to DNA. On the contrary, carnitine enhanced the binding of AFB1 and its epoxide to microsomal proteins, plasma proteins and bovine serum albumin. These results indicate that carnitine diverts AFB_1-epoxide away from DNA by promoting binding to proteins. We conclude that modulation of AFB_1 binding to proteins and DNA by carnitine alters the carcinogenic and hepatotoxic potential of AFB_1 and poses concerns about the human AFB_1-exposure data based on the AFB_1-albumin adduct concentrations as a biomarker.

I100 Effect of Taking Chicken Essence on Stress and Cognition of Human Volunteers

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Mal J Nutr 9(1): 19-29, 2003

Stress is a common phenomenon. Every individual experiences it. There are many ways of combating stress. Stress is necessary for preparation against challenging situations and danger. It is necessary to have stress before a test so that we are prepared. For instance, stress actually motivates students to prepare for examination but excessive stress can lead to poor performance. This study evaluates the effect of a commercial essence of chicken (CEC) on the various parameters related to stress and cognition of human volunteers. CEC is produced by a hot-water extraction process from chicken meat under high pressure condition. It contains concentrated amounts of proteins, amino acids and peptides such as carnosine compared to homemade traditional chicken soup. Due to the unique extraction process, it has been postulated that readily absorbed amino acids and bioactive peptides are present in CEC. In this experiment, we evaluated the effect of CEC in comparison with a placebo and carageenan on a group of stressed medical students before their examinations. Students were divided into three groups at random and given either CEC, placebo or a carageenan drink daily for two weeks. Before and after the two weeks, the students were given a series of tests to assess their mental and physical well-being as well as attention and memory. The tests were the general health questionnaire (GHQ), SF36, digit span, construction of figures, 3-min memory test, comprehension and mental arithmetic. The students who ingested essence of chicken fared significantly better than the other two groups of students. The ability of essence of chicken to control anxiety by distraction and promoting attention and memory is discussed.

I101 Eurycomanone induce apoptosis in HepG2 cells via up-regulation of p53

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Cancer Cell Int. 9:16, 2009

BACKGROUND: Eurycomanone is a cytotoxic compound found in Eurycoma longifolia Jack. Previous studies had noted the cytotoxic effect against various cancer cell lines. The aim of this study is to investigate the cytotoxicity against human hepato carcinoma cell in vitro and the mode of action. The cytotoxicity of

eurycomanone was evaluated using MTT assay and the mode of cell death was detected by Hoechst 33258 nuclear staining and flow cytometry with Annexin-V/ propidium iodide double staining. The protein expression Bax, Bcl-2, p53 and cytochrome C were studied by flow cytometry using a spesific antibody conjugated fluorescent dye to confirm the up-regulation of p53 and Bax in cancer cells. RESULTS: The findings suggested that eurycomanone was cytotoxic on cancerous liver cell, HepG2 and less toxic on normal cells Chang's liver and WLR-68. Furthermore, various methods proved that apoptosis was the mode of death in eurycomanone-treated HepG2 cells. The characteristics of apoptosis including chromatin condensation, DNA fragmentation and apoptotic bodies were found following eurycomanone treatment. This study also found that apoptotic process triggered by eurycomanone involved the up-regulation of p53 tumor suppressor protein. The up-regulation of p53 was followed by the increasing of pro-apoptotic Bax and decreasing of anti-apoptotic Bcl-2. The increased of cytochrome C levels in cytosol also results in induction of apoptosis. CONCLUSION: The data suggest that eurycomanone was cytotoxic on HepG2 cells by inducing apoptosis through the up-regulation of p53 and Bax, and down-regulation of Bcl-2.

I102 Atheromatous Plaque Formation in Rabbit Aorta Fed with High Cholesterol Diet

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Mal J Nutr 12(2): 213-220, 2006

Atherosclerosis, the cholesterol deposition in and around cells of the intimal layer of the aorta, has been recognized as one of the main causative factors for cardiovascular diseases. Intensive research has been carried out throughout the world but the precise atherogenesis has yet to be fully understood, though hypercholesterolaemia is considered to be the prime risk factor. The aim of the study was to evaluate the effect of high cholesterol diet consumption on the formation of atherosclerosis in vivo. Three groups of adultWhite New Zealand male rabbits (six animals per group) were used in this study. Except for one group which acted as a control (K), the other two groups were given 1% and 2% high cholesterol diet respectively for 10 weeks. At the end of the experiment, blood samples were taken from the marginal ear vein for plasma cholesterol estimation. The animals were sacrificed and the aorta was excised for histomorphometric analysis. The result shows that despite no significant differences in plasma cholesterol levels being observed between the groups treated with 1% and 2% cholesterol, high

cholesterol consumption was able to induce hypercholesterolaemia significantly ($p<0.01$) compared to the control group. The atheromatous plaque formation in the group given 2% cholesterol diet was significantly higher than the group given 1% cholesterol ($p<0.05$), indicated by increased thickness of the intimal layer of the aorta. There was disruption of the intima-media junction in hypercholesterolaemic groups but no atheromatous plaque formation was observed in the control group.

I103 Biological Properties of Tinospora crispa (Akar Patawali) and Its Antiproliferative Activities on Selected Human Cancer Cell Lines

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Mal J Nutr 14(2): 173 - 187, 2008

The antioxidant and anti-proliferative activity of the aqueous crude extract of Tinospora crispa stem was investigated. The proximate composition of its stem and leaves was determined. Proximate analysis revealed that T. crispa contains - protein: leaves = 4.7%, stem = 1.2%; fat: leaves = 1.5%, stem = 0.43%; carbohydrate: leaves = 11.8%, stem = 19.4%; ash: leaves = 2.7%, stem = 1.1%; moisture: leaves = 79.3%, stem = 77.9%; fibre: leaves = 1.59%, stem = 0.65%; and energy: leaves = 1.59%, stem = 0.65%. The antioxidant activity of the extract prepared at various temperatures and incubation time was evaluated to determine the optimum extraction procedure. Based on DPPH and TBA tests, the preparation of the extract at 60oC for 6 hours was established as the best possible method as it demonstrated the highest inhibition percentage. The extract was tested against brine shrimp to evaluate its toxicity and no significant toxicity was recorded since the IC50 value was more than 1000 µg/ml. The extract produced moderate anti-proliferative activity on selected human cancer cell lines (IC50 MCF-7: 107 µg/ml, HeLa: 165 µg/ml, Caov-3: 100 µg/ml, and HepG2: 165 µg/ml). The findings from this study suggest that T. crispa has the potential to be a source of natural antioxidants and nutrients, besides having a moderate anti-proliferative effect on selected human cancer cell lines.

I104 The effect of ∝-lipoic acid in blood lipid levels and malondialdehyde in atherosclerotic-induced New Zealand white rabbit

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The Malaysian Journal of Medical Sciences 8(1): 46-52, 2001

μ-Lipoic acid (ALA) is a naturally occuring cofactor that serves as an acyl carrier in oxidative decarboxylation of α-keto acids in carbohydrate metabolism. Current findings suggest that α-lipoic acid and its reduced form, dihydrolipoic acid (DHLA) may act as antioxidants and are able to quench free radicals in vitro and in vivo. However, the mechanism underlying the process is still unknown. In this study, atherosclerotic lesions were induced in six groups of adult male NZW rabbits labelled as group K, A, B, C, D, E (n=6) by giving 100g/head/day of 2% cholesterolrich diet for ten weeks. While group K acted as a control, the rest were supplemented with ALA orally (1.4, 2.8, 4.2, 8.0 and 10mg/kg, respectively). In week ten, venous blood samples drawn from ear lobes were analysed for complete lipid profile and peroxidation index. The results showed a significant reduction of total cholesterol (TC) and low density lipoprotein-cholesterol (LDL-C) levels in most of the treated groups as compared to the control whereas apo-A levels showed a significant increase in group C and D. However, microsomal lipid peroxidation index, malondialdehyde (MDA) was found to be not significantly different. These findings suggest that μ-lipoic acid may act as a lipid lowering agent in dose dependent manner in premature stage of atherosclerosis but was unable to inhibit lipid peroxidation processes in matured stage of atherosclerosis in rabbits fed a high cholesterol diet.

FOOD SCIENCE AND TECHNOLOGY

J1 Polyphenols in cocoa and cocoa products: Is there a link between antioxidant properties and health? - A review

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Molecules 13(9): 2190-2219, 2008

Cocoa and cocoa products have received much attention due to their significant polyphenol contents. Cocoa and cocoa products, namely cocoa liquor, cocoa powder and chocolates (milk and dark chocolates) may present varied polyphenol contents and possess different levels of antioxidant potentials. For the past ten years, at least 28 human studies have been conducted utilizing one of these cocoa products. However, questions arise on which of these products would deliver the best polyphenol contents and antioxidant effects. Moreover, the presence of methylxanthines, peptides, and minerals could synergistically enhance or reduce antioxidant properties of cocoa and cocoa products. To a greater extent, cocoa beans from different countries of origins and the methods of preparation (primary and secondary) could also partially influence the antioxidant polyphenols of cocoa products. Hence, comprehensive studies on the aforementioned factors could provide the understanding of health-promoting activities of cocoa or cocoa products components.

J2 Preliminary study of the chemical composition of rice milling fractions stabilized by microwave heating

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Journal of Food Composition and Analysis 20(7): 627-37, 2007

The present paper presents a preliminary study of the chemical composition of local stabilized rice bran. The four rice-bran milling fractions, after stabilization by microwave heating on site at the rice mill, were analyzed for their chemical composition. The content of all fractions tested (in g/100 g) consisted of 8.7-18.9 fat, 8.8-15.2 protein, 8.5-12.6 moisture, 4.2-7.7 ash, 22.2-44.8 total carbohydrates (by difference) and 18.3-30.5 total dietary fibre. It is encouraging to note that total phenolic compounds of all fractions were detected at 257-488 mg ferulic acid equivalent per 100 kg, while carotenoid contents were found to be in the range of 58.7-216 μg/100 g. The amino acid composition varied within wide limits with proline, histidine and threonine as the amino acids. Higher concentrations of amino acids found (in decreasing order) were arginine, glutamic acid, aspartic acid and serine. Phosphorus and potassium were among the major mineral constituents of rice bran, with values up to 1633 mg/100 g. The first rice bran fraction was found to be highest in energy, fat and minerals and could be a very good source of dietary fiber and other nutrients.

J3 Optimization of reduced calorie tropical mixed fruits jam

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Food Quality and Preference 12(1): 63-68, 2001

Response surface methodology using mixture design was used to determine the optimum ratio of pineapple, papaya and carambola in the formulation of reduced calorie tropical mixed fruit jam. Ten formulations covering the entire range of a triangular simplex were subjected to sensory evaluation. Contour plot of sensory attributes showed that formulations containing 3.5-37.7% papaya, 0-15% carambola and 61.5-96.5% pineapple produced optimum acceptance. A predicted optimum formulation containing 71% pineapple, 25% papaya and 4% carambola together with two non-optimal formulations were selected and subjected to sensory evaluation to confirm the validity of the model. There was a significant difference (P0.05) between the predicted optimum and the other two tested formulations. Results obtained matched the predicted value where the optimum formulation received the best sensory scores for most attributes tested. The optimum mixed fruit jam formulation contained 106 kcal/100g which is one-third of the caloric value of a normal jam.

J4 Polyphenol-enriched extract of oil palm fronds (Elaeis guineensis) promotes vascular relaxation via endothelium-dependent mechanisms

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Asia Pac J Clin Nutr. 2002;11 Suppl 7:S467-S472

Plant-based polyphenolic compounds have been reported to possess cardiovascular health benefits. Several dietary sources, including herbs and spices, fruits and vegetables, and tea and wine, contain an array of biologically active compounds that have been shown to be effective in retarding oxidation of low-density lipoproteins (LDL) and promoting vascular relaxation. In the present study four different plant sources, both edible and non-edible, were evaluated for potential activity. Organic extracts enriched in polyphenols were prepared from palm fronds (Elaesis guineensis); lemongrass (Cymbopogon citrates); papaya shoots (Carica papaya) and green chilli (Capsicum frutescenes) and tested for their ability to prevent in vitro oxidation of LDL, and for potential vascular relaxation actions. Rings of rat thoracic aorta and isolated perfused mesenteric vascular beds were mounted in organ baths, contracted using a half-maximal dose of noradrenaline and exposed to cumulative additions of test extracts. Palm frond extract resulted in considerable relaxation (>75%) in both

preparations and was found to be endothelium-dependent as removal of endothelium or inhibition of endogenous nitric oxide (NO) led to a total loss in relaxant activity. Lemongrass extract caused a greater relaxation action in the mesenteric preparation compared to aortic rings, and appears to be mediated via NO-independent and non-prostanoid mechanisms. Of the extracts tested, palm fronds also demonstrated the highest antioxidant capacity, as determined by the ferric reducing activity/potential assay, and resulted in a significant delay ($P < 0.05$) in the oxidation of LDL. Collectively, these preliminary findings lend further support to the potential cardiovascular actions of plant polyphenols and also identify oil palm fronds as containing constituents that promote vascular relaxation via endothelium-dependent mechanisms.

J5 Effect of Irradiation on Lipid Characteristic of Plant Nuts

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Sains Malaysiana 26(2): 43-51, 1997

Different plant nuts were irradiated with gamma rays to dose levels of 0.5, 1.0 and 1.5 kGy. Total lipids of the treated and untreated samples of plant nuts such as almond, peanut, pinenut, walnut and stones of apricot were extracted with petroleum benzene. The esterified lipids were analyzed for their fatty acid composition by gas chromatography (CC) whereas the extracted oils were tested for other physical characteristics like peroxide, iodine, anisidine and free fatty acid (FFA) values. The cc analysis showed that irradiation treatment of 1.5 kGy exhibited almost negligible effect on the composition of fatty acids. The peroxide, anisidine and FFA values were higher in the irradiated samples than untreated controls. It was also observed that these effects were increased by increasing the irradiation dose from 0.5 to 1.5 kGy but a reverse trend was noted in the case of iodine value in each case.

J6 Evaluation of a method to determine the natural occurrence of aflatoxins in commercial traditional herbal medicines from Malaysia and Indonesia

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Food and Chemical Toxicology 43(12): 1763-1772, 2005

Traditional herbal medicines, popularly known as 'jamu' and 'makjun' in Malaysia and Indonesia, are consumed regularly to promote health. In consideration of their frequent and prolonged consumption, the natural occurrence of aflatoxins (AF) in these products was determined using immunoaffinity column clean-up and high-performance liquid chromatography with pre-column derivatization. The evaluated method, which entails dilution of sample extracts with Tween 20-phosphate buffered saline (1:9, v/v) and a chromatographic system using isocratic mobile phase composed of water-methanol-acetonitrile (70:20:10, v/v/v), was effective in separating AFB1, AFG1 and AFG2 from interference at their retention times. Results were confirmed using post-column derivatization with photochemical reactor. For 23 commercial samples analyzed, mean levels (incidence) of AFB1, AFB2 and AFG1 in positive samples were 0.26 (70%), 0.07 (61%) and 0.10 (30%) µg/kg, respectively; one sample was positive for AFG2 at a level of 0.03 (4%) µg/kg. In contrast to the high levels of AF in crude herbal drugs and medicinal plants reported previously by other researchers, the low contamination levels reported in this study may be attributed to the higher selectivity to AF of the method applied. Based on the AFB1 levels and the daily consumption of positive samples, a mean probable daily intake of 0.022 ng/kg body weight was calculated.

J7 Oligopeptide patterns produced from Theobroma cacao L of various genetic origins

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Journal of the Sciences of Food and Agriculture 82: 733-737, 2002

Acetone dry powder (AcDP) was prepared for six cocoa genotypes, namely Forastero (Amelonado type), Criollo, Trinitario, SCA 12, UIT1 and PBC 140. Hydrophobic oligopeptides were produced when autolysis of AcDP was carried out at pH 3.5. Comparative HPLC analysis showed that autolysis of AcDP from various genotypes revealed a similar pattern of oligopeptides. Most of the hydrophobic oligopeptides were not generated during autolysis of AcDP in the presence of protease inhibitor (Pepstatin A), indicating that the generation of these oligopeptides was due to the action of cocoa cotyledon aspartic endoprotease. This finding implies that the splitting action of aspartic endoprotease on vicilin (7S)-class globulin (VCG) from various genotypes was the same. The information from the study provides additional evidence that there are no obvious differences in VCG composition between various genotypes.

J8 Analysis of vicilin (7S)-class globulin in cocoa cotyledons from various genetic origins

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Journal of the Sciences of Food and Agriculture 82:728-732, 2002

Cocoa cotyledons contain vicilin (7S)-class globulin (VCG), a major storage protein. It is the native source of oligopeptides and free amino acids which have been identified as precursors of cocoa-specific aroma and are formed through proteolysis during fermentation. High-resolution electrophoresis of native proteins isolated from ripe, unfermented cocoa cotyledons harvested from different cultivars was used to determine genetic differences of the genotypes. Flavour differences have been reported to exist after standard fermentation in cocoa beans harvested from various genotypes. In this paper, SDS-PAGE and 2D IEF/SDS-PAGE polypeptide separation patterns are shown which were separately isolated from cotyledons of various genetic origins. Cotyledons from three cultivars belonging to genetically distant varieties and a hybrid, Criollo, Forastero and Trinitario, did not reveal any analytical identity differences of VCG subunit polypeptide bands. Additionally, proteins of cotyledons harvested from three of those clones which were reported to produce genotype-specific flavour differences in raw cocoa after standard fermentation, SCA 12, UIT1 and PBC 140, when analysed in the same way, did not indicate differences. Thus the cotyledon storage proteins from various genetically different cocoa trees are, within methodological limits, the same. We conclude that aroma differences in raw cocoa harvested from various genotypes are the result of other genetic, physiological or curing-related factors, but are not due to genetic differences of aroma precursors derived from storage proteins.

J9 A comparison of vicilin (7S)-class globulin from three Theobroma cacao L. cultivars

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ASEAN Food Journal 13(1): 15-21, 2004

Vicilin (7S)-class globulin (VCG) was partially purified from cocoa cotyledons of different cultivars (Forastero, Criollo and Trinitario). To investigate the biochemical differentiation of VCG, one (SDS-PAGE) and two (2-D IEF/SDS-PAGE) dimensional electrophoresis techniques were used. SDS-PAGE analysis results of VCG from different cultivars did not show qualitative differences in electrophoretic mobility of

the polypeptide bands, therefore do not have an influence on the apparent molecular weights of these polypeptides. The 2-D IEF/SDS-PAGE analysis of major polypeptides of Forastero, Criollo and Trinitario cultivars revealed similar number of multiple forms of VCG polypeptides. Within the methodological limits, there was no analytical difference of VCG polypeptides pattern between cultivars.

J10 Effects of cooking practices (boiling and frying) on the protein and amino acids contents of four selected fishes

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Nutrition and Food Science 34(2):54-59, 2004

This study was aimed to estimate and compare the contents of protein and amino acids in raw, boiled and fried fishes of Indian mackerel "kembong" (Rastrelliger kanagurta), sardine (Sardina pilchardus), red tilapia (Oreochromis mossambicusx) and black tilapia (Oreochromis mossambicus). Protein contents of raw mackerel, sardine, red and black tilapia were 8.1±0.0, 8.4±0.1, 9.6±0.4 and 9.0±0.0 percent, respectively. In a boiled fish, the protein contents were 7.9±0.1, 7.7±0.0, 7.5±0.1 and 8.9±0.1 percent, respectively, and for a fried fish the values were 8.6±0.5, 8.9±0.1, 9.1±0.2 and 8.4±0.0 percent, respectively. It was found that there was a significant difference ($p<0.01$) in the protein content of the raw fish compared to the heat-treated ones for all the fishes. The study detected 17 components of essential amino acids (lysine, histidine, threonine, valine, methionine, leucine, isoleucine and phenylalanine) and non-essential amino acids (arginine, aspartic acid, serine, glutamic acid, proline, glycine, alanine, cystein and tyrosine) in all the fishes. There was no significant difference in amino acids content among the boiled and fried fishes. In conclusion, heat treatment for five minutes in boiling water (100°C) and frying for three minutes in palm oil (160°C) did not alter the quality of protein in all the fishes studied.

J11 Effect of different blanching times on antioxidant properties in selected cruciferous vegetables

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Journal of the Sciences of Food and Agriculture 85: 2314-2320, 2005

This study aimed to evaluate the effect of different blanching times on the antioxidant properties (antioxidant and free radical scavenging activities) and phenolic content of selected cruciferous vegetables. The study revealed that a 10-

min blanching time had a significant effect ($p < 0.05$) on the antioxidant properties and phenolic content of all the vegetables except for cabbage and mustard cabbage. The loss of antioxidant activity was highest in Chinese cabbage (40%) after 15 min of blanching, followed by cabbage (27%), Chinese white cabbage (19%), mustard cabbage (9%) and red cabbage (4%). Red cabbage had lost a total of 40% scavenging activity after 15min of blanching followed by Chinese cabbage (38%), cabbage (36%), mustard cabbage (23%) and Chinese white cabbage (11%). Only Chinese cabbage showed an increase ($p < 0.05$) in total phenolic content after 15min of blanching compared with other vegetables. Minimal heat treatment through blanching process is recommended to prevent the major loss of antioxidant properties and phenolic content in selected cruciferous vegetables.

J12 Lead contamination in Eugenia dyeriana herbal preparations from different commercial sources in Malaysia

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Food and Chemical Toxicology: 46(6): 1969-1975, 2008

The Drug Control Authority (DCA) of Malaysia implemented the phase three registration of traditional medicines on 1 January, 1992. A total of 100 products in various pharmaceutical dosage forms of a herbal preparation, containing Eugenia dyeriana, either single or combined preparations (more than one medicinal plant), were analyzed for the presence of lead contamination, using atomic absorption spectrophotometry. These samples were bought from different commercial sources in the Malaysian market, after performing a simple random sampling. Results showed that 22% of the above products failed to comply with the quality requirement for traditional medicines in Malaysia. Although this study showed that 78% of the products fully complied with the quality requirement for traditional medicines in Malaysia pertaining to lead, however, they cannot be assumed safe from lead contamination because of batch-to-batch inconsistency.

J13 Effect of curry powder on the growth of Listeria monocytogenes, Yersinia enterocolitica and Escherichia oli 0157:H7 in cook-chill beef dish

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Sains Malaysiana 31: 179-188, 2002

This study was conducted to determine the effect of curry powder on the growths of Listeria monocytogenes, Yersinia enterocolitica and Escherichia coli 0157:H7 in cook-chill beef curry dish. Cook-chill beef formulas (with or without curry powder) were inoculated with approximately 6 logl0cfu/g of L. monocytogenes, Y. enterocolitica or E. coli 0157:H7 and stored at 4°C for 9 days. Population of these pathogens were monitored and viable cells was enumerated by plate count method with direct plating. Growth of Y. enterocolitica was not inhibited and reached a population approximately 8 $\log_{10}$cfu/g in cook-chill beef sample regardless of the absence or presence of curry powder. The population of L. monocytogenes decreased to approxi-mately 5 $\log_{10}$cfu/g in the first day of storage. Even though a slight increase was observed in subsequent storage periods, the population of L. monocytogenes was still lower than the initial inoculated count. Population of L. monocytogenes was higher in cook-chill beef without curry than the beef with curry but the difference was not significant ($p>0.05$). Growth of E. coli 0157:H7 in both cook-chill beefs (with or without curry) were inhibited with the population showed a 3 log reduction at the end of storage time. Generally, the spices in the curry did not significantly inhibit the growth of L. monocytogenes, Y. enterocolitica and E. coli 0157:H7.

J14 Toxigenic moulds presence in Malaysian paddy and paddy products

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Malaysian Journal of Nutrition 14(2): 74, 2008

Aspergillus and Penicillium are among two widespread moulds that commonly can contaminate food and feed such as cereal. Some of these moulds can generate mycotoxins that are health hazard to humans. The mycotoxins of concerned are aflatoxin, ochratoxin A (OTA), deoxynivalenol (DON), zearalenone and citrinin. Attributable to the fact that toxigenic moulds can grow well in tropical ambiance like Malaysia, it is very imperative to determine the types of moulds present in rice, Malaysian staple food. Thus, the main objective of this study was to identify the toxigenic moulds found in the paddy and paddy products. A total of 180 samples were taken from three different millers operating in the State of Selangor, and from 35 food premises in Melaka. Nine types of samples comprising silo paddy, exposed stored paddy, brown rice, freshly polished rice, stored rice, broken rice, brewer's rice and rice bran were involved. The direct and dilution plating techniques using cornmeal agar (CMA) and Czapek-Dox agar (CDA) were employed to isolate and

cultivate the toxigenic moulds. Identification of the isolates was determined according to their morphological characteristics. Results showed that the 5 most frequent toxigenic moulds were morphologically identified as A.candidus (19.4%), Rhizopus micropus (38.9%), A.niger (42.7%), P.chrysogenum (63.3%) and A.flavus (65.0%). This study shows that the risk of samples to be contaminated with mycotoxins is high.

J15 Dietary factors affecting aflatoxin Bi carcinogenicity

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Mal J Nutr 3:161-179, 1997

This review paper describes briefly on the history of aflatoxins, the metabolism of aflatoxin B_1 (AFB_1) that leads to the activation and detoxification of AFB_1, and the findings of some of the studies relating to food nutrients and additives, and drugs on AFB_1 carcinogenicity and detoxification. Aflatoxins have been linked to many public health problems, especially to liver cancer incidences, in different parts of the world. Many studies have shown the potential of dietary factors modulating the formation of AFB_1 - DNA adduct, the initial and important step of AFB_1 carcinogenesis process. Among the food nutrients that have been shown to reduce the binding of AFB_1 to DNA are vitamin A, vitamin C and riboflavin. On the contrary, vitamin E and ß-carotene increase the DNA binding. Choline-deficient animals when subjected to multiple doses of AFB_1 had higher amount of the DNA adduct being formed than the choline-sufficient animals. Carnitine supplement, feed restriction, and some vegetables and their extracts can also decrease the AFB_1 - DNA adduct formation. The observed and proposed mechanisms for the reduction include the inhibition of bioactivation of AFB_1 and induction of glutathione S-transferase activity that detoxify the activated AFB_1. However, more research is needed before nutritional recommendations could be given to the public to control AFB_1 toxicity and carcinogenicity.

J16 The Effect of Different Frying Temperature on Moisture and Fat Content of Fried Coated Chicken Nuggets

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Sains Malaysiana: 35(1): 89-93, 2006

This study was carried out to determine the effect of different frying temperature on moisture and fat content of fried, coated chicken nuggets. Three frying temperatures (150,165 and 180°C) at two frying pressures (102 and 156 kPa) were used. Three types of batter (wheat, rice and sago) were prepared using a flour to water dilution ratio of 1:1.5 (wheat) and 1:1 (rice and sago). Results showed that an increase in frying temperature caused a reduction in moisture content in the coating for nuggets coated with wheat and rice flour. No significant differences was observed for moisture content in the substrate for all type of flour and frying pressure. Fat content in the coating portion was increased with increasing frying temperature for each frying pressure and flour type. For the substrate, even though fat content showed significant differences, these differences were very small.

J17 Effect of processing on dietary fiber contents of selected legumes and cereals

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Mal J Nutr 3: 131-136, 1997

Effects of soaking, boiling and roasting on TDF (total dietary fiber), SDF (soluble dietary fiber) and IDF (insoluble dietary fiber) of legumes (mung bean, soya bean, ground nut) and cereals (rice, wheat, barley) were studied. Results indicated that thermal processing gave different effects on TDF, IDE and SDF when analyzed using enzymatic-gravimetric methods. The changes in IDE content may explain the observed changes in TDF since SDF of most samples remained the same. In samples with high protein both SDF and IDE increases with thermal treatments, and this could be attributed to the production of Maillard reaction products.

J18 Physical properties of skin, flesh, and kernel of Canarium odontophyllum fruit

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Journal of Food, Agriculture & Environment 7 (3&4): 55-57, 2009

Fruits are needed in our life as part of nutrition component and have many beneficial effects on human health, e.g. as the source of dietary antioxidants. In Malaysia, Sarawak is one of the states that is rich in many types of flora, e.g. Canarium odontophyllum, which have not been well investigated.This fruit is not well known because it was categorized as underutilized and indigenous species. As part of an investigation, knowledge on the physical properties of fruit is important as the basic information. Therefore, this study was conducted with the objective to determine the physical properties of C. odontophyllum (length, width and thickness, cm), shape (sphericity index, aspect ratio, %) and mass (whole, skin, flesh, kernel, g). The data were obtained from the measurements of physical properties of two different sizes of C. odontophyllum and were stated as mean ± SD for whole fruit and mass fractions (skin, flesh and kernel) of the fruit. Averaged values (mean±SD) of big and small fruits were determined for length (4.10±0.11; 3.74±0.08 cm), width (2.79±0.13; 2.40±0.07 cm), thickness (0.50±0.00; 0.40 ± 0.00 cm), sphericity index (67.37±4.32; 41.28±0.69%), aspect ratio (43.62±0.76; 65.79±2.26 %), whole fruit mass (18.28±1.59; 12.73±0.69 g), skin mass (1.02±0.19; 0.86 g), flesh mass (11.22±0.93; 7.81 g) and kernel mass (6.79 ± 0.81; 5.84 g). These findings can be used as baseline information for further nutritional and processing application of the fruit.

J19 Extraction and Determination of Oryzanol in Rice Bran of Mixed Herbarium UKMB; AZ 6807: MR 185, AZ 6808: MR 211, AZ6809: MR 29

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ASEAN Food Journal 15 (1): 89-96, 2008

The level of total lipid and oryzanol content, an important antioxidant compound in locally produced bran was investigated. Total lipid in rice bran was extracted using 3:2 chloroform:methanol mixture yielding 16.4% fat. Oryzanol content was determined without saponification using a reverse-phase HPLC. Four fractions of oryzanol

were successfully separated and quantitated. The 4 isomers were cycloartenyl ferulate, 24-methylene cycloartanyl ferulate, campestryl ferulate and mixtures of ß-sitosteryl ferulate and cycloartanyl ferulate. The oryzanol content of local mixed varieties ranged from 23.7-43.0 mg g-1. The oryzanol concentration may depend on factors such as plant varieties, processing methods employed, extracting solvent used and ratio of extracting solvent to bran as well as extracting solvent temperatures. This study showed the potential of oryzanol extract from rice bran as a source of antioxidant.

J20 Replacement of animal fat with fractionated and partially hydrogenated palm oil in beef burgers

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Int J Food Sci Nutr. 49(5): 327-332, 1998

Four formulations of burgers, prepared with 65% lean meat and 15% fat consisting of RBD palm stearin (PS), Socfat 4000P and Socfat 4100P and beef fat (BF) as control were evaluated for solid fat content (SFC), slip melting point (SMP), cooking loss, proximate analysis (moisture, fat and protein), colour, i.e. lightness ('L'), redness ('a') and yellowness ('b'), free fatty acid (FFA), iodine value (IV), thiobarbituric acid (TBA) and texture profile analysis (TPA). Sensory evaluation was carried out for texture, juiciness, aroma, oiliness and overall acceptance. SFC and SMP for raw and cooked SF4000P beef burgers were closest to BF control burgers, falling into the range of 35-40 degrees C. Cooking loss was highest for PS burgers, there were no significant differences ($P > 0.05$) amongst BF, SF4000P and SF4100P burgers. Proximate analysis on raw burgers showed SF4000P to contain high fat and lowest moisture contents. Objective textural measurements using texture profile analysis (TPA) for all cooked burgers showed no significant differences ($P > 0.05$) for springiness and cohesiveness. Variation of values among the formulations for hardness, gumminess and chewiness are explained by the differences of SFC for beef burgers with various types of fats. Raw and cooked PS burgers have the lightest 'L' values compared with other fat-substituted burgers while BF, SF4000P and SF4100P indicated no significant differences ($P > 0.05$) for 'L', 'a' and 'b' values. Beef fat showed the highest amount of free fatty acids (FFA) compared to palm oil samples. For the iodine value (IV), SF4000P showed the highest value which means that it contained the highest level of unsaturated fatty acids followed by PS, BF and SF4100P successively. SF4000P had the highest TBA values followed successively by BF, PS and SF4100P. For sensory evaluation, PS burgers had the least oily taste. This may be due to its high cooking loss. Taste panelists could not differentiate burgers with substituted vegetable fats against the control burgers.

J21 Phytochemicals and antioxidant activity of different parts of bambangan (Mangifera pajang) and tarap (Artocarpus odoratissimus)

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Food Chemistry 113(2): 479-483, 2009

Mangifera pajang (family: Anacardiaceae; local name: bambangan) and Artocarpus odoratissimus (familiy: Moraceae; local name: tarap) are popular edible fruits in Sabah, Malaysia. The flesh, kernel and peel from M. pajang; seed and flesh from A. odoratissimus were analysed for total antioxidant activity, total polyphenol, total flavonoid and total anthocyanins contents. M. pajang kernel extract displayed the highest free radical scavenging and ferric reducing activities. Total phenolic content of the samples were in the range of 5.96-103.3 mg gallic acid equivalent/g. M. pajang kernel and M. pajang flesh contained the highest and lowest total flavonoid content with the values of 10.98 and 0.07 mg rutin equivalent/g, respectively. The antioxidant activities of extracts were significantly correlated with the total phenolic and flavonoid content (but not the anthocyanins content). The phytochemicals and antioxidant properties of M. pajang and A. odoratissimus, especially their by-products (kernel/seed), indicate that they may impart health benefits when consumed and should be regarded as a valuable source of antioxidant-rich nutraceuticals.

J22 Cytotoxicity and polyphenol diversity in selected parts of Mangifera pajang and Artocarpus odoratissimus fruits

Bakar MFA, Mohamed M, Rahmat A, Burr SA and Fry JR

Nutrition & Food Science 40(1): 29 - 38, 2010

Purpose- research on ancer chemopreventive properties of fruits has increased in recent years. Polyphenols have been suggested to exert such effects. The purpose of this paper is to determine the cytotoxic activity of Mangifera pajang (bambangan) and Artocarpus odoratissimus (tarap) crude extracts against selected cancer cell lines (i.e ovarian, liver and colon cancer) and to compare the amount of selected polyphenols (phenolic acids, flavanones, flavones and flavones) in the kernel, peel and flesh of M. Pajang, and the seed and flesh of A.odoratissimus.
Design/methodology/approach-Cytotoxicity activity of the extracts are investigated using MTT (3-(4,5-dimenthylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) assy while polyphenols are determined using high performance liquid chromatography. Findings - The results show that only kernel and peel extracts from M.pajang display cytotoxic activity in liver and ovariancancer cell lines with IC50 values

ranging from 34.5 to 92.0 μg/ ml. The proliferation of colon cancer cell lines is inhibited only by the kernel of M.pajang with IC50 value of 63.0 μg/ml. The kernel and peel from M.pajang contains a broad range of polyphenol phytochemicals which might be responsible for the cytotoxicity actovity against selected cancer cell lines.
Originality/value - Previous reports have indicated that both M.pajang and A. Odoratissimus contain high antioxidant properties. This study futher determines the phytochemicals profiling in both fruits, which might contribute to the antioxidant activity. Besides that, the result from this study shows that the waste of the fruits (i.e. kernel and peel) contain superior phenolic phytochemicals and display better anticancer potential compared of the flesh; suggests the use of them in health-industry application. Utilization of all parts of the fruits (i.e. flesh, seed, kernel and peel) for the development of nutraceutical and functional food application is suggested.

J23 Glycaemic index of eight types of commercial rice in Malaysia

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Mal J Nutr 11(2): 151-163, 2005

This experimental study was carried out to investigate the effect of eight types of commercial rice in Malaysia on blood glucose response and to determine their glycaemic index (GI) values. Ten healthy Malay volunteers (7 males, 3 females, BMI=23.6kgm-2, age=25.1years) participated in this study. The eight types of rice tested were three high fibre rice (HFR A, HFR B & HFR C), three white rice (WR D, WR E and WR F) and two fragrant rice (FR G and FR H). The subjects were required to go through the study protocol on eleven separate occasions (eight tests for the test rice samples and three repeated tests for the reference food) after an overnight fasting. Capillary blood samples were taken immediately before (0min) and 15, 30, 45, 60, 90 and 120min after consumption of the test foods. The blood glucose response was obtained by calculating the incremental area under the curve (iAUC). The GI was determined according to the standardised methodology. This study showed that out of eight types of rice tested, three (HFR B, WR E and WR F) could be categorised as having intermediate GI while the remaining five were considered high GI foods (HFR A, HFR C, WR D, FR G and FR H). The GI of HFR B (60 ± 5.8) and WR E (61 ± 5.8) were significantly lower than the reference food (glucose; GI=100) ($p<0.05$). No significant difference of GI value was seen between the reference food and the rest of the test rice ($p>0.05$). The GI value of the rice tested in descending order were HFR C, 87 ± 9.0 followed by HFR A (81 ± 6.7), FR G (80 ± 5.5), FR H (79 ± 7.6), WR D (72 ± 8.5), WR F (69 ± 8.3), WR E (61 ± 5.8) and HFR B (60 ± 5.8). There was no relationship between the dietary fibre content of the rice with the iAUC ($r= -0.05$, $p=0.63$) and GI values ($r= -0.08$, $p=0.46$). This shows that the GI values of the test rice were independent of the

dietary fibre content of the rice. Other factors that may influence the GI value of rice include amylose content, gelatinisation process and botanical sources. The results of this study will provide useful information for dietitians and nutritionists in selecting the appropriate type of rice for the daily diet of diabetics.

J24 Antioxidant activity of Camellia sinensis leaves and tea from a lowland plantation in Malaysia

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Food Chemistry 102(4): 1214-1222, 2007

Methanol extracts of fresh tea leaves from a lowland plantation in Malaysia were screened for total phenolic content (TPC) and antioxidant activity (AOA). AOA evaluation included 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical-scavenging ability, ferric-reducing antioxidant power (FRAP), and ferrous-ion chelating (FIC) ability. Ranking, based on TPC and AOA, was as follows: shoots > young leaves > mature leaves. TPC and AOA of lowland leaves were comparable to those of highland plants. A green tea produced by drying young leaves in a household microwave oven for 4 min showed significantly higher TPC and AOA than did four commercial brands of green and black tea.

J25 Chemical analysis of pandan leaves (Pandanus amaryllifolius)

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International Journal of Natural Product and Pharmaceutical Sciences 1(1): 7-10, 2010

Objective: To identify chemical entities of pandan leaves (pandanus amaryllifolius) by various echniques of chromatography.

Method: Plants sample were extracted with organic solvents in increasing polarity of hexane, ethanol and ethyl acetate. Extracts were concentrated under rotary evaporator and undeerwent vacuum and colum chromatography separation.

Results: Stigmasterol and mixtures of fatty acids were among the compounds indentified from the hexane extracts of pandan leaves.

J26 Mutu mikrobiologi susu lembu mentah kawasan selatan Semenanjung Malaysia

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Sains Malaysiana 27: 9-17, 1998

Kualiti mikrobiologi susu lembu mentah di kawasan Selatan Semenanjung Malaysia telah dianalisis untuk menentukan status mikrobiologi dan kehadiran patogen terpilih dalam susu tempatan. Susu yang diambil dari 127 ladang ternakan lembu mempunyai min kiraan plat total, koliform dan Escherichia coli yang tinggi, iaitu masing-masing 5.5 ' 10^5 - 2.7 ' 10^7/ml, 2.4 ' 10^4-8.0 ' 10^5/ml dan 3.5 ' 103 - 4.6 ' 10^4/ml. Hampir 63% daripada sampel susu dicemari oleh *Staphylococcus aureus* manakala 33% adalah positif bagi *E. coli* 0157:H7. Sebanyak 5 serotip salmonella termasuk *S. agona, S. newport, S. heldelberg, S. typhimurium* dan *S. weltevreden* telah dikenal pasti. Sementara itu, sebanyak 18 strain Listeria spp. telah dipencilkan daripada 4.2% sampel yang positif.

J27 Effect of Red Seaweed Polysaccharides Agar (Gracilaria changii) on Thermal Properties and Microstructure of Wheat Starch

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Sains Malaysiana 38(3): 341-345, 2009

This study has been carried out on the mixture of Gracilaria changii agar (0.1 %, 0.2 %, 0.4 % and 0.8 %) with wheat starch. Scanning electron microscopy (SEM) was performed for morphology observation, and starch thermal analysis were carried out to determine the properties of gelatinization and retrogradation. Proximate analysis has been determined for isolated wheat starch and agar. Through SEM, interaction was first observed at 64°C for 0.4 % agar but at 0.8 % of agar, a more extensive bridging was formed which enveloped the starch granules. Differential scanning calorimetric (DSC) result shows that as the addition of agar decreased the onset temperature (T_o) of gelatinization significantly ($p<0.05$) but increased the gelatinized enthalpy (ΔH_{gel}), gelatinized temperature range (R_g) and Peak Height Index (PHI) significantly ($p<0.05$). Agar lowered the retrogradation enthalpy (ΔH_{ret}), retrogradation range (R_{ret}) and retrogradation percentage (%R) of wheat starch significantly ($p<0.05$).

J28 Bacteriocin-producing lactic acid bacteria isolated from traditional fermented food

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The Malaysian Journal of Medical Sciences 8(1): 2001

Lactic Acid Bacteria (LAB) isolated from several traditional fermented foods such as "tempeh", "tempoyak" and "tapai" were screened for the production of bacteriocin. One strain isolated from "tempeh" gives an inhibitory activity against several LAB. The strain was later identified as Lactobacillus plantarum BS2. Study shows that the inhibitory activity was not caused by hydrogen peroxide, organic acids or bacteriophage. The bacteriocin production was maximum after 10 hours of incubation with an activity of 200 AU/ml. The bacteriocin was found to be sensitive towards -amylase andα-chymotrypsin, β-chymotrypsin, αtrypsin, lysozyme.

J29 Optimization of Aging Time and Temperature for Four Malaysian Rice Cultivars

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Pakistan Journal of Nutrition 2 (3): 125-131, 2003

Aging is a process that can develop rice-cooking quality. Specially, it helps to increase kernel elongation rate during cooking time. We have aged four popular Malaysian rice cultivars in different time and temperature conditions and we have observed that maximum good kernel elongation ratio for Mahsuri and Mahsuri Mutant are 100 ^{o}C for 5 hours. In 9192, maximum kernel elongation ratio was observed at 110 ^{o}C with 5 hours and for putri it was 110 ^{o}C for 3 hours. In Mahsuri, proportionate change range was 0.03 to 0.23. So we can say that the degree of elongation of Mahsuri is poor to low. For Mahsuri Mutant proportionate change range was 0.33 to 0.65 and the degree of elongation Mahsuri Mutant can be graded grading as medium. Proportionate change range was observed 0.23 to 0.60 in 9192 and it is convenient to say that degree of elongation of 9192 is low to medium. Finally, in putri a very interesting observation was occurred.When it was treated at 90 ^{o}C the lowest proportionate change (0.40) was observed with 1 hour curing and highest (0.55) was with 3 hours curing. In 100 ^{o}C, maximum proportionate changed was observed (0.59) with 3 hours curing and lowest was observed (0.41) at 7 hours curing. At 110 ^{o}C, lowest proportionate change (0.75) was observed with 9 hours curing and maximum proportionate change was observed with 7 hours curing (0.90). So we can see at 90 and 100 ^{o}C with different curing time proportionate

changes was in between 0.40 to 0.59 and the degree of elongation may consider as medium. But at 110 oC temperature we were surprised and observed that with all different temperatures the degree of elongation was high (Range 0.75-0.90). At this temperature (110 oC) Putri showed good kernel elongation ratio and high degree of elongation like the other Basmati type fine rice. Higher actual elongation is a desirable character for the consumers; the following results are the average of different curing time because our used grain size was not truly uniform (Mahsuri 5.0 mm - 5.5 mm, Mahsuri Mutant 6.2 mm - 6.75 mm, 9192 6.5 mm - 7.0 mm and Putri 6.5 mm - 7.0 mm). In this experiment we have also observed that variety, temperature and time significantly influence elongation ratio, Proportionate change and actual elongation. Variety time interaction, variety temperature interaction and variety temperature time interactions also significantly influenced these physical properties of rice kernel. Temperature time interaction does not significantly influence on elongation ratio, but this interaction influence proportionate change and actual elongation.

J30 Bioaccessibility of Carotenoids and Tocopherols in Marine Microalgae, Nannochloropsis sp. and Chaetoceros sp.

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Mal J Nutr 15(1):77-86, 2009

Microalgae can produce various natural products such as pigments, enzymes, unique fatty acids and vitamin that benefit humans. The objective of the study is to study the bioaccessibility of carotenoids (ß-carotene and lycopene) and vitamin E (α- and ß- tocopherol) of Nannochloropsis oculata and Chaetoceros calcitrans. Analyses were carried out for both the powdered forms of N. oculata and C. calcitrans, and the dried extract forms of N. oculata and C. calcitrans. In vitro digestion method together with RP-HPLC was used to determine the bioaccessibility of carotenoids and vitamin E for both forms of microalgae. Powdered form of N. oculata had the highest bioaccessibility of ß-carotene (28.0 ± 0.6 g kg-1), followed by dried extract N. oculata (21.5 ± 1.1 g kg-1), dried extract C. calcitrans (16.9 ± 0.1 g kg-1), and powdered C. calcitrans (15.6 ± 0.1 g kg-1). For lycopene, dried extract of N. oculata had the highest bioaccessibility of lycopene (42.6 ± 1.1 g kg-1), followed by dried extract C. calcitrans (41.9 ± 0.6 g kg-1), powdered C. calcitrans (39.7 ± 0.1 g kg-1) and powdered N. oculata (32.6 ± 0.7 g kg-1). Dried extract C. calcitrans had the highest bioaccessibility of α-tocopherol (72.1 ± 1.2 g kg-1). However, ß-tocopherol was not detected in both dried extract and powdered form of C. calcitrans. In conclusion, all samples in their dried extract forms were found to have significantly higher bioaccessibilities than their powdered forms. This may be due to the disruption of the food matrix contributing to a higher bioaccessibility of nutrients shown by the dried extract forms.

J31 Hair mercury level of coastal communities in Malaysia: a linkage with fish consumption

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Eur Food Res Technol 227:1349-1355, 2008

Hair mercury level was assessed in four coastal communities in Malaysia with relation to Wsh consumption between gender, age, and rural and urban area. Mercury level was found at a range of 0.01-21.00 (_g/g dry wt).The average mercury levels were 13.69, 10.85, 9.94, and 6.78 _g/g dry wt for communities in Kedah, Terengganu, Johor, and Selangor, respectively. The same order was found for the average monthly Wsh consumption, that is 14,620 § 878, 9,966 § 563, 8,939 § 793, and 8,169 § 658g/month for communities in the four respective regions. A highly signiWcant positive correlation between hair mercury concentration and Wsh consumption was observed in all communities. This gives an insight that Wsh consumption is a signiWcant route of mercury exposure for the coastal communities. Females had higher hair mercury concentration than what males had. Mercury exposure of communities in rural area was higher when compared to that in urban. However, mercury level in all Malaysian communities studied was much lower than no observable adverse eVect level (NOAEL) of WHO, that is 50 mg/g dry wt.

J32 Vitamin A Activity of Rice-based Weaning Foods Enriched with Germinated Cowpea Flour, Banana, Pumpkin and Milk Powder

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Mal J Nutr 6(1): 65-73, 2000

The objective of this study was to identify the effect of different drying methods on vitamin A activity of formulated weaning food. Weaned foods on vitamin A activity of formulated using treated cowpea flour, locally available rice flour, banana-pumpkin, skim milk powder and sugar in the ratio 35:35:15:15:5. Treated cowpea flour consisted of original cowpea flour, 24 h germinated cowpea flour. Each treated flour was mixed separately with the other ingredients and cooked into a slurry. Each mixture was either oven-dried or freeze-dried to produce a dry flaky mixture. The carotenoid composition of the product was determined by HPLC. Vitamin A activity of oven-dried weaning food was significantly reduced ($p<0.05$)

compared to freeze-dried weaning food. The freeze-dried weaning foods showed a higher retinol equivalent than oven-dried weaning foods for all treatments. The results of the study found that an intake of 100 g of freeze-dried weaning foods enriched with banana-pumpkin and cowpea flour provided an adequate amount of the recommended daily allowance (RDA) of vitamin A for infants.

J33 Penghasilan sirap glukosa berfruktosa tinggi dari kanji ubi keledek Msp94

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Sains Malaysiana 34(1): 1-6, 2005

Kajian ini merangkumi pencirian fizikokimia kanji yang diekstrak daripada ubi keledek Msp94 dan penghasilan sirap glukosa berfruktosa tinggi daripada kanji ini. Kanji ubi keledek Msp94 mengandungi 7.3% air, 0.2% protein, 0.4% lemak, 1.3% abu total, 94.8% karbohidrat total, 83.0% kanji dan 20.6% amilosa ketara. Purata saiz granul kanji adalah 13-14 mm, berbentuk bulat, poligon dan bentuk yang tidak tetap. Hidrolisis berenzim menggunakan gabungan enzim glukoamilase-pululanase dalam proses sakarifikasi, yang dijalankan ke atas kanji ubi keledek Msp94 selama 24, 48, 72 jam menghasilkan hidrolisat kanji dengan setaraan dekstrosa (DE) masing-masing pada 94.8, 99.1, 99.3. 1ni diikuti dengan kelikatan hidrolisat kanji yang semakin menurun. Penukaran kanji Msp94 kepada peratus glukosa adalah sebanyak 97.1 %, 109.5% dan 103.2% setelah dihidrolisis selama 24,48 dan 72 jam. Hidrolisat kanji Msp94 ditulenkan menggunakan tiga jenis resin penukar ion dan diisomer kepada sirap berfruktosa tinggi menggunakan enzim glukosa isomerase (Sweetzyme T). Kandungan fruktosa (43.8-46.5%) dalam sirap Msp94 yang telah diisomer adalah setara dengan kandunganfruktosa (44%) dalam sirap komersial, High Fructose Corn Syrup (HFCS) 42.

J34 Proximate composition, colour, texture profile of Malaysian chicken balls

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Pakistan Journal of Nutrition 8(10): 1555-1558, 2009

The results of the analyses of six brands of commercial chicken balls showed significant differences ($p<0.05$) in chemical composition, colour and texture among all samples. Most of the samples contained high moisture content (between 60.14-72.81%), with protein content ranging from a low of 9.93% to moderately high of 15.06%. However, the fat content displayed an inverse relationship as compared to protein, ranging from 4.26-14.00%. The low ash content ranging from 1.92-2.82%, could be contributed by the presence of salts and flavoring ingredients in the chicken balls. The difference in carbohydrate content ranging from 5.54-20.85%, indicated high usage of meat substitute in certain brands tested. The L, a and b values of cooked chicken balls ranged between 69.61-77.96, -2.02 to 0.33 and 15.66-19.70 respectively. The hardness, cohesiveness, springiness and shear force ranged between 3.73-5.73, 0.55-0.69, 11.40-13.71, 31.27-53.77 and 0.51-1.28, respectively. Chewiness readings obtained were between 31.27-53.77, possibly contributed by the different thickeners used in the formulations. The research result shows that Malaysian commercial chicken balls are significantly different in their chemical composition, colour and textural properties.

J35 Interesterified palm products as alternatives to hydrogenation

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Asia Pac J Clin Nutr 14 (4): 396-401 396, 2005

Interesterification is one of the processes used to modify the physico-chemical characteristics of oils and fats. Interesterification is an acyl-rearrangement reaction on the glycerol molecule. On the other hand, hydrogenation involves addition of hydrogen to the double bonds of unsaturated fatty acids. Due to health implications of trans fatty acids, which are formed during hydrogenation, the industry needs to find alternatives to hydrogenated fats. This paper discusses some applications of interesterified fats, with particular reference to interesterified palm products, as alternatives to hydrogenation. Some physico-chemical properties of interesterified fats used in shortenings are discussed. With interesterification, more palm stearin can be incorporated in vanaspati. For confectionary fats and infant formulations, enzymatic interesterification has been employed.

J36 Boric acid content of selected commercially available noodles in Malaysia

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Journal of Clinical Biochemistry and Nutrition, 43(S): 1-4, 2008

This study was aimed to determine the boric acid content in four types of noodles locally known as hokkien, wantan, tou qinn and yellow noodles. The effects of washing and cooking on the loss of boric acid content were also investigated. Washing up to 3 minutes may reduce 12-62% of boric acid contents in noodles, and at least 80% of boric acid contents reduce when cooked for 5 minutes. ANOVA test showed there were significant differences ($p<0.05$) of boric acid contents among the noodles studied when undergoing treatments (washing and cooking) in comparison to raw noodles. It can be suggested that, washing followed by cooking steps is advisable in order to reduce the amount of boric acid present in noodles.

J37 Chemical composition and antioxidant activity of Strobilanthes crispus leaf extract

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J Nutr Biochem. 11(11): 536-542, 2000

This study investigated the components present in and the total antioxidant activity of leaves of Strobilanthes crispus (L.) Bremek or Saricocalyx crispus (L.) Bremek (Acanthacea). Proximate analyses and total antioxidant activity using ferric thiocyanate and thiobarbituric acid methods were employed. Minerals content was determined using the atomic absorption spectrophotometer, whereas the water-soluble vitamins were determined by means of the UV-VIS spectrophotometer (vitamin C) and fluorimeter (vitamins B1 and B2). Catechin, tannin, caffeine, and alkaloid contents were also studied. All data were compared to the previously reported results of Yerbamate, green tea, black tea, and Indian tea. The dried leaves contained a high amount of total ash (21.6%) as a result of a high amount of minerals including potassium (51%), calcium (24%), sodium (13%), iron (1%), and phosphorus (1%). High content of water-soluble vitamins (C, B1, and B2) contributed to the high antioxidant activity of the leaves. The leaves also contained a moderate amount of other proximate composition as well as other compounds such as catechins, alkaloids, caffeine, and tannin, contributing further to the total antioxidant activity. Catechins of Strobilanthes crispus leaves showed highest antioxidant activity when compared to Yerbamate and vitamin E. Consumption of the leafy extract daily (5 g/day) as an herbal tea could contribute to the additional nutrients and antioxidants needed in the body to enhance the defense system, especially toward the incidence of degenerative diseases.

J38 Physicochemical Properties of Crude Elateriospermum tapas Seeds Oil

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Sains Malaysiana 34(2): 121-123, 2005

The crude oil of perah, Elateriospermum tapos, seeds collected from northern Perak was extracted. The chemical properties of extracted oil such as acid value, free fatty acids percentage, iodine value, peroxide value and saponification value were analyzed. The oil physical characteristics such as viscosity, refractive index and color were also determined. The fatty acids composition of the extracted oil was determined using the gas chromatography (GC) method. Both oleic acid (34.55 %) and linoleic acid (31.76 %) were detected as the dominant fatty acids while palmitic acid and stearic acid were the saturated fatty acids found in the perah seeds oil. Unlike most seed oils, perah seeds oil contained a-linoleneic acid (16.10%) as part of its five major fatty acids composition. Results from analyses showed that perah seeds oil is a potential nutritive seeds oil to be developed in the future.

J39 A Nutritious Medida (Sudanese Cereal Thin Porridge) prepared by fermenting malted brown rice flour with Bifidobacterium Longum BB 536

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Mal J Nutr 10(2): 183-193, 2004

The nutritive value of spontaneously fermented brown rice flour medida, a Sudanese cereal thin porridge, is low. This study was carried out to improve the nutritional quality of medida. The flour was soaked and malted at 30°C to optimise the protein content. Flour malted for two days had the highest protein content. Skim milk was added to the malted brown rice flour medida and fermented using Bifidobacterium longum BB 536. Maximum count of B. longum BB 536 up to 9 log CFU/ ml was attained at 4.6 final fermentation pH. The resultant viscosity was similar to that of the spontaneously fermented brown rice flour medida. There was significant ($P < 0.01$) increase in both the energy density and the protein content, having increased 12 folds and 24 folds, respectively. The essential amino acids including lysine and methionine were highly augmented. The resultant medida have stable flowing characteristics and meet the whole protein and energy requirements for infants and children aged 1 - 10 years old.

J40 Effects of stereospecific positioning of fatty acids in triacylglycerol structures in native and randomized fats: a review of their nutritional implications

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Nutr Metab (Lond). 4:16, 2007

Most studies on lipid lowering diets have focused on the total content of saturated, polyunsaturated and monounsaturated fatty acids. However, the distribution of these fatty acids on the triacylglycerol (TAG) molecule and the molecular TAG species generated by this stereospecificity are characteristic for various native dietary TAGs. Fat randomization or interesterification is a process involving the positional redistribution of fatty acids, which leads to the generation of new TAG molecular species. A comparison between native and randomized TAGs is the subject of this review with regards to the role of stereospecificity of fatty acids in metabolic processing and effects on fasting lipids and postprandial lipemia. The positioning of unsaturated versus saturated fatty acids in the sn-2 position of TAGs indicate differences in early metabolic processing and postprandial clearance, which may explain modulatory effects on atherogenecity and thrombogenecity. Both human and animal studies are discussed with implications for human health.

J41 Nutritional Composition of Germinated Brown Rice Porridge

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Food 2 (1): 57-60, 2008

In industrialized and developed countries more people are seeking preventive medicine rather than a curative approach. Considering germinated brown rice (GBR) is dense in dietary fibers, nutrients and antioxidants, the development of instant nutritious GBR porridge (GBRP) was proposed. The nutrient composition and fatty acid profile of GBRP were investigated. A comparison between GBRP, white rice porridge (WRP) and commercial porridge (CP) was carried out. GBRP contained significantly higher ($P<0.05$) ash (0.86 g/100 g sample) and dietary fiber (8.03 g/100 g sample) contents compared to WRP (0.81 g/100 g and 4.84 g/100 g sample) and CP (0.74 g/100 g sample and 6.46 g/100 g sample). Higher ash content was correlated with a higher level of sodium, calcium, potassium and magnesium.

Protein content of GBRP was also significantly higher ($P<0.05$; 1.74 g/100 g sample) than CP (1.17 g/100 g sample). Interestingly, GBRP had 0.17 g/100 g sample of fat, which is four-fold higher than in WRP (0.04 g/100 g sample) and CP (0.03 g/100 g sample). The higher percentage of fat was correlated to a higher level of unsaturated fatty acids (USFA) than saturated fatty acids (SFA). The results from the present study revealed a higher potential of GBRP as a healthier option that is abundant in health-promoting compounds

J42 Furoquinoline alkaloids from Melicope bonwickii (F.Muell) T.Hartley

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Natural Product Research 20(4): 355-360, 2006

Melicope bonwickii is a small tree, widely distributed in the Philipines, southward to Malaysia, Java, and east to New Guinea, and northeastern Australia [1]. The bark of the plant was used in the treatment of leech bites [2]. Previous works on many parts of Melicope species have reported the identification of various constituents including alkaloids, coumarins, acetophenones, benzopyrans, flavonoids, lignans etc. [3-6]. No previous phytochemical studies of this species have been reported. In this communication the authors wish to report the isolation of a new 7-(2-hydroxy-3-chloroprenyloxy)-4-methoxyfuroquinoline (1) together with 7-(2,3,-epoxyprenyloxy)-4-methoxyfuroquinoline (2) [7], evellerine (3)[8], kokusaginine (4)[9] and an amide compound aurantiamide acetate (5)[10,11].

J43 Stability of carotenoids from hexane fractions of 12 Malaysian underutilised tropical fruits during low temperature storage

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Food 2(2): 43-46, 2009

A study on the stability of carotenoids in fruit extract is necessary due to rapid degradation of carotenoid compounds in the extract. Twelve selected underutilised tropical fruits were studied for their total carotene content (TCC) from hexane fractions under storage for 5 h at 0°C and 12 days at -20°C. Kinetic study revealed that the degradation rate of TCC was highly depended on the storage time. Storage for 12 days at -20°C had TCC degraded for more than 30% in hexane fractions of Bacang 1 (Mangifera foetida), Bacang 3 (M. foetida), Kuini (M. odorata) and

Tampoi Putih (Baccaurea macrocarpa). Less than 5% of TCC was lost in hexane fractions of Cerapu 1 (Garcinia prainiana) and Cerapu 2 (G. prainiana). Most of the fruit's hexane fractions demonstrated a moderate loss of TCC if stored at -20°C for about 2 weeks. A major loss of TCC was found in low antioxidant fruits. However, storage for 5 h at 0°C had TCC degraded for less than 15% in hexane fractions of Cerapu 2, Durian Nyekak 2 (Durio kutejensis) and Jentik-jentik (Baccaurea polyneura). In this study, a rapid degradation of carotenoids occurred if the fruit's hexane fractions were stored at 0°C than at -20°C. Various factors may contribute to the degradation of carotenoid compounds in the fruits' hexane fractions.

J44 The role of unsaponifiable components in the lipidemic property of olive oil

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Mal J Nutr 4: 73-80, 1998

Pure olive oil triglycerides (POLO), free from all unsaponifiable matter, were isolated from Virgin Spanish olive oil (COLO) by alumina-charcoal column chromatography. COLO and POLO were used as sources of dietary fat in two animal studies. The responses of serum and liver lipids to the two types of dietary fat were examined. Our results show that animals fed POLO-diet gave somewhat higher serum total and LDL cholesterol levels as compared to those on COLO-diet. The increase in serum cholesterol level is followed by a parallel increase in liver cholesterol content. These results indicate that the hypocholesterolemic effect of olive oil was partly due to the presence of the unsaponifiable matter. Supplement of the POLO-diet separately with atocopherol and squalene resulted in serum lipid responses similar to that observed with the COLO-diet. The serum and liver triglyceride levels are not affected by the removal of unsaponifiable components but addition of a--T and squalene to the POLO-diet appeared to lower both the cholesterol and triglyceride levels in the serum but increased only the liver cholesterol content. These results show that the unsaponifiable components modulate the hypocholesterolemic effect of olive oil.

J45 Development of a HPLC method for the simultaneous determination of several B-vitamins and ascorbic acid

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Mal J Nutr 2: 49-65, 1996

In cognizance of the difficulties involved in the colorimetric and titrimetric methods for the determination of individual vitamins, this laboratory has been carrying out a

series of studies into the use of HPLC for improved analysis of these nutrients. Preliminary studies have been carried out for the determination of four B-vitamins. The present paper reports on further improvements made to enable the simultaneous determination of eight vitamins i.e. B1, B2, B6, B12, C, niacin, niacinamide and folic acid. Trials were carried out to determine the most suitable chromatographic system include changing the proportion of methanol in the mobile phase, the use of different ion-pairing reagents and other additives such as triethylamine and ammonia. Three sets of HPLC mobile phase systems are proposed to enable successful separation of all eight vitamins in less than 20 minutes, varying slightly with the type of ion-pairing reagent and mobile phase additive. This laboratory is currently carrying out trials to determine if the developed methods could be used for the determination of pharmaceutical products and food samples.

J46 Optimization of oven drying conditions for lycopene content and lipophilic antioxidant capacity in a by-product of the pink guava puree industry using response surface methodology

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LWT-Food Science and Technology 43(5): 729-735, 2010

Response surface methodology (RSM) was applied to optimize the oven drying conditions for lycopene content (Y1) and lipophilic antioxidant capacity (Y2) in decanter, a by-product of the pink guava puree industry. Two-factor central composite design was employed to determine the effects of two independent variables, namely temperature (X1: 50-80 °C) and drying time (X2: 4-6 h). Lycopene content and lipophilic antioxidant capacity were measured using high-performance liquid chromatography (HPLC) and the ABTS radicals scavenging assay, respectively. A b-carotene bleaching assay was also applied to measure the antioxidant activity. Response surface plots showed that an increase in temperature and time significantly reduced the response variables. The optimum oven conditions for drying of decanter with minimum lycopene degradation were 43.8 °C for 6.4 h, with a predicted lycopene content of 14 mg/100 g and antioxidant capacity of 21 mmol LE/100 g. To validate the optimized model, the experimental values were compared with the predicted values to check the adequacy of the model. The experimental values were found to be in agreement with those predicted, indicating the suitability of the model for optimizing the oven drying conditions for decanter.

J47 Utilization of macrofungi by some indigenous communities for food and medicine in Peninsular Malaysia

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Forest Ecology and Management 257(10): 2062-2065, 2009

The indigenous communities of Peninsular Malaysia with a population of approximately 150,000 people are collectively called the Orang Asli (original people) and consist of three major tribes, the Negrito, Senoi and Proto Malays, with six sub-tribes each. Traditionally the Orang Asli lived in and subsisted on the forests, but with increasing loss of forest areas, integration into mainstream society and urbanization, they are rapidly losing their traditional knowledge and culture. In an effort to record some of this precious indigenous knowledge, a questionnaire survey, visits and interviews were conducted with selected indigenous communities in 70 villages in Peninsular Malaysia. Macrofungi utilized for food and medicine were documented and fungi with potential for cultivation and commercialization were identified. Indigenous communities interviewed were the Semai, Temuan, Bateq, Che Wong and Jakun sub-tribes. Our results showed that at least 31 species of macrofungi were collected for food but only 14 species were used for medicinal purposes. All the fungi were collected for the communities' own consumption and not for commercial purposes with the exception of Lignosus sp. (susu rimau) which is specifically sought for upon request by urban middlemen, mostly local herbalists. Although our interviews were mainly conducted with the village Tok Batin (headman), the women folk generally joined in the interviews and were most knowledgeable, providing much of the information. Generally, the younger generation, especially the men, were much less knowledgeable and less interested to learn about macrofungi utilization. Traditional knowledge including the utilization of mushrooms is passed down orally within the communities with the women playing an important role in this oral tradition. A booklet on the common mushrooms utilized by Orang Asli communities in Peninsular Malaysia has been published and distributed to all the communities surveyed as well as to the relevant government department in charge of Orang Asli affairs.

J48 Identification of lactic acid bacteria constituting the predominating microflora in an acid-fermented condiment (tempoyak) popular in Malaysia

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International Journal of Food Microbiology 63(1-2) 22: 149-157, 2001

Tempoyak is a traditional Malaysian fermented condiment made from the pulp of the durian fruit (Durio zibethinus). Salt is sometime added to proceed fermentation at ambient temperature. In various samples obtained from night markets, lactic acid bacteria (LAB) were the predominant microorganisms, ranging from log 8.4 to log 9.2 cfu g-1. No other microorganisms were present to such a level. These samples contained reduced amount of saccharose, glucose and fructose but increased amount of - and -lactic acid and acetic acid compared with samples of non-fermented durian fruit. Sixty-four isolates of LAB were divided into five groups by use of a few phenotypic tests. A total of 38 strains of LAB were selected for comparison by sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE) of their whole cell protein patterns with a SDS-PAGE database of LAB. These strains were also examined for their carbohydrate fermentation patterns by use of API 50 CH. Isolates belonging to the Lactobacillus plantarum group were shown to be the predominant members of the LAB flora. In addition, isolates belonging to the Lactobacillus brevis group, Leuconostoc mesenteroides, Lactobacillus mali, Lactobacillus fermentum and an unidentified Lactobacillus sp. were also observed. A high degree of diversity among isolates belonging to the Lb. plantarum group was demonstrated by analysis of their plasmid profiles.

J49 Aflatoxin occurrence in nuts and commercial nutty products in Malaysia

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Food Control 21(3): 334-338, 2010

A total of 196 nuts and their products marketed in Penang, Malaysia were assessed for aflatoxins using a monitoring scheme consisting of enzyme-linked immunosorbent assay (ELISA) for rapid screening and reversed phase high performance liquid chromatography (HPLC) for quantification and confirmation. Thirty two out of 196 samples (16.3%): six raw groundnuts shelled, two roasted groundnut in shell, three roasted groundnut shelled, one walnut, four coated nut products, two peanut cakes (gung tang), 3 pounded groundnuts, one peanut slice, seven peanut butters, one bakery product and two confectionery were contaminated with aflatoxins, ranging in levels from 16.6 μg/kg up to 711 μg/kg (mean 17.2-350 μg/kg) for total aflatoxins.

J50 Kesan hidroksipropil metil selulosa dan jangka masa penggorengan terhadap kehilangan eugenol semasa penggorengan

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Sains Malaysiana 38(3): 347-351, 2009

Kajian ini dijalankan untuk menentukan kesan hidroksipropil metil selulosa (HPMC) dan jangka masa penggorengan yang berbeza ke atas pemindahan eugenol dalam produk nuget ayam bersalut. Tiga kepekatan HPMC digunakan iaitu 0, 0.75 dan 1.5% serta tiga jangka masa penggorengan iaitu 210, 240 dan 270 saat. Sampel nuget ayam ditambah 0.5% kandungan eugenol, disalut dengan kepekatan HPMC yang berbeza dan digoreng pada suhu 180°C. Di akhir penggorengan selama 210, 240 dan 270 saat, kandungan eugenol bahagian salutan nuget meningkat secara signifikan ($p<0.05$) berbanding sebelum penggorengan. Untuk setiap jangka masa penggorengan selama 0, 210 dan 240 saat, tiada kesan penggunaan HPMC yang signifikan didapati ke atas kandungan eugenol dalam salutan. Tetapi penggorengan selama 270 saat, menunjukkan kandungan eugenol yang lebih tinggi dengan penggunaan HPMC. Peningkatan jangka masa penggorengan menghasilkan penurunan kandungan eugenol dalam substrat pada setiap kepekatan HPMC. Manakala, peningkatan kepekatan HPMC menghasilkan peningkatan kandungan eugenol dalam substrat.

J51 Effect of different drying methods on concentrations of several phytochemicals in herbal preparation of 8 medicinal plants leaves

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Mal J Nutr 5:47-54, 1999

The effect of oven drying at 50°C ± 1°C for 9 hour, 70°C ± 1°C for 5 hour and freeze drying on retention of chlorophyll, riboflavin, niacin, ascorbic acid and carotenoids in herbal preparation consisting of 8 medicinal plants was evaluated. The medicinal plants selected were leaves of Apium graveolens (saderi), Averrhoa bilimbi (belimbing buluh), Centella asiatica (pegaga), Mentha arvensis (pudina), Psidium guajava (jambu batu), Sauropus androgynous (cekor manis), Solanum nigrum (terung meranti) and Polygonum minus (kesum). Results revealed that both type and conditions of the drying treatments affected retention of all phytochemicals analysed. Herbal preparation developed using oven drying was found to have inferior phytochemicals content compared to that obtained by freeze dryer. Nevertheless, the herbal preparation developed using all treatments still retain appreciable amount of phytochemicals studied, especially carotenoids, ascorbic acid, niacin and riboflavin and thus have potential for commercial purposes.

J52 Virgin coconut oil: emerging functional food oil

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Trends in Food Science & Technology 20 (10): 481-487, 2009

Virgin coconut oil (VCO) is growing in popularity as functional food oil and the public awareness of it is increasing. It is expected that VCO will experience a dramatic growth in the market. The introduction of VCO has open up new research that basically reveals new things besides what has already been known on commercial coconut oil. This paper mainly discusses on some of the findings associated with VCO up to date. Physicochemical properties, antioxidant activity, clinical and authentication studies of VCO were some of the topics addressed in this review.

J53 Use of the SAW sensor electronic nose for detecting the adulteration of virgin coconut oil with RBD palm kernel olein

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J Am Oil Chem Soc 87(3): 263-270, 2010

An electronic nose (zNose™) was applied to the detection of adulteration of virgin coconut oil. The system, which is based on a surface acoustic wave sensor was used to generate a pattern of volatile compounds present in the samples. Virgin coconut oil was mixed with refined, bleached and deodorized palm kernel olein at a level of adulteration from 1 to 20% (wt/wt). Adulterant peaks were identified from the chromatogram profile and fitted to a curve using linear regression. The best relationship (R^2= 0.91) was obtained between the peak tentatively identified as methyl dodecanoate and the percentage of palm kernel olein added. Pearson's

correla tion coefficients (r) of 0.92 and 0.89 were obtained between adulterant peak methyl dodecanoate and of the iodine and peroxide values, respectively. Principal component analysis (PCA) was used to differentiate between pure and adulterated samples. The PCA provided good differentiation of samples with 74% of the variation accounted for by PC 1 and 17% accounted for by PC 2. Pure samples formed a separate cluster from all of the adulterated samples.

J54 Analysis of adulteration of virgin coconut oil by palm kernel olein using Fourier Transform Infrared spectroscopy

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Journal of Food Lipids 14:111-121, 2007

Virgin coconut oil, a relative newcomer in the fats and oil market, is fast becoming valuable oil next to virgin olive oil. Therefore, it is important to establish reliable purity criteria to assure its premium quality. A study was carried out to assess the effectiveness of Fourier transform infrared (FTIR) spectroscopy in detecting adulteration of virgin coconut oil with palm kernel olein as a potential adulterant. Multibounce attenuated total reflectance measurements were made on pure and adulterated samples of virgin coconut oil. Detection of adulteration up to 1% was possible. Discriminant analysis using 10 principal components was able to classify pure and adulterated samples on the basis of their spectra. A partial least square calibration demonstrated good linear regression of actual value against that predicted by FTIR with coefficient of determination (R^2) of 0.9875 and root mean square error of cross validation of 1.70. Discriminant analysis was also equally effective in designing virgin coconut oil samples as distinct from other vegetable oils.

J55 Monitoring adulteration of virgin coconut oil by selected vegetable oils using differential scanning calorimetry (DSC)

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Journal of Food Lipids 16:50-61, 2009

The crystallization and melting enthalpy of virgin coconut oil adulterated with palm kernel oil (PKO) and soybean oil (SBO) were studied by using differential scanning calorimetry. Virgin coconut oil was spiked separately with PKO and SBO from 2%

to 40% (w/w) of adulterant oils. Fatty acids of all oils were determined to complement the differential scanning calorimetry data. The heating curve of SBO-adulterated samples showed the adulteration peak appearing at the lower temperature region at 10% adulteration level. Regression analyses using stepwise multiple linear regression were used to predict the percentage adulterant with R^2 of 0.9490. PKO-adulterated oils did not show any adulteration peak but demonstrated a gradual decrease in the peak height of the major exothermic peak.

J56 Chemical properties of virgin coconut oil

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Journal of the American Oil Chemists' Society 86(4):301-307, 2009

A study on the commercial virgin coconut oil (VCO) available in the Malaysian and Indonesian market was conducted. The paper reported the chemical characteristics and fatty acid composition of VCO. There was no significant difference in lauric acid content (46.64-48.03%) among VCO samples. The major triacylglycerols obtained for the oils were LaLaLa, LaLaM, CLaLa, LaMM and CCLa (La, lauric; C, capric; M, myristic). Iodine value ranged from 4.47 to 8.55, indicative of only few unsaturated bond presence. Saponification value ranged from 250.07 to 260.67 mg KOH/g oil. The low peroxide value (0.21-0.57 mequiv oxygen/kg) signified its high oxidative stability, while anisidine value ranged from 0.16 to 0.19. Free fatty acid content of 0.15-0.25 was fairly low, showing that VCO samples were of good quality. All chemical compositions were within the limit of Codex standard for edible coconut oil. Total phenolic contents of VCO samples (7.78-29.18 mg GAE/100 g oil) were significantly higher than refined, bleached and deodorized (RBD) coconut oil (6.14 mg GAE/100 g oil). These results suggest that VCO is as good as RBD coconut oil in chemical properties with the added benefit of being higher in phenolic content.

J57 Effect of breading particle size on coating adhesion in breaded, fried poultry

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Sains Malaysiana 31: 167-177, 2002

Chicken breasts were coated using breading of different particle size. Breading particle size was divided into small (particle size < U.S. No. 60 sieve mesh size), medium (U.S. No. 60 sieve mesh size < particle size < U.S. No. 20 sieve mesh size) and large (particle size > U.S. No. 20 sieve mesh size). Chicken breasts were battered, breaded and deep-fat fried for 240 sec. at an initial temperature of 160oC. The fried products were analysed for coating adhesion, moisture content and yield parameters. Yield parameters measured were coating pickup, cooking loss and cooked yield. Coating adhesion was found to be highest in coating formed from the small particle size breading. Coating formed from the large particle size breading had the lowest coating adhesion. Chicken breasts coated using the small particle size breading showed significantly higher moisture content in the surface region of the chicken meat as well as in the coating. Microstructure of the coatings showed a higher degree of merging between the breading and the batter with decreasing breading particle size. No significant differences were observed in coating pickup, cooking loss and cooked yield between samples coated with different particle size breading.

J58 Effect of co-fractionation technique in the preparation of palm oil and sal fat based cocoa butter equivalent

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Int J Food Sci Nutr. 47(1): 15-22, 1996

Two types of palm oil and sal fat based cocoa butter equivalents, namely fCBE (produced by using co-fractionation method) and mCBE (produced by using conventional method) were prepared. Results showed that the fCBE had triglyceride composition and solidification characteristics closer to the Malaysian cocoa butter than the mCBE produced at the same yield percentage. Increasing acetone washing time had little effect on the fCBE if compared to the effect of increasing palm olein to sal fat blend ratio. Co-fractionation technique increase the compatibility between CBE component triglycerides. Thus, more palm oil can be incorporated in the preparation and the process can be carried out at not low temperature as compared to the conventional method.

J59 Review of the trends and causes of food borne outbreaks in Malaysia from 1988 to 1997

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Med J Malaysia 57(1): 70-79, 2002

This paper examines the trend and possible contributing factors for the occurrence of the food borne diseases outbreaks in Malaysia. These diseases mainly are cholera, typhoid fever, hepatitis A, dysentery and food poisoning. The outbreaks still occur sporadically in certain high risk areas throughout the country. The incidence rate of all the other three major food borne diseases steadily declined from the year 1988 to 1997 except for food poisoning and cholera. Statistic of food poisoning from the year 1996 to 1997 showed that 66.5% of the outbreak occurred in schools whereas only 0.4% originated from the contaminated food sold at various public food outlets. The school age group is always more affected than the general population. Amongst the contributing factors identified are related to unhygienic food handling practices followed by inadequate safe water supply and poor environment sanitation. A multisectoral approach between Ministry of Health and other government agencies or private agents needs to be undertaken in the management of the food borne diseases in order to curb the incidences of food borne diseases in Malaysia.

J60 Kesan penggunaan jenis tepung terhadap kelikatan dan parameter pemprosesan produk goreng bersalut

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Sains Malaysiana 34(2): 17-21, 2005

Kajian ini telah dijalankan untuk menentukan kesan tepung gandum, tepung beras dan tepung sagu pada dua nisbah tepung : air yang berbeza terhadap kelikatan dan parameter pemprosesan produk goreng bersalut. Cecair penyalut telah disediakan dengan mencampurkan tepung gandum, tepung beras dan tepung sagu dengan air pada dua nisbah tepung : air iaitu 1 : 1 dan 1 : 2. Pisang nipah (Musa sapientum) sebagai substrat telah disalut dan digoreng pada suhu 180Oc selama 3 minit. Keputusan menunjukkan tepung gandum menghasilkan kelikatan, peratus lekatan salutan dan hasil akhir penggorengan yang tertinggi manakala tepung sagu yang terendah sama ada pada nisbah 1 : 1 ataupun 1: 2 (tepung : air). Terdapat perbezaan yang bererti ($p<0.05$) bagi peratus kehilangan penggorengan di antara jenis tepung yang berbeza bagi kedua-dua nisbah tersebut. Untuk cecair penyalut dengan nisbah 1:2 (tepung:air), tepung gandum menghasilkan peratusan bagi parameter kehilangan penggorengan yang terendah manakala tepung beras yang tertinggi.

J61 Studies on the antioxidant properties of tualang honey of Malaysia

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Afr. J. Traditional, Complementary and Alternative Medicines (CAM) 7 (1): 59 - 63, 2010

Honey has been used since ancient times for its nutritional as well as curative properties. Tualang honey is collected from wild honey bees' hives on Tualang trees found in the Malaysian rain forest. It has been used traditionally for the treatment of various diseases, where its therapeutic value has partly been related to its antioxidant properties. This study therefore assessed the colour intensity, total phenolic content, antioxidant activity and antiradical activity of gamma irradiated Tualang Honey. The colour intensity at ABS45O was 489.5 ± 1.7 mAU, total phenolic content was 251.7±7.9 mg gallic acid /Kg honey, total antioxidant activity by FRAP assay was 322.1±9.7 (µM Fe(II)) and the antiradical activity by DPPH assay was 41.30 ± 0.78 (% inhibition). The data confirms that the antioxidant properties of gamma irradiated Tualang honey are similar to other types of honeys reported in the literature.

J62 Effect of storage on ß-carotene content in mango var. Chokanan puree

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Food 2(2): 131-134, 2008

This study aimed to determine the effect of storage on the content of ß-carotene in mango puree. Mango (Mangifera indica L.) var. Chokanan was selected for this study. The ß-carotene content at 0, 3, 6 and 24 days of storage were 4.74 ± 0.29, 3.78 ± 0.21, 3.42 ± 0.11 and 2.84 ± 0.55 mg/100 g puree, respectively. ß-Carotene content of mango puree was significantly different ($P < 0.05$) at different storage times. However, a post-hoc test showed that the ß-carotene content was significantly different ($P < 0.05$) between day 0 and 24 of storage times. Storage at 5°C for more than 3 days reduced 20% of ß-carotene content in mango puree. Prolong storage time of the puree for more than 24 days had reduced about 40% of ß-carotene content in mango puree. The study indicated that ß-carotene content in mango puree was significantly lost after 24 days of storage.

J63 Tensile Properties of Single Oil Palm Empty Fruit Bunch (OPEFB) Fibre

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Sains Malaysiana 38(4): 525-529, 2009

The use of natural fibres obtained from plants and trees as reinforcing materials has attracted many researchers to widen their applications. Natural fibres are low cost, low density, have high specific properties, biodegradable and non- abrasive. Oil palm fibre (OPF) can be obtained directly from natural resource, it is cheap and also has advantages due to its renewable nature, low cost, and easy availability. In this study, the mechanical performances of single oil palm fibre are measured and evaluated. The diameter of OPF was in the range from 250 to 610 μm while moisture content was between 2.2 to 9.5%. The average tensile properties obtained were tensile strength, 71 MPa, Young's modulus, 1703 MPa and elongation at break, 11%.

J64 Safety issues related to polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated

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Journal of Food, Agriculture & Environment 7 (3&4): 134 - 138, 2009

Dioxins (PCDDs) and furans (PCDFs) exposure has been linked to birth detects, child growth retardation, reduced levels of male reproductive hormones, altered ratios of male to female births, diabetes and cancer. These show that PCDDs and PCDFs give awful impact to man-kind. This paper will highlight on the concentration of the contaminants in fish and shellfish as well as the estimate intake of the contaminants based on data from other countries. This paper also will identify the relevant regulatory framework presently available in Malaysia that governs the environmental management of PCDDs and PCDFs. In response to aggressive attempts globally to control PCDD/Fs emissions over the last 35 years, human exposures to PCDD/Fs from the environment have declined significantly. The primary source of human exposure to PCDDs and PCDFs is animal foods including fish and shellfish. The sources of these contaminants in the foods are not well understood and are probably varied. Data on the levels of PCDD/Fs measured in various fish samples collected from one country to another varies which correlate with the varied species of fish and shellfish available besides the human industrial

activities nearby. As for Malaysia, the information on the level and type of PCDD/Fs present in food especially fish and shellfish is still lacking and need to be made available in order for specific recommendations (kind of species, frequency and size of meals) regarding human consumption to be made. This paper also has noticed that there is no specific legislation in Malaysia that governs the safety and environmental management on PCDDs and PCDFs. However, there are several legislations that regulate the safety and environmental management of PCDDs and PCDFs which include Environmental Quality Act (1974); the Occupational Safety and Health Act (1994); the Customs Act (1967) and the Food Act (1983). The enforcement of these legislations is not the responsibility of a single government agency. Different government departments may enforce the legislation relevant to the operation of that department. Hence, the Environmental Quality Act (1974) is the responsible of the Ministry of Natural Resources and Environment, the Occupational Safety and Health Act (1994) is by the Ministry of Human Resources whilst the Food Act (1983) is by the Ministry of Health and as for the Customs Act (1967) under the supervision and administration of the Ministry of Finance. Finally, this paper concluded that Malaysia has a sufficient regulatory framework in which may adequately control on PCDDs and PCDFs emission in various life cycles. However, there is no legal provision on the control of exposure toward PCDDs and PCDFs especially for human consumption by setting specific maximum residue level for various groups of food.

J65 Caffeine and theobromine levels in chocolate couverture and coating products

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Mal J Nutr 6: 55-63, 2000

Thirty-two samples of chocolate products were analysed by HPLC for caffeine and theobromine contents. Defatted residues of samples were extracted with 80% aqueous acetone. After extraction into boiling water, the methylxanthines were identified and quantified with the use of μ-Bondapak column and mobile phase of methanol:water:acetic acid (20:79:1). Levels of caffein and theobromine in 32 samples of chocolate products averaged 0.62-1.14 mg/g and 0.026-0.153 mg/g respectively. Mean values for theobromine and caffeine content for chocolate coating were 0.82 and 0.07 mg/g respectively. The chocolate coating made from fat substitute had theobromine and caffeine levels ranging from 0.36-0.70 mg/g and 0.027-0.061 mg/g respectively, with mean values of 0.49 mg theobromine/g and 0.039 mg caffeine/g. In local chocolate, the mean theobromine and caffeine levels respectively were 0.72 mg/g and 0.04 mg/g in milk chocolate, and 0.85 mg/g and 0.06 mg/g in dark chocolate. Meanwhile, for imported chocolate, the mean

theobromine and caffeine levels respectively were 1.05 mg/g and 0.12 mg/g in dark chocolate; 0.76 mg/g and 0.04 mg/g in milk chocolate; and 0.74 mg/g and 0.03 mg/g in white chocolate. Compared with the local chocolates, imported chocolates had higher levels of theobromine and caffeine at 1.141 mg/g and 0.1533mg/g. The average theobromine and caffeine concentrations in local chocolate were 0.082mg/g and 0.066mg/g. Theobromine concentration in chocolate samples is within the range of 0.62mg/g-1.141mg/g and the range of caffeine concentration is 0.026mg/g-0.153mg/g respectively. Bittersweet chocolates were found to have higher theobromine and caffeine concentrations than normal sweet chocolates and milk chocolates.

J66 Pembentukan sebatian pirazina melalui tindak balas maillard antara likur koko dengan glukosa dan asid amino

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Sains Malaysiana 30: 119-133, 2001

Empat model tindak balas telah dikaji dengan menggunakan empat jenis asid amino yang berlainan iaitu asid amino leusina, alanina, valina dan fenilalanina bagi melihat corak penghasilan sebatian meruap daripada kumpulan pirazina secara kualititatif dan kuantitatif yang bertindak balas dengan glukosa di dalam likur koko. Satu model kawalan telah dibentuk tanpa tambahan asid amino dan glukosa. Setiap model menerima 12 perlakuan dengan suhu dan masa yang berlainan dan sebatian meruap diekstrak menggunakan modifikasi kaedah pengekstraksian pelarut radas Likens dan Nickerson yang terubahsuai. Pengecaman sebatian meruap dilakukan menerusi analisis Kromatografi Gas untuk Lapan jenis komponen pirazina iaitu pirazina, 2-metilpirazina, 2,5-dimetilpirazina, etilpirazina, 2,3-demetilpirazina, 2,3,5-trimetilpirazina, 2-asetilpirazina dan 2,3,5,6-tetrametilpirazina. Analisis kuantitatif menunjukkan penggunaan asid amino leusina adalah paling baik untuk penghasilan maksimum sebatian meruap diikuti asid amino valina, fenilalanina dan alanina. Secara kualititatif, semua sebatian yang dikenalpasti hadir di dalam setiap model tindak balas yang dibentuk dan jumlah penghasilan sebatian meruap didapati berkait secara relatif dengan faktor suhu, masa dan jenis asid amino yang digunakan. Suhu 140oC selama 30 min adalah perlakuan maksima untuk penghasilan jumlah sebatian meruap manakala suhu 130°C dalam tempoh 60 dan 90 min adalah perlakuan maksima untuk semua model tindak balas.

J67 Potential of palm oil utilisation in aquaculture feeds

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Asia Pac J Clin Nutr. 11 Suppl 7:S473-S476, 2002

One key ingredient used in the formulation of aquafeed is fish oil, which is produced from small marine pelagic fish and represents a finite fishery resource. At the present time, global fish oil production has reached a plateau and is not expected to increase beyond current levels. Recent estimates suggest that fish oils may be unable to meet demands from the rapidly growing aquaculture industry by as early as 2005. Therefore, there is currently great interest within the aquafeed industry in evaluating alternatives to fish oils. The ever-expanding oil palm cultivation in Malaysia and other tropical countries offers the possibility of an increased and constant availability of palm oil products for aquafeed formulation. Research into the use of palm oil in aquafeed begun around the mid-1990s and this review examines some of the findings from these studies. The use of palm oil in fish diets has generally shown encouraging results. Improved growth, feed efficiency, protein utilisation, reproductive performance and higher concentrations of alpha-tocopherol in fish fillets have been reported. Recent evidence for the ability of palm oil to substitute for fish oil in catfish diets is reviewed. The potential of palm oil use in aquafeed and future experimental directions are suggested. The aquaculture feed industry offers a great avenue to increase and diversify the use of palm oil-based products.

J68 Evaluation of the Safety of Heated Vegetable Oils Containing 25% of Polar Compounds

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Mal J Med Hlth Sc 2: 25-39, 2006

The content of polar compounds (PC) and polymeric triglycerides build up in fried and recycled/reused oils and therefore, these undesirable components are often used as markers of deterioration in edible oil quality. Expert and authoritative agencies have recommended an upper limit of 25% for PC in fried/reused edible oils; beyond this level the oil is considered unsuitable for human consumption. The safety of recycled or repeatedly-heated oils is still very much a concern of both the health authorities and the general public. Objective: The present study evaluates the safety of long-tern consumption of heated vegetable oils containing 25% of PC on growth, effect on major body organs and reproduction outcome, using the Sprague-Dawley rat model. Methods: Refined, bleached and deodorised palm olein (PO) and partially hydrogenated soybean oil (HSBO) were repeatedly heated for 5 hours

daily with no topping-up at 180oC until a polar compound (PC) content of 25% was attained. Refined soybean oil was similarly heated up to 50% PC and used in the positive control diet. All five experimental oils, namely unheated PO (No PC), heated PO (25% PC), unheated HSBO (No PC), heated HSBO (25% PC), and positive control oil (50% PC) were separately incorporated at 30% energy (15% w/w) as the sole dietary fat into nutritionally-adequate purified diets. Each experimental diet was provided ad libitum to a different dietary group comprising 14 male and 20 female Swiss-albino rats. After 13 weeks (90 days), 10 males were selected from each group and each male was paired with two females from the same dietary group for the reproductive study. After 4 weeks into the reproductive study (total of 17 weeks on the experimental diets), all 10 males in each group were sacrificed and the usual toxicity tests consisting of blood cell-type counts, liver and kidney function tests, and examination (organ-to-body weight ratios and histology) of the liver, kidney, heart and spleen were performed. Results: The heated PO and HSBO diets were well-tolerated by the animals. However, these heated test oils inhibited growth marginally ($p>0.05$), enlarged the liver, kidney and heart, and markedly raised serum alkaline phosphatase (liver function test) compared to the unheated oils ($p<0.05$), but with no obvious histological damage to these tissues. The positive control diet caused mild to moderate diarrhoea in the animals during the first week, and significantly inhibited growth ($p<0.05$) compared to the other dietary groups. The heated-fat diets affected adversely the reproductive performance of the female rats which improved significantly after supplementation with 3%(w/w) [6% energy] unhydrogenated soybean oil. Conclusion: The above findings suggest that long-term consumption of heated vegetable oils containing PC in the region of 25% has negative effects on growth, metabolism, and pregnancy outcome.

J69 Evaluation of dietary intake of pesticides residues

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Sains Malaysiana 33(1): 129-145, 2004

Food contaminations are global problems that arise from industrial pollution, agricultural practices, or from food preparation and storage processes. Food contamination may lead to adverse health effects and there is considerable effort on the part of governments and industry to minimize the level of contamination. A joint Food Contamination Monitoring and Assessment Programme under the UN Environmental Programme (UNEP) in conjunction with FAO and WHO was established in 1976. There are increases in numbers of 40 countries participating the programme in 1992. The main objectives of the Programme is to be informed about levels and trends of contamination in food, their contribution to total human exposure and significance with regard to public health and trade. The Programme have been

concerned with levels of priority chemicals in foods of major dietary importance and a significant portion of the data concerns the estimated total dietary intake of those contaminants selected for further comparison with toxicologically available standards or tolerance intake levels.

J70 Identification of antioxidants (flavonoids) from the tissue cultures of Citrus mitis (limau kasturi), rutaceae family

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Asia Pacific J Clin Nutr 7(3/4): 329-336, 1998

Identification of most flavonoid compounds (antioxidants) and determination of the tissue culture growth, callus of Citrus mitis (limau kasturi), Rutaceae family were studied. A combination of phytohormones, naphthaleneacetic acid (NAA) 1.0 mg/L (w/v) and kinetin (KN) 0.5 mg/L (w/v) as previously established by Gill et al. (1995) were supplemented to the basal medium of Murashige and Skoog (MS) (1962). Seed explants were obtained from mature fruits of C. mitis, while stem, root and leaf explants were asceptically obtained from young seedlings earlier grown in vitro at 28 ± 2ºC for 5 weeks. Callus derived from stem explants showed the best response of callus growth compared to the other explants that showed only the occurrence of the organogenesis process. Determination of callus growth, cell viability and identification of flavonoids produced was performed only on C. mitis callus cultures. The callus that was cultured in dark conditions showed the best growth, was more friable and was golden cream in colour. There were also more viable cells present compared to the light condition. The flavonoids were determined by using the simple techniques of preparative thin layer chromatography (pTLC) with a development solven (e.g. n-butanol:acetic acid:water (BAW, 4:1:5). The spots were obtained after exposure to either iodine or NH3 vapour and detected under UV light. The callus derived from stem explants had two spots, one with Rf (x100) 43.4 (i.e. myricetin) and the other with Rf(x100) 94.7 (i.e. hesperitin) which are, respectively, under the flavonol and flavanone groups. Individual spots were carefully scraped by being dissolved in 3.0 mL absolute ethanol and centrifuged. The supernatant obtained was screened at 250-550 nm by using a spectrofluorometer for their chromatograms.

J71 Intertidal marine life as a source of food in Semporna district, Sabah

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Mal J Nutr 1: 105-114, 1995

Kajian di empat buah perkampungan nelayan di Daerah Semporna, Sabah mendapati sejumlah 55 spesies hidupan marin intertidal dijadikan sumber makanan. Pengutipan dilakukan semasa air surut dengan menyertai penduduk tempatan yang sering mengutip hidupan laut ini. Kampung terlibat ialah Kg. Panji, Kg. Bangau-Bangau (kawasan penempatan baru kaum Bajau Laut), Kg. air dan Kg. Kebimbangan. Pencaman spesies berdasarkan kaedah ilustrasi dan juga dengan merujuk di muzium-muzium tempatan. Nama tempatan untuk setiap spesies diperolehi daripada penduduk pesisiran pantai. Jumlah bilangan spesies yang dikutip bagaimanapun tidak sama antara kampung. Hasil analisis kimia berdasarkan kaedah A.O.A.C. ke atas beberapa spesies menunjukkan perbezaan nilai nutrien dan kandungan unsur surih serta plumbum.

J72 Kesan suhu pengeringan dan penggaraman terhadap kualiti ikan tongkol kering (Euthynnus Affinis)

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Sains Malaysiana 35(1): 83-87, 2006

Kajian terhadap kesan suhu pengeringan (50, 60, 70oC) dan kepekatan garam (3, 5, 7%) terhadap kualiti ikan tongkol (Euthynnus affinis) telah dilakukan. Analisis kandungan proksimat menunjukkan nilai yang berbeza secara bererti ($p<0.05$), terutama kandungan protein (76.66%) ikan yang dikering pada suhu 50°C. Pengeringan pada suhu dan kepekatan garam yang tinggi cenderung untuk menghasilkan ikan tongkol kering dengan wama yang agak gelap (72.39). Ikon tongkol kering memiliki keupayaan memegang air yang rendah iaitu antara 3.43-3.66 ml/g sampel. Aktiviti air (aw) ikon tongkol yang hanya mencapai 0.76 atau kurang, merupakan tahap yang paling baik untuk tujuan penyimpanan, dan dapat mengawal pertumbuhan mikroorganisma, merencat aktiviti enzim dan memenuhi keperluan pembungkusan.

J73 Two varieties of honey that are available in Malaysia gave intermediate glycemic index values when tested among healthy individuals

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Biomedical Papers Med Fac Univ Palacky Oloumuc Czech Repub 153(2): 145-148, 2009

Aim: To determine the glycemic index (GI) of Malaysian wild honey and Australian honey. Methods: Eight healthy volunteers (5 men and 3 women, aged 24 - 44 y, with normal BMI) were served 50 g carbohydrate portions of two varieties of honey or the reference food (glucose, tested 3 times), on separate occasions. Capillary blood glucose was measured fasting and at 15, 30, 45, 60, 90 and 120 min after the start of the test meals. The GI was calculated by expressing each subject's incremental area under the blood glucose curve (AUC) after honey as a percentage of his or her mean AUC after glucose. Results: The results showed that the mean AUC of the Malaysian and Australian honeys, 174 ± 19 and 158 ± 16 mmol×min/l, respectively, did not differ from each other but were significantly less than that after glucose, 259 ± 15 mmol×min/l ($P < 0.001$). The mean GI of Malaysian wild honey, 65 ± 7, did not differ from that of Australian honey, 59 ± 5, but both were significantly less than the GI of glucose, 100 ($P < 0.001$). Conclusions: We conclude that both Malaysian wild honey (GI = 65 ± 7) and Australian honey (GI = 59 ± 5) are intermediate GI foods.

J74 Glycemic index of common Malaysian fruits

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Asia Pac J Clin Nutr 17(1): 35-39, 2008

The objective of the present study was to measure the glycemic index of durian, papaya, pineapple and watermelon grown in Malaysia. Ten (10) healthy volunteers (5 females, 5 males; body mass index 21.18±1.7kg/m^2) consumed 50 g of available carbohydrate portions of glucose (reference food) and four test foods (durian, papaya, pineapple and watermelon) in random order after an overnight fast. Glucose was tested on three separate occasions, and the test foods were each tested once. Postprandial plasma glucose was measured at intervals for two hours after intake of the test foods. Incremental areas under the curve were calculated,

and the glycemic index was determined by expressing the area under the curve after the test foods as a percentage of the mean area under the curve after glucose. The results showed that the area under the curve after pineapple, 232±24 mmol×min/L, was significantly greater than those after papaya, 147±14, watermelon, 139±8, and durian, 124±13 mmol×min/L ($p<0.05$). Similarly, the glycemic index of pineapple, 82±4, was significantly greater than those of papaya, 58±6, watermelon, 55±3, and durian, 49±5 ($p<0.05$). The differences in area under the curve and glycemic index among papaya, watermelon and durian were not statistically significant. We conclude that pineapple has a high glycemic index, whereas papaya is intermediate and watermelon and durian are low glycemic index foods. The validity of these results depends on the accuracy of the data in the food tables upon which the portion sizes tested were based.

J75 Microbiological status of food sold at UPM cafeterias

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Asia Pacific J Clin Nutr 7(3/4): 1998, 329-336

A study was carried out to determine the level bacteria in food served in the cafeteria at UPM (Universiti Putra Malaysia). Three cafeterias were selected for this study, namely, Kolej Kediaman Kelima, Kolej Tun Perak and Kolej Mohamad Rashid Cafeteria. The selection of the cafeterias was based on four types of common food (nasi goring, nasi lemak, mi goring and mihoon goring) served at early morning (7.30 am) and the same food still available at mid morning (10.30 am). Enumeration of bacteria was carried out using an Aerobic Plate Count, the Coliform and Escherichia coli determination, and Coagulase positive Staphylococcus aureus test. Sanitation of the cafeteria was observed based on structured questionnaire. Swab 'N' Check Method was used to determine the cleanliness of the utensils and premises in the cafeterias. The results showed that foods served at early morning (7.30 am) contained bacteria level of 10^3 to 10^7 cfu/g, the coliform between 1 to 7 MPN/100g, E. coli between 1 to 2 MPN/100g and S. aureus between 10^2 to 10^3 colon/g. the foods served at mid morning (10.30 am) contained bacteria levels of 10^5 to 10^8 cfu/g, the coliform between 2 to 27 MPN/100g, E. coli between 1 to 8 MPN/100g and S. aureus between 103 to 104 colon/g. the level of sanitation at the cafeterias were satisfactory. The level of cleanliness of the utensils and premises range between leval 1 (clean) to level 4 (very dirty). The Pearson Correlation Coefficient showed no significant correlation ($P > 0.05$) between bacteria content and the level of sanitation. The t-test indicates that the level of bacteria count in food served at 7.30 am and the same food served at 10.30 am was significant ($P < 0.05$). The data suggests that foods served at early morning have lower bacteria content as compared to the same food served at mid-morning. Therefore, consumers should not eat the food sold 3 hours after preparation in order to avoid food poisoning.

J76 Hypoglycaemic properties of Malaysian cocoa (Theobroma cacao) polyphenols-rich extract

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International Food Research Journal 15(3): 305-312, 2008

The objective of the study was to investigate the hypoglycaemic properties of Malaysian cocoa (Theobroma cacao) polyphenols extract in-vivo and insulin sensitivity in-vitro. Cocoa extract (CE) (containing 190 - 286 mg total polyphenol per gram extract) was prepared from fermented and roasted (140°C, 20 min) beans by extracting with 80% ethanol in the ratio of 1 to 10. For the in-vivo study, the CE was administered in three dosages (1%, 2%, and 3%) to groups of normal and diabetic rats for a period of 4 weeks by force-feeding. Results showed that dosages of 1% and 3% CE significantly reduced ($p < 0.05$) plasma glucose levels in the diabetic rats. An in-vitro study (BRIN-BD11 cell lines) was used to evaluate the effect of CE on insulin sensitivity. The results demonstrated that CE at a concentration of 0.1 mg/ml significantly increased ($p < 0.05$) insulin level compared to the control. The results of this study showed that Malaysian cocoa polyphenol extract have the potential of being an insulin-mimetic agent. Further studies are on-going to elucidate the underlying mechanisms of polyphenols present in CE that contribute to the reduction of plasma glucose levels and insulin mimicking activity.

J77 Frying Pressure and Temperature Effects on Sensory Characteristics of Coated Chicken Nuggets

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Sains Malaysiana 38(2): 171-175, 2009

A study was carried out to evaluate the effects of frying pressure (102 and 156 kPa) and temperature (150, 165 and 180°C) on sensory characteristics of chicken nuggets coated with wheat, rice and sago flours. Batters from wheat, rice and sago flours were prepared by mixing each flour with water at a weight ratio of 1:1.2 (flour: water). Chicken nuggets were dipped in the prepared batters and fried at the different pressure and temperature for 7 minutes. Sensory evaluation was done using trained panelists (n=7) with two replication. Attributes assessed were color, aroma, coating thickness, adhesiveness, hardness, crispness, oiliness, juiciness and overall acceptance. Results showed that using different frying pressures and

temperatures did significantly affect ($p<0.05$) all the sensory attributes of chicken nuggets coated with wheat, rice and sago flours. It was observed that coated chicken nuggets fried at a pressure of 156 kPa and temperature of 165°C was most preferred by the trained panellists.

J78 Properties of coating systems during the initial period of deep-fat frying as affected by flour type, temperature and pressure

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Sains Malaysiana 38(2): 177-183, 2009

This study was carried out to determine the properties of coatings made from wheat, rice and sago flour when fried under different frying temperature and pressure during the initial period of deep-fat frying. Three types of batter made from wheat, rice and sago flour were prepared by mixing each flour with water at a ratio of 1:1.2 (flour: water). Poultry nuggets were dipped in the prepared batter and fried for 0, 6, 18 and 30 seconds at three frying temperatures (150, 165, 180°C) and two frying pressures (102 and 156 kPa). Results showed that the frying pressure applied did not produce any significant effect on moisture content, normalized moisture loss and fat content up to 30 seconds of frying. All parameters except moisture content of the coating region were significantly ($p<0.05$) affected by flour type. Coating from sago flour produced the highest normalized moisture loss and fat content compared to other flour.

J79 Potential of using refined red palm olein in carrot cake

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Sains Malaysiana 31: 159-166, 2002

The possibility of using refined red palm olein in carrot cake was studied. Cakes were prepared using refined red palm olein (Carotino®) by itself and in combination with other vegetable oils. Five cake formulations were developed. Formulation A containing 100% soya bean oil (SBO), formulation B with 100% palm olein (POO), formulation C using 100% refined red palm olein (RRPO). Formulation D is similar to C, but with less amount of sugar while formulation E contained all three types

of oils blended at a ratio of 1/3:1/3: 1/3. The cake samples were subjected to sensory evaluation to determine the acceptability of the cake. Specific volume and texture of 5 cake formulations were determined using rapeseed displacement and texture meter respectively. The results of the study showed that there were significant differences ($p<0.05$) in sensory rating for texture, sweetness, oiliness and overall acceptability for samples A, C and D. In term of colour there was no significant difference. For overall acceptability rating, cake B was rated the most acceptable (4.2) followed by cake C and A (3.7), However there was no significant difference between cake B and cake C. Cake E have the highest specific volume (1.50 cm^3 g^{-1}) followed by B (1.47 cm^3g^{-1}) and A (1.44 cm^3 g^{-1}). ln term of hardness cake C was softest and there was inverse relationship (r=-0.98) between instrumental texture measurement and texture evaluated by sensory test.

J80 Toxicological evaluation of some Malaysian locally processed raw food products

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Food Chem Toxicol. 46(1): 368-374, 2008

Malaysian locally processed raw food products are widely used as main ingredients in local cooking. Previous studies showed that these food products have a positive correlation with the incidence of cancer. The cytotoxicity effect was evaluated using MTT assay (3-(4,5-dimetil-2-thiazolil)-2,5-diphenyl-2H-tetrazolium bromide) against Chang liver cells at 2000 microg/ml following 72 h incubation. Findings showed all methanol extracts caused a tremendous drop in the percentage of cell viability at 2000 microg/ml (shrimp paste - 41.69+/-3.36%, salted fish - 37.2+/-1.06%, dried shrimp - 40.32+/-1.8%, $p<0.05$). To detect DNA damage in a single cell, alkaline Comet Assay was used. None of the extracts caused DNA damage to the Chang liver cells at 62.5 microg/ml following 24 h incubation, as compared to the positive control, hydrogen peroxide (tail moment - 9.50+/-1.50; tail intensity - 30.50+/-2.50). Proximate analysis which was used for the evaluation of macronutrients in food showed that shrimp paste did not comply with the protein requirement (<25%) as in Food Act 1983. Salt was found in every sample with the highest percentage being detected in shrimp paste which exceeded 20%. Following heavy metal analysis (arsenic, cadmium, lead and mercury), arsenic was found in every sample with dried shrimps showing the highest value as compared to the other samples (6.16 mg/kg). In conclusion, several food extracts showed cytotoxic effect but did not cause DNA damage against Chang liver cells. Salt was found as the main additive and arsenic was present in every sample, which could be the probable cause of the toxicity effects observed.

J81 Toxicity of Copper and Nickel to Freshwater Prawn Macrobarchium lanchesteri

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Sains Malaysiana 38(3): 353-358, 2009

Adult Macrobrachium lanchesteri were exposed for a four-day period in the laboratory condition to a range of copper (Cu) and nickel (Ni) concentrations. The mortality was assessed and median lethal times (LT50) and concentrations (LC50) were calculated. At the end of four-day period, the survived prawns were used to determine bioconcentration of the metals. LT50 and LC50 increased with decrease in mean exposure concentrations and times respectively for the two metals (Cu and Ni). LC50s for 24, 48 and 96 hours for Cu were 261.6, 171.6 and µg/L and for Ni 30786.3, 28534.7 and 8056.6 µg/L respectively. Copper and Ni bioconcentration in M. lanchesteri increases with increase in concentration exposure and Cu was more toxic than Ni to M. lanchesteri.

J82 Reliability and Validity of the Instrument Used in the HELIC (Healthy Lifestyle in Children) Study of Primary School Children's Nutrition Knowledge, Attitude and Practice

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Ma1 J Nutr 12(1): 33-44, 2006

The objective of this paper is to report on the reliability and validity of a knowledge, attitude and practice instrument used among young primary school children. The instrument was developed as an evaluation tool in the HELIC study and consisted of 23 knowledge, 11 attitude and 10 practice items. A total of 335 Year 2 students from 4 randomly selected primary schools in Selangor and Wilayah Persekutuan participated in the HELIC study. Students were divided into small groups and an enumerator verbally administered the instrument to each group. Reliability for each construct (knowledge, attitude and practice) was estimated as item to total score correlation and internal consistency (Cronbach's alpha). Construct validity was determined through factor analysis and Pearson correlation. Results indicated that 3 attitude and 3 practice items did not correlate significantly to the total score ($p>0.05$). However, the deletion of these items did not significantly alter the Cronbach's alpha coefficients. Internal consistency was good for knowledge

(α=0.68) but low for attitude (α=0.37) and practice (α=0.36) constructs. Based on factor analysis, 5 factor- solutions emerged for knowledge and 4 factor solutions for attitude and practice. Sufficient variance was obtained for the factors in knowledge (51.7%), attitude (51.2% and practice (51.0%). There were also significant positive correlations among the constructs ($p<0.01$). I.n conclusion, the instrument was valid and reliable, especially for the knowledge construct. Further improvements, particularly on the attitude and practice constructs, are needed in order for the instrument to be an effective assessment or evaluation tool in various settings.

J83 Effects of treatments on the nutrient composition and anti-nutritional factors of rubber seed (Hevea brasiliensis)

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Asia Pacific J Clin Nutr 7(3/4), 329-336, 1998

This study was carried out to determine the nutrient composition and the anti-nutritional factors in rubber seeds as well as asam rom, a tradiditional Malay food based on rubber seed. Asam rom was prepared by drying under the sun for 2-4 days followed by melting and then fermenting. Nutrient composition was determined using proximate analysis based on the AOAC (1980). The anti-nutritional factors analyzed were cyanide and trypsin inhibitor. The treatments applied in this study included removal of the rubber seed skin, soaking in water (24 h), boiling (30 min), drying in oven (80ºC for 4 h), soaking (24 h) followed by drying (80ºC for 4 h) and boiling (30 min) followed by drying (80ºC for 4 h). The results of proximate analysis of rubber seed were as follows: 31.9% moisture, 1.3% ash, 29.6% fat, 5.3% crude fiber, 12.2% protein and 19.7% carbohydrate. The nutrients composition of asam rom was as follows: 19.5% moisture, 4.7% ash, 22.1% fat, 9.5% crude fiber, 11.6% protein and 32.5% carbohydrate. The compositions of the trypsin inhibitor and cyanide content obtained from rubber seed were 15.1 ± 2.5 TIU/mL and 55 ± 0.9 mg HCN/kg, respectively. All the heat treatments conducted were found to reduce the content of trypsin inhibitor in rubber seed, as much as 70-80%. The cyanide content was also found to be reduced after each treatment. Removal of the skin only resulted in small effect. About 50% cyanide was destroyed when rubber seed was boiled followed by drying, soaking and drying. On the other hand, in asam rom, very little amount of cyanide was obtained (0.25 ± 0.35 mg HCN/kg) and trypsin inhibitor was not detected. In conclusion this study showed that various treatments applied can reduce the levels of cyanide and trypsin inhibitor in rubber seed and that it therefore has the potential to be processed as a food product.

J84 Nutrition and ecosystems in Sarawak: The role of the areca nut

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Asia Pacific J Clin Nutr 7(3/4): 300-306, 1998

The effects of population pressure on agricultural sustainability in the delicate tropical and subtropical ecosystems have often been thought to explain high prevalence rates of malnutrition in rural South-East Asia. However, recent studies in rural Sarawak suggest thet processes of modenisation have resulted in increased variations in energy nutritional status in adults. A contributory factor may be consumption of area nut (Malay Pinang, of the palm Areca catechu). This is thought to influence energy balance through effects on appetite and resting metabolic rate. Body mass index (BMI, kg/m^2) data for 325 Iban men and 438 non-pregnant Iban women, measured in 1990 and again in 1996, have been analysed in relation to areca use, smoking behavior, socio-economic status, and reported morbidity. Body composition derived from skinfold thickness measurements for 313 men and 382 women was also analysed. The results suggest that use of areca nut is associated with significantly lower age-related increments in BMI and percentage body fat in women after allowing for age, smoking, reported morbidity, and confounding socio-economic factors. Therefore, the impact of recent economic and social development seen in rising prevalences of 'over-nutrition' may be modulated by use of the areca nut.

J85 Palm fruit chemistry and nutrition

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Asia Pac J Clin Nutr. 12(3): 355-362, 2003

The palm fruit (Elaies guineensis) yields palm oil, a palmitic-oleic rich semi solid fat and the fat-soluble minor components, vitamin E (tocopherols, tocotrienols), carotenoids and phytosterols. A recent innovation has led to the recovery and concentration of water-soluble antioxidants from palm oil milling waste, characterized by its high content of phenolic acids and flavonoids. These natural ingredients pose both challenges and opportunities for the food and nutraceutical industries. Palm oil's rich content of saturated and monounsaturated fatty acids has actually been turned into an asset in view of current dietary recommendations aimed at zero trans content in solid fats such as margarine, shortenings and frying fats. Using palm oil in combination with other oils and fats facilitates the development of a new generation of fat products that can be tailored to meet most current dietary recommendations. The wide range of natural palm oil fractions, differing in their physico-chemical characteristics, the most notable of which is the carotenoid-rich red palm oil further assists this. Palm vitamin E (30% tocopherols, 70% tocotrienols) has been extensively researched for its nutritional and health properties, including antioxidant activities, cholesterol lowering, anti-cancer effects and protection

against atherosclerosis. These are attributed largely to its tocotrienol content. A relatively new output from the oil palm fruit is the water-soluble phenolic-flavonoid-rich antioxidant complex. This has potent antioxidant properties coupled with beneficial effects against skin, breast and other cancers. Enabled by its water solubility, this is currently being tested for use as nutraceuticals and in cosmetics with potential benefits against skin aging. A further challenge would be to package all these palm ingredients into a single functional food for better nutrition and health.

J86 Incidence of Listeria spp. in Vegetables in Kuala Lumpur

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Med J Malaysia.49(3): 217-22, 1994

From April 1992 to September 1992, 280 samples of 10 different fresh vegetables, bought from four different market outlets in Kuala Lumpur were examined for the presence of Listeria spp. Most of the market produce was locally grown with the exception of carrots. The isolation procedure was based on the Food & Drug Administration method (modified) used for the detection of Listeria spp. Isolation media used were Listeria Selective medium and LiCl-phenylethanol-Moxalactam agars. The identification of isolates was by means of conventional biochemical tests and API Listeria identification system. Five out of the 280 samples showed Listeria contamination, Listeria monocytogenes was isolated in lettuce, sengkuang (Pachyrrhizus erosus) and selom (Oenanthe javanica) and Listeria innocua was isolated from sengkuang (Pachyrrhizus erosus) and pegaga (Hydrocotyle asiatica).

J87 Simultaneous determination of B-vitamins and ascorbic acid in multi-vitamin preparations by reversed-phase HPLC

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Mal J Nutr 2: 176-194, 1996

The tedious and time consuming methods employed for the analysis of individual B-vitamins can now be replaced by ion-pair reversed-phase high-performance liquid chromatographic (HPLC) methods. This laboratory has previously reported the simultaneous determination of eight water-soluble vitamin standards that is, B_1, B_2, B_6, B_{12}, C, niacin, niacinamide and folic acid. The proposed isocratic HPLC method, employing 3 channels of detection, adequately separated all eight vitamins in less than 20 minutes. This study reports another phase of the project whereby the method was employed for the analysis of pharmaceutical preparations. Different extraction procedures were first evaluated, namely acid, acid plus enzyme and

alkaline hydrolysis methods, using vitamin standards, individual vitamin tablets and multivitamin preparations. The amounts obtained from the analysis were compared with the declared values. Recovery studies were also carried out. The method of acid hydrolysis with 0.1N sulphuric acid was found suitable for use and was thus adopted as the extraction procedure for the analysis of 10 multivitamin preparations obtained from various pharmaceutical outlets. For most of these preparations, the amount obtained were close to the declared values, except for folic acid and cyanocobalamin. Further trials on folic acid showed that the problem could be resolved by omitting the filtration step in the final extract after acid hydrolysis and diluting with 0.01N sodium hydroxide before processing for chromatography. Vitamin B_{12} was not detectable using the present chromatography system probably because of its low concentration in the samples studied.

J88 Simultaneous determination of retinol and α-tocopherol by high pressure liquid chromatography in micro-volumes of serum

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Mal J Nutr 5:21-30, 1999

The lack of biochemical data to indicate the prevalence of marginal vitamin A deficiency (VAD) in the country is largely because of the difficulty of obtaining enough serum for analysis, especially from malnourished children. Efforts were therefore made to establish a high-pressure liquid chromatography system (HPLC) for the determination of retinol in micro-volumes of serum. Since our previous studies showed that tocopherol could be simultaneously determined in the same system, studies have been carried out for the determination of both vitamins using retinol acetate and -tocopherol acetate as internal standards. Trials were carried out to determine the most suitable sample treatment procedures and chromatographic system including composition of the mobile phase for handling 20 µl of serum. The HPLC system proposed enables successful separation and quantitation of retinol and α-tocopherol and their respective internal standards, retinol acetate and -tocopherol in less than 14 minutes. Reproducibility studies carried out with pooled sera showed a within day and between day variation of less than 8% and 13% respectively for retinol, whilst variations for α-tocopherol were higher, ranging from 8-16%. The proposed method is currently being applied to the determination of retinol and α-tocopherol in a group of malnourished children under six years of age.

J89 Simultaneous determination of retinol, carotenoids and tocopherols in human serum by high pressure liquid chromatography

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Mal J Nutr 1: 151-170, 1995

The determination of serum vitamins having antioxidant properties has gained in importance in recent years. This is mainly due to the observation that an inverse correlation exists between blood levels of these vitamins, including retinol, carotenoids and tocopherol, and diet-related chronic diseases such as coronary heart disease and cancers. This laboratory has been carrying out a series of studies into the nutritional and analytical aspects of retinol and carotenoids. A simple reversed-phase HPLC method has been developed in an effort to improve methodologies for the separation and quantitation of carotenoids and retinol in foods and biological specimens, especially blood serum. As an extension to these studies, trials were carried out to determine the feasibility of analysing tocopherols using the same chromatographic procedure. With the addition of another detector wavelength, the same procedure detected and quantitated 3 major tocopherols simultaneously with retinol and five carotenoids. Within-day and between-day precision of the procedure was satisfactory. Trials carried out were able to improve recovery of the vitamins. Experiments conducted also showed that the addition of ascorbic acid to the extracting ethanol was beneficial for the analytical procedure. The presence of peroxide in ethyl acetate used in the chromatography mobile phase caused drastic destruction to the vitamins analysed. The addition of ascorbic acid during sample preparation was able to inhibit this destruction. The method was used for the analysis of sera from 65 apparently healthy Malaysians with a mean age of 52.8 years (range 24-76 years). Mean retinol concentration of the group was 69.8 ± 18.8 μg/dl. The mean ß-carotene concentration of the subjects studied was 33.8 ± 24.3 μg/dl, while the mean total carotenoid concentration was 180.2 ± 3.0 μg/dl. The most abundant carotenoid in the serum samples studied was lutein, comprising about one-third of all carotenoids quantitated. The concentrations of δ- and γ-tocopherols in the serum samples studied were too low to be identified with certainty and quantitated accurately. The mean α-tocopherol level was 1840 ± 528 μg/dl. For retinol, α-tocopherol and most of the carotenoids determined, there was no statistically significant difference in the mean levels between male and female subjects as well as among the three different ethnic groups. Results obtained in this study were very similar to those previously reported by this laboratory. It is hoped that more data on the serum concentrations of these vitamins can become available for various population groups, including during various disease conditions.

J90 The medical importance of vitamin A and carotenoids (with particular reference to developing countries) and their determination

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Mal J Nutr 1: 179-230, 1995

Vitamin A, or retinol, is an essential nutrient for man and all mammalian species since it cannot be synthesised within the body. Deficiency of the vitamin results in adverse effects on growth, reproduction and resistance to infection. The most important manifestation of severe vitamin A deficiency (VAD) is xerophthalmia, and irreversible blindness may eventually occur in one or both eyes. VAD is still an important micronutrient deficiency problem in many developing countries, afflicting large numbers of pre-school children. It is often associated with protein-energy malnutrition, parasitic infestation and diarrhoeal disease. For many communities in developing countries, the major source of vitamin A in the diet is carotenoids. These compounds are synthesised only by photosynthetic microorganisms and by members of the plant kingdom where they serve important functions in metabolism, including participating in the photosynthetic process. These pigments also provide aesthetic qualities as colourants in the plant and animal kingdoms. Most importantly, the carotenoids serve the animal kingdom as sources of vitamin A activity. Major advances have occurred in understanding the role and mechanisms of action of carotenoids. They are now thought to play specific roles in mammalian tissues related to their function in plants. Carotenoids, with their highly reactive conjugated double bonds, act as free radical traps or antioxidants and may play an important role in the prevention of cancers. In view of the wide medical importance of carotenoids, much attention has been given to the determination of these pigments in foods as well as blood. Carotenoids in foods have conventionally been analysed using the open-column chromatography technique, but the high-pressure liquid chromatographic (HPLC) method is now gaining in importance as well. The classical method for the determination of carotenoids in blood is by the spectrophotometric method while the HPLC method is also recommended for use. An example of an HPLC method developed for the simultaneous determination of retinol and carotenoids in food and blood is given. The determination of retinol and carotenoids should be further developed in view of the wide importance of carotenoids in health and disease.

J91 Demand for beef in Malaysia: preference for quantity, quality or lean?

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Using the Malaysian Household Expenditure Survey 2004/2005 data, this study investigated Malaysian consumers' preference for beef quantity, quality, and lean beef. Demand and price models that incorporated consumer socio-economic variables were estimated via two-stage least squares (2SLS). This study showed that Malaysian consumers tend to demand for more quantity rather than quality of beef products. Malaysian consumers are also more responsive to price changes rather than fat reduction in beef products. It is more profitable for beef market players to increase their production as Malaysian consumers are expected to consume increasing amounts of beef products.

J92 Effect of Substituting rice palm flour and sago flour on the physicochemical characteristics and sensory of coating formulation

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Sains Malaysiana 31: 261-272, 2002

This study was carried out to evaluate the effect of substituting rice flour and sago flour on the physicochemical characteristic and sensory evaluation of coating formulation. Using a mixture design, ten formulations were obtained. Dilution 1:2 of weight of dry mixture to water was used. Deboned and skinless breast chicken meat served as a carrier. Results of preliminary study on wheat, rice and sago flours showed that wheat flour contained 3.5% damaged starch compared to 1.0% in rice flour and sago flour. The three types of flours also had different protein contents, wheat (13.7%), rice (8.9%) and sago (0.1%). Different types of flours contributed to different viscosity to the batter. The pH value of batter did not show any differences. Substitution of rice and sago flours showed reduction in oil absorption during cooking and improved moisture retension of chicken. In general, the mean scores of each attribute was not significantly different except for juiciness and overall acceptance. Formulation 10 (ratio wheat: rice: sago equal to 1:1:1) was found to be the most acceptable formulation based on physico-chemical characteristic whereas formulation 8 (ratio wheat: rice: sago equal to 1:1:2) for the sensory evaluation.

J93 Production of egg yolk protein hydrolysate through acid hydrolysis

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Sains Malaysiana 33(1): 63-72, 2004

Off grade egg with egg yolk content of 50% higher than normal egg can be successfully used in processing of hydrolysate flavourings. Protein extrac-tion using ethanol with two different ratios of egg yolk: ethanol: water (1: 1: 1 and 1:5:2) was carried out. The egg yolk protein was hydrolysed with 3N and 5N HCI for 10 hours at 11 ()'C. The protein hydrolysate obtained was freeze- dried. Studies showed that extraction using 1:5:2 ratio gave the highest protein content. The protein hydrolysate treated with 5N HCI gave the highest degree of hydrolysis. Sample of 1:5:2 - 5N had the highest degree of hydrolysis (78.8%),followed by sample of 1:1:1-5N (69.4%) and 1:5:2 - 3N (66.9%). Sensory evaluation results showed that sample of 1:5:2 - 3N produced the strongest aroma among the four samples studied. Aroma of egg yolk protein hydrolysate was similar to Brands Chicken Essence or Brovil Beef Extract. The presence of volatile compounds with amine chemical groups, alcohol, alkane, indole and phenol were detected using headspace Gas Chromatography.

J94 Kesan Penggunaan Kanji Terubahsuai ke atas Ayam Goreng Bersalut

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Sains Malaysiana 34(2): 1-6, 2005

Kajian ini dijalankan untuk menentukan ciri-ciri fizikokimia kanji terubahsuai (Pure Cote) dan melihat kesan penggunaan Pure Cote ke atas ciri-ciri ayam goreng bersalut. Sebanyak enam formulasi dihasilkan melalui penambahan Pure Cote pada 0%, 2%, 4%, 6%, 8% dan 10% (berat/berat). Nisbah pencairan campuran kering kepada air ialah 1:2. Daging dada ayam tanpa kulit dan tanpa tulang digunakan sebagai pembawa. Sampel digoreng dengan menggunakan minyak banyak pada suhu 180°C selama 3 minit. Ciri fizikokimia Pure Cote ditentukan dengan kanji jagung asli digunakan sebagai perbandingan. Suhu dan entalpi penggelatinan bagi Pure Cote (57.99-68.23°C, 1.08 J/g) dan kuasa pengembangan pada suhu melebihi 65°C adalah lebih rendah daripada kanji jagung asli. Manakala kejernihan pes dan sifat kelarutan Pure Cote (95.93%) lebih tinggi berbanding kanji jagung asli. Penambahan Pure Cote menyebabkan pengurangan nilai Ph dan kelikatan adunan penyalut serta pengurangan kandungan lembapan pada ayam goreng bersalut tanpa

menjejaskan kandungan lemak dan warna (nilai L (kecerahan), a (kemerahan) dan b (kekuningan)) tidak menunjukkan perbezaan yang bererti. Ketanggalan salutan produk bagi setiap formulasi adalah sangat rendah iaitu dalam julat 0.01-0.06%. Kekerasan ayam goreng menunjukkan peningkatan dengan penambahan Pure Cote.

J95 Effect of retorting and oven cooking on the nutritional properties of beef frankfurters blended with palm oils

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Int J Food Sci Nutr. 61(5):519-535, 2010

Abstract The effect of retorting and oven cooking on the nutritional properties of beef frankfurters blended with palm oil (PO), red PO35 and red PO48 were compared against the control beef fat treatment. Red PO oven-cooked beef frankfurters resulted in a significant loss of vitamin E from 538.5 to 287.5 mug after 6 months. Oven cooked sausages stored at -18 degrees C and retorted sausages stored for the 6 months of shelf studies resulted in more than 90% loss of alpha-carotene and beta-carotene in red PO beef frankfurters. Cholesterol was reduced at the range of 29.0-32.2 mg/100 g when beef fat was substituted with palm-based oils, in beef frankfurters. Differences of heat treatments did not significantly change THE cholesterol content, within all treatments. This study showed the potential of utilizing red palm oils as animal fat analogues in improving vitamin E, reducing cholesterol but not carotenes in beef frankfurters.

J96 Effects of processing on nutritional and sensory qualities of beef burgers incorporated with palm fats

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Mal J Nutr 11(2): 165-175, 2005

A study was undertaken to investigate the effects of processing on the nutritional and sensory qualities of beef burgers formulated with palm fats as animal fat analogues. After processing, a-tocopherol and a-tocotrienol levels were significantly decreased, ranging from 46-48% to 36-44% respectively, in beef burgers made with red palm fat (RPF35) and fat blend. The changes in the levels of g-tocotrienol and

d-tocotrienol after processing in all beef burgers except for the control were not statistically significant (P>0.05). After processing, a-carotene and b-carotene levels were significantly decreased, ranging from 27-40% to 42-54% in beef burgers formulated with fat blend and RPF35. After cooking,a-tocopherol and a-tocotrienol in all cooked beef burgers, except the control, were significantly decreased with levels ranging from 18- 50% to 17-46% respectively. The changes in the levels of a-carotene and ß-carotene after cooking were also statistically significant (36-47% and 48-62% loss, respectively). Substitution of animal fats with palm-based fats reduced the content of cholesterol in beef burgers. The taste panel was not able to differentiate the sensory attributes such as colour, juiciness and oiliness of beef burgers formulated with palm-based fats and beef fat. Overall levels of carotene and vitamin E were higher in palm fat burgers but losses occurred upon processing and cooking.

J97 Vitamin E contents of processed meats blended with palm fats

Wan Rosli WI, Babji AS, Aminah A, Foo SP and Abd Malik O

Journal of Food Lipids 13: 186-198, 2006

The vitamin E contents of beef burgers and chicken frankfurters blended with palm oil (PO) were determined. PO and red PO cooked beef burgers resulted in a significant ($P < 0.05$) loss of vitamin E from 427.5 to 178.0 μg/g and from 367.0 to 271.0 μg/g, respectively, after 6 months of storage. The concentration of alpha-tocopherol (a-tocopherol) for all retorted chicken frankfurters was reduced ($P < 0.05$) by 66.0-91.50 (16-46%) mg/g while the alpha-tocotrienol (a-tocotrienol) in all retorted chicken frankfurters significantly decreased ($P < 0.05$) by 63.0-95.5 μg/g (28-48%) after 6 months of storage. Both a-tocopherol and a-tocotrienol decreased at a faster rate (62- 64% and 53-61% loss, respectively) and was less stable than the gammatocotrienol (12-59%) and the delta-tocotrienol (4-28%) in beef burgers. The effect of processing, cooking, frozen storage and the type of fats used could influence vitamin E stability and content in meat products.

J98 Optimization of extraction conditions of total phenolic compounds from star fruit (Averrhoa carambola l.) Residues

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Sains Malaysiana 38(4): 511-520, 2009

A study was conducted to optimize the extraction conditions for total phenolic contents (TPC) of star fruit residues using response surface methodology (RSM). By using Design Expert (Version 6.0.10, Stat-Ease Inc., Minneapolis) statistical software, a five-level, three-factor central composite rotatable design (CCRD) was employed to investigate the effects of three independent variables including solvent concentration, X1 (40-80%), extraction temperature, X2 (25-55°C), and extraction time, X3 (90-270 min) on total phenolic content. These independent variables were coded at three levels and their natural values chosen according to preliminary experimental results. In single factor experiments, 60% acetone, 180 minutes extraction time and 40°C extraction temperature were set as center points due to their highest TPC value, which were 2366.71, 2436.03, and 2510.95 mg GAE/100 g dry weight (DW) of star fruit residues, respectively. The results showed that the acetone concentration was statistically the most significant factor ($p<0.01$) and the optimal extraction conditions obtained were: acetone concentration, 65.34%; extraction temperature, 43.18°C; and extraction time, 233.51 min. Under the above-mentioned conditions, the experimental TPC was 965.65 ± 30.87mg GAE/100 g DW, which was well matched with the predicted value, 965.52 mg GAE/100 g DW.

J99 Effect of non-meat proteins, soy protein isolate and sodium caseinate, on the textural properties of chicken bologna

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Int J Food Sci Nutr. 47(4): 323-329, 1996

Nine formulations were processed into bologna with different ratios of soy protein isolate (SPI):sodium caseinate (SCA), i.e. 1:1, 1:2.5, 1:5, 5:1, 5:2.5, 5:5, 10:1, 10:2.5 and 10:5. The products were evaluated for yields, emulsion stability, physical measurements (shearforce-kgf and folding test) and taste panel evaluation. Formulations with 5:1 and 5:5 SPI:SCA had lower liquid loss resulting in higher yields while the others had poor emulsion stability and high liquid loss. Firmer texture was exhibited by formulations 1:1, 5:1 and 10:1 SPI:SCA but formulation with 1:1 SPI:SCA showed better gelation followed by 1:2.5, 1:5, 5:1, and 5:2.5. The other formulations had poor gelation and binding properties, especially formulation with 10:5 SPI:SCA. Sensory evaluation was carried out using 30 untrained panelists. Attributes evaluated were aroma, texture, chewiness, juiciness, saltiness, chicken taste and overall acceptance. Formulation with 5:1 SPI:SCA was more acceptable for texture, chicken taste and overall acceptance while formulation with 1:1 SPI:SCA was more acceptable for the chewiness, juiciness and saltiness attributes. There was no significant difference ($P > 0.05$) in aroma attribute, for all formulations.

J100 Modification of palm oil for anti-inflammatory nutraceutical properties

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Lipids 44(7): 581-592, 2009

Palm oil is one of the most important edible oils in the world. Its composition (rich in palmitate and oleate) make it suitable for general food uses but its utility could be increased if its fatty acid quality could be varied. In this study, we have modified a palm olein fraction by transesterification with the n-3 polyunsaturated fatty acids, alpha-linolenate or eicosapentaenoic acid (EPA). Evaluation of the potential nutritional efficacy of the oils was made using chondrocyte culture systems which can be used to mimic many of the degenerative and inflammatory pathways involved in arthritis. On stimulation of such cultures with interleukin-1alpha, they showed increased expression of cyclooxygenase-2, the inflammatory cytokines tumour necrosis factor-alpha (TNF-alpha), IL-1alpha and IL-1beta and the proteinase ADAMTS-4. This increased expression was not affected by challenge of the cultures with palm olein alone but showed concentration-dependent reduction by the modified oil in a manner similar to EPA. These results show clearly that it is possible to modify palm oil conveniently to produce a nutraceutical with effective anti-inflammatory properties.

J101 Palm olein oil produces less lipid peroxidation products than soya bean oil

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Asia Pacific J Clin Nutr 6(2): 116-118, 1997

The soleus muscles of hyperthyroid rats were used to investigate the effect of palm olein oil and soya bean oil on the production of lipid peroxidation products. It was found that palm olein oil but not soya bean oil significantly decreased malonaldehyde and conjugated diene levels of the soleus muscles of hyperthyroid rats. These findings suggest that palm olein per se produces less lipid peroxidation products than soya bean oil. Such an assay method gives a composite net picture of the propensity of an oil to produce lipid peroxidation products.

NUTRITION EDUCATION, PROMOTION & STRATEGY

K1 Community Kitchen: Centralised community cooking for elderly in Pondok Paya Ular Pasir Mas, Kelantan

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Mal J Med Scien 6(1):33-37, 1999

Community kitchen or meals on wheels is a common community service in developed countries which aimed to improve the nutritional situations of the elderly. A pilot project for a community kitchen was carried out in Pondok Paya Ular, Pasir Mas, Kelantan involving 14 elderly females. Members of the community participated in organising the kitchen. The aim of the study is to determine the viability of the community kitchen, its cost-effectiveness and the improvement of nutritional situations of the elderly following centralised cooking with a set of menu on a sufficient balance diet. Two meals (lunch and dinner) were provided for six days a week for a period of four months. It was found that the elderly enjoyed eating in group and their nutritional status showed some improvement in terms of body Mass Index (BMI), haemoglobin level and haematoctrit. The average cost of running the community kitchen was RM3.20 per person per day.

K2 Nutrition and the Malaysian Healthy Lifestyle Programme: Challenges in implementation

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Asia Pacific J Clin Nutr 7(3/4):230-237, 1998

There are significant differences in the food consumption patterns of countries. In the lower income countries, most of the energy intake is derived from cereals and starchy roots. On the other hand, the intake of these carbohydrate foods is much lower in the economically developed countries and more of the energy is derived from added fats, alcohol, meat, dairy products and sweeteners. The contribution of energy from various food groups has changed markedly over the past three decades. With increasing national wealth there is a general tendency for the consumption of cereal foods to decline, whereas the consumption of added fats, alcohol, meat and dairy products has increased over the years. Similar changes have also been observed for Malaysia. These dietary alterations, as well as other lifestyle changes, have brought about a new nutrition scenario in many developing countries. These countries are now faced with the twin problems of malnutrition, that is, undernutrition among some segments of the population and diet-related chronic diseases in other groups; for example, obesity, hypertension, coronary heart disease, diabetes and various cancers, in Malaysia, deaths due to diseases of the

circulatory system and neoplasms have been on the rise since the 1960s. The former has been the most important cause of death in the country for more then 15 years, with cancer ranking third for almost 10 years. Epidemiological data collected from different community groups showed increased prevalences of various risk factors amongst Malaysians. In view of the changed nutrition scenario in the country, intervention programmes have been reviewed accordingly. The Healthy Lifestyle (HLS) Programme was launched in 1991 as a comprehensive, long-term approach to combating the emerging diet-related chronic diseases. For six consecutive years one thematic campaign per year was carried out; namely, coronary heart disease (1991), mellitus (1996). To future strengthen health promotion among the community, another series of activities to be carried out under the second phase of the HLS programme from 1997 to 2002 was launched within the framework of the National Plan of Action on Nutrition (NPAN) for Malaysia. In view of the importance of diet and nutrition in the causation and prevention of chronic diseases, the theme for the first year of this phase was Healthy Eating. It is clear that nutrition education for the community in order to inculcate a culture of healthy eating is the long-term solution. A series of guidelines have been prepared for dissemination to the public via a variety of media and approaches, and with the collaboration of various government and non-governmental organizations. The implementation of the programme is, however, a challenge to health and nutrition workers. There is a need to examine the strategies for nutrition education to ensure more effective dissemination of information. The challenge is to determine how best to promote healthy eating within the [resent scenario of rapid urbanisation, 'western' dietary pattern influence, a whole barrage of convenience and 'health' foods, and nutrition misinformation. We would like to share our experiences in the approaches taken and our concerns with other countries in the region given that various opportunities exist for collaboration.

K3 Changing concepts in lipid nutrition in health and disease

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Med J Malaysia. 54(3):408-427, 1999

Fat remains a hot topic because of concerns over associations between consumption of fats and the incidence of some chronic conditions including coronary artery disease, diabetes, cancer and obesity. Dietary fats serve multiple purposes. The effects of dietary fats generally reflect the collective influences of multiple fatty acids in the diet or food. This presentation highlights some recent developments on the role of dietary fats and oils in health and disease. Debate continues over the role of dietary modification in coronary prevention by lipid lowering. The degree to which a recommended diet will result in health benefits for an individual is difficult to predict, because the outcome will depend on the influence of other factors such as a person's genetic constitution, level of physical activity and total diet composition. There can now be little doubt about the importance of genetic factors in the etiology

of cardiovascular disease, diabetes, obesity and cancer. The importance of antioxidant status in the prevention of cardiovascular disease as well as many cancers is being increasingly recognised. It is now evident that not all saturated fatty acids are equally cholesterolemic. Recent accounts evaluating palm oil's effects on blood lipids and lipoproteins suggest that diets incorporating palm oil as the major dietary fat do not raise plasma total and LDL cholesterol levels to the extent expected from its fatty acid composition. Palm oil is endowed with a good mixture of natural antioxidants and together with its balanced composition of the different classes of fatty acids, makes it a safe, stable and versatile edible oil with many positive health and nutritional attributes. In recent times, adverse health concerns from the consumption of trans fatty acids arising from hydrogenation of oils and fats have been the subject of much discussion and controversy. Trans fatty acids when compared with cis fatty acids or unhydrogenated fats have been shown to lower serum HDL cholesterol, raise serum LDL cholesterol and when substituted for saturated fatty acids, increase lipoprotein Lp (a) level, an independent risk factor for the development of coronary heart disease. The idea of which foods, nutrients and supplements are "healthy" is often being amended as new scientific data is presented and then simplified for the consumers. What was once perceived as a healthy diet is often no longer considered as such and vice versa. Dietary recommendations have to change with time and the evidence available. Nutritional recommendations should encourage eating a great variety of nutrient sources within our food supply in moderation. Various lifestyle options to improve health should also be promoted.

K4 Impact of a school milk programme on the nutritional status of school children

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Asia Pac J Public Health 3(1): 19-25, 1989

From the start of the school milk feeding programme in February 1985 to October 1986, a total of 2, 766 children aged six to nine years from 12 primary schools in Ulu Selangor were followed-up for about two years. The children's weight and height were monitored at the beginning, in the middle and at the end of the study. The study shows that there is a reduction in the prevalence of protein-energy malnutrition in terms of underweight (15.3% to 8.6%), stunting (16.3% to 8.3%) and wasting (2.6% to 1.7%) from the start of the school feeding programme to two years later. Associated with this there was an improvement in the attendance rate of the children during the same period. As there was no major developmental change in Ulu Selangor during that period, it is likely that the reduction in the prevalence of protein-energy malnutrition and the improvement of the attendance rate among the children are due to the impact of the school milk feeding programme.

K5 Development of multi-dimensional body image scale for Malaysian female adolescents

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Nutrition Research and Practice 2(2): 85-92, 2008

The present study was conducted to develop a Multi-dimensional Body Image Scale for Malaysian female adolescents. Data were collected among 328 female adolescents from a secondary school in Kuantan district, state of Pahang, Malaysia by using a self-administered questionnaire and anthropometric measurements. The self-administered questionnaire comprised multiple measures of body image, Eating Attitude Test (EAT-26; Garner & Garfinkel, 1979) and Rosenberg Self-esteem Inventory (Rosenberg, 1965). The 152 items from selected multiple measures of body image were examined through factor analysis and for internal consistency. Correlations between Multi-dimensional Body Image Scale and body mass index (BMI), risk of eating disorders and self-esteem were assessed for construct validity. A seven factor model of a 62-item Multi-dimensional Body Image Scale for Malaysian female adolescents with construct validity and good internal consistency was developed. The scale encompasses 1) preoccupation with thinness and dieting behavior, 2) appearance and body satisfaction, 3) body importance, 4) muscle increasing behavior, 5) extreme dieting behavior, 6) appearance importance, and 7) perception of size and shape dimensions. Besides, a multidimensional body image composite score was proposed to screen negative body image risk in female adolescents. The result found body image was correlated with BMI, risk of eating disorders and self-esteem in female adolescents. In short, the present study supports a multi-dimensional concept for body image and provides a new insight into its multi-dimensionality in Malaysian female adolescents with preliminary validity and reliability of the scale. The Multi-dimensional Body Image Scale can be used to identify female adolescents who are potentially at risk of developing body image disturbance through future intervention programs.

K6 Report of a seminar and workshop on Food-based Dietary Guidelines and Nutrition Education: Bridging Science and Communication

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Asia Pacific J Clin Nutr 8(4): 291-299, 1999

The 3-day seminar-workshop on 'Food-based Dietary Guidelines and Nutrition Education' was held from 22-24 July 1998 in Kuala Lumpur, Malaysia to present the latest scientific information on nutrition and health and to discuss its impact on the rationale and process for the development of food-based dietary guidelines (FBDG). The first two sessions were devoted to a review of the current information on the relation between lifestyle factors and chronic diseases, particularly obesity; the present health status and food consumption patterns in Malaysia; the current consensus on carbohydrates and fats and oils and the importance of considering the glycemic index of foods; and the importance of micronutrients in health and disease. The third and fourth sessions dealt with the rationale of FBDG and the process of their development, drawing from the 1990 FAO/WHO Consultation on Development of FBDG and the experience in the Philippines and in Europe. The importance of effective dissemination of nutrition messages to the public was thoroughhly discussed. The workshop sessions arrived at recommendations on important issues in the development of FBDG in the region, including main research and information needs, the steps in the development of FBDG, and strategies for their dissemination.

K7 Diet and lifestyle intervention among patients with colorectal adenomas: rationale and design of a Malaysian study

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Asian Pac J Cancer Prev. 6(4):553-560, 2005

Comprehensive evaluation of the large body of consistent evidence from laboratory, epidemiologic and clinical studies has led to the conclusion that modification of the dietary and lifestyle patterns of populations has considerable potential for reducing cancer risk. This paper describes a randomized-controlled trial involving a diet and lifestyle intervention for patients with history of colorectal adenomas. The primary aim of this trial is to evaluate the effectiveness of the intervention with reference to recurrence of adenomatous polyps over a two year period--the first year being the intervention period and the second year of the study allowing for post-intervention follow-up. Subjects found to fit the inclusion criteria are recruited and randomized to two groups: the intervention group and the control group. The intervention group subjects will attend a monthly lecture-discussion session for 10 months and small group counseling on modification of lifestyle behavior and diet as well as receive educational materials which were adapted from the WCRF Diet and Health Recommendations for Cancer Prevention. Control subjects will be provided with the usual care given to such patients. One hundred and sixteen patients who were diagnosed with colorectal adenomatous polyps in the previous twelve months at the Hospital Kuala Lumpur have already been enrolled in this trial. Baseline data collection is on-going.

K8 What's on Malaysian television? - A survey on food advertising targeting children

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Asia Pac J Clin Nutr 17(3): 483-491, 2008

The Malaysian government recently introduced a ban on fast food advertisements targeting children on television. This study reports on data covering 6 months of television food advertising targeting children. Six out of seven of the Nation's commercial television networks participated (response rate = 85.7%). Based on reported timings of children's programmes, prime time significantly differed ($p<0.05$) between weekdays (mean = 1.89 ± 0.18 hr) and weekends (mean = 4.61 ± 0.33 hr). The increased trend during weekends, school vacation and Ramadhan was evident. Over the six-month period, the mean number of food advertisements appearing per month varied greatly between television stations (C = 1104; D = 643; F = 407; B = 327; A = 59; E = 47). Food advertising also increased the most in September (n = 3158), followed by July (n = 2770), August (n = 2431), October (n = 2291), November (n = 2245) and June (n = 2211). Content analysis of advertisements indicated snacks were the highest (34.5%), followed by dairy products (20.3%), sugars and candies (13.4%), biscuits (11.2%), fast food (6.7%), breakfast cereal (6.4%), beverages (4.1%), supplements (0.9%), rice (0.6%), noodles (0.5%), bread (0.3%), miscellaneous and processed foods (0.2%). Paradoxically, we found that the frequency of snack food advertised during children's prime time was 5 times more than fast foods. The sodium content (mean = 620 mg per 100g) of these snack foods was found to be highest.

K9 Developing a nutrition education package for Malaysian hemodialysis patients

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Journal of Renal Nutrition, 11(4): 220-227, 2001

Objective: To develop an education package with uniform nutrition messages appropriate for Malaysian patients undergoing hemodialysis. Methods: Nutritional problems and socioeconomic, ethnic, cultural, and religious factors influencing food habits of HD patients were considered in planning the package. The package comprised a Flipchart and 55 food Fotocards. The Flipchart used a modular format to target nutrition education in stages. The food Fotocards were designed to help the patient plan a daily menu and enjoy greater food variety. Photographs related

to common food servings carried symbols for significant nutrient sources of energy, protein, fat, sodium, potassium, and phosphate. A traffic-light color system quantified potassium and phosphate content. The package was evaluated by 25 respondents, composed of nephrologists, nurses, dietitians, and patients. Results: Eighty percent of evaluators rated the Flipchart as good and 20% rated it as excellent, whereas 28% rated the Food Fotocards as good and 72% rated them as as excellent. Conclusion: This package is a useful nutrition education tool for both health educators and dietitians to present first-line nutrition advice to patients undergoing hemodialysis.

K10 Food-based approaches to combat the double burden among the poor: challenges in the Asian context

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Asia Pac J Clin Nutr 17(S1):111-115, 2008

Estimates of FAO indicate that 14% of the population worldwide or 864 million in 2002-2004 were undernourished in not having enough food to meet basic daily energy needs. Asia has the highest number of undernourished people, with 163 million in East Asia and 300 million in South Asia. Meanwhile obesity and diet-related non-communicable diseases continue to escalate in the region. The double burden of malnutrition also affects the poor, which is a serious problem in Asia, as it has the largest number of poor subsisting on less than $1/day. As poverty in the region is predominantly rural, agriculture-based strategies are important for improving household food security and nutritional status. These measures include shifting toward production of high-value products for boosting income, enhancing agricultural biodiversity, increasing consumption of indigenous food plants and biofortified crops. Urban poor faces additional nutritional problems being more sensitive to rising costs of living, lack of space for home and school gardening, and trade-offs between convenience and affordability versus poor diet quality and risk of contamination. Time constraints faced by working couples in food preparation and child care are also important considerations. Combating the double burden among the poor requires a comprehensive approach including adequate public health services, and access to education and employment skills, besides nutrition interventions.

K11 Improving nutrition knowledge

Khor GL

Asia Pac J Public Health. 17(2):65, 2005

K12 Evaluation of the Healthy Village Program in Kapit District, Sarawak, Malaysia

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Health Promot. Intern. 21(1):13-18, 2006

Sarawak, Malaysia has a large population of ethnic minorities who live in longhouses in remote rural areas where poverty, non-communicable diseases, accidents and injuries, environmental hazards and communicable diseases all contribute to a lower quality of life than is possible to achieve in these regions. To address these issues and improve the quality of life for longhouse people, the Kapit Divisional Health Office implemented the World Health Organization's Healthy Village programme in 2000. An evaluation was undertaken in 2003 to determine physical and behavioural changes resulting from the programme. The main changes evaluated were those involving smoking habits, exercise habits, health screening, fire safety, environmental improvements and food preparation and hygiene. A qualitative evaluation was conducted using participant observation and key-informant interviews, focus groups and observation. Results indicate that the programme is inspiring changes in various behavioural and physical characteristics of the study population. It is clear that the Healthy Village programme is a widely accepted way of improving health outcomes in longhouses, and that it is succeeding in making beneficial health changes.

K13 Diabetes Care: Is it Adequate? An Audit of Diabetes Care in a Hospital

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Med J Malaysia 45(1): 18-22, 1990

An audit of diabetes care was done in a hospital to assess its effectiveness. The results revealed that diabetic patients received less than adequate care. Only 9% of the patients achieved good glycaemic control; 39% had hypertriglyceridemia and 65% had undesirable weight gain while on treatment. The average duration of diabetes in this group of young diabetic patients under study was only 4.5 years, yet 12% of them had evidence of diabetic retinopathy. Few patients possessed adequate knowledge and skills of diabetes self-care. No patients could draw up and mix insulin adequately. Only one patient could self-inject insulin correctly. Few understood the nature of hypoglycaemia, hence few took adequate precaution

against it. Patients had frequent hypoglycaemia; 61% had at least one episode per week and 56% of the diabetic drivers admitted to occurrence of hypoglycaemic while driving. No patient understood the principle of diabetic diet therapy, nor did they carry out regular home monitoring of their diabetes. Good diabetes care requires organization with supportive patient education. The less than adequate standard of care achieved by the hospital under study is probably explained by the absence of both.

K14 Dietary modification in a workplace health promotion program in Kuala Lumpur, Malaysia

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Asia Pac J Public Health 20 (Suppl), 166-172, 2008.

Lifestyle modification is effective in the prevention of cardiovascular diseases. This study aimed to promote healthy lifestyle behaviours to prevent cardiovascular disease. This study was a quasi-experimental trial with a follow up of two years. The intervention group (n = 102) received intensive individual and group counselling on diet and physical activity. The comparison group (n = 84) was given minimal education through mail and group counselling. Following the intervention, both groups reduced their total fat intake through a replacement in carbohydrate intake. The saturated fat and cholesterol intake was also reduced with a larger magnitude in the intervention group. Fruits and vegetables consumption was increased within the intervention group. The intervention group showed a statistically significant reduction in their mean total cholesterol levels with an intervention effect of -0.38 (95% C.I. = -0.63, -0.14) mmol/l. This study has achieved moderate improvement in dietary intakes as well as the total cholesterol of the participants.

K15 The results of a worksite health promotion programme in Kuala Lumpur, Malaysia

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Health Promot. Int. 21(4): 301-310, 2006

The worksite is one of the key channels for the delivery of interventions to reduce chronic diseases among adult populations. It provides easy and regular access to a relatively stable population and it encourages sustained peer support. This paper

reports a 2-year follow-up of the impact of a worksite health promotion programme on serum cholesterol and dietary changes among employees in a city in Malaysia. A quasi-experimental study was conducted among Malay-Muslim male security guards, with those working in a public university in Kuala Lumpur comprising the intervention group, and those working in the teaching hospital of the same university as the comparison group. They were comparable in sociodemographic characteristics. The intervention group received intensive individual and group counselling on diet, physical activity and quitting smoking. The comparison group was given minimal education on the same lifestyle changes through mail and group counselling. The intervention group showed a statistically significant reduction in their mean total cholesterol levels as compared with the comparison group, with an intervention effect of -0.38 (95% CI = -0.63, -0.14) mmol/l. The intervention group also reported a reduction in the amount of cigarettes smoked. The worksite was shown to be an effective channel for health promotion. The adoption of the new lifestyle behaviours should be supported and sustained through modification of work policies.

K16 Evaluation of the school supplementary feeding program in Peninsular Malaysia

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Mal J Nutr 6: 1-15, 2000

This study was conducted to evaluate the implementation of the School Supplement Feeding Program (SSFP) among primary school in terms of financial management and budget disbursement, food preparation, selection of menus and nutrient content of food served. A total of 129 schools comprising 77 national type, 31 Chinese and 21 Tamil vernacular schools in four different regions (northern, eastern, central and southern) of Peninsular Malaysia were selected for this study. The results of this cross-sectional study showed a need to improve the budget disbursement to schools. Most of the schools followed the guidelines provided by the Ministry of Education for selection of eligible children. The quality of food prepared by contracted (local community members) and voluntary (teachers) operators. The use of 10 recommended menus provided for a 2-week cycle by most of the schools has shown increased acceptance and less monotonous feeling towards the food among the children. Nutrient content of food served increased relatively with an increase in budget from RM0.45 to RM0.80 per child. Parents surveyed indicated that the program should continue as this will keep children from low income families from being hungry during school hours. A continued process of monitoring and evaluation is necessary to improve its implementation.

K17 Parental perception of their children's weight status, and its association with their nutrition and obesity knowledge

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Asia Pac J Clin Nutr 17(4):597-602, 2008

BACKGROUND: Worldwide the prevalence of overweight and obesity in children is escalating. Parents' recognition of overweight or obesity in their own children is very important for a successful intervention in these children. This study examined parental perception of their children's weight status, and its association with their knowledge on nutrition and obesity. MATERIALS AND METHODS: This was a cross sectional study of parents with children aged 9 to 12 years, in a primary school of Kuala Lumpur. Parents responded to a self-administered questionnaire which contains parental perception of their child weight status as well as knowledge on nutrition and obesity. The parents' perception of the children's weight status was then compared with the actual measured weight status. RESULTS: There were 204 parents who participated in the study. Parents were found to underestimate their child weight status and 38.2% were inaccurate in their perception. The mean score of knowledge on nutrition and obesity was 78.5+/-14.4; and this did not associate with the accuracy of their perception on the child weight status. Parents showed inadequate knowledge in food pyramid and preparation of low fat meals. CONCLUSION: The Malaysian Health Campaigns had resulted in overall good knowledge on nutrition and obesity in the parents except in few domains. However, this was insufficient to make the parents recognize the growing overweight and obesity problem in their children.

K18 DietPLUS- a User-friendly '2 in' food composition database and calculator of nutrient intakes

Ng TKW

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Mal J Nutr 16(1): 125 - 130, 2010

The teaching and research tool called 'DietPLUS', developed by the present author at an institution of higher learning in 2007, contains nutrient information of 840 food items in Excel format. DietPLUS functions as a '2-in-1' food composition database plus a rapid calculator of nutrient intakes, with the option of 'collapsing' the food composition face leaving only the nutrient calculator face. The macronutrients featured in the programme are energy, protein, fat, carbohydrates, dietary fibre, sugars (intrinsic + added), polyunsatuared omega-6 fatty acids (mainly linoleic acid, LA) and polyunsaturated omega-3 fatty acids [alphalinolenic acid (ALA) or

eicosapentaenic acid (EPA) + docosahexaenolic acid (DHA)]. The micronutrients in the programme are vitamin A (as retinol equivalents, RE), vitamin C, thiamin (vitamin B1), riboflavin (vitamin B2), and niacin. Cholesterol content was included to complete the list of food components tabled. Food items consumed are converted into gram quantities (edible portion) and are entered in one column in the Excel programme which emphasises the simplicity and user-friendliness of the present nutrient calculator. DietPLUS instantaneously sums up the macronutrients and micronutrients consumed with each subsequent entry. Macronutrients (protein, fat, carbohydrate, sugars and dietary fibre) consumed are presented as gram quantities and a percentage of the Recommended Nutrient Intakes for Malaysia 2005. An approximate number of servings are also provided for vegetables, fruits, legumes, fish and meat, which may be useful in meal planning and nutrition/dietetic counselling.

K19 DietPal: a Web-based dietary menu-generating and management system

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J Med Internet Res. 6(1):e4 2004

BACKGROUND: Attempts in current health care practice to make health care more accessible, effective, and efficient through the use of information technology could include implementation of computer-based dietary menu generation. While several of such systems already exist, their focus is mainly to assist healthy individuals calculate their calorie intake and to help monitor the selection of menus based upon a prespecified calorie value. Although these prove to be helpful in some ways, they are not suitable for monitoring, planning, and managing patients' dietary needs and requirements. This paper presents a Web-based application that simulates the process of menu suggestions according to a standard practice employed by dietitians. OBJECTIVE: To model the workflow of dietitians and to develop, based on this workflow, a Web-based system for dietary menu generation and management. The system is aimed to be used by dietitians or by medical professionals of health centers in rural areas where there are no designated qualified dietitians. METHODS: First, a user-needs study was conducted among dietitians in Malaysia. The first survey of 93 dietitians (with 52 responding) was an assessment of information needed for dietary management and evaluation of compliance towards a dietary regime. The second study consisted of ethnographic observation and semi-structured interviews with 14 dietitians in order to identify the workflow of a menu-suggestion process. We subsequently designed and developed a Web-based dietary menu generation and management system called DietPal. DietPal has the capability of automatically calculating the nutrient and calorie intake of each patient based on the dietary recall as well as generating suitable diet and

menu plans according to the calorie and nutrient requirement of the patient, calculated from anthropometric measurements. The system also allows reusing stored or predefined menus for other patients with similar health and nutrient requirements. RESULTS: We modeled the workflow of menu-suggestion activity currently adhered to by dietitians in Malaysia. Based on this workflow, a Web-based system was developed. Initial post evaluation among 10 dietitians indicates that they are comfortable with the organization of the modules and information. CONCLUSIONS: The system has the potential of enhancing the quality of services with the provision of standard and healthy menu plans and at the same time increasing outreach, particularly to rural areas. With its potential capability of optimizing the time spent by dietitians to plan suitable menus, more quality time could be spent delivering nutrition education to the patients.

K20 Lifestyle intervention improved nutritional knowledge, dietary composition and health status of midlife malaysian women

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Mal J Nutr 12(2): 125-146, 2006

Lifestyle has been shown to exert a major impact on the quality of life and health in mid-life women coping with menopausal changes. This study aimed to assess the efficacy of a lifestyle intervention package in improving nutritional knowledge and composition, dietary habits and related health status in mid-life women. Between Nov 1999 to Oct 2001, 360 disease free women, non users of HRT, aged 45 years and above with intact uterus were recruited into the study. The women were randomised into three groups - I (control), II (lifestyle intervention) and III (lifestyle intervention with HRT) respectively. After 12 months, 85.6% completed the study. The lifestyle intervention programme, well accepted by the participants, brought about an improved dietary composition, better eating habits, more exercise participation and increment in knowledge with concomitant improvement of the health status. The benefits observed were significant reduction in energy, fat and carbohydrate intake with increased intake of legumes; milk and cheese/yogurt; and reduction of tea and coffee. Body weight was reduced and more importantly preventing abdominal obesity in the intervention groups with HRT was more effective. Further adaptations of the dietary component with advice on obtaining micronutrients from local produce would contribute towards a more balanced diet in midlife women as dairy products were not popular and these women had low meat intake.

K21 Messages of the Newly Proposed Malaysian Dietary Guidelines (MDG): Do Adults in Kuala Lumpur Understand Them?

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Mal J Nutr 16(1): 113 - 123, 2010

The Malaysian Dietary Guidelines (MDG) with eight key messages were first published in 1999. An updated version consisting of 14 key messages is being developed. The objective of this study was to evaluate the understanding of five key messages of the updated MDG among adults aged 18-59 years in Kuala Lumpur. A total of 773 adults comprising 330 Malays, 364 Chinese and 79 Indians were included in the study. A self-administrated questionnaire was used to obtain demographic data and to determine the level of understanding of key words and messages to be included in the new MDG. The results showed that 63% of the subjects were not aware of the existence of the MDG published in 1999. Overall, the understanding of the five messages in the updated MDG was moderate with a mean score of 60.0 ± 16.5. Between 52% to 93% of the subjects did not understand such key words as serving size, sedentary habits, blended vegetable oil and shortenings. The mean scores of understanding were significantly higher ($p< 0.05$) among the Chinese subjects (61.3 + 17.8) than Malays (58.6 + 14.2) and Indians (60.0 + 18.9). The younger subjects (61.2 + 16.0) scored significantly ($p< 0.05$) higher than the older (58.7 + 17.0) counterparts. There was also a significant association between the level of understanding of MDG with education level ($p<0.001$) and occupational status ($p<0.001$), respectively. This study suggests that some key words and messages in the updated MDG should be simplified to ensure that they are understood by Malaysians.

K22 An action research on promotion of healthy ageing and risk reduction of chronic disease: a need assessment study among rural elderly Malays, care givers and health professionals

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J Nutr Health Aging 13(10): 925-930, 2009

Prior to the development of a healthy ageing and risk reduction of chronic diseases intervention package for older people in Malaysia, a need assessment study was conducted to identify nutritional knowledge status and information needs, as part of

an action research process. DESIGN: A cross sectional study was conducted among 267 elderly people, 54 care givers and 66 health professionals in two rural areas of Peninsular of Malaysia (i.e Sabak Bernam, Selangor and Kuala Pilah, Negeri Sembilan). Information on nutritional knowledge was obtained from an interview based questionnaire for older subjects and caregiver and through self administered questionnaire from the health professionals. Anthropometric and functional measurements were also conducted among elderly subjects. RESULTS: It was found that the elderly subjects had poor nutritional knowledge with 43.8% of them classified as having unsatisfactory nutritional knowledge, followed by moderately satisfactory (33.7%), very unsatisfactory (15.7%) and good (6.7%). Talks, counselling sessions with health professionals and electronic media such as television and radio were the most preferred nutrition education sources among elderly subjects and their care givers. The majority of health professionals studied (98.5%) had good nutritional knowledge. Although most of them (93.6%) were involved in management of the elderly, only 45.5% incorporated nutritional information component in this activity. Most of the health professionals used the guidelines for management of elderly patients (63.6%). However, nutritional knowledge was very minimal in these guidelines. Multiple regression analysis indicated that 'level education', involvement in 'social activities', presence of 'hearing problems', the Instrumental Activities of Daily Living (IADL) score, having previous 'nutritional information' and 'participation in healthy eating programme' were the major predictors of nutritional knowledge score among elderly subjects. CONCLUSION: Based on the above findings it is thus, imperative that an appropriate nutritional intervention package and programme be developed so as to help improve nutritional knowledge and subsequently the nutritional status of the rural elderly Malays.

K23 Barriers for breast cancer screening among Asian women: a mini literature review

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Asian Pac J Cancer Prev. 7(4): 509-514, 2006

Breast cancer is the most commonly diagnosed cancer among Asian women. Breast cancer is detected in advanced stages and among younger age group women in Asia. The delay in presentation is attributed mainly to the social-cultural perception of the disease, poverty, and the strong influence of traditional medicine. Many of Asian women are not aware of the importance of regular screening. Cultural attitudes toward breast cancer screening tests, modesty, lack of encouragement by family members and physicians are the major inhibitors to women's participation in breast cancer screening. Health education using media and community health programs to create awareness of the advantages of earlier presentation and diagnosis of breast cancer in Asian women can motivate participation in breast cancer screening programs.

K24 Computer programme for diet analysis using portion - size or weighed - food intake for general and clinical usage

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Mal. J. Med. Scien. 4(2): 42-51, 1997

A diet analysis computer programme written in DBASETM which can analyse diet taken from one to seven days using portion size or weighed-food intake has been designed for both general and clinical usage. The programme is capable of calculating the energy in kilocalories or in Megajoules and amount in grams of protein, carbohydrate, fat, five minerals, five vitamins content for one to seven days by either using weighed-food intake or portion size was designed and produced. The programme accepts data in the form of weight, portion size, length of certain foods and measurements of liquid equivalent to a standard glass. The values for each meal breakfast, lunch, dinner and snacks), average values per day as well as total average over a period of one to seven days can be calculated and printed. The programme also calculates the content and percent of kilocalories from protein, fat and carbohydrate. Results can be presented as histograms for the average daily intake or as weekly energy intake for each meal. In conclusion, this dietary programme can be useful in assessing the intake of energy and nutrients by using portion size.

K25 Infant and young child nutrition promotion strategies--the Malaysian experience.

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Forum Nutr. 56: 234-236, 2003

K26 Penerimaan Masyarakat Terhadap Bahan Pendidikan Pemakanan Bercetak

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Mal J Nutr 7(1&2): 51-60, 2001

Bahan pendidikan memainkan peranan penting dalam menyampaikan maklumat pemakanan yang tepat kepada masyarakat. Kajian ini dilakukan untuk menilai penerimaan golongan dewasa muda terhadap bahan pendidikan pemakanan bercetak. Booklet bertajuk Kolesterol: Apa yang anda perlu tahu? disediakan khusus untuk

kajian ini. Kajian ini terdiri dari tiga fasa iaitu fasa tinjauan dan perancangan, fasa pembentukan serta fasa penilaian bahan pendidikan yang disediakan. Seramai 90 orang subjek di kawasan bandar dan luar bandar telah dipilih secara rawak untuk kajian ini. Borang soalselidik diedar bersama bahan bercetak yang diberi kepada subjek kajian. Subjek diberi masa selama dua minggu untuk memahami dan menilai bahan bercetak yang diberi. Penilaian penerimaan subjek terhadap isi kandungan, grafik dan rekabentuk bahan bercetak adalah daripada memuaskan sehingga baik. Skor pengetahuan subjek di kawasan bandar dan luar bandar meningkat dengan signifikan ($p<0.05$) selepas menerima bahan bercetak (84 + 12 dan 80 + 13) berbanding sebelum menerima bahan bercetak (66 + 11 dan 49 + 12). Secara keseluruhan, bahan yang dibentuk mendapat penerimaan yang baik oleh golongan dewasa muda dan berupaya meningkatkan pengetahuan.

K27 The effectiveness of group dietary counselling among non insulin dependent diabetes mellitus (NIDDM) patients in resettlement scheme areas in Malaysia

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Asia Pacific J Clin Nutr 6(2): 84-87, 1997

A study was undertaken in FELDA (Federal Land Development Authority) resettlement scheme areas in Pahang, Malaysia, to determine the effectiveness of group dietary counselling in motivating diabetic patients to achieve good dietary habits, and weight and diabetes control. Sixty-one non-insulin dependent diabetes mellitus (NIDDM) patients were randomly assigned to either the experimental or control group. The experimental group received six sessions of group dietary counselling over 5 months and the control group received mass media diabetes-educational program during the same period. The one hour group dietary counselling sessions discussed general knowledge of diabetes, food groups for meal planning, the importance of dietary fibre-rich foods, types of fat in food, exercise and weight control. The experimental group met monthly with a dietitian as a counsellor. Effectiveness was assessed by improvement in food choice, and decline in percentage glycated haemoglobin (total HbA1) or body mass index (BMI). Measurements were made at a baseline visit, every two months during the six month program, and six months afterwards. Patients in the experimental group improved their food choices, resulting in a healthier diet high in unrefined carbohydrates and dietary fibre rich foods, and low in fat. There were significant reductions of their percentage total HbA1 levels and BMI following the counselling sessions, which decreased further six months after the program compared with patients in the control group. Thus group dietary counselling is effective in motivating NIDDM patients to achieve better food choice, and related weight and glycaemic control in a Malaysian setting.

K28 The effectiveness of nutrition education programme for primary school children

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Mal J Nutr 13(1): 45-54, 2007

This study was conducted to determine changes in nutrition knowledge, attitude and practice of 8-year-old school children after receiving a nutrition education package. A total of 418 school children from urban and rural areas participated in this study. The intervention group consisted of 237 children while 181 children who did not receive the nutrition education package acted as controls. The nutrition education programme that was conducted for 3 weeks comprised of a video viewing session and a comic reading session followed by exercise questions as reinforcement for each session, and also classroom activities. Knowledge, attitude and practice questionnaires were distributed to the children before (pre-intervention) and after (post-intervention) receiving the nutrition education programme. A follow-up visit was conducted six months after the programme had elapsed. The results obtained indicated that the nutrition knowledge score increased significantly in the intervention group from 48.3±13.2 at pre-test to 54.6±16.2 in post-test and 55.0±14.3 in follow-up test ($p<0.05$). The nutrition attitude score also increased significantly from 68.7±15.5 at pre-intervention to 72.6±15.0 and 74.7±15.8 during post-test and follow-up test respectively ($p<0.05$). However, the nutrition practice score had no significant improvement in both groups throughout the study period. There were no significant changes in the control group in knowledge, attitude and practice scores at pre, post and follow-up tests. In conclusion, this study showed that a good nutrition education programme had a positive impact whereby better nutrition knowledge, attitude and healthy eating habits in children were seen. It is hoped that the improvements would be sustained throughout their lives.

K29 Food variety score is associated with dual burden of malnutrition in Orang Asli (Malaysian indigenous peoples) households: implications for health promotion

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Asia Pac J Clin Nutr 18(3): 412-422, 2009

This paper reports on the presence of dual burden households in Orang Asli (OA, indigenous people) communities and its associated factors. A total of 182 OA households in two districts in Selangor with the required criteria (182 non-pregnant women of child bearing age and 284 children aged 2-9 years old) participated in the study. Height and weight of both women and children were measured. Energy intake and food variety score (FVS) were determined using three 24-hour diet recalls. While 58% were underweight and 64% of the children were stunted, the prevalence of overweight and obesity in women were 31% and 20% respectively. The percentage of dual burden households (overweight mother/underweight child) was 25.8% while 14.8% households had normal weight mother/normal weight child. The mean food variety score (FVS) was similar for women (7.0+2.1) and children (6.9+1.9). Dual burden households were associated with women's employment status (OR: 3.18, 95% CI: 2.65-5.66), FVS of children (OR: 0.71, 95% CI: 0.51-0.95) and FVS of women (OR: 1.39, 95% CI: 1.02-1.89). The FVS of children (OR: 0.49, 95% CI: 0.25-0.89) and women (OR: 1.92, 95% CI: 1.64-2.77) remained significant even when dual burden households were compared to only households with normal weight mother/normal weight child. In these OA communities, food variety may predict a healthier diet in children, but may increase the risk of overweight and obesity in adults. Efforts to address households with dual burden malnutrition should consider promotion of healthy diets and lifestyle for all members.

K30 Correlates of Children's Eating Attitude Test scores among primary school children

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Percept Mot Skills. 100(2): 463-472, 2005

A total of 107 Malay primary school girls (8-9 yr. old) completed a set of measurements on eating behavior (ChEAT, food neophobia scales, and dieting experience), the Rosenberg Self-Esteem Scale, body shape satisfaction, dietary intake, weight, and height. About 38% of the girls scored 20 and more on the ChEAT, and 46% of them reported dieting by reducing sugar and sweets (73%), skipping meals (67%), reducing fat foods (60%) and snacks (53%) as the most frequent methods practiced. In general, those girls with higher ChEAT scores tended to have lower self-esteem (r=.39), indicating they were more unwilling to try new foods (food neophobic) (r=.29), chose a smaller figure for desired body size (r=-.25), and were more dissatisfied with their body size (r=.31).

K31 Nutrition Promotion: The Role of Monitoring Physical Growth

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Asia Pac J Public Health 6(4): 210-216, 1992

Growth monitoring has been included as one of the basic strategies for child survival. In this paper, the rationale for this is reiterated both for individual as well as population nutritional surveillance. Methods for and approaches to growth monitoring are described. In addition, potential problems in implementing growth monitoring projects and interpreting the results are discussed. Despite its lack of sensitivity and specificity as a diagnostic tool, its advantages in terms of low cost, simplicity, reliability and social acceptability justify its use in nutritional surveillance, particularly in populations at risk of malnutrition.

K32 Model development of students attitude towards genetically modified food

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Sains Malaysiana 38(2): 241-247, 2009

It is evident that the development and future success of biotechnology and genetically modified technology relies directly on the public perceptions and the attitude of the consumers. Previous research have shown that consumers were highly sceptical towards genetic modification in food production. The purpose of this study is to examine the dimensions that form students' attitude towards GM food and towards changes in food quality and how it could shape their lifestyle and attitude towards GM food. This research used the model proposed by Latifah which has six dimensions: perceived benefit, perceived risk, risk acceptance, familiarity, moral aspect and encouragement. Factor analysis has been used to identify dimensions that form students attitudes in this model. It was found that the dimension for risk acceptance has low reliability. A new dimension existed, namely control. Result of factor analysis has been approved by using structural equation modeling (SEM) method. These results show that the perceived benefit, perceived risk, familiarity, moral aspect, control and encouragement explained students' attitude towards GM food.

K33 Abbreviated report of the WHO Western Pacific Region Workshop on National Plans of Action for Nutrition: key elements for success, constraints and future plans

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Biomed Environ Sci.14(1-2) :87-91, 2001

A workshop on National Plans of Action for Nutrition: Constraints, Key Elements for Success, and Future Plans was convened and organized by the WHO Regional Office for the Western Pacific in collaboration with the Institute for Medical Research Malaysia and co-sponsored with FAO and UNICEF from 25-29 October 1999. It was attended by representatives of 25 countries in the region and resource persons, representatives from WHO and other international agencies. The objectives of the workshop were to review the progress of countries in developing, implementing and monitoring national plans of action for nutrition (NPANs) in the Western Pacific Region and to identify constraints and key elements of success in these efforts. Most of the countries have NPANs, either approved and implemented or awaiting official endorsement. The Plan formulation is usually multisectotal, involving several government ministries, non-governmental organizations, and international agencies. Often official adoption or endorsement of the Plan comes from the head of state and cabinet or the minister of health, one to six years from the start of its formulation. The NPAN has stimulated support for the development and implementation of nutrition projects and activities, with comparatively greater involvement of and more support from government ministries, UN agencies and non-governmental agencies compared to local communities, bilateral and private sectors and research and academic institutions. Monitoring and evaluation are important components of NPANs. They are, however, not given high priority and often not built into the plan. The role of an intersectoral coordinating body is considered crucial to a country's nutrition program. Most countries have an intersectoral structure or coordinating body to ensure the proper implementation, monitoring and evaluation of their NPANs. The workshop identified the constraints and key elements of success in each of the four stages of the NPAN process: development, operationalization, implementation, and monitoring and evaluation. Constraints to the NPAN process relate to the political and socioeconomic environment, resource scarcity, control and management processes, and factors related to sustainability. The group's review of NPAN identified successful NPANs as those based on recent, adequate and good quality information on the nutritional situation of the country, and on the selection of strategies, priorities and interventions that are relevant to the country and backed up by adequate resources. Continued high level political commitment, a multisectoral approach, and adequate participation of local communities are other key elements for success. The participants agreed on future actions and support needed from various sources for the further development, implementation, monitoring and evaluation of their NPANs. The recommendations for future actions were categorized into actions pertaining to

countries with working NPAN, actions for countries without working NPAN and actions relevant to all countries. There was also a set of suggested actions at the regional level, such as holding of regular regional NPAN evaluation meetings, inclusion of NPAN on the agenda of regional fora by the regional organizations, and strengthening of regional nutrition networks.

K34 Current status of nutrition labelling and claims in the South-East Asian region: are we in harmony?

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Asia Pacific J Clin Nutr 11(2): S80-S86, 2002

This review includes the situation of nutrition labelling and claims in six countries in South-East Asia: Brunei, Indonesia, Malaysia, Philippines, Singapore and Thailand. With the exception of Malaysia, there is no mandatory nutrition labelling requirements for foods in these countries except for special categories of foods and when nutritional claims are made for fortified or enriched foods. Nevertheless, several food manufacturers, especially multinationals, do voluntarily label the nutritional content of a number of food products. There is, therefore, increasing interest among authorities in countries in the region to start formulating regulations for nutrition labelling for a wider variety of foods. Malaysia has proposed new regulations to make it mandatory to label a number of foodstuffs with the four core nutrients, protein, carbohydrate, fat and energy. Other countries have preferred to start with voluntary labelling by the manufacturers, but have spelt out the requirements for this voluntary labelling. The format and requirements for nutrition labelling differ widely for countries in the region. Some countries, such as Malaysia, closely follow the Codex guidelines on nutrition labelling in terms of format, components to be included and mode of expression. Other countries, such as the Philippines and Thailand, have drafted nutrition labelling regulations very similar to those of the Nutrition Labeling and Education Act (NLEA) of the United States. Nutrition and health claims are also not specifically permitted under food regulations that were enacted before 1998. However, various food products on the market have been carrying a variety of nutrition and health claims. There is concern that without proper regulations, the food industry may not be certain as to what claims can be made. Excessive and misleading claims made by irresponsible manufacturers would only serve to confuse and mislead the consumer. In recent years, there has been efforts in countries in

the region to enact regulations on nutrition claims. Recently enacted regulations or amendments to existing regulations of almost all the countries reviewed have included provisions for nutrition claims. Malaysia is in the process of gazetting regulations to clearly stipulate the permitted nutrition claims and the conditions required to make these claims along the guidelines of Codex Alimentarius Commission. Only two countries in the region permit health claims to be made - Indonesia and Philippines. Other countries in the region are following developments in Codex and examining the need for allowing these claims. There are more differences than similarities in the regulations on nutrition labelling and claims among countries in the South-East Asian region as no previous efforts have been made to address these. Hopefully, through this first regional meeting, countries can initiate closer interaction, with a view to working towards greater harmonization of nutrition labelling and health claims in the region.

K35 Southeast Asian perspectives on nutrition needs for the new millennium

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Biomed Environ Sci. 14(1-2): 75-81, 2001

Over the last three decades, there has been significant changes in the lifestyles of commmunities, including food habits, and food purchasing and consumption patterns in the Southeast Asian region. As a result, there is a definite change in the food and nutrition issues in the region. Nutritional deficiencies in many of these countries are slowly being decreased in magnitude. On the other hand, the significant proportions of the population are now faced with the other facet of the malnutrition problem, namely diet-related chronic diseases. However, because of the different stages of socio-economic development, the extent of each of these extremes of the malnutrition problems varies considerably between the different countries in Southeast Asia. Nutrition needs in the new millennium would necessarily differ somewhat among these countries while at the same time, there would be a considerable amount of similarities. This presentation highlights several macro issues that countries in the region may focus on in the near future. Various intervention programmes have been undertaken by authorities to tackle the co-existence of twin faces of malnutrition in many developing countries. It would be desirable to have a blue print of such programmes and activities in the National Plans of Action for Nutrition (NPANs). The NPAN should be more than a framework or a descriptive document. It should be a tool for action, an operational plan that sets out priorities; identifies projects and activities, with details of implementation such as what, how and when; designates responsibilities and accountability for the activities; identifies resource requirements and their source; and sets out the plan for monitoring and evaluation. One of the main obstacles in the formulation and effective implementation of intervention

programmes in developing countries is the lack of comprehensive data on the extent of the problems in many cases and the causes of such problems specificy to the communities concerned. It is thus imperative to identify appropriate research priorities and conduct relevant studies. It is also important to have basic baseline data collected at regular intervals such as nutritional status of communities and dietary intake. To conduct all these activities, it is vital to ensure adequate funding, preferably through establishing a dedicated fund for research. There should be closer collaboration between countries in the region in all nutrition activities to enable sharing of resources, experiences and learn from the mistakes of others. One existing mechanism is through the ASEAN structure. The other existing mechanisms are through WHO and FAO. One other mechanism is through the International Life Sciences Institute (ILSI) Southeast Asian Branch. Closely related to this need for networking is the need for continuing harmonization of approaches to nutrition activities in the region. Current efforts in harmonisation include RDA, nutritional status assessment methodologies and dietary guidelines. Other areas of harmonisation in the near future include nutrition labelling and claims.

K36 Knowledge of HIV/AIDS and attitudes towards people living with HIV among the general staff of a public University in Malaysia

Tee Y, Huang M

SAHARA-J 6(4): 179-187, 2009

Stigma and discrimination towards people living with HIV have been widely documented, and have extended their impact into the workplace. Stigmatizing attitudes towards people living with HIV (PLHIV) in the workplace significantly hinder HIV prevention efforts and indirectly affect national development. This cross-sectional study was designed to determine the level of knowledge about HIV and AIDS and assess attitudes towards PLHIV among the general staff of Universiti Putra Malaysia (UPM), as well as to identify factors that are associated with it. Self-administered questionnaires were posted to a total of 344 general staff from six randomly selected faculties, and they were a given a week to return the questionnaires. The response rate was 38%. Data were analyzed using Pearson's correlation, independent t-test and multiple linear regression. The respondents showed a considerably high level of knowledge about HIV/AIDS (mean knowledge score of 15.57±1.93 out of 18 points) although there were some misconceptions (N=129). Likert scale responses to 20 attitude statements revealed that respondents generally had moderately positive attitudes toward PLHIV (average score of 69.65±10.08 out of 100 points). Attitudes were inconsistent when it involved direct contact and interaction with PLHIV. Factors significantly associated with level of knowledge and attitudes included age, education and income. There was no difference in mean score for knowledge and attitudes by gender. Further efforts are necessary to improve attitudes of the general staff towards PLHIV, particularly in areas of direct contact with PLHIV.

K37 Vitamin Use and Beliefs among Students at a Malaysian University

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Perspectives in Public Health 110(4): 132-134, 1990

Questionnaire was administered in class to a sample of physical education students at a Malaysian University in order to determine their beliefs and use patterns regarding vitamin supplementation. About a quarter of the subjects (24.6%) had practised vitamin supplementation for the past two years prior to the study, 14.9% of them being females as opposed to only 9.7% males. The most frequently used vitamin supplements, in rank order, were multivitamins (used by 57.6%), vitamin C (24.2%), the B-Complex vitamins (9.1%), and vitamin E (6.1%). Among vitamin supplementeers, the most frequently cited reasons for using vitamin supplements, in rank order, were 'to supplement the daily diet' (33.3%), 'to prevent colds' (27.3%), and 'to prevent fatigue or lethargy' (21.2%). Among non-supplementeers, the three reasons most frequently mentioned for not using vitamin supplements were 'vitamin needs are ade quately supplied by daily meals' (50.5%), 'I am healthy enough and therefore I do not need extra vitamins' (27.2%), and 'fear of insidious side effects' (9.9%). In general, both supplementeers and non-supple menteers tended to beheve in the purported health benefits of vitamin supplementation. However, on the whole, supplementeers were willing to change their supplementation habits.

K38 Factors influencing nutritional knowledge of teachers

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Perspectives in Public Health 105(6): 204-205, 1985

The relationships of ethnicity, father's occupation, sex and respondent's academic major with nutritional health knowledge were studied on a sample of Malaysian teachers using a self-administered questionnaire. Results indicated that the level of nutritional health knowledge is low and dependent on sex but not on ethnicity, respondent's academic major and father's occupation. The need for males and physical education majors to improve their levels of nutritional health knowledge is indicated.

K39 Assessment of nutrition education needs among a sample of elderly Chinese in an urban area

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Mal J Nutr 1: 41-50, 1995

As Malaysia is moving towards a rapidly developing economy, its elderly population is also expected to increase not only in numbers and proportion but also in their life expectancies. This demographic shift from a relatively young population to one that includes an increasing number of old and very old age group presents a real challenge to nutritionists and health professionals. The challenge is to maintain a healthy and vigorous elderly population who can lead fulfilling and independent lives. Health promotion and disease prevention efforts, including nutrition education, targeted towards this group can contribute important elements in meeting the challenge. The objective of the study was to assess the nutrition education needs of a sample of elderly Chinese in an urban area. The sample consisted of 34 males and 36 females, whose age ranged from 55 to 86 years. They were generally affluent and well-educated with a mean income of RM1O1 1.86 and 8.0 years of formal education. A self-administered questionnaire which requires 20 to 30 minutes to complete was used to collect the information. The results of the nutrition knowledge assessment indicated that the typical respondent correctly identified 16 of the 22 nutrition knowledge statements. A majority (91.4%) of the respondents recognized the fact that tomato, dark green leafy vegetables, and orange juice are good sources of vitamin C, while the statement on vitamin supplementation was correctly answered by only 15.7% of the respondents. The mean nutrition knowledge score was 26.14 with a range of between 18 and 36. The t-test indicated a significant difference (t=3.63, p_0.05) between males and females in their nutrition knowledge scores, with the males having higher mean scores. Although only 8.6% of the respondents reported they had participated before in a nutrition education programme, a majority of them believed that nutrition education can improve the nutritional and health status of the elderly. A majority (80%) of the respondents mentioned newspaper articles as their source of nutrition information, while only 8.6% indicated the dietitian as their source of information. However, the doctor was identified as a more creditable and reliable source of information by a majority (68.6%) of the respondents. Nutrient requirements and physical exercise for the elderly were topics of greater concern to a majority of the elderly than topics on food preparation and food labels. Although the results of the study do not represent the nutrition education needs of all elderly population in Malaysia, our findings may be useful for planning strategies to meet food and nutrition education needs of other elderly groups.

K40 Parental perceptions of children's body shapes

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Med J Malaysia 58(5): 743-751, 2003

The aim was to determine the differences in parents' perceptions of boys' and girls' body shapes and the explanations for the emphasis on body shape care of children. Subjects were low-income parents (n = 158) of preschoolers attending preschools in Kuala Lumpur, Malaysia. Parental perceptions of children's body shapes were assessed based on their rankings (scale of 1 to 7) of four attributes (ideal, healthy, fat and thin) for boy and girl figures. Parental responses to five questions on the importance of body shape were also obtained. Parental rankings of ideal and healthy body shapes were significantly lower for girls than boys ($p < 0.001$). However, mothers' and fathers' rankings of boys' and girls' body shapes were not significantly different. for both boys and girls, parental ratings for ideal body shape were significantly lower than for healthy body shape ($p < 0.001$). The majority of parents indicated that children's body shape is important for their future health, self enhancement, social interaction and career. With the increasing prevalence of body dissatisfaction among Malaysian children, these findings contribute to the understanding of parental roles in the development of body image and perhaps, in the etiology of body dissatisfaction among children.

K41 Evaluation of food photographs for 24-hour recall method

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Mal J Nutr 1: 95-104, 1995

The purpose of this study was to develop a visual aid to improve and increase accuracy of the 24-hour recall method. This aid in the form of a booklet, consists of life-sized photographs of common Malaysian foods, accompanied by the weight of its edible portion and nutrient values. These photographs used together with the recall method were tested against the weighed record method for its validity. For this preliminary test, a total of 23 photographs of food items were tested. Sixty healthy adult volunteers were selected as respondents for the test. These respondents were divided into 2 groups. Each group was given either a simple or complicated menus. The respondents were served 3 test meals: breakfast, lunch and tea. Each food item served and plate waste were weighed and recorded. The 24-hour recall was conducted the day following the weighed record day. The results of the paired

t-tests indicated no significant difference in group's mean weights of food intake between the weighed record and recalled method for 13(57%) of the foods tested. The correlation coefficients between the two methods showed a moderate to strong positive relationships for 17 out of the 23 food photographs tested (ranged from r=0.49-0.92, p<0.01). Analysis on the nutrient intake for simple menus showed high correlation coefficients between both methods for all nutrients tested, r=0.62-0.95, p<0.01. For the complicated menus, the correlation coefficients were slightly lower than the simple menus, ranging from r=0.38-0.71, P<0.0l. Except for the fat intake in the complicated menus, all the correlation coefficients between the two methods reached 0.5 and above for both types of menus.

OTHERS

L1 Factors affecting public attitude toward genetically modified food in Malaysia

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Sains Malaysiana 35(1): 51-55, 2006

Public perceptions, understanding and acceptance of modern biotechnology can both promote and hamper their commercial introduction and adoption. Various studies have shown that consumer acceptance of modern biotechnology tend to be conditional and dependent on several factors. Public perceptions of biotechnology have received extensive attention in recent years in most Western countries such as Europe, USA and Canada but there have been limited similar surveys in developing countries. Most of the earlier studies used uni-dimensional or bi-dimensional instrument with multi-items or the most is four dimensions with single item. In this study, public attitude towards genetically modified (GM) soybean that is already available in the Malaysian market. A survey was carried out on 577 general public respondents in the Klang Valley region. In order to detect the structure of attitude amongst the expert group in the Klang Valley region, structural equation modeling (SEM) using AMOS version 5.1 was carried out. Result of the survey has confirmed that attitude towards complex issues such as biotechnology should be seen as multi-faceted/ multidimensional process. The most important factors predicting encouragement of GM soybean are the specific application-linked perceptions about the benefits and acceptance of risk while moral concern, risk and familiarity are significant predictors of intermediate factors. Researchers, policy makers and industries interested in developing and marketing GM products in Malaysia should consider the various factors mentioned in this in order to gain public approval.

L2 Use of traditional and complementary medicine in Malaysia: a baseline study

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Complementary Therapies in Medicine. 17(5-6): 292-299, 2009

BACKGROUND: The increasing popularity and use of traditional and complementary medicine (TCAM) in both developed and developing countries, including Malaysia, have raised significant public health policy issues. However, currently, there is a paucity of baseline data on such usage by the Malaysian community. OBJECTIVE: This study was conducted to identify and describe the prevalence and frequency of various TCAM modalities that are being used by the Malaysian population by age, gender, marital and working status, ed ucational level and ethnic group for health issues and maintenance. DESIGN: A nationwide interviewer-administered questionnaire survey was conducted in August 2004. An open-ended questionnaire pertaining to TCAM modalities was used to increase the probability of capturing maximum data. This survey implemented a multistage design, stratified by state and urban/rural random sampling, proportionate to the size of the state population and was representative of the Malaysian population. Post-survey classification of modalities was done accordingly. Complex data analysis was carried out using SPSS 13.0. RESULTS: Various TCAM modalities that were used by the Malaysian population were identified and categorised. Biological-based therapies, which included herbal therapy, were most commonly used for health problems (88.9%) and for health maintenance (87.3%). Under this category, herb-based application/ herb-based beauty product/herb-based hygiene product group was most commonly used for health issues (23.6%) while pure herbs were the ones most commonly used for health maintenance (29.6%). There was no significant difference across all groups in the usage of biological-based therapies for health issues. CONCLUSION: The study showed that there is a high prevalence of TCAM use by the Malaysian population, particularly in the use of herb-based therapies for both health issues and health maintenance. Thus, a strict guideline for herbal commercialisation as well as public education is important.

AUTHORS' INDEX

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