

Day 1: Keynote Lecture

Understanding Children's Eating Behaviour

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Children need a balanced diet to meet their requirements for growth and development. Health-related behaviour and attitudes towards food are established in childhood. Factors affecting the eating habits of children change in priority as they move through childhood into adolescence. Both individual-level and environmental factors play a role in children's eating behaviour. Individual-level factors include attitudes, beliefs, self-efficacy, dietary knowledge, as well as food preferences. However, the individual child needs a supportive environment to facilitate healthy eating and there seems to be more evidence to suggest that improving the child's social environment is crucial. The latter includes school, the home and family, watching television and exposure to other media. Children can spend up to 2 hours each day watching TV and food advertisements during children's TV programmes are often for energy dense, nutrient-poor foods; and there is increasing evidence to suggest that these influence behaviour. Parents also have a crucial influence on food choice, as they influence the availability of food, and act as role models for their children. Children's food preferences are often influenced more by general cultural norms than family preferences, and the role of peer pressure is key. Peer pressure has a powerful effect on eating behaviour and body image, whose importance increases with age. Income also has a key influence and is associated with poor nutrition throughout childhood. The school environment plays an important role in the development of children's dietary practices, as children consume a substantial proportion of their daily intake at school. Schools are ideal settings to influence food choice in a positive way using a whole school approach and teacher and peer-led interventions are often successful in motivating children to eat healthily. Strategies to improve the nutritional quality of children's diets need to encompass both individual-level and environmental-level interventions.

Symposium 1: Childhood Nutrition (I)

Children Nutrition Policies & Programmes in the Ministry of Health Malaysia

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Nutrition, as a programme in Malaysia, has largely been an integral component of the maternal and child health services since early 1950s under the primary health care (PHC) approach. The formulation of the National Nutrition Policy and the National Plan of Action for Nutrition of Malaysia (NPANM) in 1996 further provided the framework for collaborative efforts between the Ministry and other agencies in promoting nutrition to various target groups beyond the Ministry of Health. The National Nutrition Policy of Malaysia aims to achieve and maintain the nutritional well-being of the population including children. The National Breastfeeding Policy encourages all mothers to exclusively breastfeed their infants up to six months and to continue breastfeeding up to two years. Complementary feeding is to be introduced at the age of six months. Policies and activities of the Ministry in collaboration with other government and non-government agencies have lent considerable social support for nutrition of infants as seen in the provision of breastfeeding facilities at workplace and paid maternity and paternity leave. The adoption of the Baby-friendly Hospital Initiative (BFHI) since 1993 provides mothers the support required to initiate breastfeeding immediately after birth. Regulatory and ethical measures as implemented under the Food Regulations 1985 and Food Act 1983 as well as the Code of Ethics for Infant Formula Products since 1979 include the development of provisions to encourage the adoption of healthier nutrition and breastfeeding practices and make available healthier food choices through product labeling and ethical practices. To promote optimal infant and young child feeding practices, nutrition education and training remain the long term strategies. Educational activities to mothers or caretakers through growth monitoring, nutrition talks, counseling, cooking demonstrations and video shows are conducted during the child health, ante-natal and post-natal clinic sessions as well as during home visits after discharge from hospitals or maternity homes. In preventing and controlling nutritional deficiencies, various intervention programmes have been initiated. These include the Programme on the Rehabilitation of Malnourished Children where food baskets are distributed to eligible recipients, Iodine Deficiency Disorders Programme and Full Cream Milk Powder Programme. In promoting healthy eating amongst children, the Ministry provides consultancies to the development of healthy menus in various institutions such as day-care centres, kindergartens, boarding schools and National Service Training Centres. Collaboration with the Ministry of Education includes the formulation of the School Canteen Guidelines, School Milk Programme, Supplementary Feeding Programme and the establishment of the Health Promoting School concept. New initiatives such as Healthy School Canteens and Food Fortification are currently being developed to improve health outcomes and the nutritional status of children and to provide nutrition knowledge and skills to assist children to select healthier food choices in a more supportive school canteen environment.

Healthy Children, Healthier Nation – Nutrition Month Malaysia 2009

Tee E Siong

Steering Committee, Nutrition Month Malaysia 2009

Initiated in 2002, Nutrition Month Malaysia (NMM) has been observed in the month of April for the past 6 years. The NMM project is a collaborative effort among fellow professional bodies, namely the Nutrition Society of Malaysia (NSM), Malaysian Dietitians' Association (MDA), and Malaysian Association for the Study of Obesity (MASO). The project also has the support of the Ministry of Health Malaysia (MOH), particularly the Nutrition Division. The objective of NMM is to promote greater awareness and the practice of healthy eating, in line with the Government's healthy lifestyle programme.

During NMM, a number of activities are carried out, using a variety of approaches and media, to further raise the visibility of nutrition. Different themes have been selected for each NMM. The topics given focus over the years are:

- 2002: Building healthy families
- 2003: Healthy eating, healthy life
- 2004: Eat right, work well
- 2005: Youth & nutrition: future of the nation
- 2006: Women & nutrition
- 2007: Adolescents & nutrition
- 2008: Eat right, enjoy life

Available data from various studies have highlighted the underweight and overweight problems affecting children in Malaysia, as well as iron deficiency anaemia, vitamin A deficiency and iodine deficiency disorder as among the most important micronutrient deficiencies. The National Plan for Nutrition of Malaysia (NPANM II 2006-2015) has therefore given due focus to improving the nutritional status of children in the country.

In cognizance of the importance of improving the nutritional status of Malaysian children, NMM 2009 is focusing on "Healthy children, healthier nation". This is intended to bring about greater awareness of childhood nutrition to all parents, provide them with basic knowledge about child nutrition and practical guides. It is a call for all stakeholders (government, industry, professional organisations, consumer bodies and the public) to collaborate in promoting healthier Malaysian children.

There will be more activities during NMM 2009 compared to NMM of previous years. Two booklets shall form the "hero" of the programme, namely *Raising Healthy Eaters* (RHE) and *Easy Nutrition Planner* (ENP). Both booklets are targeted at parents to promote healthy eating amongst their children. The first booklet shall provide parents with simple basic knowledge about child nutrition; meal planning and shopping; healthy cooking; healthy eating guides including the child food pyramid; common nutritional problems; and weight monitoring.

The *Easy Nutrition Planner* focuses on providing practical guides and tips on healthy eating, cooking methods, meal planning, shopping, food storage, an FAQ section and also several recipes. Besides these two booklets, a booklet on interesting bread recipes for children shall be published.

Based on the information in the *Raising Healthy Eater* booklet, a DVD has been produced for kindergarten teachers to teach toddlers healthy eating. Messages in the DVD are short and tuned to the level of young children. Further, to make these messages fun for the kids, worksheets for colouring and simple quizzes have been prepared. A training seminar on the use of the RHE, the DVD and the worksheet is being planned for end April, where kindergarten teachers from various parts of the country shall be invited to participate.

There will be a number of press articles to reach out to all parents throughout the country. The first 4 articles are scheduled for publication from mid-March till the first week of April. All these articles, to be published in an English, Malay and Chinese newspapers, are focused on various

aspects of childhood nutrition, including the importance, basic nutritional needs and practical guides on meal planning and healthy eating. The second series of articles will focus on nutrition and learning and is targeted for publication through the month of April till early May. In May, further articles shall be published focusing on appropriate snacking habits, healthy digestive system and probiotics.

In addition to these educational materials, various out-reach activities have also been planned. The main event is a NMM 2009 Family Carnival, scheduled for 4-5 April in Mid Valley Exhibition Centre. This will also serve as the official launch of NMM 2009 and the activities planned include family and child nutrition screening, a toddler talent content, games, quizzes and trade exhibition by sponsors of NMM 2009. Educational materials of NMM and the Nutrition Society of Malaysia shall be distributed during the event. Additional roadshows are also being planned for Penang and Johor Bahru.

NMM is able to conduct all these activities only because of financial support from the Health Promotion Board Malaysia as well as several food companies in the country. The Steering Committee of NMM gratefully acknowledges their generous support.

There is a need to continue to empower the people with healthy eating knowledge. There is a need for continuous efforts to provide more unbiased nutrition information to the public. There is therefore a need for Nutrition Month Malaysia to continue and grow and reach out to all corners of the country, all segments of the population.

It is certainly not sufficient just to have a few booklets published and a dozen articles in the press and magazines. We need to disseminate this information to the people. We need the help of all of you at the community level to assist in this endeavour. We need you as a nutritionist, a dietitian, a food scientist, a doctor, a health professional, an academician, and even you as a member of the community to help promote the messages of NMM, that is, to promote healthy eating.

I am of the belief people will benefit from these activities. I urge you to do your bit in promoting NMM 2009.



Symposium 2: Childhood Nutrition (II)

Breakfast and Cognitive Function in 10-Year Old Primary School-children in Penampang, Sabah

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The relationship between breakfast omission and cognitive performance was investigated in primary school children ($n = 51$; $m=25$; $f=26$; $age=10y$) using a cross-over design. On the study day, subjects were randomly assigned to receive breakfast (BR) or no breakfast (NBR) in school. One week later, the treatments were reversed. Subjects acted as their own controls. They were instructed to fast overnight but 39.6% did not comply. One hour after treatment, subjects completed a set of cognitive tasks involving: (1) short-term memory (assessed using Serial Recall Task), (2) spatial memory (using Spatial Memory Task), and (3) attention (using Visual Search Task). The breakfast provided was a *kaya* sandwich, a 200ml chocolate malt drink, and one banana (approximately 413 calories). The short-term memory task was repeated 20 times with subjects required to identify the correct positions of 7 alphabets, two seconds after the visual stimulus was provided. In the second task, subjects were asked to correctly recall 24 items and their spatial positions in a pictorial map. In the third task, subjects were given four pages of randomly arranged alphabet maze and were asked to identify 40 target sequences embedded within it in three minutes. BR subjects performed better than NBR subjects towards the end of the 7-alphabet positions in the Serial Recall Task. BR subjects performed worse than NBR subjects for the Spatial Memory Task and the Visual Search Task, albeit the differences were insignificant ($p>0.05$). Findings from the Visual Search Task were congruent with Dickie & Bender (1982) and Chandler *et al.* (1995). Findings from the Spatial Memory Task were different from that obtained by Mahoney *et al.* (2005). These findings could be due to (1) the level of food deprivation because results from non-compliers to the overnight fasting protocol were not significantly different from compliers irrespective of treatment groups ($p>0.05$); and (2) the glycaemic composition of the breakfast.

Food Habits and Physical Activity Pattern among Primary Schoolchildren in Malaysia

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The findings of a food habits and physical activity pattern study carried out among schoolchildren in Malaysia in 2007/2008 are reported. A total of 9375 children with equal percentage of boys and girls participated in this study. The cross-sectional study was carried out in four regions of Peninsular Malaysia as well as Sabah and Sarawak. The study design included anthropometric measurements and administration of a questionnaire to gather information on demography and food habits as well as the physical activity pattern of the children. The prevalence of overweight was almost similar in boys (12%) and girls (13%). On the other hand, 17% boys and 10% girls were obese. The food habits results showed that while 7 in 10 children consumed breakfast daily, there was still 1 in 10 children who never had breakfast. This trend of eating

breakfast was similar by sex, area, region and age groups. However, it appeared that Chinese and Indian children demonstrated better breakfast habits than other ethnic groups, with the worst habits being found among Malay children. Health was the main reason for consuming breakfast, and was cited by the majority of children, particularly among girls and older children. Other reasons for having breakfast were feeling hungry in the morning and parental supervision. The most frequently consumed breakfast was bread, fried rice and noodles. For children who skipped breakfast, the reasons were lack of time, not hungry and no appetite. The cited reasons were the same by sex and region. The majority of the children had lunch (78%) and dinner (76%). Approximately 4 in 10 children still snack everyday, with extruded snacks being the most frequently eaten snack. Daily fast food consumption was still rampant particularly among the older children. With regard to physical activity, the majority of children were sedentary in their activities such as reading and chatting while sitting and going to school by vehicles. Overall, 55% of the children were involved in sports after school, higher among boys (61%) than girls (50%). The trend of involvement in sports after school was similar by ethnic, area and age groups. These results demonstrate that there are still problems in food habits and physical activity. More aggressive nutrition education and promotion are needed to alleviate these problems.

Assessment of Nutritional Status of Children Living with HIV Receiving Anti-retroviral (ARV) Medication

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The objectives of this study were to determine the nutritional status and associated factors among children living with HIV currently receiving antiretroviral (ARV) medication at Paediatric Institute, Kuala Lumpur Hospital and Universiti Malaya Medical Centre (UMMC). A total of 101 children aged between one to nineteen years were recruited over a period of six months. Data collected included socio-economic status, anthropometric measurements of weight, height and skinfold thickness, dietary intake assessed using 24-hour dietary recall, medical history, the perception of body image and serum levels of selected micro-nutrients. The mean age of the children was 8.41 ± 3.96 years, with more males (n=55) than females (n=46). The majority of the children were Malay (53.5%), followed by Chinese (32.7%), Indian (5.9%), East Malaysian (4.0%) and Myanmarese (5.9%). A total of 27.0% had been on the ARV medication for a period of one to three years, 33.3% for four to six years, 24.0% for seven to nine years and 11.5% for more than ten years while only 4.2% had taken the regimen for less than a year. For those aged between one to five years, 33.3% had low to marginal count of CD4 while for those aged between six to nineteen years, 25.4% had low to marginal count of CD4. Among the adolescents, only 9.1% were satisfied with their body shape while 33.3% indicated that they desired a slimmer body shape and majority (57.6%) desired a bigger body shape. Anthropometric measurements found 9.9% were wasted, 3.0% were severely wasted, 19.8% were stunted, and 13.8% were severely stunted while 24.7% were at risk of overweight, 8.0% were overweight and 3.0% were obese. The mean percent of body fat was $18.9\% \pm 6.1\%$ with 9.1% of the boys having more than 25% body fat while 6.5% of the girls had more than 30% body fat. Biochemical indicators showed that 25.8% had vitamin A deficiency while 12.4% had selenium deficiency while the majority had adequate serum level of vitamin E (97.8%), iron (91.0%) and zinc (92.8%). Fifty-four percent had a low level of HDL-C while 5.1% had high LDL-C level, 19.2% had high triglyceride level and 8.1% had high total cholesterol level. In terms of dietary assessment, 40.2% of the parents/guardians under-reported the child's energy intake. Furthermore, 76.8% of the children did not achieve the recommended energy intake for

their age groups. It was also found that boys had a higher mean energy intake (1325.3 ± 445.5 kcal) than girls (1306.9 ± 396.4 kcal). By excluding under-reporters, the means for energy intake were higher for both boys (1649.2 ± 338.2 kcal) and girls (1458 ± 378.7 kcal). Almost half of the children did not achieve the RNI for iron, selenium and vitamin A. This study provides an insight into the nutritional status of children living with HIV. Further studies are necessary to identify the determinants of nutritional status among children living with HIV.

Nutritional Status and Quality of Life among Leukemic Children at Pediatric Institute, Hospital Kuala Lumpur

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The purposes of this study are to determine the inter-relationship between nutritional status and quality of life among leukemic children at the Pediatric Institute, Hospital Kuala Lumpur. This cross-sectional study involved 34 children aged 5 to 15 years old. Anthropometric measurements of weight, height, mid-upper arm circumference (MUAC), triceps and mid-calf skinfolds were obtained, together with biochemical data of albumin, total protein and hemoglobin. A Multiple Pass 24-hour Diet Recall for nutritional assessment was attained. Quality of life was measured using Cancer Module PedsQL which encompassed domains of physical, psychological and social well-being. The findings revealed that leukemic children had normal development just like healthy children of the same age. The majority had normal percentiles of height-for-age and weight-for-age with 91.2% and 97.1%, respectively and only 5.9% were stunted. Indicators of protein-energy malnutrition showed that the triceps skinfold of 64.7%, MUAC of 73.5% and arm muscle area (AMA) of 73.5% were in the normal percentiles. Whereas, for biochemical assessment, the majority had normal albumin and total protein, 91.8% and 79.4%, respectively but 55.9% had low hemoglobin level. Meanwhile, for nutritional intake, the children met the recommendation for protein, ferum, riboflavin, vitamin A and C according to RNI 2005. Nonetheless, energy, calcium, thiamine, niacin and folate intakes were lower than RNI. Overall, the majority of the children were found to have an optimum quality of life but were slightly affected psychologically through procedural anxiety and socially through body perception. There was significant difference between quality of life and socio-economic status ($\chi^2 = 7.109$, $p < 0.05$) and time of diagnosis ($\chi^2 = 6.905$, $p < 0.05$). Quality of life was positively correlated with weight ($r = 0.371$, $p < 0.05$) and body mass index (BMI) ($r = 0.405$, $p < 0.05$) but negatively correlated with total protein $r = -0.367$, $p < 0.05$ and albumin $r = -0.385$, $p < 0.05$. In conclusion, it was found that weight, BMI, total protein and albumin were not predictors for quality of life among leukemic children ($p > 0.05$).

Symposium 3: Young Investigators Symposium

Influence of Low Glycemic Index & High Glycemic Index Pre-exercise Meals on Cycling Performance

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Effects of pre-exercise carbohydrate ingestion with different glycemic index (GI) have been studied extensively over the years to elevate athletes' performance during competitions. However, there are limited studies on pre-exercise meals on sports performance in this country. Thus, this cross-over study was designed to examine the effects of pre-exercise meals with high glycemic index (HGI) and low glycemic index (LGI) on exercise time to fatigue among cyclists. Seven well-trained cyclists were recruited as subjects (age: 19.4 ± 1.3 years old; VO_{2max} 56.2 ± 8.4 ml.kg⁻¹.min⁻¹) for this study. During the pre-test, VO_{2max} of subjects was determined using a gas analyser. Subjects exercised on a cycle ergometer with intensity increments of 50 watt for every 4 minutes until 150 watt. After the sub-maximal exercise, subjects exercised until fatigue with 25 watt increments every 2 minutes, and VO_{2max} was determined. Body composition of subjects was determined using Bio Impedance Analysis (BIA) in the pre-test. During the second session of the study, subjects were given 2 different test meals which contained 70g carbohydrate each to consume within 15 minutes on 2 different trials. They exercised at intensity of 65% VO_{2max} after 1 hour of ingestion and time of exercise to fatigue was recorded. Three-day energy intake was assessed through a food diary and estimation of physical activity pattern was carried out simultaneously with diet intake record. The data showed a negative value of energy balance where mean energy intake was 2604 ± 857 kcal and mean energy expenditure was 3758 ± 381 kcal. Mean body weight and height were 59 ± 3.6 kg and 169 ± 4.6 cm, while mean of BMI was 20.8 ± 2.0 . Mean body fat and lean body mass were $11.1 \pm 2.2\%$ and $89 \pm 2.2\%$ respectively. Mean water percentage and estimated BMI were $64.4 \pm 3.0\%$ and 1650 ± 78 . Mean total water consumption and weight loss after test for LGI were 903 ± 655 ml and 0.8 kg, and 764 ± 469 ml and 0.6 ± 0.5 kg for HGI. Cyclists recruited for this study with mean VO_{2max} of 56.2 ± 8.4 ml.kg⁻¹.min⁻¹ were considered physically fit as compared to data from Wilmore and Costill (2005), where the VO_{2max} for male endurance-trained cyclists, aged 18 to 26 years old, was estimated to range from 62 to 74 ml.kg⁻¹.min⁻¹. Results of mean respiratory exchange ratio ($p=0.289$) and heart rate ($p=0.977$) demonstrated no significance difference between LGI and HGI meals ingestion. The mean of exercise time to exhaustion achieved by ingestion of LGI trial (1:46:08) was 19 minutes longer than the time of HGI (1:27:08). However there was no significant difference ($p>0.05$) between the time of exercise to exhaustion achieved by LGI and HGI meals, which may be due to the small sample size. Therefore, more studies with a bigger sample size on pre-exercise carbohydrate ingestion are needed to further examine the effect of glycemic index on sports performance.

Association between Television Viewing, Video Games & Computer Usage & Obesity Prevalence among Children in Cheras, Selangor

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Overweight and obesity place children and adolescents at increased risk of significant health problems, both during their early life and adult life. A cross-sectional study was carried out to determine the prevalence of overweight and obesity among primary school children and their relationship with television viewing, video games and computer usage (electronic media) as well as snacking and physical activity. The respondents were selected randomly by using the table for determining Random Sample Size for a given population. A total of 287 respondents, aged between 10-11 years old, were selected for this study. The sample consisted of 110 boys and 177 girls. Weight was recorded using TANITA model HD-309, height was measured using SECA Body meter Model 208 and waist circumference was determined using measuring tape. A questionnaire was developed to determine the duration of electronic media usage among children and snacking behaviour as well as their one-week frequency and duration of a given list of physical activities. Statistical analysis was carried out using SPSS version 15. Out of the 287 respondents, 13.1 % were found to be overweight and 19.0 % obese. There was no correlation between duration of electronic media usage and sedentary behaviour. However, there was a weak correlation between snacking and duration of video games and computer usage during weekdays ($r=0.22$, $r^2=0.05$, $p<0.001$) and also duration of TV viewing during weekends ($r=0.13$, $r^2=0.02$, $p<0.05$). This study also found that there was no correlation between Body Mass Index (BMI) and duration of media usage. No correlation was also found between snacking and BMI. In conclusion, even the prevalence of overweight among the primary school children is high in this study, but there is no significant contribution by duration of electronic media usage and sedentary lifestyle. Therefore there is a need for further research on snacking behaviour besides comprehensive integrated population-based intervention programmes for overweight and obese children.

Prediction Equation for Bioelectrical Impedance Analysis in Malaysian Adolescents Aged 13-16 Years

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Bioimpedance analysis (BIA) is a widely used technique for estimation of body composition. However, most previous studies have been carried out on white and normal-weight populations, hence the question of validity arises when the prediction model is applied to populations other than in which they were generated. The purpose of this study was to develop a single BIA equation for Malaysian adolescents with a wide range of body mass index (BMI). A total of 75 boys and 75 girls aged 13 - 16 years and with BMI ranging from 15.4 to 33.6 kg/m² participated in this study. Body weight and height were measured, and BMI was calculated. FFM was measured by DEXA (Hologic QDR-4500, Waltham, MA, USA) and used as the reference measure to develop prediction equations based on single-frequency bioelectrical impedance analyser (Omron pre-commercial unit). Subjects were categorised based on WHO 2007 BMI-for-age reference: 53 had normal weight, 44 were overweight, and 53 obese. Subjects were randomly divided into developmental (50 boys,

51 girls) and cross-validation (25 boys, 24 girls) groups. Prediction equation was developed using stepwise regression analysis. Predicted FFM (41.4 ± 7.6 kg) in the validation group was not significantly different from measured FFM (41.2 ± 8.03 kg) [pure error = 1.79kg]. A single prediction equation was hence developed using the total sample (n=150): FFM= (0.385 X impedance index) + (0.135 X weight (kg)) + (0.104 X height (cm)) + (0.414 X age) - 18.755 ($R^2= 0.977$, $SEE=1.815$ kg). There was no significant difference between measured FFM and predicted FFM using the formula developed (measured FFM= 40.7 ± 8.5 kg, predicted FFM= 40.6 ± 8.3 kg, $p=0.433$). In conclusion, the new BIA equation was valid for prediction of FFM in Malaysian adolescents aged 13-16 years with body mass indexes between 15.4 and 33.6 kg/m².

Dietary Intake, Appetite and Depression among Chinese Elderly in Nursing Homes at Butterworth, Penang

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Poor appetite and under-nutrition occur commonly among elderly as aging is associated with several psychological and physiological factors that result in a reduction in appetite and food intake. Healthy elderly individuals are less hungry and more full before meals, and become satiated more rapidly after eating a standard meal than do younger persons. Among nursing home residents, depression is common as an affective response to illness, disability, adjustment to long-term placement, a symptom of medical illness and has been associated with decreased appetite and energy intake in the elderly. Therefore, the objective of this cross-sectional study was to assess food intake, appetite and depression among Chinese elderly in nursing homes at Butterworth, Pulau Pinang. Dietary intake of 100 Chinese elderly (49 men and 51 women) was assessed using one-day food weighing and 24-hour diet recall. Appetite of the subjects was assessed using Council of Nutrition Appetite Questionnaire (CNAQ). Depression was determined using Geriatric Depression Scale (GDS). An interview-based questionnaire was used to obtain information on socio-demographic and health status. Anthropometric measurements included body weight, height, body mass index (BMI), half-arm span, mid-upper arm circumference (MUAC), calf circumference and waist circumference. Results showed that the mean energy and nutrients intake fulfilled the RNI recommendation except for calcium which was only 54.9% of RNI in men and 42.3% of RNI in women. Only 4% of the subjects were underweight ($BMI < 18.5$ kg/m²), 65% were normal ($BMI = 18.5-24.9$ kg/m²), 31% were overweight ($BMI \geq 25.0-29.9$ kg/m²) and only 4% were obese ($BMI \geq 30.0$ kg/m²). Approximately 71% of women and 69% of men had poor appetite (CNAQ score ≤ 28). Depression prevailed in 78.5% of women and 67.3% of men. There was an association between CNAQ score with age ($r = -0.175$, $p < 0.05$) and GDS ($r = -0.429$, $p < 0.001$). Subjects who had depression and insomnia were more likely to have poor appetite ($p < 0.05$ for both parameters). Those who did not participate in social activities and had insomnia were more likely to be depressed ($p < 0.05$ for both parameters). In conclusion, although the nutritional status and food intake of subjects were satisfactory, poor appetite and depression prevailed and was interrelated as well as associated with insomnia and participation in social activities.

Day 2

Symposium 4: Towards Meeting Nutritional Needs

Nutrition & Cognitive Development Potential in Children

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In developing countries, more than 200 million children below 5 years of age are at risk of not achieving their potential in cognitive development. Sustained cognitive disabilities in early childhood can persist into late childhood or adolescence and adulthood, manifesting in poor academic achievement and less physical and economic productivity, respectively. Childhood undernutrition, marked by stunting or micro-nutrient deficiencies, is prevalent in the developing countries and the damages due to undernutrition from conception through the first two years of life can be largely irreversible. These nutritional deficiencies have been shown to exert a negative impact on cognitive development of children in various settings of developed and developing countries. This presentation will focus on the relationship between child undernutrition, particularly stunting, iron deficiency anemia and iodine deficiency with cognitive development of children. Stunting and micro-nutrient deficiencies commonly occur in the context of poverty or food insecurity and among households experiencing multiple economic, psychological and social stressors that could potentially influence children's development and behaviour. The presentation will also review recent evidence on optimal timing of intervention to address childhood undernutrition and its long term effects. As nutrition has a profound effect on children's development, improvements in nutritional status of children is an important step towards achieving cognitive development potential. The presentation will conclude with recommendations for actions to address nutrition and children's cognitive development.

Breakfast Cereals and Wholegrain Foods as a Dietary Strategy for Prevention of Obesity

Sritharan N

Cereal Partners Worldwide (Oceania), 1 Homebush Bay Drive, Rhodes, Sydney, NSW, Australia

Breakfast cereals are a nutritious way to start the day, providing between 10-50% daily vitamin and mineral needs whilst delivering around 10% of total energy. Breakfast cereals frequently provide fibre and wholegrains too. Epidemiological data also shows that regular consumption of RTEC has been linked with an average 30% risk reduction in obesity in both adults and children (odds ratio of 0.70 and 0.67 respectively). Regular breakfast cereal eaters, including those of pre-sweetened cereals, are significantly more likely to be lean ($BMI \leq 25$), than non-RTEC consumers and consumers of other breakfast choices. Family-based interventions have also shown positive results when breakfast cereals are promoted as part of a broader strategy to tackle obesity, showing significant reductions in % body fat among participants and their immediate family. There is also good evidence to support the inclusion of wholegrain-rich foods, including wholegrain breakfast cereals, as part of an obesity prevention strategy. Meta-analyses have shown that people who eat wholegrain-rich diets (around 48g wholegrain a day) have lower BMIs, a smaller waist circumference, reduced waist: hip ratio and are more likely to maintain weight over time, relative

to those who eat little or no wholegrain foods. Possible mechanisms are poorly understood but suggestions include the relatively low energy density and bulking effect of wholegrain foods, increased satiation or slowed gastric emptying impact on hunger signals. Based on the current literature, regular consumption of wholegrain-rich foods and breakfast cereals should be encouraged as part of family-based strategies for the prevention of obesity. Efforts to increase the wholegrain content of breakfast cereals should also be encouraged.

The World of Functional Carbohydrates

Koen Van Praet

Beneo-Orafti Asia Pte Ltd, Singapore

Functional foods made their entry when our lives changed from a physically active one to a technical-driven more sedentary lifestyle. Our diets changed from traditional cooking to prepared foods, convenience foods and takeways. Consequently increased diet related diseases occurred: obesity, diabetes, heart diseases, cancer, osteoporosis, dental carries. Numerous papers and programme followed with the common aim to “promote a healthy diet and physical activity.” The focus of nutrition evolved from energy intake through role of essential nutrients to functional ingredients and bio-active substances. In a variety of areas, functional foods play a role; from early development and growth, weight management, cardiovascular function, gut health, immunity, performance and fitness. In each of these areas Functional Carbohydrates can play a role. Prebiotics, polyols and isomaltulose are respectively pioneers and a novelty as functional carbohydrates.

Influence of Prebiotics on the Infant Immune System

Chai Pei Fan

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The human body is attacked continuously by all kinds of danger signals. An effective defense system against foreign organisms or substances is essential in order to protect the human body. This defense consists of a non-specific first line defense, a non-specific innate immunity and finally a specific adaptive immunity. Altogether this is called the immune system. The immune system has the ability to recognise, remember, destroy cells or inactivate danger signals.

After birth, the development of a healthy gut microflora, consisting of mainly bifidobacteria and lactobacilli, is considered to play an important role in the maturation of the immune system of infants. Prebiotics, which are non-digestible oligosaccharides are transferred by the mother through the breastmilk to the child. A prebiotic effect is defined as “a selectively fermented ingredient that allows specific changes, both in the composition and/or activity in the gastrointestinal microflora that confers benefits upon host well-being and health”. Prebiotics may influence the development of the immune system by stimulating the growth of beneficial bacteria but can also directly interact with cells of the immune system.

The addition of a prebiotic mixture induces a gut microflora with predominant bifidobacteria and lactobacilli. Furthermore, it also results in formation of fermentation products (SCFA), lower faecal pH, inhibition of the growth of pathogens and protection of gut mucosa barrier integrity. In addition, SCFA can improve mucin production by gut epithelial cells in *in vitro* systems which are essential for intestinal barrier integrity and therefore an essential part of the first line defence.

In addition to indirect effects on the immune system via microflora changes, prebiotics can affect immune cells in a direct fashion. In an *in vitro* gut epithelial cell system it was demonstrated that the addition of scGOS/lcFOS did increase the TLR9 induced TH1 stimulation of co-cultured human blood cells highly significantly. This is indicative for down regulation of allergy induction. Co-culture of dendritic cells isolated from human cord blood with 'healthy' human PBMC (blood lymphocytes) does lead to down regulation of Th2 development if scGOS/lcFOS were added to the culture system. Since in both the small as well as large intestine, numerous dendritic cells have direct contact with signals/compounds in the lumen of the gut, the direct effects on dendritic cells should be recognised as a potential mechanism leading to immune changes in the human body (i.e. systemic IgA, IgG production). The dendritic cells migrate to local lymph nodes where they influence lymphocytes leading to Th2 down regulation. These cells in turn can migrate into the rest of the human body.

In summary, these *in vitro* data on both human and animal cells lead to the conclusion that a prebiotic mixture of scGOS/lcFOS affects both DC/T cell interactions, macrophages as well as TLR9 stimulation in a direct way without any bacteria or bacterial products available. Oligosaccharides might interact directly via TLR with immune cells that are present in the gut. Therefore, these effects might be of high relevance in terms of prevention of allergies as well as infections in human.

Symposium 5: Nutrition Potpourri

Can a Health-related Physical Fitness Intervention Programme Improve the Fitness of Secondary School Boys?

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The objective of this study was to examine the effect of a health-related physical fitness programme within the parameters of the secondary school curriculum on the body composition and fitness components of lower secondary school boys. Three hundred and fifteen secondary school boys aged 13 participated in this study over a two-year period. Schools involved in the study were randomly assigned to the one-year intervention and one-year control (Group 1), two-year intervention (Group 2), and two-year control groups (Group 3). The intervention schools received the exercise modules consisting of twelve-lesson plans focusing on circuit, fartlek, interval and rhythmic exercise training modes. The control school followed the regular physical education programme. Body composition and fitness parameters were assessed seven times (Time 1 to Time 7) in the same manner over the two-year period. The 2-way (Group*Time) mixed ANOVA with repeated measures was used to analyse the data. All raw data were log-transformed prior to inferential statistical analysis. No significant differences were found between all three Groups in anthropometric measurements. Body Composition scores showed significant ($p<0.05$) differences, with Group 1 (1st yr. intv. + 2nd yr. ctrl.) and 2-year Intervention Group 2 having lower scores in triceps thickness. The 2-year Intervention Group 2 showed a significantly ($p<0.001$) higher gain in VO_{2max} (cardiorespiratory endurance) and also had the highest gain in flexibility scores. The change in scores for the back and leg strength over the 2 years was also significantly greater ($p<0.05$) in Intervention Group 2. Groups 1 and 2 attained significantly ($p<0.001$) better distances in the Standing Long Jump over the 2 years when compared to Control Group 3. In conclusion, the exercise intervention package conducted within the parameters of the secondary school curriculum, improved the cardio-respiratory endurance, triceps thickness and muscular strength of the lower secondary school boys.

Influence of Stages of Change in Exercise Behaviour on Health Outcomes among CORFIS Intervention Patients

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Community-based Multiple Risk Factors Intervention Strategy (CORFIS) to prevent cardiovascular and chronic kidney diseases is a multicentre 6-month trial involving primary care patients with hypertension, diabetes and hyperlipidemia, aged 18 and above. The objective of this study was to evaluate exercise behaviour change in CORFIS patients (N=138) on standard therapy but receiving intensive lifestyle behaviour modification counseling. Stages of Change and lifestyle behaviour were measured at baseline and after 6 months using IPAQ, pedometer and diet records. Patients were counseled monthly on diet and lifestyle changes by dietitians.

Stage of Change in exercise among subjects at baseline was Pre-contemplation (8.3%), Contemplation (22.7%), Preparation (27.3%), Action (10.6%), and Maintenance (31.1%). Overall, 36% of patients progressed from preaction stages (Pre-contemplation, Contemplation, Preparation) to post-preparation stages (Action, Maintenance), 22.1% remained in the pre-action stages, 36% remained in the post-preparation stages and 5.9% regressed after 6 months. Those who stayed at pre-action stages showed little weight loss (-0.7%, $p<0.5$) and decreased HDL levels (-3.4%, $p<0.5$) despite a decrease in calorie intake (-23.9%, $p<0.01$), increased median MET-scores (23.1%, $p<0.01$) with marginal changes in pedometer steps (-3.0%, $p>0.5$). Those who progressed also decreased their calorie intake (-7.3%, $p<0.5$), increased MET-scores (11.5%, $p>0.5$) and pedometer steps (8.3%, $p<0.5$), lost weight (-2.3%, $p<0.001$) and improved on HDL-C levels (1.6%, $p>0.5$). Those who stayed at post-preparation stage also ate lesser (-0.1%, $p<0.05$), increased MET-score (28.6%, $p>0.5$) and steps (7.2%, $p<0.5$), with weight loss (-3.3%, $p<0.001$) and improved on HDL-C levels (8.8%, $p<0.05$). Although under-represented, those who regressed also lost weight (-0.7%, $p>0.5$) and HDL-C levels (-1.7%, $p>0.5$) despite eating less (-5.4%, $p<0.5$), but decreased MET-scores (-70.9%, $p<0.5$) and pedometer steps (-8.8%, $p<0.5$). Findings obtained showed that CORFIS patients in post-preparation stages had greater weight loss and higher HDL-C levels compared to those in pre-action stages after the intervention.

Dietary Fibre Intake for Malaysians: Have We Set Our Goal too High?

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Early studies with Caucasian adults had indicated that a daily intake of 20g non-starch polysaccharides- NSP (equivalent to about 25g total dietary fibre) was associated with a healthy faecal output of at least 100g/day, which protected against risk of constipation. Based largely on this early work, the World Health Organization (WHO) had recommended a daily intake of 25g total dietary fibre (TDF) which it reckons could be provided by 400g of vegetables and fruits, 30g of which should come from pulses, nuts, and seeds. Meanwhile, the Institute of Medicine (IOM) and the American Dietetic Association (ADA) had recommended daily dietary fibre intakes of 25-

38g and 20-35g for adults, respectively. Based on these recommendations from international authoritative bodies, and faced with a lack of local data, the Technical Working Group on Nutritional Guidelines, Malaysia had set a recommended nutrient intake (RNI) of 20-30g/day TDF for the healthy general Malaysian population. The secondary data analysed in the present paper consisted of food intake records collected from healthy Malaysian adults during three different events, using 24-hr dietary recalls. Food intake analysed with the nutrient intake calculator- DietPLUS developed at IMU, showed that the majority ([~]75%) of the individuals involved did not meet RNI for TDF with mean \pm SD values of 16.1 \pm 6.08g (n=25), 10.7 \pm 0.10g (n=50), and 15.7 \pm 6.00g (n=103). This overall low mean intake of TDF in the present data sets could mean one of two things, namely (i) \geq 75% of the individuals consumed less than 20g TDF/day and were therefore at moderate to high risk of constipation, or (ii) the RNI for TDF set at 20-30g/day for the general Malaysian population is too high. Assuming that local vegetables and fruits contain on the average about 3g TDF/100g, 3 servings of vegetables (equivalent to about 5.4g TDF) and 2 servings of fruits (equivalent to about 6.0g TDF) would provide a total of only 11.4g TDF. With a reasonable allowance of 4.0g TDF from other dietary sources, mean total TDF intake per day by the average healthy Malaysian is not likely to exceed 16.0g. It is the opinion of the author that the minimum of 20g TDF currently recommended for the general healthy Malaysian population represents what would be 'nice' or 'ideal' but is certainly far from realistic.

Physical Activity among Overweight, Obese and Normal Weight Schoolchildren Aged 8 to 10 Years

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Studies on the relationship between physical activity and health are usually limited by the ability to accurately measure physical activity. This study aimed to explore the intensity and duration of physical activity of overweight/obese and normal weight children using objective measurements. Subjects comprised 78 schoolchildren aged between 8 and 10 years; divided into overweight/obese (O/O) (BMI-for-age e " 1SD) and normal weight ($-1SD < \text{BMI-for-age} \leq \text{median}$) groups based on WHO (2007) growth reference. Physical activity was measured using Actical accelerometer. Physical activity pattern was also assessed using a set of physical activity questionnaire. Body weight, height, waist circumference and body composition were measured, and body mass index (BMI) was calculated. Mean age for O/O and normal weight groups were 9.3 \pm 0.9 years and 9.2 \pm 0.8 years, respectively. The O/O group had a significantly higher BMI (24.7 \pm 4.2 kg/m²) as compared to 15.1 \pm 0.9 kg/m² in normal weight group ($p < 0.001$). Percent fat mass and fat free mass were also significantly higher in the O/O group ($p < 0.01$). Overall, subjects spent 62.1 \pm 5.6% of their time daily in sedentary activity. Only 23.1% subjects managed to achieve the recommended 60 minutes of moderate to vigorous activities in a day. Children in normal weight group spent twice as much time (0.6 \pm 0.6 minutes) on vigorous activities (4843 \pm 4950 counts per day) as compared to the O/O group who only spent 0.3 \pm 0.5 minutes in vigorous activities (2306 \pm 3961 counts) per day ($p < 0.01$). However, each bout of activity was not sustained for more than 10 minutes. Only 5.4% O/O and 4.9% normal weight subjects, respectively, managed to perform at least one 10-minute bout per day. None of the children had any moderate to vigorous intensity activity bouts that were sustained for more than 20 minutes. Vigorous-intensity activity counts were negatively correlated to both BMI ($r = -0.375$, $p < 0.01$) and percent fat ($r = -0.36$, $p < 0.01$). We conclude that the schoolchildren who participated in this study were not active. Sedentary activities occupied the major proportion of their daily life whereas vigorous activity only occupied less than 1% of their time daily. Although only vigorous activities showed a significant negative

relationship with fatness, the recommendation for moderate activities should also be emphasised for it is more easily achievable and plays a role in fat burning. Initiatives should be stepped up to increase involvement in moderate and vigorous intensity activities among O/O children.

Effect of a Low Glycemic Index Dietary Advice on Dietary Quality in Patients with Type 2 Diabetes Mellitus

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The practicality of a low glycemic index (GI) diet is controversial. Theoretically, low-GI diets may limit food choice and increase dietary fat intake, but there is little evidence to support such a theory. The objective of this randomised controlled study was to determine the effect of low-GI dietary advice on dietary quality in patients with type 2 diabetes (T2DM). A total of 104 T2DM patients were randomised into two groups of either low GI (GI) or conventional carbohydrate exchange (CCE) dietary advice for a 12-week period. Nutritional prescriptions were based on the Medical Nutrition Therapy for T2DM with the difference being in the component of the carbohydrates. Dietary intakes were assessed with the use of a 3-day food record. At week 12, both groups achieved the recommendations for carbohydrate ($52 \pm 4\%$ and $54 \pm 4\%$ of energy) and fat ($30 \pm 4\%$ and $28 \pm 5\%$ of energy) respectively with no differences detected between the groups. The total amount of carbohydrate per day also did not differ significantly (g/day; GI=196.8; CCE=193.2). With the low GI diet, crude fibre and dietary calcium increased while the dietary GI reduced significantly. Subjects in the lowest dietary GI/GL quartile consumed more parboiled/basmati rice, pasta, milk/dairy products, fruits and dough which are foods from the low GI category. These results demonstrate the ability of a low GI dietary advice in improving the dietary quality of patients with T2DM.

Poster Presentations

Group A: Nutritional Status (various groups) & Community Interventions

A01 Comparison of Physical Activity Level Assessed by WHO Stepwise Physical Activity Questionnaire, 3-day Physical Activity Record & Accelerometer

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Physical activity is as important as food intake in maintaining good health. The objective of this study was to compare the physical activity level (PAL) assessed by WHO Stepwise Physical Activity Questionnaire (WHO SPAQ), 3-Day Physical Activity Record (3DPAR), and Lifecorder Accelerometer among employees recruited from the Faculty of Medicine and Health Sciences, UPM. Over 5 consecutive days, 47 employees (15 men, 32 women) wore an accelerometer to monitor physical activity and completed a 3-day physical activity record and the WHO SPAQ as well as the 3-day dietary record to assess both their physical activity and energy intake. The mean age of respondents was 33.32 ± 11.82 years. The WHO SPAQ classified the respondents by categories of PAL based on IPAQ Scoring Protocol. Among the respondents, 44.68% were categorised as vigorously active, 38.30% as moderate, and 17.02% as sedentary. Meanwhile, the 3DPAR results showed a different distribution of the respondents according to the PAL categories whereby the majority (53.19%) of respondents were categorised as moderate, 34.04% as vigorously active, and 12.80% as sedentary. Classification of PAL measured by accelerometer showed that more than half of the respondents (65.96%) were categorised as moderately active (5000 to 9999 steps per day), 17.02% were sedentary (<5000 steps per day), and 17.02% were vigorously active ($\geq 10,000$ steps per day). The mean steps were 7529 ± 2562 steps per day. There was no significant association between the two questionnaire-derived instruments ($\chi^2=4.206$, $p=0.379$) but it overestimates the energy expenditure of subjects compared to the accelerometer measurement. The MET score of WHO SPAQ was not significantly correlated with the PAL as assessed by 3DPAR ($r=0.087$, $p=0.561$). There was also no significant association between PAL that was assessed by WHO SPAQ and PAL that was assessed by accelerometer ($\chi^2=3.467$, $p=0.483$). The 3DPAR is not significantly associated with the accelerometer in terms of PAL ($\chi^2=5.842$, $p=0.211$). The energy intake of respondents was not significantly associated with their energy expenditure ($r=0.114$, $p=0.444$). All the three instruments were comparable and can be used to rank individuals according to physical activity level. These findings require further investigation with a larger population to confirm comparisons among instruments studied.

A02 Overweight & Obesity Problems among Hearing Impaired Adolescents in a Special School

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A cross-sectional study was conducted to determine anthropometry status of hearing-impaired adolescents in a special school. Data collection involved use of a questionnaire on demographic data and anthropometric measurements only. A total of 114 boys and 94 girls from the Special Education Secondary School Shah Alam were recruited comprising mainly Malays (83.7%), Chinese (10.1%), Indians (5.3%) and others (1.0%). A quarter of the subjects (25.5%) were from families with incomes below RM 1000 per month. Only 37.0% used hearing-aid and 73.6% of the subjects used sign language to communicate with each other. Almost a third (31.7%) of the subjects was diagnosed with hearing impairment before 7 years and 26% of the subjects had family and relatives with a hearing impairment history. Mean body weight, height, Body Mass Index (BMI), triceps and waist circumference of the subjects were 51.65 ± 12.22 kg, 156.9 ± 12.58 cm, 20.68 ± 4.1 kg/m², 13.86 ± 6.3 and 69.12 ± 10.4 cm. Body composition was measured using TANITA Body Composition Analysers. Mean percent body fat was 22.09 ± 9.8 % and mean fat mass 11.91 ± 7.4 kg while mean free fat mass and total body water were 39.74 ± 8.45 kg and 29.0 ± 6.2 kg respectively. Based on WHO BMI-for-age chart, 46.2% of the subjects had normal BMI, and about 13.0% were overweight and 0.5% obese. In conclusion, the majority of the adolescents had normal weight for their age. However, the numbers of overweight and obese children are consistent with the national figures for normal children.

A03 Energy Balance of Young Malaysian Armed Forces (MAF) Officers during 14 days of Military Training

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This study was carried out to investigate the effects of military training on energy intake, energy expenditure and energy balance in MAF. Forty young Malaysian Armed Forces (MAF) officers participated in a challenging 14-days field exercise training. Training was conducted in Kampung Sedili Kecil, Kota Tinggi, Johor and Kem Pusat Latihan Tempur Tentera Darat (PULADA), Johor for 7 days each. Each officer was subjected to a 14-day comprehensive protocol involving anthropometric, food intake, activity pattern and energy expenditure measurement. Comparison of energy intake was made between Sukatan Rangsum Biasa Angkatan Tentera (SRBAT) and Rangsum Tempur Biasa Kantung (RTBK). Subjects were divided into two groups- A and B. Group A (n=20, 28.28 ± 4.96 y; 64.52 ± 10.11 kg; 1.67 ± 0.06 m; 23.02 ± 2.97 kg.m²; 15.50 ± 3.78 % body fat) consumed SRBAT while group B (n=20, 28.45 ± 4.90 y; 62.64 ± 6.65 kg; 1.67 ± 0.04 m; 22.42 ± 2.21 kg.m²; 14.58 ± 3.01 % body fat) was given RTBK. There were no significant changes ($p > 0.05$) in body weight and lean body mass for both groups but there was a significant reduction ($p < 0.05$) in fat mass for groups A and B. Mean changes for fat mass were 21.54% and 24.81% respectively. The mean energy intake for group A in Sedili and Pulada was 4042 ± 392 kcal and 3620 ± 247 kcal respectively and for group B, the figures were 3193 ± 69 kcal and 3436 ± 197 kcal in Sedili and Pulada respectively. The mean energy intake was well above recommended allowance of 2830-2940 kcal for RNI Malaysia (2005), 2700 for SRBAT (group A) and 3200 kcal for RTBK (group B).

Total energy expenditure was 5404 ± 695 kcal with a negative balance of -1362 kcal and 4774 ± 717 kcal with a negative balance of -854 kcal for group A in Sedili and Pulada respectively. Mean total energy expenditure for group B was 5449 ± 711 kcal with a negative balance of -2256 kcal and 4812 ± 752 kcal with a negative balance of -1376 kcal in Sedili and Pulada respectively. The results showed a higher reduction in percentage of total body fat in Pulada compared to Sedili for both groups although there was less negative energy balance in both locations for both groups. This suggests that the subjects were in a stressed condition.

A04 Barriers to Physical Activity Perceived by Adolescents in Kuala Lumpur

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A decline in physical activity participation has been reported in adolescents. However, minimal research has examined perceived physical activity barriers among adolescents. The objective of this study was to determine perceived physical activity barriers (PAB) among adolescents and its association with gender, Body Mass Index (BMI) and physical activity level. A total of 384 adolescents (aged 12-16 years, 154 boys and 230 girls) with 59.6% being Malays, 26.9% Chinese and 13.5% Indians completed a 29-item physical activity barriers questionnaire, drawn up on a 5-point Likert scale with five PAB categories: (i) intrapersonal (i.e. I do not like others to look at my body when doing physical activity); (ii) interpersonal (i.e. no one accompanies me to do exercise); (iii) institution (i.e. too much of homework to do); (iv) community (i.e. lack of sports equipment and facilities in neighbourhood); and physical environment (i.e. weather is too hot or raining and safety concerns). Physical activity was assessed by a 3-day physical activity recall (3DPAR). Anthropometric measurements on height, weight, waist circumference, and BMI were taken. Gender and physical activity level differences in PAB were assessed using Mann-Whitney test whereas BMI differences to PAB were assessed using Kruskal-Wallis test. The Spearman Correlation test was used to assess the relation between variables. Findings obtained from 3DPAR showed mean total metabolic equivalents (METs) of 58.42 ± 12.50 and 63.5% active subjects. Higher mean total METs was found in boys (64.46 ± 14.79) compared to girls (54.31 ± 8.61) with 76.9% of boys being active whereas 54.4% of girls were active. Mean BMI for the samples was 20.60 ± 5.0 with 6.0% underweight, 68.0% normal weight and 26.0% overweight subjects. The Likert scale scores showed that physical environment PAB (2.96 ± 0.93) was the main PAB followed by community PAB (2.71 ± 0.82), intrapersonal PAB (2.56 ± 0.55), institution PAB (2.51 ± 0.65), and interpersonal PAB (2.44 ± 0.63). There was a significant difference in PAB between boys and girls ($p < 0.001$), with girls (2.77 ± 0.46) having a higher mean score for total barriers compared to boys (2.44 ± 0.50). Perceived intrapersonal PAB were significantly different for BMI ($p < 0.05$), in particular, overweight or obese adolescents (2.64 ± 0.98) had higher mean score for "being too fat to do physical activity" compared to normal weight adolescents, and it was positively correlated ($r = 0.123$, $p < 0.05$), an indication that as BMI increases, perceived barriers also increases. Comparison of barriers among active and inactive group showed significant difference ($p < 0.001$) with mean perceived barriers of 2.54 ± 0.52 and 2.81 ± 0.44 in the respective groups. Perceived barriers were negatively correlated ($r = -0.274$, $p < 0.001$) with physical activity level. In conclusion, physical environment PAB and community PAB were the main PAB perceived by adolescents in Kuala Lumpur. Since types of PAB were dependent on gender, BMI and physical activity level, there is a need for future studies to identify the predominant determinants in different types of PAB for effective intervention strategy planning.

A05 Relationship Between Obesity and Other Factors in a Sample of Employees in a Public University: Structural Equation Modeling Approach

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Increasing sedentariness at the workplace has been implicated in the development of overweight and obesity among working adults. This study aims to investigate the factors associated with obesity among a sample of employees in a university in Selangor. Height, weight, and waist circumference were measured using established methods to compute Body Mass Index (BMI) and waist circumference. A pre-tested self-administered questionnaire was used to obtain information on socio-demographic factors, work related factors, physical activity psycho-social factors, and weight control behaviours. A structural equation modeling (SEM) analysis was applied to test the structural relationships of the model using the Analysis of Moment Structures (AMOS™) 16.0 software. Data were obtained from 367 adults of whom 39.2% were males and 60.8% females with mean age of 32.22 ± 9.76 years. Overweight was seen in 31.9% of males and 26.5% of females while 16.1% were obese. Central obesity was noted in about 37% of males and 39% of females. Our hypothesis was that all factors under study were independently related to obesity. Factors were fitted into one model. The results of SEM showed a good fit for the final model. Among the factors, only socio-demographic factor (age, monthly household income, and family size) was significantly related to obesity (BMI and waist circumference) ($b=0.469$, $p<0.001$). However, work related factor (sitting time, duration of computer usage, working days and working hours) ($b=-0.019$, $p=0.159$), weight control practices (diet control practices and physical activity practices) ($b=0.018$, $p=0.979$) and physical activity psycho-social factors (exercise self-efficacy, perceived barriers to exercise, and perceived physical activity environment) ($b=0.363$, $p=0.196$) were not significantly related to obesity. These findings suggest that higher age, higher income and larger family size significantly contribute to higher BMI and waist circumference. Physical activity related psycho-social factors provide possible evidence of a significant relationship with obesity. These factors should be taken into account when planning weight management programmes for employees in an academic setting.

A06 Development of Waist Circumference Percentiles for Malaysian Primary Schoolchildren

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Central body fat is a better predictor than overall body fat for cardiovascular risk factors in both adults and children. Waist circumference (WC) is a sensitive marker for abdominal obesity in the pediatric age group. The aim of this study was to develop age- and sex-specific WC percentile curves for Malaysian primary schoolchildren. The data from a representative sample of 9569 Malaysian children (4826 boys, 4743 girls) aged 6 to 12 years who participated in a study of nutritional status and dietary habits of primary school children currently being conducted nationwide was included in this study. WC was measured midway between the 10th rib and the iliac crest using a flexible non-elastic tape. Sex-specific descriptive statistics for each whole-year age group

were calculated. Age- and sex-specific WC percentile curves were constructed and smoothed using the LMS method. The results showed that mean body weight, WC, percentage of body fat and body mass index of boys (31.7 ± 11.6 kg, 60.9 ± 11.4 cm, $19.3\pm 8.2\%$ and 17.5 ± 4.3 kg/m²) were higher than for girls (31.0 ± 11.2 kg, 58.3 ± 9.6 cm, $17.1\pm 8.3\%$ and 17.0 ± 3.9 kg/m²), while the opposite was true for height (girls 133.5 ± 11.7 cm; boys 133.0 ± 10.7 cm). Mean WC was found to increase with age in both boys and girls although boys had significantly higher values of WC than girls at each age ($p<0.05$) except for 12 years. BMI and WC showed a significant correlation for both boys ($r=0.903$, $p<0.05$) and girls ($r=0.884$, $p<0.05$). Comparison of the 50th and 90th percentile values with those from different countries was also made. These curves represent the first WC percentiles reported for Malaysian primary schoolchildren. They could be added to the existing international reference values for WC of children, although they should be validated against equivalent longitudinal data.

A07 Haemoglobin and Serum Ferritin Levels in Newborn Babies of Anaemic Iranian Women: a Cross-sectional Study in an Iranian Hospital

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The purpose of this study was to assess the hemoglobin and serum ferritin levels in newborn babies of anaemic mothers and to determine the relationship between maternal biochemical parameters with neonatal biochemical and anthropometric characteristics. A total of 70 pregnant women aged between 17 and 40 years were divided into two groups based on their pre-delivery haemoglobin (Hb) and serum ferritin (SF) concentrations; anaemic mothers Hb < 11 g/dl and SF ≥ 10 ng/ml; normal control group Hb ≥ 11 g/dl and SF ≥ 10 ng/ml. Maternal biochemical assessments were obtained before delivery, and neonatal anthropometrical and biochemical measurements were obtained immediately after delivery. Mean maternal haemoglobin and serum ferritin levels were 11.2 ± 1.16 (g/dl) and 45.8 ± 35.9 (ng/ml), respectively. Incidence of anaemia among Iranian pregnant women in this study was 51.4%. Mean neonatal weight, length head circumference born to anaemic mothers was 2.87 kg, 47.9 cm and 31.5cm, respectively, while, among neonates born to normal mothers, the figures were 3.38 kg, 49.6 cm and 33.7cm, respectively. Maternal Hb level had significant ($p<0.001$) positive correlation with neonatal parameters such as birth weight ($r=0.729$), length ($r=0.665$) and head circumference ($r=0.762$). However similar positive correlations were not found between maternal serum ferritin concentration and pregnancy outcome. There was a positive correlation between neonatal and maternal haemoglobin levels ($r=0.423$, $p<0.001$). No significant differences were found between neonatal and maternal serum ferritin concentration. Significant differences were found between neonatal haemoglobin levels from normal and anaemic mothers ($p<0.001$). In conclusion, this study showed that maternal hemoglobin concentration had a strong influence on neonatal parameters.

A08 Association between Nutritional Status and Behavioural Problems among Lower Primary Schoolchildren in Bachok, Kelantan

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Malnutrition continues to be one of the major problems among children especially those living in rural areas. Malnutrition is also known to affect brain development and consequently cognitive performance. The main objective of this study was to determine nutritional status and its association with behavioural problems among primary school children. A cross-sectional study was conducted in two randomly selected rural primary schools in Bachok, Kelantan. This study involved 68 children aged between 6-10 years old comprising 37 boys (54.4%) and 31 girls (45.6%). Relevant anthropometric data was obtained and nutritional status was classified based on the WHO 2007 reference. Percent of body fat was measured using InnerScan[®] Body Composition Monitor BC545 (Tanita, Japan). Behavioural problems were assessed using a Malay Language translated and validated Strength and Difficulties Questionnaire (SDQ). The 25 items on psychological attributes were divided into 5 scales: (i) emotional symptoms, (ii) conduct problems, (iii) hyperactivity, (iv) peer relationship problems, and (v) pro-social behaviour. Results showed that 11.8 % (n=8) of the children were stunted (HAZ <-2 SD), 11.8 % (n=8) wasted (WAZ <-2 SD), and 8.8 % and 4.4 % underweight (BMI <-2 SD) and overweight (BMI >2SD), respectively. A strong correlation was found between BMI and body fat ($r=0.9$, $p<0.01$). Behaviour-wise, there was a significant correlation between z-score for wasted with emotional symptoms ($r=0.4$, $p<0.01$) and total score of the SDQ ($r=0.3$, $p<0.05$). A significant correlation was also observed between z-score for stunted with total score of the SDQ ($r=0.3$, $p<0.05$). In conclusion, malnutrition in children is a public health concern and it is important to overcome this problem as it affects the behaviour of the children.

A09 Usage of Nutrition Information on Food Labels among Women in Sandakan, Sabah

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A cross-sectional study ($n = 394$, age: $31 \pm 7.9y$) was conducted to examine the extent of usage of Nutrition Information Panel (NIP) among women in Sandakan, Sabah. Respondents who answered the questionnaires were mostly Malays or Sabahan Bumiputras (59%), educated to at least secondary level (69%), employed (50%), married (70%), and spent <RM500/month on household food purchases (52%). Most respondents (33%) had a household income <RM1000/month. The poverty line for Sabah is RM888 per five-member household. Respondents were categorised into frequent (49%) and non-users and infrequent NIP (51%) users. Frequent users were respondents who referred to the NIP in at least two out of three situations: (i) when purchasing routine food products, (ii) purchasing new products for the first time, and (iii) before their consumption. There was a good 35% who did not read the NIP in all these three situations. The differences in level of knowledge of NIP and attitude towards it between frequent and infrequent NIP users were compared using Mann-Whitney test. The score for frequent users was significantly better than non-users and infrequent users ($p=0.008$). Attitude towards NIP regarding its usefulness, truthfulness and accuracy was assessed using a 5-item Likert scale (minimum=13. maximum=65). Frequent users had a more positive attitude (50.1 ± 5.7) than the other group (46.7 ± 6.2) (unpaired t -

test, $p < 0.001$). Further elucidation of knowledge and attitude by socio-economic variables was analysed using Kruskal-Wallis test and ANOVA respectively. Respondents with at least a diploma had a significantly better level of knowledge of NIP than those with a primary level education ($p < 0.001$). Students, full-time employees and pensioners had better knowledge of NIP than housewives who had the lowest score ($p > 0.001$). As expected, knowledge of NIP was shown to be correlated to attitude towards NIP ($r_s = 0.137$, $p = 0.007$). There is cause for concern about the usage of NIP among housewives and individuals with low levels of formal education.

A10 Understanding of Key Messages in the Newly Proposed Malaysian Dietary Guidelines among Men in Kuala Lumpur

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The Malaysian Dietary Guidelines (MDG) (1999) was published almost ten years ago. The objective of this study was to determine the understanding of five out of thirteen key messages of the newly proposed MDG among 390 men aged 18-59 years in Kuala Lumpur. The five key messages tested were (i) eat a variety of foods within your recommended intake, (ii) maintain body weight in a healthy range, (iii) be physically active everyday, (iv) eat plenty of fruits and vegetables everyday, and (v) limit intake of foods high in fats and cholesterol as well as minimise fats and oils in food preparation. The questionnaire used to test the understanding consisted of 23 questions. Respondents were asked to explain the meanings of the key words and key recommendation statements based on their understanding. Only 30% respondents were aware of the existence of MDG 1999. More than 50% of the respondents did not understand the key words such as serving size, sedentary habits, unsaturated fats, blended vegetable oil and the key recommendation statement 'like limit the intake of saturated fats to less than 10% of total daily calorie intake'. The respondents of this survey comprised 175 Malays, 173 Chinese and 42 Indians. Overall, the understanding of Malay, Chinese and Indian men towards the five key messages of MDG was at intermediate level. The median scores were 69.7%, 69.7% and 67.4% respectively among the three races and were not significantly different ($p = 0.0697$). There was also no significant association between the understanding of five key messages among men in the younger or older aged group ($p = 0.971$). However, education level ($p = 0.021$) and economic status ($p = 0.000$) were significantly associated with understanding of the five key messages. Based on the findings, it is suggested that the proposed key messages be simplified and more user friendly to ensure that the Malaysian population will have a better understanding of the newly proposed MDG.

A11 Nutritional Status and Body Fat Composition of Malay Subjects in Kg Tawang, Bachok

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The combination of low physical activity and high caloric food intake is linked to obesity and many chronic health problems such as cardiovascular disease. Overweight and obesity among adults is not only a problem in urban but also in rural areas of Malaysia. The objective of this study was to determine nutritional status and body fat composition of Malay subjects in a rural village

in Bachok, Kelantan. This was a cross-sectional study involving 61 adults aged between 19 to 64 years. Socio-economic and demography data were collected using a standard questionnaire. Anthropometric measurements included height, weight, waist circumference and hip circumference. Body fat composition was measured using InnerScan[®] Body Composition Monitor BC545 (Tanita, Japan). Body Mass Index (BMI) and waist-hip-ratio (WHR) were calculated using standard formula. A total of 50.8% of the subjects had normal weight, 32.8% were overweight, 8.2% obese and 8.2% were underweight. Overall, 41% of subjects had a weight problem. Gender-wise, the WHR result showed that 52% of males and 45% of female subjects had abdominal obesity. There was a significant association between BMI and waist circumference ($r=0.8$, $p< 0.01$), hip circumference ($r= 0.9$, $p< 0.01$), visceral fat ($r=0.7$, $p< 0.01$) and body fat ($r=0.8$, $p<0.01$). A significant correlation was also observed between WHR with visceral fat ($r=0.6$, $p<0.01$). This study reveals a serious problem with regard to overweight and abdominal obesity in a rural community. Innovative public health programmes are required to effectively reduce obesity among adults in urban and rural Malaysia.

A12 Association between Weight Status and Iron Status among Adolescents

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Obesity prevalence has increased at an epidemic rate, and obesity has emerged as a major health concern in Malaysia. Some studies have found a possible association between iron deficiency and obesity. This is a case-controlled study that aims to investigate the association between weight status and iron status of adolescents. Subjects comprised 50 obese and 50 normal weight boys and girls, aged 12 to 17 years, from secondary schools in Kuala Lumpur. Data on socio-demography, anthropometry, iron status and dietary intake were collected. Multiple iron status indicators namely, serum ferritin, transferrin saturation, mean corpuscular volume (MCV), total iron binding capacity (TIBC) and hemoglobin were determined. Logistic regression was used to estimate the association between iron status and weight status. Mean age of subjects was 14.0 ± 1.2 years, while mean BMI for obese and normal groups were 31.1 ± 4.7 kg/m² and 18.6 ± 3.0 kg/m², respectively. Using the multiple criteria of iron status indicators, the percentage of iron depletion, iron deficiency and iron deficiency anemia in the obese and normal group adolescents were 13%, 9%, 5% and 11%, 6%, 3%, respectively. Obese subjects demonstrated the highest percentage of iron deficiency. Obese subjects were found to have significantly higher TIBC than normal weight subjects ($p<0.05$). Results from the logistic regression analysis showed that an obese subject is 1.3 times more prone to iron depletion; 1 unit increase in BMI would lead to an increase of 0.6% suffering from iron deficiency, and 1 kg increase in weight would lead to an increase of 3.6% suffering from iron deficiency anemia. Dietary iron intake of the subjects was unsatisfactory, with approximately 61% subjects failing to meet the Malaysian Recommended Nutrient Intake (RNI) level. Approximately 42% of obese subjects and 46% of normal subjects had dietary iron intake below two-thirds of the RNI level. In conclusion, obese adolescents demonstrated a higher percentage of iron depletion and iron deficiency compared to their normal weight counterparts. Given the increasing numbers of overweight and obese adolescents and the known morbidities of iron deficiency, these findings suggest that guidelines for screening for iron deficiency may need to be modified to include adolescents with elevated BMI.

A13 Validation of Skinfold Thickness Method against Air Displacement Plethysmography for Estimation of Body Fat in Children

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Skinfold thickness is a simple means of estimating body composition which is widely used in children, but with little information on its validity. The objective of this study is to validate six existing skinfold equations (SKF) against air displacement plethysmography (ADP) for estimation of body fat in children aged 9-12 years. The skinfold equations tested were Brook (1971), Johnston *et al.* (1988), Slaughter *et al.* (1988) (triceps and subscapular), Slaughter *et al.* (1988) (triceps and calf), Deurenberg *et al.* (1990) and Lohman *et al.* (2000) equations. Subjects comprised 62 boys and 64 girls who volunteered for the study. All measurements were carried out in a single morning session at the National Sports Institute of Malaysia, Bukit Jalil. Mean body weight, height, BMI and percentage of body fat measured by ADP for boys were 43.4 ± 14.3 kg, 144.3 ± 8.7 cm, 20.4 ± 5.2 kg/m² and $30.9 \pm 11.7\%$, respectively; while for girls the figures were 43.9 ± 15.8 kg, 144.3 ± 9.8 cm, 20.6 ± 5.6 kg/m² and $29.4 \pm 11.4\%$, respectively. Among boys, all the skinfold equations used to estimate percentage body fat were significantly correlated with ADP ($p < 0.05$) with r values ranging from 0.893 to 0.935. However, Bland-Altman analyses revealed that all six skinfold equations significantly underestimated percentage of body fat ($p < 0.01$) for boys with the smallest bias achieved by Lohman *et al.* (2000) equation (-5.6%) and greatest bias showed by Deurenberg *et al.* (1990) equation (-18.2%). Among girls, all equations were significantly correlated with ADP ($p < 0.01$) with r values ranging from 0.821 to 0.866. Body fatness was significantly underestimated ($p < 0.01$) by all equations in girls except for Lohman *et al.* (2000) equation (-1.2%, $p = 0.15$). Bland-Altman limits of agreement (defined as ± 2 SD) between all six equations and ADP were wide in either boys or girls, indicating poor agreement between predictions. In conclusion, the present study suggests that for groups, Lohman *et al.* (2000) equation provided the most accurate estimates of percentage body fat in both boys and girls. However, there appears to be no skinfold equation that could estimate children's body fat accurately at the individual level.

A14 Determination of Physical Activity Barriers among Primary Schoolchildren in Kuala Lumpur

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The objective of this study was to determine physical activity barriers among primary schoolchildren at Kuala Lumpur. 392 children aged 10 to 12 years completed a questionnaire and had their height and weight measurements taken. Mean age and BMI of the primary schoolchildren were 11.26 years and 18.28 kg/m² respectively. The questionnaire had 29 items on physical activity barriers categorised to 5 domains according to the ecological approach: (i) intrapersonal, (ii) interpersonal, (iii) community, (iv) institution, and (v) physical environment. Most of the respondents were of normal weight (62.2%), followed by overweight (28.8%) and underweight (8.9%). More than half the respondents (59.2%) fell in the active group while 45.7% were non active. The results showed that the main physical activity barriers among primary school children were weather (56.9%), preference for watching television or playing electronic games (36.5%) and spending time to do schoolwork (36.2%). The preference for watching television or playing

electronic games was higher in boys (39.1%) compared to girls (35.1%). More girls (57.5%) perceived weather as their main physical activity barrier compared to boys (56.5%). The majority (59.7%) of the Chinese children perceived weather as a physical activity barrier, in comparison to 58.4% of Malays and 49.3% of Indians. The main physical activity barrier among overweight children was the lack of field and sports facilities in their school (80.5%) followed by a dislike for physical activities (79.6%). On the other hand, the main physical activity barrier among normal weight children were feeling uncomfortable when active and the perception of being too fat for physical activity (80.7%). By ethnicity and gender, there were significant differences in intrapersonal ($p < 0.001$) and interpersonal ($p < 0.004$) physical activity barriers. There was a significant difference in community ($p < 0.013$) and physical environment physical activity barriers ($p < 0.001$) between active and non-active children. In conclusion, the main physical activity barriers among primary schoolchildren were intrapersonal such as preference for watching television or playing video or computer and the physical environment such as weather.

A15 Body Fat Distribution & Cardiovascular Risk Factors in Iranian Adolescent Girls

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Obesity is associated with increased risk of cardiovascular disease. In adults, fat distribution has been shown to be related to lipid profile and blood pressure. However these relationships have not been extensively studied in young subjects. Thus this cross-sectional study aimed to evaluate the association between adiposity and fat distribution on established cardiovascular risk factors in adolescent girls. A total of 477 adolescent girls aged 15 to 18 years were recruited from Mashhad high schools. Socio-demographic characteristics were assessed using a self-administered questionnaire. Anthropometric assessments and blood pressure measurements were taken. Blood samples were analysed for glucose, serum lipid profile and C-reactive protein. Bioelectrical Impedance Analyses was applied for measuring total and regional fat mass. Cardiovascular disease risk factors were reassessed onto body fat measures and adjusted for confounders including age and socio-economic status of family. The prevalence of overweight and obesity was 14.6 % and 3.4 % respectively. There were significant correlations between fat mass and fat distribution in body with triglyceride ($r = 0.19, P < 0.001$), systolic and diastolic blood pressure ($r = 0.33, 0.24, P < 0.001$) and CRP concentration ($r = 0.1, P < 0.05$). After adjusting for age and socio-economic status of family, fat mass especially truncal fat were strong predictors for triglyceride and blood pressure elevation. CRP was associated significantly with fat mass and its distribution. BMI and WC were also significant independent correlates of triglyceride, hsCRP, systolic and diastolic blood pressure. Fat mass and body size measures were associated with metabolic factors of coronary disease. With increasing prevalence of obesity, the impact of central adiposity on cardiovascular risk will be important in the planning of medical intervention strategies to lower cardiovascular risk for young people.

A16 Nutritional Profile of Disabled Individuals at Centre for Industrial Training and Disability Rehabilitation, Bangi

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Disability is a condition that is associated with poor food intake, abnormal body composition and lack of physical activity, life satisfaction and nutritional knowledge. This study examined the nutritional status and dietary pattern intake among disabled people in the Centre for Industrial Training and Disability Rehabilitation at Bangi. Forty-six subjects mean age 22.9 ± 4.2 years were recruited consisting of 26 men and 20 women. Anthropometric measurements, dietary intake, and physical activity data were collected. Subjects were also asked to answer a questionnaire regarding food and nutrition as well as life satisfaction and self-confidence level. Of the 46 subjects, 17% and 7% were identified as overweight and obese respectively while 31% were underweight. Almost two-thirds of the subjects (64%) had high bone density. Mean weight recorded was 50.95 ± 13.46 kg; mean height measured from standing position, armspan and knee height were 154.7 ± 14.4 cm, 160 ± 15.9 cm and 150.9 ± 24.5 cm respectively. Armspan ($p < 0.005$) and knee height ($p < 0.005$) correlated with measured height for disabled people. The majority had normal anthropometric measurements with 80% having a normal fat composition. Almost half of the disabled (48%) had a low level of nutrition knowledge while 75% scored normal for self-esteem and 86.4% were satisfied with their life. Dietary intake derived from carbohydrates, protein and fat were 51%, 17% and 32% respectively with the average total daily energy intake (1809.7 ± 335.8 kcal) being higher than average daily energy expenditure derived from physical activity (1655.2 ± 337.2 kcal). In conclusion, this study shows an unbalanced dietary intake among the disabled subjects that does not meet the energy intake recommended in RNI. This indicates that disabled people need to improve on their nutritional intake. As the majority of subjects live a sedentary lifestyle, they also need to engage in increased frequency/ intensity and/or duration of physical activity.

A17 Prevalence of Malnutrition in Cancer Patients in Hospice Home Care

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Malnutrition is prevalent in patients with advanced cancer. It causes deterioration in the quality of life, reduces response to treatment, enhances length of hospital stay and leads to reduced survival. A cross-sectional study was carried out to identify malnutrition in 60 patients with advanced cancer in selected hospices in Malaysia. Patients were between 18 to 89 years old with the mean age being 61 years. Males comprised 45% of the sample while 55% were females. The majority of patients (68.3%) were in stage four of the primary disease. The most common cancers were breast (15%) and rectum (15%). Nutritional status was determined with the Scored Patient-Generated Subjective Global Assessment (PG-SGA) questionnaire. The PG-SGA consists of 7 items, viz: weight, food intake, symptoms, activities and function, disease and its relation to nutritional requirements, metabolic demand and physical examination. Height, weight, mid-upper-arm muscle circumference (MUAMC) and triceps skinfold (TSF) were also assessed. The PG-SGA found 15% (9) of the 60 patients to be well nourished, 62% (37) were moderately or suspected of being malnourished and 23% (14) were severely malnourished. The mean total PG-SGA score was 13.68, which indicated a critical need for nutrition intervention. Based on BMI, 38.9% of respondents

were underweight, 96.6% revealed muscle wasting based on MUAMC while 84.9% had low subcutaneous fat based on TSF. It is urgent that nutritional screening be carried out on patients upon admission into hospice care for implementation of effective nutritional interventions.

A18 Dietary Assessment & Nutritional Status of Low Income Households in Penampang, Sabah

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A cross-sectional study on dietary intake and nutritional status of adults in low income households was conducted in Kampung Pogunon, Penampang, Sabah ($n=30$, $m=14$, $f=16$, age: $40.6\pm 9.4y$). Low income status was determined using socio-economic indicators assessed using a questionnaire. Dietary intake was assessed using interviewer-administered food frequency questionnaire (FFQ) and triple 24-hour recalls (24HR). Body mass index (BMI) was calculated from height and weight measurements. Basal metabolic rate (BMR) was estimated using predictive equations. Under-reporters of energy intake were determined using a cut-off of $<1.2*BMR$ and over-reporters $>2.0*BMR$ for both FFQ and 24HR. There was no association between these two methods (χ^2 , $p>0.05$). Reported energy intakes from FFQ (REIf) of bias-reporters were significantly different from good reporters ($p<0.05$; min=1211kcal/day, max=9593kcal/day). The reported energy intakes from 24HR (REId) of bias-reporters were not significantly different from good reporters ($p>0.05$; min=1735kcal/day, max=1990kcal/day), so data from 24HR of every subject could be included in the analyses. Percentage of subjects categorised as underweight, normal and overweight were 7.1%, 85.7% and 7.1% respectively. Both dietary assessment methods identified protein, niacin and vitamin C intakes as adequate in comparison to the Recommended Nutrient Intake (RNI). Only 6.7% of subjects achieved the RNI for energy, 56.7% met RNI for vitamin C, and 66.7% for iron based on their 24HR. Iron intake was based on 10% bioavailability due to the scarcity of heme-iron sources in their 24HR items. Dispossession of assets, for example, house and washing machine were not predictive of poor nutritional status ($p>0.05$). In conclusion, the triple 24HR were more reliable than the FFQ to assess the dietary intake of low income rural households in Sabah. Iron deficiency anaemia might potentially be prevalent, but this requires further studies which include sampling for haemoglobin and serum ferritin.

A19 Validation of Physical Activity Questionnaire with Actical Accelerometer among Malaysian Adolescents

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Physical activity questionnaires are useful for determining the level of physical activity of population groups, but need to be validated. Thus, the aim of this study was to determine the validity and reliability of a set of physical activity questionnaire (PAQ) for use amongst Malaysian adolescents. A questionnaire was developed based on the questionnaire used in the Western Australian Child and Adolescent Survey 2003, and modified by the National Sports Institute, Malaysia. Subjects for validation study comprised 20 boys and 23 girls aged 13–16 years. Test-retest reliability was assessed by repeated administration of PAQ seven days apart. Criterion

validity was studied in relation to eight days of Actical accelerometer data. From the PAQ results, mean times spent in vigorous activities was lowest at 223 ± 362 min/week and highest for sedentary activities at 8532 ± 3620 min/week. Subjects spent 231 ± 344 min/week in light-intensity activities and 255 ± 420 min/week in moderate-intensity activities. Total time spent in light and vigorous activities were significantly different ($p < 0.001$) between boys and girls. Actical data also showed that subjects spent the most amount of time in sedentary activities at 1051 ± 91 min/day followed by 279 ± 63 min/day in light activities; 104 ± 49 min/day in moderate activities, and only 2 ± 4 min/day in vigorous activities. Mean activity counts recorded by Actical were $186,635 \pm 115,223$ activity counts/week. Spearman correlation was used to test the reliability of PAQ and showed sedentary activity ($r=0.598$, $p < 0.01$), light activity ($r=0.665$, $p < 0.01$), moderate activity ($r=0.644$, $p < 0.01$) and vigorous activity ($r=0.530$, $p < 0.01$) are significantly correlated between PAQ1 and PAQ2. Bland-Altman plot was used to test the validation of PAQ and showed that sedentary, light and moderate activities showed agreement between PAQ2 and Actical. A fair agreement was observed in vigorous activities due to the over-reporting in PAQ. In conclusion, the PAQ is reliable and valid for physical activity assessment among adolescents with the exception of vigorous activities.

A20 Body Composition & Physical Activity Level among Elderly Malays in Cheras

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Body composition and physical activity level have important health related effects on the elderly. Therefore, the objectives of this study were to assess the body composition and physical activity level among elderly Malays in Cheras, and to determine the association between physical activity level and body composition. A total of 135 elderly Malays aged 60 years and above (55 men and 80 women) participated in this study. Body composition included the measurement of fat-free mass (FFM) and fat mass percentage (%) by bioelectrical impedance analysis (BIA). Physical activity was assessed using the short form of International Physical Activity Questionnaire (IPAQ) through face-to-face interview. A high proportion of subjects were classified as overweight (39.3 %) and obese (23.0 %). Moreover, the results showed that Body Mass Index (BMI) was significantly higher in women (27.2 ± 4.5) than in men (25.6 ± 5.0) ($p < 0.05$). BMI decreased with increasing physical activity level but not at a significant level. Approximately 80% of the subjects had body fat % higher than normal range, particularly women ($P < 0.05$). They also had lower FFM than the men (36.6 ± 5.5 ; 48.3 ± 5.9). Married elderly and smokers did show a lower body fat % ($p < 0.05$ for both parameters). Based on the three activity categories established by IPAQ, 39.3 % of elderly Malays were inactive, 45.9 % were moderately active and 14.8 % were physically active. Men were more likely to participate in vigorous-intensity physical activity whereas women participated more in moderate-intensity activities. Older elderly subjects participated less in all types of physical activity than the younger elderly ($p < 0.05$). More than 80% of the subjects did not engage in any type of vigorous-intensity physical activity lasting for at least 10 minutes. There was only a slight difference in body fat % between active and inactive elderly. However, a high percentage of subjects without education were classified as inactive (17.0 %) as compared to those who had received education (2.4 %) ($p < 0.05$). In conclusion, the prevalence of inactivity, overweight and obesity among elderly Malays was relatively high. Efforts are needed to encourage elderly people to be more physically active.

A21 Perceived Barriers to Physical Activity Participation among Malay Women in Kuala Lumpur

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Physical activity has been addressed as a major public health concern that is gaining more interest in recent years. More than 2 million people die in the world each year due to lack of physical activity. Physical activity level among Malaysians particularly women is unsatisfactory. This cross-sectional study was carried out to determine the barriers to physical activity participation among Malay women. A total of 264 Malay women were randomly chosen from several government sectors. Demographic data were collected as well as physical activity habits and perceived barriers to physical activity were assessed. Anthropometric measurements of height, weight, waist circumferences and body fat were taken. Using Likert type scale, participants answered an instrument with 24 items representing barriers to physical activity. The barriers were categorised into three main groups: (i) personal and psychological barriers such as lack of interest and lack of motivation; (ii) physical environmental barriers such as lack of resource or skills; and (iii) weather and social environmental barriers such as lack of support. Mean scores were computed. The higher the score, the greater the tendency for the item to be a perceived barrier. This study found that environmental barriers were more important than intrapersonal barriers. The mean score for environmental barriers was 2.59 ± 0.76 compared to 2.25 ± 0.58 for intrapersonal barriers. Individually, lack of motivation and lack of time were the most cited barriers with scores of 3.10 ± 1.17 and 2.94 ± 1.14 respectively. The sample consisted of 77.3% of young adults and 22.7% of middle-aged adults. The difference in scores between the age groups was not significant. Respondents were categorised into active and inactive based on data obtained from International Physical Activity Questionnaire (IPAQ). More than half the respondents (59%) were classified as active compared to 41% who were inactive. Comparison of scores between these two groups showed that only the domain of personal and psychological barriers was significantly different ($p=0.047$). Comparison based on BMI showed that there was a significant difference between overweight and obese women in personal and psychological barriers ($p=0.043$) and a highly significant difference in physical environmental barriers ($p=0.008$). A highly significant difference was also found between normal weight and obese women in both personal and psychological barriers ($p<0.001$) and physical environmental barriers ($p=0.002$). The study further revealed that BMI was positively correlated to the scores of barriers. BMI had a significant impact on physical environmental ($p=0.033$) and social environmental barriers ($p=0.016$) and a highly significant influence on personal and psychological barriers ($p<0.001$). PAL was negatively correlated to scores in barriers. It was significantly related to the social environmental barriers ($p=0.013$) and highly significantly related to the personal and psychological barriers ($p=0.007$). In conclusion, the top barriers to physical activity participation among Malay women were lack of motivation with the thought that other recreational activities were more entertaining, lack of time, weather, cost of exercising, and thinking that exercise intensity required to improve health is too high. These findings might help in developing a physical activity intervention programme in future.

A22 Body Composition, Nutrient Intake & Energy Expenditure during & after Ramadhan among Female Government Staff

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Previous studies have shown inconsistent results of the effects of fasting in Ramadhan on body weight and composition. Therefore, the purpose of this study was to assess body composition, nutrient intake and energy expenditure during and after Ramadhan among adult females. This study was carried during the month of Ramadhan in September 2008 and a month after that. A total of 49 females government staff were recruited from government offices around UKM's campus in Kuala Lumpur. The mean age of the subjects was 29.8 ± 10.12 (range 22-54) years. Body weight, fat percentage and waist circumference were measured, and body mass index (BMI) was calculated. A 3-day food diary (2 weekdays and 1 weekend) was used to estimate energy, carbohydrate, protein, fat and fluid intake during and after Ramadhan. Average daily energy expenditure was determined from a 3-day activity diary during and after Ramadhan. All measurements during Ramadhan were done in the 2nd and 3rd week of Ramadhan while measurements after Ramadhan were done on the 7th week after Ramadhan. Body weight, waist circumference and BMI was reduced significantly during Ramadhan ($p < 0.05$) but there was no significant difference in fat percentage ($p = 0.810$). The mean energy, protein and fat intake during Ramadhan was not significantly different during Ramadhan: 1606 ± 315 kcal, 63 ± 18 g and 59 ± 16 g respectively, and after Ramadhan, the figures were 1527 ± 310 kcal, 59 ± 15 g and 60 ± 14 g respectively. Mean daily intake of carbohydrate was significantly higher during Ramadhan (207 ± 45 g) compared with after Ramadhan (188 ± 41 g) ($p < 0.05$). Fluid intake reduced significantly during Ramadhan (4.8 ± 1.3 cups), compared with after Ramadhan (5.9 ± 1.1 cups) ($p < 0.001$). Energy expenditure was not significantly different during Ramadhan (2411 ± 640 kcal) and after Ramadhan (2367 ± 656 kcal) ($p = 0.246$). This study indicates that Ramadhan fasting led to a decrease in body weight which may be due to a reduction in fluid intake as energy intake and energy expenditure were not significantly different.

A23 Nutritional Status among Children with Cerebral Palsy

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It has been reported that nutritional status has a stronger effect on the linear growth of children with cerebral palsy. Therefore, this cross-sectional study was carried out to assess the nutritional status among children with cerebral palsy between the ages of 1-9 years from three Community Based Rehabilitation Centres in Kajang, Semenyih and Hulu Klang Selangor. Forty-five subjects were recruited consisting of 25 boys and 20 girls. The sample consisted of 31 Malays (68.9%), 10 Chinese (22.2%) and 4 Indians (8.9%). Data were collected using a set of questionnaires, a 3-day food record and anthropometry measurements (body weight and upper arm length (UAL) as an alternative to height). The average body weight (kg), height (cm) and BMI (kg/m^2) for children aged 1-3 years were 10.0 ± 2.3 : 88.8 ± 5.8 : 12.6 ± 2.3 ; 4-6 years were 13.5 ± 2.8 : 108.3 ± 11.0 : 11.5 ± 1.5 and 7-9 years were 15.8 ± 4.2 : 115.9 ± 9.9 : 11.6 ± 1.8 . Weight-for-age measurement showed that 35 children (77.8%) were underweight and 10 children (22.2%) were normal. Incidence of stunting was seen in 18 children (40%). For most, nutrient intake did not meet the Recommended

Nutrient Intake (RNI). The average daily energy and protein intakes were 1043.0 ± 262.3 kcal and 44.8 ± 10.8 g respectively. The mean percentages of energy and protein intake were 73.9% and 177.9% respectively compared with the RNI. The average daily fibre, fluid, fruit and vegetable intakes were 2.64 ± 1.9 g; 3.7 ± 1.2 cups; 17.0 ± 22.1 g; 19.9 ± 18.0 g. These findings suggest that most of the cerebral palsy children were underweight and their daily nutrient intakes were insufficient except for daily protein intake.

A24 Nutritional Status & Pregnancy Outcomes of Anemic & Non-anemic Pregnant Women

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Anemia among pregnant women has been documented to be associated with low birth weight and poorer health status of the newborns. Anemia due to lack of certain nutrients during pregnancy is still a great concern worldwide. Abnormality during the pregnancy stage will affect not only the health status of the mother but also the infant's birth weight and general development. A comparative study on nutritional status and pregnancy outcomes between anemic and non-anemic pregnant women was done. This study was conducted in the districts of Hulu Selangor, Selangor. A total of 188 pregnant mothers in their third trimesters from five health clinics (KK Kuala Kubu Baru, KK Kalumpang, KK Rasa, KK Hulu Yam, and KK Serendah) were recruited and interviewed. A set of questionnaires was used to collect information on socio-demographic background, history of pregnancy, and health related data. Dietary intake was assessed using a Semi-Quantitative Food Frequency Questionnaire. Pregnancy outcome data and infant nutritional status were collected after each delivery and at one month of age. All data were analyzed by using SPSS version 16.0 and Nutritionist Pro version 2.4.1 was used to analyse subjects' nutrient intake. Among the subjects, 90 were anemic (A) and 98 were non-anemic (NA) after being matched. Independent *t*-test was used to compare differences between the two groups. The mean age for anemic mothers was 29.12 ± 5.14 and that of non-anemic mothers was 29.06 ± 5.19 years old. The majority had secondary level education and ranked at the fourth social class level (Department of Statistics Malaysia, 2000) with the household income ranging between RM1001-2000. The mean weight gain was 8.14 ± 4.74 kg for (A) and 7.93 ± 4.60 kg for (NA) throughout their pregnancies. The mean values for hemoglobin levels for (A) and (NA) subjects were 10.10 ± 0.77 g/dl and 11.87 ± 0.68 g/dl, respectively. The majority of the babies were normally delivered, and 2% of non-anemic mothers delivered stillbirth infants. Only 13% of the babies were delivered by caesarean section and 1% by the vacuum method for anemic subjects, while 22% of non-anemic subjects had their babies delivered by caesarean section. The majority of the infants born to the subjects had normal birth weights (>2.5 kg). The mean birth weight for babies of anemic subjects was 3.16 ± 0.53 kg, while that of non-anemic subjects was 3.07 ± 0.51 kg. About 39.5% for (A) and 44.9% for (NA) gave birth to pre-term babies with a mean of 36 weeks and 32 weeks respectively. After one month of age, both (A) and (NA)'s infants had normal z-scores for weight-for-age and length-for-age. In terms of nutrient intake, there were significant differences between (A) and (NA) on carbohydrate ($p = 0.001$) and calcium ($p = 0.049$) intakes. Other nutrient intake showed no significant difference between the two groups. Thus the overall results indicate that the nutritional status and pregnancy outcomes between both groups were similar. It showed that both anemic and non-anemic women may have adopted good nutritional diets and prenatal care in order to achieve good pregnancy outcomes. Thus, the health authorities (Ministry of Health) have played a significant role in educating the anemic mothers in improving their health status and thus reducing the negative effects of anemia on themselves as well as the newborns.

A25 Nutritional Assessment of Adult Patients Newly Admitted to Hospital Kuala Lumpur

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This study was conducted to determine the prevalence and predictors of malnutrition among adult patients newly admitted to Hospital Kuala Lumpur using Malnutrition Screening Tools (MST), Body Mass Index (BMI) and Subjective Global Assessment (SGA). A cross-sectional study with consecutive selection was carried out among patients newly admitted into HKL from all clinical disciplines excluding pediatric, emergency and maternity. A total of 567 patients {261 males (46%) and 306 females (54%)}, aged 18-80 years comprising Malays (46.9%), Chinese (29.6%), Indians (18.3%) and others (5.1%) admitted from September till December 2008 were recruited. A significant association using Chi square analysis was found between BMI category ($<18.5\text{kg}/\text{m}^2$ and $\geq 18.5\text{kg}/\text{m}^2$) with patients at risk and not at risk of being malnourished by MST ($p<0.05$) as well as for SGA category ($p<0.05$). Using MST, 19.75% (112) of patients were identified as at risk of being malnourished. Of these 112 patients who were identified as at risk of malnutrition using MST, 88 were further assessed by SGA at ward level. Using logistic regression analysis, age (odds ratios [OR]=1.06, 95% confidence interval (CI):1.004-1.120%, $p<0.05$) and BMI lower than $18.5\text{kg}/\text{m}^2$ (OR=3.32, CI :5.907-390.717%, $p<0.05$) showed the most predictive power of malnutrition. Using Mann Whitney U test, no significant difference was found between the mean score of MST among malnourished patients (SGA-B+SGA-C) and well nourished patients (SGA-A) ($p=0.405$). It appears that newly admitted patients who are older and those with BMI lower than 18.5 are at high risk of developing malnutrition. Early screening of the nutritional status of all newly admitted patients is therefore important for appropriate early nutritional intervention.

A26 Comparison between Body Image Perception and Body Mass Index (BMI) among Malay Female Youth in Urban and Rural Areas in Gombak

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Body image plays an important role in managing one's body weight especially among female youth. This research identifies the different body image perceptions, knowledge of body weight management, eating habits and physical activity among female secondary school students in urban and rural areas of Gombak district. A check on body mass index (BMI) was carried out on 200 Malay students at four secondary schools around Gombak. No significant difference in BMI of female students was found between the urban secondary schools ($19.27 \pm 3.83\text{kg}/\text{m}^2$) and rural secondary schools ($18.65 \pm 3.60\text{kg}/\text{m}^2$). Respondents answered questions regarding demography and body silhouette chart. Average age of respondents in urban areas was 14.53 ± 0.520 years with a family income of $\text{RM}4570 \pm 1890$ and the rural areas was 14.56 ± 0.47 years with a family income of $\text{RM}1690 \pm 580$ ($p=0.002$, $p<0.05$). Body image perception was gauged by asking the respondents to identify own body image through five picture diagrams provided (Body Silhouette Chart). Although more of the urban respondents gave inaccurate perceptions compared to rural respondents, there was no significant difference in body image perception as compared to body

mass index among urban and rural respondents { $t(198)=1.18$, $p=0.23$, $p>0.05$ }. But there was a significant difference between urban and rural respondents in body image perception and the desired body image { $t(198)=4.57$, $p<0.05$ }. Overweight was found to occur more often among urban females as compared to rural female youth because the urban youth enjoyed a higher economic status than their rural counterparts. Body image perception among urban and rural youth differs from their mother's perception. The results of this research show that body image should also be given more attention in promoting an active healthy lifestyle especially among youth.

A27 Prevalence and Risk Factors of Obesity among Children Aged between 7 to 12 Years in Kota Kinabalu

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The objective of this research was to determine the prevalence of obesity among the children aged between 7 to 12 years and the risk factors which contribute to the childhood obesity. This study was carried out at the St. Agnes Primary School, located in Likas, Kota Kinabalu; 500 children were chosen as respondents. Of the 500 respondents, 241(48.2%) were male and 259 (51.8%) were female. The number of obese children in this sample can be determined by calculating body mass index (BMI) through anthropometric measurements and by reference to the CDC growth chart, BMI-age for male and female children. The body mass index (BMI) can be calculated using the formula of weight divided by the square of the height. The unit for the BMI can be written as kg/m^2 . The results showed that of the 500 respondents, 69 (13.8%) were obese (BMI more than 95th percentile) and 82 (16.7%) were overweight (BMI between 85th and 95th percentiles). Of the 69 obese respondents, 45 (65.2%) were female and 24 (34.8%) male. The Chi Square analysis revealed the significant risk factors leading to childhood obesity ($p<0.05$) in this primary school. The risk factors were gender, age, television viewing, frequency of playing computer games, snacking habits, fast food consumption, excess intake of daily calorific needs and parents' income. This study also showed that knowledge on nutrition and obesity were high and moderate among 319 (63.8%) respondents. In conclusion, childhood obesity in this sample was not caused by a single risk factor but by a number of risk factors.

A28 Growth Rate, Energy Intake and Feeding Problem among Autism and Down Syndrome Children & Adolescents at the Pusat Pemulihan Dalam Komuniti (PDK)

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A cross-sectional study was conducted to assess growth rate, energy intake and feeding problem among children and adolescents at PDK. Data collection involved anthropometric measurements, food records over 3 days and a checklist to determine feeding and behaviour problems among 49 subjects aged 1-18 years at the PDK Kajang, Semenyih and Hulu Kelang. A total of 23 subjects were diagnosed with Autism and 26 with Down Syndrome. Mean for weight, height, Body Mass Index (BMI), triceps and MUAC were respectively 12 ± 1 , 88 ± 5 , 15 ± 1 , 7 ± 2 and 150 ± 4 (age 1-3 years), 17 ± 6 ,

104±10, 16±3, 9±3 and 170±25 (age 4-6 years), 30±15, 123±10, 19±7, 13±6, and 206±55 (age 7-9 years), 29±11, 127±18, 17±2, 10±6 and 206±41 (age 10-12 years), 46±12, 147±5, 21±5, 13±7, and 243±50 (age 13-15 years) and 65±20, 151±10, 29±9, 18±8 and 306±59 (age 16-18 years). Underweight subjects constituted 14%, while 47% were normal, 16% overweight and 22% obese. About 82% subjects had a normal range of triceps and 59% had normal MUAC, between 5th – 95th percentiles. For the Down Syndrome children, 69% were in the normal weight for age by percentile and 89% subjects were in the normal range for height for age. Mean age of mothers during pregnancy was 32±7 years while mean age of fathers during wife's pregnancy was 35±7 years. Mean energy intake percentage was 121±23% (1-3 years), 120±23% (4-6 years), 99±17% (7-9 years), 84±8% (10-12 years), 79±16% (13-15 years) and 83±15% (16-18 years) when compared to the Malaysian Recommended Nutrient Intake (RNI). The ability to chew properly was the highest oral motor impairment (22%) and 25% subjects were reported to have dental problems which made eating difficult especially for those with Down Syndrome. Meanwhile, excessive eating was a frequent behavioral and communication problem (49%) reported. In conclusion, most subjects were in the normal range for growth rate; however, younger children tend to have higher than RNI energy intake compared to the older children. The feeding problems experienced by some subjects might be affecting their food habits.

A29 Weight status, Body Image Perception and Physical Activity of Malay Housewives in Kampung Chengkau Ulu, Negeri Sembilan

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The objectives of this study were to determine the weight status, body image perception and physical activity as well as the relationship between weight status and body image dissatisfaction, weight status and physical activity, and body image dissatisfaction and physical activity among housewives in Kampung Chengkau Ulu, Negeri Sembilan. The anthropometric measurements collected were Body Mass Index (BMI), waist and hip circumferences. Figure rating scale and International Physical Activity Questionnaire (IPAQ) were used to assess body image dissatisfaction and physical activity patterns, respectively amongst the housewives. Data collected were analysed using Statistical Package for Social Science (SPSS). A total of 119 housewives aged from 20 to 50 years completed the questionnaire. The prevalence of obesity and overweight recorded 33.6% and 36.1%, respectively. Meanwhile, 30.3% of the housewives were categorised under normal weight. In addition, it was found that 44.5% of the housewives were at risk of abdominal obesity. When asked to estimate their weight status, more than one-third of obese housewives underestimated their BMI status. Body image dissatisfaction was found to be significantly correlated with BMI ($r=0.487$, $p<0.05$). Physical activity results indicated that 50.4% of the housewives could be categorised under low physical activity level. However, there was no significant correlation between BMI and physical activity ($p>0.05$). Therefore, further research needs to be carried out to study other contributing factors towards high prevalence of obesity and overweight and barriers that contribute to low physical activity among housewives.

A30 Selected Health-related Characteristics and Bone Health Status of a Sample of Chinese Women in an Urban Area

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The data reports the distribution of selected health-related characteristics and bone health status of 63 Chinese women who attended health screening conducted in an urban area in Selangor. A self-administered questionnaire was used to collect information on socio-demographic, general health status, exercise regularity, and consumption pattern of milk, calcium and vitamin D supplements. Weight, height and blood pressure were measured using appropriate equipments and standard procedures. Random blood glucose was assessed using a finger-prick glucometer. Bone health status was measured using an ultrasound machine (QUS-2™). The mean age of the sample was 51.34 ± 9.74 years old. About 29% of the women reported having diseases such as diabetes, hypertension, thyroid disease, and arthritis whilst 6% had had fractures of the arm and thigh. A total of 75% of the women reported exercising regularly. About 12% consumed milk daily and 45% were taking calcium supplements, while 12% were taking vitamin D supplements. The mean weight, height and Body Mass Index (BMI) was 54.85 ± 9.15 kg, 1.56 ± 0.06 m, and 22.68 ± 3.46 kg/m², respectively. A total of 7.9% of the women were underweight, 14.3% were overweight and 4.8% were obese. The mean systolic blood pressure and diastolic blood pressure was 70.5 ± 9.7 mmHg and 119.5 ± 15.1 mmHg, respectively. The mean blood glucose level was 4.19 ± 1.25 mmol/L and 6.6% of the women were at risk of high blood glucose. In the assessment of bone health status, the mean Broadband Ultrasound Attenuation (BUA) was 84.99 ± 15.74 dB/MHz and the mean T-score was -0.32 ± 1.26 . Based on WHO classification, 25% were osteopenic and 3.8% were osteoporotic. A significant correlation was found between BMI and T-score ($r=0.29$, $p<0.05$). The response towards such health screening was encouraging and the samples screened were generally healthy. Health screening serves as a platform for assessment of simple risk factors to identify those who have low bone mass and are at risk of osteoporosis, in addition to common chronic diseases such as diabetes and hypertension.

A31 Going Hungry in Australia?

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Food security is defined as access by all people at all times to sufficient food for an active, healthy life. Food insecurity occurs not only in under-developed and developing countries, but also in developed nations such as Australia. The inconsistency of measurement techniques and administration has limited the efforts to gain a better understanding of food insecurity problems in Australia. Analysis of data from recent health surveys which included indicators of this problem has demonstrated that food insecurity is becoming a significant public health issue. In the 1995 National Health & Nutrition Survey, 5.0% of the surveyed population indicated that they were having food insecurity problems. Increasing in number, 6.2% affirmative responses were received in the 2001 and 2005 National Health Surveys. More people in 2005 (39.9%) went without food when they could not afford it. People with food insecure status also have a significantly different ($p<0.001$) fruit and vegetable intake, BMI, as well as poor indicators of psychological wellbeing, such as a sense of feeling hopeless and depressed. Hence, a well validated measurement and effective monitoring system is necessary for developing policies and programmes to address food insecurity issues.

A32 A Comparative Study of Metabolic Syndrome among Overweight/Obese and Normal Weight Young Adolescents in Klang Valley

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This study was conducted to determine the prevalence of metabolic syndrome among primary school children aged 9 – 12 years in Selangor and Kuala Lumpur. A total of 403 subjects participated in this study, comprising 195 boys (overweight/obese=51.4%, normal weight=48.6%) and 208 girls (overweight/obese=52.3%, normal weight=47.7%) with mean age of 11.06 ± 0.84 years and 10.94 ± 0.86 years, respectively. Subjects were 61% Malay, 30.5% Chinese and 8.2% Indian. WHO 2007 BMI-for-age growth reference was used to group subjects into overweight/obese (1SD³BMI³3SD) and normal weight (-2SD£BMI£median) groups. The International Diabetes Federation 2007 criteria for children was used to identify metabolic syndrome in the study group. Anthropometric measurements comprised weight, height, waist circumference and hip circumference. Blood pressure was taken, and 5ml of overnight fasting blood was drawn by venous puncture. Fasting blood glucose, full lipid profile including triglycerides (TG), high lipoprotein cholesterol (HDL-C), low lipoprotein cholesterol (LDL-C) and total cholesterol (TC) were determined. Fasting blood glucose was significantly different (p=0.033) among boys (5.06 mmol/dL, 95% CI: 4.98, 5.14) and girls (4.94 mmol/dL, 95% CI: 4.88, 5.01) ± 0.50 mmol/dL. Of the five components of metabolic syndrome, 43.6% of boys and 44.0% of girls were found to have waist circumference ≥90th percentile, 6.7% boys and 5.8% girls had fasting blood glucose of ≥5.6mmol/dL. More girls had higher TG (11.1%), HDL-C (46.2%) and high blood pressure (4.3%) as compared to the boys at 7.2%, 8.2% and 3.6% respectively. Metabolic syndrome was found in 1.5% boys and 4.3% girls, with 5.8% being overweight/obese, as compared to 0% in the normal weight group (p=0.001). Waist circumference (p<0.001), TG (p=0.007), HDL-C (p<0.001) and HBP (p=0.016) were found to be significantly different in the overweight/obese group as compared to the normal weight group. In conclusion, metabolic syndrome was found to be higher in girls than boys and in the overweight/obese group. Thus, an appropriate intervention programme should be planned to increase awareness and promote healthy lifestyles in schools.

A33 Association between Childhood Obesity and Blood Pressure

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Childhood overweight and obesity have become a common nutrition-related health problem which places them at a significantly higher risk of having hypertension. A cross-sectional study was conducted to determine the association between obesity and hypertension among school children (96 boys and 125 girls) aged 10-11 years in Selangor. Overweight and obese were defined using IOTF standards while hypertension was defined using National High Blood Pressure Education Program (NHBPEP) cut-off percentiles. The mean BMI for boys and girls were 21.4±5.7 and 19.1±4.6 kg/m² respectively. The mean systolic blood pressure (SBP) for boys and girls were 103±13 and 99±12 mmHg respectively while the mean diastolic blood pressure (DBP) for boys and girls were 63±11 and 60±9 mmHg respectively. The results revealed a high prevalence of overweight (22.6%) and obesity (18.1%). The prevalence of hypertension among the children was 10.9%. Obese children were more likely to have hypertension (x²=15.6, p<0.05). Logistic regression analyses showed a child's BMI to be significantly associated with increased odds of hypertension across

gender (all $p < 0.05$) except for SBP in girls. There is an urgent need to have intervention health programmes to address the problem of obesity in children in order to reduce the risk of developing hypertension.

A34 Maternal Perceptions of Nutritional Status of Their Children with Cerebral Palsy

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A cross-sectional study was carried out to evaluate maternal perception of body weight status and adequacy of daily calorie and protein intake of children with cerebral palsy. Body weights of 45 cerebral palsy children (aged 1 to 9 years) were measured and their calorie and protein intakes were estimated from a 3-day food record. Maternal perceptions of their children's body weight, calorie and protein intake were obtained by interviews. Maternal perceptions of their children's weight status were compared with measured weights while their perceptions of their children's daily calorie and protein intake were compared with the average of a 3-day food record. Frequency analyses determined the percentages of mothers considering their child to be 'underweight', 'about the right weight', 'underweight' or 'unsure'; daily calorie and protein intake 'meet the requirement', 'not meet the requirement' or 'unsure'. Weight-for-age measurements showed that 35 children (77.8%) were underweight and 10 children (22.2%) normal. Thirty-two parents (71.1%) perceived that their children to be 'underweight' while 13 parents (28.9%) perceived their children to be 'about the right weight'. Thirty-six (80%) mothers correctly classified their child's weight status while 9 (20.0%) mothers perceived otherwise. Analysis from 3-day food records indicated that 44 (97.8%) children did not meet RNI for calories (mean percentage calorie intake: 73.9%) while only 1 child had calorie intake of 119.4% of RNI. Daily protein intake was higher than requirement (mean percentage protein intake: 177.9%) for 43 (95.6%) children while only in 2 children (4.4%) it was lower than RNI (mean percentage protein intake: 82.3% and 99.09%). All mothers perceived incorrectly on daily calorie and protein intake. This study indicates that most of the mothers correctly classified their children's weight status but then misclassified their children's daily calorie and protein intake. Education and intervention from health professionals on sufficient daily food intake for their children is vital.

A35 Relationship between Pedometer-determined Physical Activity and Body Composition Variables among Students of Universiti Putra Malaysia

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Physical activity is well known for its health benefits and advantages in reducing risks of chronic diseases. Meanwhile the pedometer has been found to be an effective instrument to objectively measure daily steps taken under a free living condition. The main objective of this cross-sectional study was to determine the relationship between pedometer-determined physical activity and body composition variables among undergraduate students at Universiti Putra Malaysia. A total of 101 subjects (51 males, 50 females) aged between 18-24 years from the Tenth

and Eleventh Residential Colleges in Universiti Putra Malaysia were recruited for this study. Data collection was done by two sets of questionnaires (Set A and Set B) including socio-economic characteristics, medical and family history for chronic diseases, smoking habit and alcohol consumption, vitamin and mineral supplement intake, International Physical Activity Questionnaire (IPAQ) and 24-Hour Dietary Recall. Anthropometric measurements (weight, height, waist and hip circumferences, percentage body fat and blood pressure) were done by Tanita digital weighing scale THD-306, Seca body meter 206, measuring tape, Omron body fat monitor HBF-302 and Omron automatic blood pressure monitor MX3. A Yamasa Allness 200S pedometer was given to each subject to record daily steps taken for two week-days and one weekend. Dietary intake of the subjects and data from questionnaires were analysed by using Nutritionist Pro software and Statistical Package for Social Sciences Version 15.0 respectively. The mean age of subjects was 20.44 ± 1.39 years, mean monthly household income was RM2431.78 \pm 2192.47, mean energy intake was 1426.51 ± 428.84 Kcal per day. Mean Body Mass Index was 21.93 ± 3.97 kg/m² with 11.88% and 2.97% of the subjects being overweight and obese respectively. Mean waist hip ratio was 0.85 ± 0.05 for male and 0.80 ± 0.05 for female subjects. Mean percentage body fat was $19.44 \pm 7.06\%$ for male and $27.27 \pm 6.42\%$ for female subjects. Mean systolic and diastolic blood pressure were 111.75 ± 13.15 mm Hg and 68.29 ± 9.55 mm Hg. Mean step count of the subjects was 8450.84 ± 2613.66 steps per day. From Pearson's Coefficient Correlation test, a significant but weak relationship was found between daily total calorie intake and waist circumference ($r=0.252$, $p<0.05$), waist hip ratio ($r=0.347$, $p<0.001$), diastolic blood pressure ($r=0.028$, $p<0.05$). A weak and inverse relationship was observed between total calorie intake and percentage body fat ($r=-0.026$, $p<0.05$). However, no significant relationship was observed between pedometer-determined and IPAQ-determined physical activity and body composition variables. Furthermore, no significant relationship was found between pedometer-determined and IPAQ-determined physical activity ($\chi^2=6.550$, $df=6$, $p=0.365$). In conclusion, body composition variables were influenced by total calorie intake and physical activity practised. University students are recommended to practise regular physical activity and have a balanced diet.

A36 Determinants of Perceived Health Status among Older Women in Malaysia

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Perceived health is based on an individual's perception and evaluation of his or her own health. Previous studies have shown that age, education, ethnicity, marital status and monthly income are determinants of self-rated health among older Malaysians. The objective of this study was to identify indicators of socio-economic status (SES) and health-related characteristics influencing perceived health status among older Malaysian women. The subjects were a representative sample from 13 states and the Federal Territory of Kuala Lumpur. Information on demographics, socio-economic status, and health-related characteristics was obtained using a pre-tested questionnaire. Perceived Health Status was measured using a statement based on a 4-point Likert Scale (4-Excellent, 0-very poor). Data from a sample of 1502 older women were analysed. More than half of the respondents (55.1%) resided in urban areas. A total of 59.9% were Malays, 24.0% were Chinese, 10.5% were bumiputeras, 4.4% were Indians and 1.3% were others. According to age categories, 71.8% were young-old (60-74 years old), 22.6% were old-old, (75-84 years old) and 5.2% were oldest-old (> 85 years old). The majority of the respondents (61.9%) never received any formal education. The average total household income was RM339.00 per month. ANOVA test showed a significant difference between perceived health status and level of education ($F=15.074$, $df=3$, $\mu=5.915$, $p=0.000$) and age ($F=22.140$, $df=2$, $\mu=7.066$, $p=0.000$). Multiple Regression analysis showed that eight predictor variables accounted for 28.4% of the variance in perceived health

status ($F=55.47$, $df=8$, $p<0.000$). Level of physical activity ($\beta=0.100$, $p=0.000$), number of health problems ($\beta=-0.311$, $p=0.000$), functional status ($\beta = 0.251$, $p = 0.000$) and age ($\beta = -0.06$, $p = 0.02$) were significantly related to perceived health status but not for ethnicity, level of education, and total monthly income. In conclusion, respondents with good functional status, who are physically active and with few health problems have a positive perception of their health status. On the other hand, older women had poorer perception of their health. The findings also showed that monthly income and ethnicity did not influence their perception of health status. Therefore, it is important to promote a healthy and active lifestyle among older women to enhance a better perception of health.



Poster Presentations

Group B: Dietary Intake, Consumption Pattern and Association with Diseases

B01 Food Choice Motives of Husbands and Wives in an Urban Community

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The objective of this study was to determine the differences in motives underlying the selection of food between husbands and wives in an urban community. This cross-sectional study was carried out in Bandar Baru Bangi, Selangor among 212 married couples aged 20 and above, who voluntarily agreed to participate and were not practising any special diet. Data were collected using the Food Choice Questionnaire (FCQ) which measures the health-related and non-health-related factors that influence people's dietary 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 consideration), was included. Demographic characteristics including age, occupation, education, household income and household size were collected. Data were analysed using SPSS version 16. Results showed that 52.4% of the main food shoppers were wives, followed by husbands (38.9%), both husbands and wives (8.0%) and others (0.7%). On the other hand, 83.0% of main meal planners were wives, followed by husbands (10.8%), both husbands and wives (5.7%) and others (0.5%). Husbands (mean age= 43.33 ± 11.16 years) rated religion as the most prominent factor in food choice motive with a mean average rating of 4.53 ± 0.59 on a 5-point rating scale, followed by health and convenience factors. Meanwhile, the wives (mean age= 41.28 ± 10.93 years) rated health as the most essential factor with mean average rating of 4.50 ± 0.57, followed by religion and convenience factors. Sensory appeal, ethical concerns and familiarity were rated as the bottom three factors of food choice motives among these two groups. Mean average ratings of convenience ($t= -3.58$, $p<0.05$) and sensory appeal factor ($t= -2.42$, $p<0.05$) were found to be significantly different between husbands and wives. 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.

B02 Predicting Healthy Eating among Normal Weight Schoolchildren Using Theory of Planned Behaviour

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Prevalence of obesity among schoolchildren in Malaysia is on an increasing trend. The purpose of this cross-sectional study was to predict healthy eating among school children by using the Theory of Planned Behaviour. A total of 319 (144 boys and 175 girls) primary schoolchildren aged 9-11 years old were chosen randomly from four different zones in Kuala Lumpur. Subjects comprised 55% Malays, 22% Chinese, and 23% Indians. Anthropometry measurements such as weight and height were obtained to calculate BMI and then compared to the WHO 2007 BMI-for-age reference. Dietary intake was assessed by using interview 24-hour dietary recall method. A set of structured questionnaires was developed to obtain information about healthy eating based on the Theory of Planned Behaviour. The questionnaire was divided into 4 components, which were attitude (person's overall evaluation of the behaviour), subjective norms (person's own estimate of the social pressure such as from teacher and parents to perform or not the behaviour), perceived behaviour control (the extent to which a person feels able to enact the behaviour such as barrier) and intention to eat healthy. Mean of Body Mass Index was $16.4 \pm 1.5 \text{ kg/m}^2$. Mean attitude score was 1.98 ± 4.4 , subjective norm 7.7 ± 3.5 and perceived behaviour control 2.4 ± 2.7 . Multiple linear regression showed that only subjective norms and attitude significantly predicted intention to eat healthy ($p < 0.01$). This model only explains about 21% of the variance in predicting healthy eating. The study also found a positive correlation between intention to eat healthy and attitude ($p < 0.01$, $r = 0.359$), subjective norms ($p < 0.01$, $r = 0.369$) and perceived behaviour control ($p < 0.05$, $r = 0.135$). These results suggest that the Theory of Planned Behaviour was able to assess the intention of healthy eating. Therefore, to educate healthy eating among children, programmes promoting healthy eating should focus on attitude and subjective norm that influence children's behaviour.

B03 Traditional Ritual in Relation to Infant Feeding of an Indigenous Rural Community

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This paper is part of the findings of an ethnographic study concerning child rearing practices of an indigenous rural community. It aims to inform people, especially the health professionals and significant others, to appreciate and understand the feeding practices of a rural community. Ethnography was employed to explore the social and cultural practices on childrearing of a community in three rural villages in Sarawak. It used triangulation methods of data collection which included several sessions of interviews, participant observation and document reviews. The data collected was analysed with the help of NuDIST software. This study highlights that the life-cycle of an individual is marked by a series of rituals which are extensively expressed throughout life. One of the significant rituals is during the first session of weaning. This practice implies that there are mothers who wean their infants as early as one month old. It suggests that health education activities should also target mothers as well as caregivers on the importance of appropriate weaning as prescribed by the Ministry of Health.

B04 Pubertal Development, Body Image and Eating Behaviour among Female Adolescents in Kuantan, Pahang

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Studies have reported that children achieved their menarche earlier than the previous generation. Children in the early stage of pubertal development were found to be at-risk of negative body image and eating disorders. This study aimed to determine the associations between pubertal development and body image and eating behaviour among 407 female adolescents, aged between 13 to 19 years, randomly selected from two secondary schools in Kuantan, Pahang. Pubertal development, body image and eating behaviour were measured using the Pubertal Development Scale (PDS), the Multidimensional Body Image Scale (MBIS) and the Eating Attitude Test - 26 (EAT-26) respectively. Most of the respondents (96.6%) achieved menarche at the point of study, and they were either in the advanced pubertal stage (64.1%) or post-pubertal stage (32.5%), and the remaining pre-menarcheal participants were in the mid-pubertal (2.4%), beginning pubertal (0.5%) and prepubertal (0.5%) stages. The mean composite score of body image was 56.26 ± 9.57 , and 4.2% of the respondents were found to be in the highest tertile, and were more likely to have body image disturbances. Also, about one in ten (12.8%) were at-risk of eating disorders. Results showed that pubertal development was correlated with body image ($r=0.170$, $p<0.05$), but not correlated with eating behaviour. After controlling for age, pubertal development remained correlated with body image ($r_p=0.163$, $p<0.05$), indicating age has little effect on body image. Besides, body image was correlated with eating behaviour ($r=0.603$, $p<0.05$), and approximately three-quarters of the participants (76.5%) who were categorised in the highest tertile of body image were at-risk of eating disorders ($\chi^2=70.210$, $p<0.05$). This study shows the need for body image intervention programmes which should be conducted in early adolescence to prevent disordered eating problems among female adolescents.

B05 Food Intake Pattern of Normal Weight and Obese Primary Schoolchildren

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With the prevalence of childhood obesity increasing rapidly worldwide, it is becoming more important to evaluate nutritional status and promote healthy eating among children. The objective of this study was to compare the food intake pattern of normal weight and obese primary school children aged 8 to 10 years. Participants comprised 67 normal weight (41 boys, 26 girls) and 70 obese (39 boys, 31 girls) Malay children. A set of questionnaires was used to assess food habits, while dietary intake was assessed using multiple pass 24-hour recall method. Anthropometric measurements included body weight, height, BMI and body fat. Mean weight, height, BMI and percentage of body fat for normal weight children were 25.3 ± 3.5 kg, 128.6 ± 7.1 cm, 15.2 ± 1.0 kg/m² and $18.0 \pm 5.4\%$, respectively; and 47.8 ± 9.6 kg, 136.7 ± 7.1 cm, 25.3 ± 3.2 kg/m² and $38.7 \pm 4.9\%$, respectively among obese children. Mean daily energy intake of obese children (boys 1964 ± 414 kcal; girls 1867 ± 468 kcal) was significantly ($p<0.05$) higher than their normal weight counterparts (boys 1697 ± 408 kcal; 1557 ± 418 kcal). Comparing macronutrient contribution to total energy intake, obese children consumed a significantly ($p<0.05$) higher proportion of carbohydrate ($56.2 \pm 6.5\%$ versus $53.4 \pm 7.3\%$)

but surprisingly less fat ($28.5 \pm 6.2\%$ versus $30.8 \pm 6.2\%$) than normal weight children. Food habits such as frequency of breakfast, fruits, fresh fruit juice, vegetables, fast food, milk and sweetened drink consumption showed no significant difference and association between normal weight and obese children. In conclusion, although eating habits were similar, total energy intake of obese children was evidently higher than normal weight children. Nevertheless, diet may not be the only determinant of children's body weight status, as other confounding factors such as environmental factors and physical activity levels were not taken into consideration.

B06 Dietary Fats and Risk of Cardiovascular Disease

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Recently, there has been greater interest in understanding the role of quantity and quality of dietary fats in the prevention of cardiovascular disease. Lipid profile has become the most immediate biomarker to reflect fat intake as well as an indicator for the risk of cardiovascular disease. However, the association between dietary fat intake and lipid profile remains controversial. The objective of this study was to systematically review the effect of dietary fat intake on blood cholesterol and risk of cardiovascular disease. Databases from Cochrane Library, Medline and Embase were searched and screened thoroughly for potential appropriate studies. A total of 14 studies (January 2000 to January 2009) that investigated the effects of dietary fats on lipid profile among healthy adults were included in this review. Most studies found that lower total fat intake reduced total, LDL and HDL-cholesterol levels. Consumption of lower saturated fat significantly reduced total cholesterol, LDL-cholesterol and triglyceride levels. On the other hand, most of the studies found that higher MUFA and/or PUFA intake reduced triglyceride and total cholesterol levels. Studies that focused on *trans* fatty acids found that consumption of *trans* fat decreased HDL-cholesterol level significantly. A study on diet with a similar amount of total fat intake but with a high proportion of either saturated or monounsaturated fat found that high monounsaturated fat reduced LDL-cholesterol level without adverse effects on HDL-cholesterol level. However, another recent trial with a diet rich in monounsaturated fat without decreased saturated fat intake reported that there was no effect on LDL-cholesterol level. In conclusion, different types of fat seem to have independent effects on lipid profile. Hence, the quality of fat in the diet has a more important role in determining the risk of cardiovascular disease.

B07 Schoolchildren's Ability to Identify Food Group Based on Food Pyramid and its Relation with Food Intake at a Primary School, Cheras

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The food pyramid is an approach that contributes to diet planning knowledge to ensure nutrients that are of sufficient quantity and quality to meet daily nutrient recommendations. It serves as an important instrument to educate a community to plan their daily food intake. Hence, the purpose of this cross-sectional study was to assess children's ability to identify food groups based on the food pyramid and its relation to food intake among 327 children aged between 10 and 11 years from three primary schools at Cheras. Demographic data, anthropometry measurements,

food intake and knowledge on food pyramid data were collected from the children. A reliability test was performed on the questionnaire before knowledge on food pyramid collection was collected. Meanwhile, a 3- day food diary that represented foods intake on a schoolday and during holidays was used to gather data for food intake. Height-weight measure and Body Mass Index (BMI) was calculated based on WHO's 2007 BMI classification. Minimum BMI (kg/m^2) was 18.6 ± 4.42 for man and 18.4 ± 4.32 for women. This study found 7.6% of subjects to be underweight, 14.5% overweight and 17.5% subjects obese. A large number of subjects (60.0 %) was classified as having a normal BMI. In terms of knowledge on the food pyramid, this study found 11.5% had a low score, 27.5% had good knowledge, and the majority (61.1 %) had moderate knowledge on the food pyramid. Mean energy intake was 1530.35 ± 425.6 kcal and this intake did not meet the Recommended Nutrient Intake (RNI) for children. The mean intakes of carbohydrates, protein and fat were 193.3 ± 64.7 g, 62.0 ± 19.6 g and 61.7 ± 40.01 g respectively, and these met the RNI requirements. Micronutrient intake such as thiamin (B1), niacin (B3), vitamin A and iron also met the RNI requirement with mean intakes of 5.12 ± 59.6 mg, 21.6 ± 120.4 mg, 1059.4 ± 559.1 μg and 31.1 ± 199.3 mg respectively. However, the intakes of calcium, vitamin C and riboflavin (B2) which were 394.1 ± 195.1 mg, 52.0 ± 53.5 mg and 1.2 ± 0.47 mg, did not meet the requirements of RNI. In conclusion, children's knowledge of the food pyramid does not affect their food choice and further, it did not influence their food intake.

B08 Dietary Intake and Feeding Problems of Children with Special Health Care Needs in Pediatric Institute, Kuala Lumpur

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Children with special health care needs are those who have congenital or acquired conditions that affect physical, behavioural and/or cognitive growth and development and who require more than usual pediatric health care. They are vulnerable to nutrition-related problems that jeopardise their nutritional status and pose barriers to their development. This study aimed to assess the dietary intake and its association with feeding problems among children with special health care needs. A total of 202 subjects aged 2-12 years who had registered as 'children with special health care needs' (CSHCN) in the Pediatric Institute, Kuala Lumpur, participated in this cross-sectional study. Pre-tested questionnaires were used to gather the information from parents/carers about the children feeding problems. The 24-hour diet recall was carried out and the nutrient content was calculated using the Malaysian Food Composition Table. The results from the 24-hour diet recall showed that the mean daily energy intake was 1438 ± 35 kcal with 55.0 ± 1.7 g proteins. The mean intake of male subjects aged 7-12 years and female aged 7-9 years did not achieve RNI. Mean intake of micronutrients namely vitamin A, thiamin, riboflavin, niacin, calcium and iron was 227.1 ± 17.1 μg , 0.79 ± 0.04 mg, 1.02 ± 0.05 mg, 10.5 ± 0.57 mg, 703.3 ± 36.7 mg and 9.05 ± 0.53 mg respectively. The mean intake for all vitamins and minerals exceeded 2/3 RNI for both males and females except for vitamin A and calcium. Common feeding problems among this group of children as reported by parents/carers were difficulty in chewing (23.9%), swallowing (14.4%) and sucking (14.4%), self-feeding impairment (61.2%), lack of appetite (15.4%) and prolonged feeding time (26.4%). However, among those who had self-feeding impairment, most of them (96.0%) were able to be fed orally, only 4.0% were fed through the tube. Despite those feeding difficulties, 73.8% of the children tolerated the texture of a normal diet, 9.9% were given a soft diet, 9.9% a pureed diet and 6.4% a liquid diet. Children with self-feeding impairment were significantly associated with lower calories ($r = 0.190$, $p < 0.01$) and protein ($r = 0.147$, $p < 0.05$) intake. Other feeding

problems did not show any significant association with dietary intake. Although the dietary intake of children with special health care needs was quite good, the trend of inadequate energy intake in the older group should not be overlooked.

B09 Comparison of Dietary Intake between Overweight/Obese and Normal Weight Female Adolescents

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Numerous studies have shown that adolescents' dietary intake is not consistent with national recommendations. The aim of this study was to determine the dietary intake among female adolescents aged 13 – 17 years in Kuala Lumpur. A total of 133 adolescent girls were selected and based on the WHO 2007 BMI-for-age reference, 68 subjects were classified as normal weight while 65 were overweight/obese. Body weight and height were measured, and Body Mass Index (BMI) calculated. Dietary intake was determined using diet history method. Mean age, weight and height for the normal weight subjects were 14.5±1.2 years; 44.8±5.7kg and 153.5±5.7cm while for the overweight/obese group the figures were 14.6±1.3 years; 71.9±11.9kg and 155.7±5.5cm, respectively. The results also showed that more overweight/obese subjects skipped breakfast (55.6%) as compared to their normal weight counterparts (44.4%) but the difference was not statistically significant ($p=0.348$). Energy intake of overweight/obese girls (1682±399 kcal) was significantly higher ($p<0.005$) than in the normal weight group (1518.1±321 kcal). The contribution of carbohydrate and fat intakes to total energy intake was slightly higher among overweight/obese subjects; (53% and 33%, respectively) as compared to normal weight subjects; (52% and 30%, respectively), while contribution of protein in both groups was 17%. In both normal and overweight/obese groups, lunch provided the most contribution of energy intake (438.5±192.6kcal; 544.3±272.3kcal) followed by dinner (352.2±198.0kcal; 479.5±205.2kcal) and breakfast (238.3±227.2kcal; 238.8±226.6kcal), respectively. Two-thirds of overweight/obese subjects (69%) under-reported their diet history as compared to their normal-weight counterparts (31%). In conclusion, notwithstanding the under-reporters, this study suggests that overweight/obese subjects were more likely to skip breakfast and have a higher energy intake compared to normal weight subjects.

B10 Breastfeeding Practices among Mothers with Children below 24 Months of Age Attending Health Clinics in Kuala Terengganu

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Breastfeeding practices offer nutritional, cognitive, economical, immunological and social benefits for optimal infant growth and development. WHO/UNICEF's recommendation states that every infant should be exclusively breastfed for the first six months of life. The objective of this study is to determine the prevalence of exclusive breastfeeding up to six months among mothers in Kuala Terengganu. A clinic based cross-sectional study was conducted amongst 342 mother-infant pair in 3 government health clinics, Kuala Terengganu, from April to November 2008. Participants were selected using a systematic sampling method and were interviewed using

a validated questionnaire. Univariate and multivariate logistic regression analysis was performed to assess the independent factors associated with exclusive breastfeeding. The proportion of infants who had ever been breastfed was 99.4%, however, only 67.1% initiated breastfeeding within the first hour of birth. The prevalence of exclusive breastfeeding at 0 and 6 months was 29.8% and 17.3%, respectively. The median duration of exclusive breastfeeding was 2.0 (SD 2.29) months. The preliminary regression model included ten variables within its equation. Exclusive breastfeeding at six months was most strongly associated with health professional influence with adjusted odds ratio of 3.59 (95% CI 1.25 – 10.32). Other significant associated factors in the final model were monthly family income (OR = 1.00), introduction of bottle feeding (OR = 0.76) and father's occupation (OR = 0.25). It can be concluded that exclusive breastfeeding at six months was not satisfactory in Kuala Terengganu. Thus, active breastfeeding promotion and programmes by health-care providers are crucial in order to achieve a satisfactory level of compliance to the WHO/UNICEF recommendation.

B11 Theory of Planned Behaviour and Healthy Eating among Overweight and Obese Schoolchildren in Kuala Lumpur

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This study was carried out to predict healthy eating behaviour by using the framework of the theory of planned behaviour among schoolchildren in Kuala Lumpur. A total of 223 schoolchildren (126 boys and 97 girls) comprising 59.2% Malays, 21.1% Chinese and 18.4% Indians were involved in this study through multi-stage random sampling. Weight and height were measured and BMI was calculated and classified based on BMI-for-age chart (WHO 2007) according to sex. Self-administered questionnaires based on the theory of planned behaviour were distributed. The questionnaire consisted of attitude (person's evaluation of the behaviour), subjective norm (person's own estimate of the social pressure whether to perform the target behaviour such as parents, teachers and etc.), perceived behaviour control (the extent to which a person feels able to enact the behaviour such as barriers) and intention to healthy eating behaviour. Data on food intake was collected using a 24-hour dietary recall by interview. The mean age was 10.4 ± 0.5 years. The mean of body mass index (BMI) of all children was 23.65 ± 3.46 kg/m², with male schoolchildren showing a slightly higher BMI (23.69 ± 3.70 kg/m²) compared to female schoolchildren (23.58 ± 3.15 kg/m²). The results showed positive correlation between subjective norm ($r = 0.395$, $p < 0.001$) and perceived behaviour control ($r = 0.293$, $p < 0.001$) but attitude was not significantly correlated towards intention to healthy eating behaviour. Multiple linear regression showed that subjective norm and perceived behaviour control were highly significant to predict intention to eat healthy ($p < 0.001$). This model explained about 21% of the variance in predicting healthy eating. From this study, it can be concluded that changing the attitude of the children and improving the subjective norm and perceived behaviour control were factors that could achieve healthy eating behaviour. Nutritionists or health educators can use the components of this theory and apply it in the health and nutrition related behaviour programmes in order to achieve success in healthy lifestyle programmes. Further studies which include other factors like physical activities should be considered.

B12 Omega-3 Polyunsaturated Fatty Acids Intake among Urban Elderly Individuals: a Comparison between 3-D Food Record and Semi-Quantitative Food Frequency Questionnaire

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Omega-3 polyunsaturated fatty acids are essential to health and crucial for optimal brain function. This cross-sectional study was conducted to estimate and compare omega-3 polyunsaturated fatty acids intake in a group of 37 elderly individuals [20 (54.1%) women and 17 (45.9%) men] aged 60 and above residing in urban areas, i.e. Klang Valley using a 3-day food record and semi-quantitative food frequency questionnaire. The FFQ consisted of 45 most frequently consumed omega-3 polyunsaturated fatty acids food choices listed using Food Composition Table of Malaysia and Singapore Food Composition Table. Subjects were required to record their dietary intakes for 3 days using household measures. The administration of FFQ was carried out by a trained nutritionist and dietitian. Results indicated that around 94.6% subjects did not fulfill the Malaysian RNI requirement for omega-3 polyunsaturated fatty acids. Mean intake of omega-3 polyunsaturated fatty acids was 0.29 ± 0.18 mg in men and 0.25 ± 0.24 mg in women. Analysis of group means using Wilcoxon Signed Rank Paired Test showed no significant difference ($p > 0.05$) between the estimation of omega-3 polyunsaturated fatty acids intake using both the 3-day food record and FFQ. Percentage mean difference of omega-3 polyunsaturated fatty acids intake was also less than 5%. The Spearman's rank correlation coefficient was satisfactory and sufficient ($r = 0.956$; $p = 0.000$) to rank individuals consistently. Furthermore, both the 3-day food record and FFQ classified approximately 78.4% of the subjects into the same quartile. In conclusion, the FFQ was reliable and valid for obtaining the dietary intake of omega-3 polyunsaturated fatty acids, and can provide similar estimation as compared to the food record.

B13 An analysis of Household Purchasing Behaviour and Diet Quality in a Residential Area of Setapak

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Healthy eating is a desired behaviour outcome in public health care and food purchasing patterns in the community should reflect the national dietary guidelines. Study objectives are to understand household purchasing patterns through the analysis of shopping receipts and evaluate diet quality using the Healthy Eating Index (HEI). A cross-sectional study of 53 households (16 Malays, 26 Chinese, 11 Indians) in the Setapak area examined food expenditure patterns and 3-day diet records (3-DDR) from representative householders ($n = 53$ females aged 27-64 years old) to evaluate HEI. Household food expenditure was tagged through shopping receipts for one-month and food purchasing records. Household demographics included socio-economic status and combined incomes. Data analysis included descriptive percentages as well as statistical analysis

using T-test, ANOVA and regression tests. Food purchasing records indicated that distribution of household expenditure was on meat-meat products (19.21%), fish-seafood (15.49%); rice-grains-cereals (11.49%), vegetables (10.48%), milk-milk products (8.36%) and fruits (4.82%). Significant expenditure also included non-alcoholic beverages (5.07%) and the sugar-jams-confectionaries (3.79%). Typically Malay households spent more on fish-seafood (22.93%), oils- fats (3.04%) and spices (5.01%). Chinese households spent more on milk-milk products (9.96%), fruits (7.41%), non-alcoholic beverages (5.82%), bakery products (3.76%), nuts-seeds-legumes (2.78%), eggs (2.74%) and snacks (1.79%); whilst Indian households spent more on meats-meat products (20.91%), vegetables (12.62%), sugar-jams-confectionaries (4.08%), canned foods (3.56%) and sauces-flavorings (3.11%). Overall, all households spent a higher percentage of their food budget on protein foods of animal origin compared to carbohydrate sources. 3-day diet records indicated the overall diet quality of subjects was a mean HEI score of 75.04 ± 7.47 which could be classified as 'needing improvement'. About 77.4% of subjects' diet quality needed improvement ($HEI = 72.01 \pm 5.54$) whilst the remaining was considered good ($HEI = 85.07 \pm 3.22$). The HEI score was significantly different ($F=28, p<0.05$) between races [Indians (69.35 ± 6.54) < Malays (75.06 ± 6.62) < Chinese (77.43 ± 7.23)]. Mean HEI score was also significantly different ($t=2.98, p<0.05$) between mean week-day (74.22 ± 7.85) and weekend (70.50 ± 9.18) diets. This cross-sectional study indicates that the majority of households need to improve their diet quality based on the Healthy Eating Index, suggesting a need for promoting dietary guidelines in the community.

B14 Understanding of Five Key Messages of Newly Proposed Malaysian Dietary Guideline among Women in Kuala Lumpur

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The objective of this study was to determine the understanding of five key messages of the newly proposed Malaysian Dietary Guideline among women in Kuala Lumpur. The five key messages being tested were 'Eat a variety of foods within your recommended intake; 'Maintain body weight in a healthy range'; 'Be physically active everyday'; 'Eat plenty of fruits and vegetables everyday' and 'Limit intake of foods high in fat and cholesterol as well as minimise fat and oils in food preparation'. The questionnaire for pre-testing on key messages in the newly proposed Dietary Guideline Malaysia was designed by the National Research Institute of Behavioral Health, Ministry of Health. The questionnaire was self administered to 383 women aged 18 to 59 years. Among 383 women, 155 were Malays, 191 were Chinese and 37 were Indians. The women were further classified into younger women (18 to 39 years) and older women (40 to 59 years). The women were staff from the government sector, private sector and members from churches selected from six population zones in Kuala Lumpur. The questionnaire consisted of two parts; i.e. demographic part and questions which assessed the understanding of the five key messages in the newly proposed Malaysian Dietary Guideline. The level of understanding of the messages was based on a cumulative score of understanding among women. Among the 383 women, 44.4% realised the existence of a previous Malaysian Dietary Guideline 1999 while 55.6% did not. The maximal and minimal scores of understanding among women from the three races of Malay, Chinese and Indian were 91.7; 91.7; 87.5 and 0; 8.3; 8.3 respectively. Besides, the maximal and minimal scores of understanding among younger women and older women were 91.7; 91.7 and 16.7; 0 respectively. Mean score of understanding among women from the three races of Malay, Chinese and Indian was 61.72 ± 16.68 ; 64.44 ± 18.67 ; 61.94 ± 20.23 , respectively and were not significantly different ($p = 0.108, p > 0.05$). Meanwhile, the mean score of understanding among

younger women and older women was 64.8 ± 16.2 and 59.8 ± 20.9 , respectively and was also not significantly different ($p=0.073$, $p>0.05$). There was a significant association between the level of understanding of message with age group ($p=0.002$, $p<0.05$), education level ($p=0.001$, $p<0.05$) and economic status ($p=0.013$, $p<0.05$). Women in Kuala Lumpur generally have a moderate understanding of the five key messages in the newly proposed Malaysian Dietary Guideline.

B15 Healthy Eating and Healthy Living: Knowledge and Practices of On-campus University Students

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The main objectives of the study were to evaluate the healthy eating awareness (HEA) and healthy living awareness (HLA), and to compare these with dietary intakes and physical activity levels of university students who eat most meals at the campus cafeteria. Respondents were Universiti Malaysia Sabah undergraduates randomly recruited from on-campus hostels ($n=110$: 51 males, 59 females; mean age $20.9 \pm 1.2y$). Most respondents had normal body sizes (72%), while 16% were underweight and 12% overweight or obese. Awareness of healthy eating and healthy living was evaluated using nutrition knowledge questionnaires adapted from Temple (1999) and lifestyle questionnaires adapted from Monmuang (2005) respectively. Healthy eating and healthy living practices were analysed from data collected using food frequency questionnaires (FFQ) and the International Physical Activity Questionnaire (IPAQ). Respondents were categorised by their degree studies: arts and humanities (52%), science and technology (36%) and food science and nutrition (12.7%). As expected, the latter scored significantly better in both ($p<0.05$). Females scored significantly better than males in nutrition knowledge ($p<0.016$). HLA was significantly associated with physical activity levels in females ($p=0.001$) but not in males ($p=0.821$). Using an EI:BMR cut-off of <1.2 and >2.0 for under- and over-reporters of energy intake, 30% of respondents under-reported, and 40% over-reported. The under-reporters had significantly higher BMI than over-reporters ($p=0.039$). The food science and nutrition students were over-represented in the under-reporters group ($p=0.002$). Excluding over-reporters, percent mean RNI for calcium achieved was 35% for under-reporters and 51% for good reporters. Nutrition knowledge was inversely correlated to reported energy intake ($r=-0.264$, $p=0.003$). Inverse relationships, albeit insignificant, were observed between nutrition knowledge and fruit ($r=-0.105$, $p=0.137$) and vegetables intake ($r=-0.145$, $p=0.66$). Inability to afford food was most probably not a confounding factor in food choices because 81% had study loans and 80% had at least RM300/month excluding tuition, hostel and transportation fees. It is alarming that nutrition knowledge is not translated into practice and intake of calcium is particularly low in this last stage of calcium deposition in the life cycle.

B16 Appetite, Food Intake and Body Composition among Elderly Malays in Cheras, Kuala Lumpur

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Loss of appetite, decrease in food intake and changes in body composition appear to be interrelated factors that can influence well being of older individuals. Therefore, this study aimed to determine the level of appetite, food intake and its relation to body composition among elderly Malays in Cheras, Kuala Lumpur. Council of Nutrition appetite questionnaire (CNAQ), dietary history questionnaire (DHQ) and bio-impedance analysis by Maltron 916 were used to measure appetite, food intake and body composition respectively. A total of 112 subjects participated with mean age 66.0 ± 5.0 and 66.3 ± 6.2 for 46(41.1%) men and 66(58.9%) women respectively. Body Mass Index (BMI) for women ($26.9 \pm 4.5 \text{ kg/m}^2$) was significantly higher than for men ($25.2 \pm 4.7 \text{ kg/m}^2$). Prevalence of poor appetite was significantly ($p < 0.05$) higher in elderly women (41.7%) than in elderly men (28.3%). Pearson correlation test showed that poor appetite or low CNAQ score had a significant correlation with age ($r = -0.255$, $p < 0.01$) and energy intake ($r = 0.272$, $p < 0.01$) respectively. A similar test also showed that energy intake had a significant correlation with age ($r = -0.45$, $p > 0.05$). Poor appetite had no significant correlation with Body Mass Index (BMI), waist circumference and body composition, either fat free mass or fat mass ($p > 0.05$). Besides, energy intake among elderly had a significant correlation with body composition such as fat free mass ($r = 0.285$, $p < 0.01$) and fat mass ($r = -0.281$, $p < 0.01$). From the multiple regression analysis, only 12.7% of poor appetite can be explained by age and energy intake. The remaining 88.3% could be explained by other factors such as depression, disease, socio-economic and socio-demographics. This study concludes that poor appetite was higher in elderly women compared to men. Poor appetite is influenced by age and energy intake rather than body composition; body composition too was influenced by energy intake.

B17 Energy-dense Food Intakes and Risk of Post-menopausal Breast Cancer

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Consumption of energy-dense foods is increasing worldwide and probably contributing to increasing adult weight gain problems. World Cancer Research Fund/ American Institute of Cancer Research in their recent report concluded that adult weight gain is a probable cause of post-menopausal breast cancer. Therefore, this case-control study aimed to determine the association between energy-dense food intakes and post-menopausal breast cancer risk. A total of 188 post-menopausal breast cancer cases and community-based controls in Kuala Lumpur, Malaysia were enrolled from January 2006 to December 2008. Food intake was assessed using a validated interviewer-administered semi-quantitative food frequency questionnaire, which included 200 food items. All foods were grouped into several food groups and an energy-dense food group was identified as those with an average energy content of more than 275 kcal per 100g food. Drinks

with added sugar and fruit juices were excluded from analysis. Odds ratio (OR) for risk calculation was adjusted for age, other risk factors of post-menopausal breast cancer, body mass index and energy intake. Results of this study showed that out of 34 food groups, four were classified as energy-dense namely fat-based spread i.e. butter, margarine, peanut butter, cheese (675 kcal/100 g), western snacks i.e. various biscuits, cakes, pastries (430 kcal/100 g), traditional fried snacks i.e. *pisang goreng*, *cekodok pisang*, curry puffs, *cucur udang* (325 kcal/100 g) and *roti canai* (317 kcal/100 g). Intake of fat-based spread for one serving per week was not associated with post-menopausal breast cancer risk (OR=0.99, 95% CI=0.86-1.47, p-trend=0.785). There was no significant association with breast cancer risk when post-menopausal women consumed more than three servings per week of western snacks (OR=1.25, 95% CI=0.39-3.97, p-trend=0.785) or traditional fried snacks (OR=1.73, 95% CI=0.42-6.99, p-trend=0.056). *Roti canai* intake of more than one serving per week was also not significantly associated with post-menopausal breast cancer risk (OR=3.44, 95% CI=0.96-12.24, p-trend=0.056). In conclusion, energy-dense foods may not be associated with breast cancer risk in Malaysian post-menopausal women. A larger cohort study will be needed to confirm these results. However, moderate consumption of energy-dense foods as part of a healthy diet might be of benefit for the prevention of other chronic diseases.

B18 A Comparative Study of Fast Foods and Snacks Consumption among Iranian Students before and while Staying in Malaysia

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There are more than 5000 Iranian students in Malaysia and this number is increasing according to local authorities. Iranian students in Malaysia face a problem of food choice as Malaysian and Iranian food cultures are totally different. High price of Iranian foods and inaccessibility of its ingredients, discourage the practice of Iranian food habits among them. It can cause a tendency towards unhealthy food habits and consumption of low nutrient dense foods like fast foods and snacks. The objective of this study was to investigate changes in food preferences of the subjects in relation to socio-cultural background of the subjects. The research design included an explorative study through focus groups followed by a self-administered questionnaire. The study was carried out among Iranian students in Universiti Putra Malaysia. Results showed that the majority of the 308 subjects who participated in the study (65%) chose fast food restaurants when eating out. A significant increase ($p < 0.005$) was noted in the consumption of fast foods and snacks in Malaysia in comparison to living in Iran. These changes also show some correlation to the socio-economic situation of Iranian students in Malaysia. An increase in fast foods and snacks consumption suggested an inclination to unhealthy dietary practices among subjects. The study suggests that subjects need to get accustomed to local food ingredients to gain a more balanced and healthy diet.

B19 Sodium Consumption among Chinese Adults in Bahau Negeri Sembilan

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Salt or sodium chloride (NaCl) is a substance that is needed in the diet and its function in the body is important. However, excessive intake of sodium is associated with increased risk of several health problems. The objective of this study was to determine the level of sodium consumption among Chinese adults. Sixty Chinese subjects (30 males and 30 females) aged 21-50 years who lived in Bahau, Negeri Sembilan were recruited. Data on anthropometry measurements, blood pressure measurement, a 24-hour diet recall and 24-hour urine of the subjects were collected. The 24-hour diet recall result showed that 80% of the subjects consumed more sodium than the daily recommendation of 2400mg/day. The average dietary sodium intake was 4190.03±1854.97mg for males and 3484.73±2031.6mg for females. The 24-hour urinary sodium excretion result showed that 95% of the subjects consumed more sodium than the daily recommendation of 2400mg/day. The average dietary sodium intake was 7869.86±3816.5mg for males and 6257.82±2731.5mg for females. Result also showed that urinary sodium excretion was significantly correlated with dietary sodium intake ($r = 0.392$; $p < 0.001$). Noodles soup (mee, bee-hoon, etc.) contributed the greatest sodium amount in subjects' diet (45%), followed by dishes containing thick sauces (40%); fried noodles (23.33%); home-made soup dishes (21.67%) and wanton mee (15%). It is recommended that education programmes be targeted at the studied population to reduce their sodium consumption levels.

B20 Eating Disorder among Female Adolescents in Kuala Terengganu, Terengganu

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Incidence of eating disorder among female adolescents in Malaysia is on the increase but this problem has not been widely studied. The purpose of this study was to determine eating attitudes and behaviour related to anorexia nervosa and bulimia among female adolescents in Kuala Terengganu, Terengganu. A total of 400 female students aged 16 to 17 years were randomly selected from five secondary schools. A translated and validated Eating Attitudes Test 40 and Eating Disorder Inventory 64 were used to evaluate eating habits and psychological profiles. The results showed that 48.0% of the respondents had a cut-off score of above 50 for Eating Disorder Inventory 64, indicating eating disorder behaviour and symptomatology. The mean score was (51.5 ± 20.2). For Eating Attitudes Test 40, the results showed that 12.5% of the respondents had a cut-off score of 30 or greater which indicated risk for eating disorder; the mean score was (16.9 ± 10.3). About 29.8% of the respondents were terrified about being overweight. Meanwhile, based on body dissatisfaction scale of Eating Disorder Inventory 64, 25.3% of the respondents did not approve of their body shape. For bulimia scale, 29.9% of the respondents exhibited bulimic symptom. For Eating Attitudes Test 40, 12.3% respondents were preoccupied with a desire to be thinner, 16.0% were preoccupied with the thought of having fat on their body and 16.6% were engaged in dieting. Results also showed that 10.3% feel bloated after meals and 19.1% of the respondents think about burning up calories when exercising. In conclusion, this study had shown that the eating disorder problem has increased among female adolescents and further information should be given to improve their awareness on healthy eating behaviour.

B21 Perceived Benefits and Barriers to Healthy Eating among Children with Malnutrition: Mothers' Perspectives

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The mother is important as she is responsible for a child's nutrition. Other than education, the mother's attitude is a factor that contributes to malnutrition among children. The objective of this study was to find out the mother's perception about the benefits and barriers to healthy eating among malnourished children. Fifty-six malnourished children (1 to 5 years old) and their mothers were recruited. Mothers were interviewed based on a structured questionnaire and their children's food intake was estimated from a 24-hour diet recall. Children were also measured for their weight and height. Sixteen (33.9%) and 37(66.1%) of the children were severely and moderately malnourished, respectively. However, only half of the mothers (n=28) perceived their children's body weight to be appropriate for age, 16(28.6%) perceived their children to be underweight and 12(21.4%) were unsure. Only 21(37.5%) of mothers knew the normal body weight of their children while the others 35(62.5%) did not know. About 33(58.9%) of mothers perceived their children's intake to be adequate and balanced but based on a 24-hr diet recall, mean percentage of calorie intake of all the children was only 77.8% of RNI; meanwhile the mean percentage of protein intake was 177% of RNI. Mothers claimed that their children were small eaters 30(n=30, 53.6%), frequently fell ill (n=9,16.1%), picky eaters (n=5,8.9%), refused to eat (n=2,3.57%) while 16.0% (n=9) perceived that their children did not have eating problems. Mothers (n=54, 96.4%) claimed that they only get nutrition information from the nurses at the clinic. This study shows that awareness among mothers on the nutritional status of their malnourished children is low and nurses play an important role in their nutritional education.

B22 Development of a Website-based Dietary Education for Patients with Type 2 Diabetes Mellitus: a Theory-based Approach

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The Internet holds promise for wide-scale promotion of dietary and lifestyle behavioural change. Despite that, no published study was found focusing on dietary behaviour change in adults with type 2 diabetes mellitus via a website-based system. The objective of this study was to develop and evaluate an interactive nutrition education website for patients with type 2 diabetes mellitus. A user-friendly website will be developed using the Health Action Process Approach (HAPA) and Object Oriented (OO) Programming approach. Modularity, simplicity, clarity, reliability, safety and maintainability will be used as criteria in the development of the system. The system will be built using PHP and powered by MySQL. This will be a theory-based interactive website that will emphasise nutrition behavioural modification. Immediate feedback received will imitate the responses usually given during face-to-face counselling. Besides providing evidence-based recommendations that is modified to the local context, this website will also provide reliable and comprehensive nutritional information to the patients. The website is hoped to improve patients' knowledge, attitude and practice (KAP), anthropometrical measurements and blood biomarkers (fasting blood glucose and HbA1c), while reducing the cost and burden of face-to-face counselling.

B23 Fruit and Vegetable Intake among Primary Schoolchildren: Effect of School Curriculum

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The objective of this study was to evaluate the effect of school curriculum on consumption of fruits and vegetables among primary schoolchildren. Besides, this study also (i) identified the syllabus that gave the most basic nutrition education about fruits and vegetables to schoolchildren and (ii) determined the significance of the syllabus in affecting the consumption of fruits and vegetables among school children. A total of 198 standard four school children (79 boys and 119 girls) around Cheras, Selangor participated in this study. Specific questionnaires were distributed to the children in the classroom to determine nutrition knowledge, attitude and practice on fruits and vegetables. Food intakes of subjects were assessed by using a 3-day food record. This study found that most children get most information on fruits and vegetables from Civic & Nationality, Health Education and Science subjects. The majority of the children agreed that input from those subjects encouraged them to eat more fruits and vegetables (86.7%) The study also found that the mean of nutrition knowledge, attitude and practice scores were $62.88 \pm 19.97\%$, $73.61 \pm 21.57\%$ and $70.33 \pm 18.65\%$ respectively. Most of the children scored a moderate level of nutrition knowledge (56.6%) and practice (66.7%) towards fruits and vegetables consumption; meanwhile 45.5% of the children scored good and moderate level for attitude. There was no positive relationship between nutrition knowledge with fruit and vegetable consumption practice among the children. However, the results indicate a negative correlation between nutrition knowledge and practice scores ($r = -.082$, $p > 0.05$). These results suggest that though the children acquired knowledge on fruits and vegetables mainly from the subjects offered in the school curriculum, it was not reflected in their attitude and practice.

B24 Dietary Pattern of Children with Gastroesophageal Reflux Disease (GERD) at Pediatrics Institute, Hospital Kuala Lumpur (IPHKL)

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This cross-sectional study was conducted to determine the dietary pattern and intake among pediatric patients with gastroesophageal reflux (GERD) at Pediatrics Institute, Hospital Kuala Lumpur (IPHKL). Thirty subjects were recruited (3 months to 2 years old). Subjects' dietary intakes were determined from their medical records, which were prescribed by dietitians, while their weight was measured by nurses and recorded. Symptoms shown by subjects were recorded based on caregivers' observations. Approximately 76% (n=22) subjects were categorised as failure to thrive (FTT). About 40% (n=12) and 73% (n=22) of subjects managed to fulfill more than 100% of the energy and protein requirement respectively. The most common milk formula given was infant formula with thickening agent i.e. Novalac AR (87%; n=26). Rice cereals, MCT oil and glucose polymers were also added to feeding to add energy density of their feeding as volume of feed was restricted. Approximately 57% (n=17) subjects were on tube feeding, 13% (n=4) were on oral feeding and 30% (n=9) were on a combination of both. Those on tube feeding had a significantly ($p < 0.05$) lower weight (4.26 ± 1.69 kg), a different percentage of subjects achieving RDA, Catch-up Growth and RNI requirements of 75% and above for energy intake (65%, 24% and 24% respectively)

and protein intake (82%, 41% and 53% respectively) compared to those on oral and combination feeding. Subjects weaning off milk (37%, n=11) had a significantly higher weight (7.42 ± 1.94 kg), energy (657 ± 234 kcal) and protein intake (17.1 ± 6.73 g) compared to those depending exclusively on milk. Those showing GERD symptoms such as problem gaining weight, colic and food refusal had significant differences ($p < 0.05$) in terms of their weight and dietary intake as compared to those who did not show those symptoms. In conclusion, those who exhibited symptoms of improper weight gain, refused to accept feeds and had colic showed differences in intake and weight compared to those who did not. GERD symptoms influence food intake and the nutritional status of these children. Minimising the symptoms by dietary manipulation or medical means may be beneficial for this group of children.

B25 Association between Calcium Intake and Childhood Obesity in Selangor and Putrajaya

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Several studies have shown that calcium intake has a protective effect against obesity. With the increase in prevalence of overweight and obesity in Malaysia, the objective of this cross-sectional study was to determine if there is any association between calcium intake and body mass index (BMI) among children. A total of 218 boys and girls aged between 10 and 11 years participated in this study which was conducted in Selangor and Putrajaya. The height and weight for each child was measured in order to calculate their BMI while calcium intake was assessed using food diary and food frequency questionnaire. Mean BMI for males was 20.1 ± 5.6 kg/m² and 18.0 ± 4.2 kg/m² for females. Average estimated daily calcium intake was 295.2mg for males and 360.8mg for females. There was no significant association between calcium intake and BMI. However, there were significant differences in calcium intakes among different races. For males, mean estimated daily calcium intake was 372.5mg for Malays, 221.0mg for Chinese and 82.9mg for Indians while for females, mean estimated daily calcium intake was 404.2mg for Malays, 380.1mg for Chinese and 153.8mg for Indians. The present study found no significant association between calcium intake and children's BMI but there were significant differences in calcium intake among the three races.

B26 Association between Dietary Habits and Family and Social Lifestyles

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Parents and the family environment play an important role in the development of food habits and food preferences among young children. The objective of this study was to examine the association between the dietary habits and family and social lifestyles among primary schoolchildren in Kuala Lumpur. A total of 391 schoolchildren in Primary 3 from 10 schools were selected using multi-stage sampling. The dietary habits of the children and their mothers were determined using a pre-tested dietary habits questionnaire. Weight and height of the children were measured using the standard procedures. Background information regarding family's lifestyle and social factors were obtained using a reliability tested and validated questionnaire. The results showed 66.5% children had healthy dietary habits while the remaining 33.5% children had less

healthy dietary habits. There was a moderate significant relationship between mother's and children's dietary habits ($r = 0.35, p < 0.001$). The mother's consumption of breakfast ($r = 0.29, p < 0.001$), snack ($r = 0.15, p < 0.005$), fruits ($r = 0.14, p < 0.01$), vegetables ($r = 0.27, p < 0.001$), fast foods ($r = 0.25, p < 0.001$), milk or malted drinks ($r = 0.11, p < 0.05$), soft drinks ($r = 0.16, p < 0.005$), fruits juice ($r = 0.25, p < 0.001$), tea and coffee ($r = 0.30, p < 0.001$) were significantly correlated with their children's consumption. Multiple linear regression analysis generated by inclusion of socio-economic and family's lifestyle variables showed that parent's dietary habits score and availability of fruits and vegetables at home was positively associated with the children's dietary habits score. Conversely, television viewing during meals had an inverse relationship with the children's dietary habit score. Parent's income, education level, working status, family size, food-parenting practices and taking meals away from home were not significantly associated with their children's dietary habits. In conclusion, although this study had not demonstrated an association between family and social lifestyles with children's dietary habits, parent's own dietary habit and healthy food availability at home will still be a pervasive influence of children's dietary habits.

B27 Dentition Status, Nutrient Intake and Dietary Quality among the Elderly

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The relationship between dentition status and nutrient intake is of prime importance among the elderly, because of their poor dietary habits. And in turn, nutrition intake is dependent on the dentition status. However, there is little information on the relationship between intake of specific nutrients and denture status, and there is no consensus on whether the presence of a removable denture results in diet of poor nutritional quality. The main objective of this study was to determine the dentition status, dietary intake and quality of life among the elderly aged 65 years and above at Penang Old Folks Home for the infirmed and aged. This was a cross-sectional study conducted on 140 elderly inmates. A structured questionnaire was formulated and the subjects were interviewed to collect information about their demographic background, food intake and mental status. The respondent's health histories were obtained from their medical reports. Dental examinations were carried out to determine their dentition status by registered dentists. Ethical approval was obtained. Food consumption was assessed using food weighing method. The "Diet 4 software" was used for the analysis of nutrient intakes and SPSS version 14 was used for data analysis. Results revealed that 13.8% of respondents had complete dentition, 15% had partial dentition, 25% had complete denture, 18.75% had partial denture and 27.5% were edentulous. The majority (53.75%) of the respondents were female. The mean BMI for ages between 65-74, 75-84, and 85-94 were 20.31 ± 2.76 , 20.06 ± 2.18 , and 20.83 ± 2.66 respectively. Comparing the chewing ability among the sample, those who were edentulous had (95.45%) hard chewing ability. The subjects were found to be having (57.77%) calcium and (21.42%) iron deficiency with decreasing number of teeth and consuming less nutrients than the recommended nutrient intakes (RNIs). It can be concluded that poor dentition status reduces the nutrient intake and dietary quality among the elderly.

B28 A Semi-quantitative Food Frequency Questionnaire for Assessment of Energy, Total Fat and Fatty Acids Intake among Chinese Adults in Malaysia: Comparison with Three-day 24-hour Diet Recalls

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Dietary intakes, food habits and preferences of Chinese adults in Malaysia vary from other ethnic groups. A food frequency questionnaire (FFQ) is a practical tool for the measurement of usual food intake in large surveys because it gives a quick approximation to 'true' dietary intake. This study was carried out to compare the semi-quantitative FFQ for Chinese adults with three-day 24-hour diet recalls (24-hr DR) in assessing intake of energy, total fat and fatty acids. The semi-quantitative FFQ that was developed specifically for the Chinese ethnic group had 175 food items, which included 45 pork-based food items and categorised according to three mealtimes namely breakfast, lunch or dinner and morning or afternoon snacks. A total of 51 Chinese women and 29 Chinese men aged between 20 to 60 years volunteered as study subjects. The results of the study showed that the majority of study subjects were within the normal EI/BMR ratio when their energy intake was assessed by semi-quantitative FFQ (74%) and 24-hr DR (70%). Analysis of *t*-test showed no significant difference ($p>0.05$) in the mean intake of total fats, saturated, mono-unsaturated and poly-unsaturated fatty acids between semi-quantitative FFQ and 24-hr DR. There was a significant difference ($p<0.05$) for mean intake of energy and carbohydrate assessed between both methods. However, percent mean differences were less than 10% for energy and all nutrients included in this study. This indicates that the semi-quantitative FFQ can produce comparable results with 24-hr DR. Energy adjusted correlation coefficient values showed significant positive correlation for total fat ($r=0.34$), saturated fatty acids ($r=0.26$), mono-unsaturated fatty acids ($r=0.40$), and poly-unsaturated fatty acids ($r=0.32$). Cross-classification for both methods into quartiles of intake resulted in correct classification into the same or adjacent quartile from 90% to 95% of the study subjects. Only 1% of the subjects were grossly misclassified. In conclusion, this semi-quantitative FFQ gives estimation as good as 24-hr DR for intakes of total fat, saturated fatty acids, mono-unsaturated fatty acids and poly-unsaturated fatty acids among Chinese adults in Malaysia. This semi-quantitative FFQ is a useful tool in dietary intake assessment for ranking Chinese individuals into quartiles of intake in epidemiological studies on diet and disease relationships.

B29 Relationship Between Dental Caries and NMES Intake in Pre-schoolers: a Preliminary Study

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The study of non-milk extrinsic sugar (NMES) intake in Malaysia is somewhat hampered by the lack of data on NMES content of food eaten here. This preliminary study was divided into two parts: (1) development of food frequency questionnaire (FFQ) based on 3-day 24-hour recalls completed by parents of children aged 4 to 6 years ($n=10$), and (2) completion of FFQ and dental habits questionnaire by parents, and dental examination by a dentist on pre-schoolers ($n=30$, 18 males, 12 females; mean age 5.1 ± 0.69 years) attending a private kindergarten in the suburb of Kota Kinabalu, Sabah. Subjects came from middle to upper-middle class families. The FFQ consisted of

25 food and beverage items with considerable amounts of NMES commonly consumed by children, e.g., confectionaries, fruit jam, local sweet cakes (*kuéh*) and soft drinks. The limitation encountered was that there was no data on NMES content in Malaysia. Therefore the NMES intake was counted as frequency of consumption of servings of food items identified. One serving was defined as one unit of typical consumption or one serving as stated on the nutrition information panel of processed food. There was a significant difference between consumption of NMES containing foods and whether children brushed their teeth after each meal ($p=0.032$), suggesting that there is a relationship between consumption and occurrence of dental problems (defined as teeth with caries, filling or crowning). However, there was no association between consumption and caries ($r_s=0.043$, $p=0.823$) or all dental problems combined ($r_s=0.003$, $p=0.986$). These findings clearly indicate the need for studies quantifying NMES content for food consumed in Malaysia. The estimation method used in this study equated one serving of a local fried *kuéh* (e.g. *cucur pisang*) with confectionaries (e.g. sweets). There is also a need to repeat such studies in a sample of medium to low income households.

B30 Intuitive Eating and Nutritional Status among First-year Female Undergraduates in Universiti Kebangsaan Malaysia, Kuala Lumpur Campus

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Intuitive eating is characterised by eating based on physiological hunger and satiety cues rather than situational and emotional cues and is associated with psychological well-being. A cross-sectional study was carried out on 177 first-year female undergraduates in Faculty of Allied Health Sciences (FSKB) to determine their score for Intuitive Eating Scale (IES). After screening, 91 subjects were chosen to take part in anthropometry and nutritional status assessment, where 48 subjects were found to have high IES score and 43 subjects low IES score. Data demography, IES score, data antropometry and Food Frequency Questionnaire (FFQ) information were obtained through questionnaires. There was no significant difference for intrinsic eating sub-scale IES but significant difference ($p<0.05$) was found for extrinsic eating, anti-dieting and self-care sub-scale between high scorers and low scorers on IES. Mean weight, Body Mass Index (BMI), percentage of body fat and waistline showed significant difference ($p<0.05$) between high scorers and low scorers on IES. Mean BMI, percentage of body fat and waistline for high scorers on IES were 19.39 ± 3.05 kg/m², 24.44 ± 5.16 % and 68.62 ± 7.50 cm whereas mean BMI, percentage of body fat and waistline for low scorers were higher than high scorers on IES, that is 22.04 ± 2.19 kg/m², 28.84 ± 3.54 % and 72.56 ± 5.45 cm. No significant difference was found between the mean energy intake for high scorers on IES (1840.75 ± 620.40 kcal) and low scorers on IES (1870.47 ± 614.16 kcal). There was no significant difference for mean nutrient intake between high scorers on IES and low scorers on IES. Mean protein, fat, thiamine, riboflavin, niacin, vitamin A, vitamin C, calcium and iron intake were lower for high scorers on IES while only carbohydrate intake was higher for high scorers on IES. The percentages of subjects who met the RNI requirement were higher for high scorers on IES for all the nutrients except vitamin A. In conclusion, subjects who had practised intuitive eating possessed a healthier eating behaviour.

B31 Child Feeding Practices and Childhood Obesity in Malaysia

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The objective of this study was to examine the influence of parental feeding practices and other related parental influence on weight status of 10-12-year-old children in the state of Selangor, Federal Territory of Kuala Lumpur and Putrajaya. Parental feeding practices were measured using a modified and translated version of Child Feeding Questionnaire (CFQ). A total of 1186 children and their parents participated in this study. Of the child respondents, 72.2% were of normal weight, 20.1% overweight and 7.8% obese. Male children were found to have higher mean BMI (18.84 ± 3.63) compared to female children (18.21 ± 3.42). Children of Chinese ethnicity were found to have highest mean BMI (18.82 ± 3.61) compared to Malay (18.30 ± 3.45) and Indian (18.31 ± 3.60) children. When looking at different child feeding practices and educational level of the parents, parenting relating to child's eating ($r = -0.061$, $p \leq 0.05$), parents' concern of children's weight status ($r = 0.092$, $p \leq 0.01$) and restriction from parents ($r = 0.057$, $p \leq 0.05$) were found to be significantly correlated. Home environment ($r = 0.060$, $p \leq 0.05$) and parent's concern for children's weight status ($r = 0.107$, $p \leq 0.01$) were found to be positively correlated with parent's socio-economic status. There was a positive correlation between parent's concern for children's weight status and the child's weight status ($r = 0.129$, $p \leq 0.01$). A negative correlation was found between pressure to eat from parents and the child's weight status ($r = -0.101$, $p \leq 0.01$). The study found that when parent's concern for child's weight increases, the higher the child's weight status whereas the higher the parental pressure for the child to eat, the lower the weight status of the child. In conclusion, child feeding practices such as parent's concern for child's weight and pressure to eat were found to be predictors of children's risk of obesity.

B32 Association between Self-efficacy, Perceived Benefits, Perceived Barriers and Dietary Intakes

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Understanding psychosocial factors in adopting healthful diets is important as dietary behaviour is complex. A cross-sectional study was conducted to determine the association between self-efficacy, perceived benefits, perceived barriers and dietary intakes (dietary fat, fruit and vegetable intakes). A total of 345 adults (19-56 years) participated in the study. Information on demographic, socio-economic and psychosocial determinants related to dietary intakes was obtained using a pre-tested interview-administered questionnaire. Dietary intakes were assessed using 2-day 24-hour diet recall. Pearson correlation was used for data analysis. Those respondents with higher self-efficacy scores tended to have higher perceived benefits ($r = 0.318$, $p < 0.01$) and lower perceived barriers ($r = -0.259$, $p < 0.01$) for increased fruit and vegetable intakes. Respondents with higher perceived benefits scores for increased fruit and vegetable intakes, also tended to have lower perceived barriers ($r = -0.216$, $p < 0.01$). Respondents with higher self-efficacy scores for dietary fat reduction tended to have higher perceived benefits ($r = 0.174$, $p < 0.01$) and lower perceived barriers ($r = -0.259$, $p < 0.01$), but there was no significance association between perceived benefits and perceived barriers. There was no significance association between psychosocial factors (self-efficacy, perceived benefits, and perceived barriers) and dietary intakes (dietary fat, fruit and vegetable intakes). Individuals with higher self-efficacy and perceived benefits may be able to

overcome barriers to healthier dietary intakes. However, further research is needed to clarify the association between psychosocial factors and dietary intakes.

B33 Intake of Antioxidants and Mild Cognitive Impairment among Elderly People in the Klang Valley: A Pilot Study

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Mild cognitive impairment (MCI) is associated with significant morbidity, especially the development of Alzheimer's disease, and it is related to nutritional factors. A pilot study was carried out to determine antioxidant intake and its relation with MCI among elderly people aged 60 to 74 years old in the Klang Valley. Subjects were interviewed to obtain socio-demography data and health status. Data on food intake was assessed using the diet history questionnaire and food frequency questionnaire, whilst the Geriatric Depression Scale (GDS) was used to assess depression level. A combination of tests was used to assess cognitive decline; these were Mini-mental State Examination (MMSE), Clock Drawing Test (CDT), and Dementia Rating Scale (DRS). Out of the 84 elderly recruited, 70 completed all parts of the study (response rate 83.3%). Mean vitamin E intake was less than the Malaysian RNI (50% of RNI for men and 57.3% for women). The incidence of amnesic-MCI (aMCI) was 5.7% among the respondents. When adjusted for education, beta-carotene intake was found to be significantly ($R^2=0.123$, $r^2=0.343$, $p=0.043$) correlated with cognitive impairment based on CDT scores. In conclusion, the intake level of antioxidants among subjects was unsatisfactory and beta-carotene intake was related to poor cognitive status based on CDT.

B34 Nutritional Status and Eating Habits among Pre-schoolers in the Klang Valley

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A cross-sectional study was carried out to determine the nutritional status and eating habits among pre-schoolers. A total of 992 pre-schoolers aged 5-6 years participated in this study. Body weight, height, mid-upper arm circumference (MUAC), triceps and subscapular skinfolds were measured, and body index mass (BMI) was calculated. A set of questionnaires on KAP was administered among teachers and mothers. Another set of questionnaires to test nutrition knowledge was administered through face-to-face interviews using relevant pictures of food as visual aid for the children. Mean BMI was 15.7 ± 2.7 kg/m² in boys and 15.4 ± 2.4 kg/m² in girls. Mean z-score for weight-for-age, height-for-age and weight-for-height were -0.09 ± 1.61 , -0.27 ± 1.01 and 0.03 ± 1.58 respectively. A significant difference was observed among ethnic groups and

gender for both z-scores for weight-for-age and height-for-age ($p < 0.05$). The prevalence of overweight was 9.3% while prevalence of underweight, stunting and wasting were 6.9%, 4.2% and 3.2% respectively. This result indicates that overnutrition is more prevalent than undernutrition among pre-schoolers. Most preschoolers consumed breakfast (86.4%), lunch (94.1%) and dinner (93.3%) daily. The majority of pre-schoolers liked fruits (95.1%), snacks (93.8%), fast food (93.3%) and milk (90.8%) with a lower percentage of children (65.1%) liking vegetables. Mean score for nutrition knowledge among pre-schoolers was $73.2 \pm 9.8\%$, of which 38.3%, 58.8% and 2.9% had good, moderate and poor nutrition knowledge respectively. There was significant difference ($p < 0.05$) in nutrition knowledge scores between the three main ethnic groups: Chinese $75.9 \pm 9.2\%$, Malays $71.1 \pm 9.6\%$, and Indians $70.1 \pm 10.0\%$. Child's nutrition knowledge was positively associated with milk intake ($r = 0.133$, $p < 0.01$). The result showed no significant association between nutrition knowledge scores among mothers and teachers with children. However, mother's nutrition knowledge was positively associated with vegetable intake ($r = 0.111$, $p < 0.05$) and negatively associated with snack intake ($r = -0.134$, $p < 0.05$) among children. Household income was significantly associated with fast food intake among pre-schoolers ($r = 0.107$, $p < 0.05$). In conclusion, pre-schoolers who had relatively good knowledge scores in nutrition, and mother's knowledge were found to have an influence on the child's eating habits.

B35 Dietary Fibre Knowledge and Consumption among Adults in a Malay Village, Negeri Sembilan, Malaysia

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Nutrition knowledge has been recognised as an effective modifier of dietary behaviour. Many studies have indicated that dietary fibre (DF) consumption in the general population is decreasing concomitantly with the increase in DF associated diseases; however, little is known about DF knowledge and consumption among the rural population. This study was aimed at assessing DF knowledge and consumption as well as the correlation of DF knowledge to consumption among adults in a Malay village, Negeri Sembilan, Malaysia. A total of 188 adults (77 males and 111 females) participated in this study. The DF knowledge was assessed using a 12-item questionnaire comprising knowledge on overall understanding of DF, major food sources of DF, health benefits of DF and the recommended ways to increase daily DF intake. A 132-item Food Frequency Questionnaire (FFQ) was used to assess DF consumption. Statistical analyses were performed using SPSS Version 15.0 for Windows. More than half of the respondents knew about DF (61.2%) and had moderate mean DF knowledge score of $66.0 \pm 17.7\%$. Respondents were able to identify the sources of DF (58.3%) and demonstrated positive attitude towards DF intake. The mean DF intake of respondents was high ($25.36 \pm 12.58\text{g/day}$) and achieved the recommended daily DF intake of 20-30g/day. Men had also a significantly higher mean DF intake than females ($t = 0.699$; $p < 0.05$). The easy availability and accessibility of fruits and vegetables and the cultural eating habits of the rural respondents could contribute to the high DF intake. This was supported by a significantly higher mean DF intake among the respondents whose diet was influenced by traditional beliefs ($t = -0.806$; $p < 0.05$). No significant correlation was found between DF knowledge and consumption ($r = -0.064$, $p = 0.500$). Nutrition intervention programmes should be implemented in the rural areas to improve DF knowledge and to maintain or increase DF consumption.



Poster Presentations

Group C: Nutrients and Other Components in Food

C01 The Effects of Temperature and Fermentation Time on Total Antioxidant Activities and Total Phenolic Content of *Orthosiphon stamineus* Tea Extract

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The aims of this study were to determine total antioxidant activity and total phenolic content of fermented *Orthosiphon stamineus* tea. Black tea processing method was used to produce fermented *Orthosiphon stamineus* tea. The leaves were fermented at two different fermentation temperatures (20 and 30 °C) for 30, 60, 120, 180 minutes. For comparison, *Orthosiphon stamineus* fresh leaves were also examined. The total antioxidant activity of the *Orthosiphon stamineus* extracts was evaluated by using a model system consisting of β -carotene and linoleic acid. Quercetin and BHA were used as the reference compounds. The total phenolic of the *Orthosiphon stamineus* extracts was determined spectrophotometrically according to the Folin-Ciocalteu procedure. The results were expressed as mg caffeic acid/ 100 g dry weight. The results showed that total antioxidant activities and total phenolic content declined when fermentation temperature and time were increased. A high correlation was found between the antioxidant activity and total phenolic content for both fermentation temperature 20 and 30°C ($R^2= 0.9366$ and $R^2= 0.9236$). The overall results showed that fermentation temperature of 20°C (180 minutes) produced the highest total phenolic content as well as antioxidant activity.

C02 Effect of Drying Temperatures on Quality Properties and Antioxidant Activity of *Peria katak* (*Momordica charantia* L.) and Seeds Extract

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Momordica charantia L. (*Cucurbitaceae*) is a widely cultivated plant for medicine and food uses. The fruits (bitter melon or bitter gourd) of the plants are used in culinary preparations all over the world. *Peria katak* extract can be a potential source of antioxidant. This extract can find application in food products and dietary supplements. The aim of this work is to observe whether the temperatures of drying used (40°C and 50°C) had a significant effect on moisture, colour, bulk density, water holding capacity and total phenolic compounds of the *peria katak* extract and seeds of *peria katak* (*Momordica charantia* L.). *Peria katak* extracts were obtained through methanolic extraction and antioxidant activity of the extracts were evaluated using total phenolic compound. Fresh *peria katak* were used as a control. The moisture content of *peria katak* extract ranged from 0.06 to 0.08%. The colour parameters of lightness (L), redness (a) and yellowness (b) were studied, using Minolta CR 300. Drying temperature had a significant effect on the redness (a). However, lightness (L) and yellowness (b) were not significantly different ($p>0.05$). The lightness, redness and yellowness values of the sample were about 53.93 to 67.20; -1.86 to 2.52; and 12.34 to 19.34, respectively. The values of bulk density ranged from 3.30 to 4.60mg/mL and showed a significant

difference ($p < 0.05$). The water-holding capacity of *peria katak* and seeds was also determined. The total phenolic compounds, determined according to Folin-Ciocalteu method, varied from 2.70 to 7.60 GAE/g for dry *peria katak*. The results of this study show that *peria katak* extract has a higher total phenolic compound than the seeds of *peria katak*. This study shows that drying temperature has an influence on the total phenolic compound of *peria katak* extract and seeds.

C03 Determination of Folate Contents in Food Items (Cereals and Vegetables) Commonly Consumed by Malaysians Using Microbiological Assay

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Folate is essential to humans and must be obtained through the diet. It plays a significant role in preventing the possible occurrence of neural tube defects. Folate can be found abundantly in many vegetables - beans, fruits, whole grains - and fortified breakfast cereals. Currently, data on folate content of naturally occurring dietary folate in Malaysian foods is scarce. The aim of this study was to determine the folate content of food particularly cereals and vegetables, commonly consumed by Malaysians using microbiological assay. The total folate content of 13 samples (7 cereals and 6 vegetables) available in Malaysia was assayed with *Lactobacillus casei* after preliminary digestion with rat serum by using microbiological assay with trienzyme extraction. Recovery studies were conducted at six concentration levels by using CRM 121 (wholemeal flour) and CRM 485 (mixed vegetables) with 96 ± 5.0 and 99 ± 11.0 (RSD% 0.298 and 0.040) respectively. The range of folate content in vegetables and cereals was 2-5 $\mu\text{g}/100\text{g}$ fresh weight and 4-11 $\mu\text{g}/100\text{g}$. Folate content was significantly higher ($p < 0.05$) in cauliflower (5 $\mu\text{g}/100\text{g}$ fresh weight) when compared with other vegetables whilst bean string had the lowest (2 $\mu\text{g}/100\text{g}$ fresh weight). Chicken flavoured corn snack (11 $\mu\text{g}/100\text{g}$) had the highest folate content in cereal products. Oat biscuits (6 $\mu\text{g}/100\text{g}$) had the lowest. This study shows that naturally occurring food like cereals and vegetables are also a good source of folate in fulfilling dietary intake besides supplementation.

C04 Pandan amaryfolius Extracts Inhibit Growth and Induce Apoptosis in Breast Cancer Cells

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Numerous phytochemicals derived from edible plants are regarded as potential sources of chemopreventive agents. Chemopreventive phytochemicals possess substantial anticarcinogenic and antimutagenic properties which enable blockage, reversal or prevention in the development of cancers through various mechanisms. A wide array of phytochemicals e.g. carotenoids, polyphenolic flavonoids and piperidine alkaloids were among phytonutrients identified from the extract of *Pandanus amaryllifolius*. *Pandanus amaryllifolius* or daun pandan is a common culinary

plant in Malaysian dishes for the addition of fragrance, flavour and colour. In traditional and complementary medicine, extracts of pandan were used for various ailments and conditions ranging from headaches, rheumatism, and epilepsy and also served as a remedy for sore throats and toothache. Previously, 72-hr Microculture tetrazolium salt (MTT) assay of *Pandanus amaryllifolius* ethanolic extract was shown to be anti-proliferative and resulted in a 50% inhibition of cell growth at 80mg/ml towards human breast adenocarcinoma MDA-MB-231 cells. Apoptosis assays and cell cycle analysis were carried out to investigate the underlying mechanisms of the chemopreventive actions. Results from cell cycle distribution and apoptosis assays revealed that *Pandanus amaryllifolius* induced cell apoptosis through a caspase-3-dependent pathway and mediated cell cycle arrest in the G2/M phase. This study therefore implies that *Pandanus amaryllifolius* may possess chemopreventive phytochemicals and/or chemotherapeutic activities against breast cancer by reducing cell viability and inducing apoptosis; thus suggesting it might be effective for the prevention and treatment of cancer.

C05 Benzoic Acid and Its Potential Health Effects

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Benzoic acid (BA) is one of the food preservatives commonly used in Malaysia. Since early 1990s, it has been widely utilised not only in foods and beverages but also in pharmaceutical and cosmetics products. This study was aimed at determining effects from its prenatal exposure on the development of male reproductive organs namely, the testis, epididymis, seminal vesicle and prostate gland. Time-mated pregnant Sprague-Dawley (SD) rats were divided into 2 groups and treated by oral gavage with either vehicle (Tween 80) or BA at 10.0 mg/kg body weight/day. Offspring were sacrificed at postnatal day 28 (P28). Prior to the necropsy, their body weight (BW) and anogenital distance (AGD) were measured and gross morphology of their external genitalia was examined. All animals were then fixed via perfusion technique either using 10% buffered formalin for light microscopic examination or 4% glutaraldehyde solution for electron microscope examination. Organs were harvested and weighed prior immersion into the fixative. There was no significant difference in mean AGD between the two groups. The BA-treated group did not show any abnormality in their external genitalia morphology. Light microscope examination revealed a significant decrease in diameter of seminiferous tubules of the BA-treated animals, associated with a less number of primary spermatocytes within the tubules. Epithelial height of the caput epididymis and prostate gland in the BA-treated group were also significantly decreased. There was also less secretion noted in the prostate gland. However, no abnormality in histoarchitecture of seminal vesicles was noted. Ultrastructural features of the testis of the BA-treated animals showed early signs of cell necrosis in their germ cells. There was also some delay in the maturation process of the Sertoli cells. Epididymis of the BA-treated animals showed fine features suggestive of impairment in its absorptive function. Seminal vesicle and prostate gland of the BA-treated animals also showed abnormalities associated with their secretory function. In conclusion, this study showed that *in-utero* exposure of BA did have impact on the development of male reproductive organs at pre-pubertal stage.

C06 Freshwater Fishes are a Poor Source of EPA and DHA

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Omega-3 fatty acid is an essential polyunsaturated fatty acid, widely recognised as beneficial to health and general well-being. It has been shown to reduce the risk of cardiovascular diseases, cancer, hypertriglyceridaemia, hypertension, rheumatoid arthritis and Alzheimer disease as well as promote brain development among infants and children. The aim of this study was to determine and quantify omega-3 fatty acids specifically eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) content of the freshwater fishes namely African bream (*Tilapia spp.*), African red bream or tilapia (*Tilapia mossambics*), Javanese carp (*Puntius gonionotus*), common snakehead (*Chana striatus*), catfish (*Clarias batrachus*), yellowtail catfish (*Pangasius-Pangasius*), Asian redtail catfish (*Mystus nemurus*), rohu (*Labeo rohita*), sultan fish (*Leptobarbus hoeveni*), big head carp (*Aristichthys nobilis*), goby (*Oxyeleotris marmoratus*) and perch (*Anabas testudineus*). The samples were purchased from *Pasar Borong Selangor* and fish farms in Bandar Baru Bangi and Kuala Kubu Bharu between September and November 2008. The fish samples were homogenised and proximate analysis was conducted to determine moisture, ash, crude protein, crude fat and carbohydrate content. Direct transesterification method was used to convert crude fat to fatty acid methyl esters (FAME). The FAME was injected into gas chromatography and identification of specific fatty acids was based on comparison with the external standard of fatty acids. Findings of the study were as expected. Fresh water fish are poor sources of EPA and DHA. Among the fishes studied, total EPA and DHA were found to be highest in big head carp (9.2%) followed by rohu (1.4%), goby (1.3%), yellowtail catfish (1.1%) and sultan fish (1.0%) while African bream, African red bream, Javanese carp, perch, catfish, common snakehead and Asian redtail catfish contained less than 1%. The variations in fatty acids content observed may be due to the different types of feed fed by the farmers. As a conclusion, freshwater fishes are not a good source of omega-3 fatty acids. This information provides health professionals and consumers with options in food choices and meal planning with the goal towards achieving the recommended intakes for omega-3 fatty acids.

C07 *In vitro* Antioxidant Capacities of Different Solvent Extracts from Green Algae, *Nannochloropsis sp*

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Nannochloropsis sp microalgae have been reported to contain a substantial amount of polyunsaturated fatty acids. The aquaculture industry commonly makes use of these microalgae as fish feed. However, their potential as a natural source of antioxidant is not known. The aim of this study was to determine the *in vitro* antioxidant properties of different solvent extracts from *Nannochloropsis sp*. Four different solvents namely hexane, dichloromethane, chloroform and methanol were used and evaluation of antioxidant capacities was done by 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical-scavenging, ferrous ion chelating, nitro-blue tetrazolium (NBT) reduction, ferric-reducing antioxidant power (FRAP) and ABTS radical cation decolorisation assay. Methanol extract significantly showed higher antioxidant power in DPPH and NBT assay [41.82 ± 0.50 and 129.95 ± 1.19 nmol Trolox equivalents (TE)/g dry mass of extract (DE)] compared with other extracts. Methanol extract also showed the highest reducing power in FRAP assay with

264.85± 1.70 nmol TE/g DE. However, ferrous ion chelating assay and ABTS, hexane (34.82± 0.019 nmol EDTA eq/g DE) and dichloromethane extract (152.51± 0.002. nmol TE/g DE) respectively showed a significantly higher antioxidant power compared with other extracts. This study suggests that different solvent extracts of *Nannochloropsis sp.* contain different potential antioxidant components that can scavenge different types of free radicals.

C08 Marine Products are Good Sources of EPA and DHA

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Omega-3 polyunsaturated fatty acid (n-3 PUFA) has been shown to significantly reduce risk of coronary heart disease, cancer, Alzheimer and depression. Therefore, incorporating n-3 PUFA in the daily diet is important for maintaining good health. This study was carried out to determine and quantify n-3 PUFA, specifically eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) content of marine products namely cockle, clam, dried anchovy, brown squid, white squid, dried shrimp and white shrimp. These food samples were purchased from various supermarkets within Kuala Lumpur between September and November 2008. Proximate analysis was conducted to determine ash, moisture, crude protein, crude fat and carbohydrate in the samples. Crude fat was used for determination of fatty acid composition. Fatty acid methyl esters (FAME) were prepared by a direct transesterification method. The FAME was quantified by gas chromatography using external standard. The findings showed that marine products are rich sources of EPA and DHA. Among the marine products studied, total EPA and DHA were found to be highest in white squid (34.3%) followed by brown squid (33.3%), clam (24.9%), dried anchovy (21.3%), dried shrimp (20.5%), cockle (18.8%) and white shrimp (16.3%). High EPA and DHA content observed in marine products may be due to their food chain in deep sea, which is high in n-3 PUFA sources such as plankton and algae. In conclusion, marine products are a good source of EPA and DHA. These findings may open broader choices of food sources rich in EPA and DHA.

C09 Antioxidant Activity of Pink-flesh Guava as Determined by Ferric Reducing Antioxidant Power (FRAP)

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Rapid and simple ferric reducing antioxidant power (FRAP) test is often applied to classify reducing ability of antioxidant compounds. In this work, parameters such as kinetics of the reaction, wave length used in the test, temperature of test, and automation of the procedure are discussed. The test showed linearity in all standards used which indicated that the test is not concentration dependent. The wave length to be used in the test was found to be 595 nm and the use of temperature generally affected the first phase of the reaction. Automated procedure was applied and the results were obtained in less time and less chemicals, and cost. Kinetics of the test showed that different samples need different times to reach a point that the reaction order of the antioxidant is maintained. The choice of time to calculate the end point of the reaction is critical for classifying the antioxidant activity. Safe classification can be based only on results from kinetics research.

C10 Amylose in the Diet of Malaysian Endurance Athletes: Does Amylose Content Affect Glycemic Index of the Food?

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Over the past 20 years, research has clearly documented the beneficial effects of nutrition on exercise performance. Also, manipulation of the glycemic index concept in sports diets had been scientifically proven to improve sport performance. The blood glucose response to food is reflected by the glycemic index of the particular food. Previous studies had shown that the amylose content in a meal that is greater than 50% significantly reduces plasma glucose and insulin response. Besides, the ratio of amylose to amylopectin is inversely correlated with GI. Thus, this study was conducted to determine the amylose content of eight foods selected by endurance athletes of Malaysia and examine the relationship between the amylose content and GI. The food samples consisted of *nasi lemak*, fried rice, fried *bihun*, fried macaroni, sandwich, doughnut, curry puff and *roti canai* with dhal. Each sample was prepared based on a standard recipe (except for doughnut, *roti canai* with dhal and curry puff which were bought from 3 different locations) in duplicates from 2 different cycles providing a total of 4 replicates. Moisture, ash, crude protein and crude fat were analysed using proximate analysis whereas amount of carbohydrate was calculated 'by difference'. Total dietary fiber was analysed using AOAC 991.43 enzymatic-gravimetric method. The content of amylose and amylopectin were analysed using colorimetric method and calculated 'by difference', respectively. Results showed that *nasi lemak* contained the highest moisture (62.8 ± 0.04 g/100g) while sandwich contained the highest crude protein (11.31 ± 0.65 g/100g). The highest ash (1.93 ± 0.09 g/100g) and crude fat (17.47 ± 0.77 g/100g) content were depicted by doughnut. Besides, *roti canai* with dhal contained the highest total dietary fibre (3.89 ± 0.43 g/100g). *Roti canai* with dhal showed the highest ratio of amylose to amylopectin and amylose content (0.13; 11.75 %), followed by curry puff (0.12; 10.77 %), fried macaroni (0.11; 9.73 %), fried rice (0.10; 8.99 %), doughnut (0.09; 8.40 %), fried *bihun* (0.08; 7.72 %), sandwich (0.07; 6.34 %) and *nasi lemak* (0.06; 5.81 %). Pearson Correlation test indicated $r = -0.27$, $p = 0.515$ ($p > 0.05$) where the negative trend existed but there was no significant and strong correlation between the ratio of amylose to amylopectin to GI. It may due to the small sample size.

C11 Proximate Composition, Total Dietary Fibre & Amylose Content of 12 Selected Rice Products in Malaysia

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The study is a part of the research to determine the Glycemic Index (GI) values of rice commercially available in Malaysia. It is important to know the proximate composition, total dietary fibre and amylose content of the foods because these compositions may be useful in the GI study. Therefore, the objectives of this presentation were to determine the proximate composition, total dietary fibre (TDF) and amylose content of 12 rice products which will be used in the GI study. The 12 rice products tested were MRQ50, MR84, Q76, Pulut Siding, YTM10, YTM 16, two local white rice (LWR A and LWR B), one imported white rice (IWR C), fragrant rice (FR D) and two

specialty rice (SR E and SR F). This study showed that the range of total carbohydrate, protein, fat, ash and moisture were 75.00-79.98g/100g, 7.65-9.92g/100g, 0.03-2.32g/100g, 0.10-0.81g/100g and 10.76-13.50g/100g respectively. The range of TDF was 6.53-13.8g/100g with the lowest TDF content being found in FR D while the highest TDF content was found in YTM10. In addition, the range of amylose content was 4.10-28.06%. Based on amylose classification, the Pulut Siding and YTM16 could be categorised as very low amylose rice whereas the Q76, YTM10, IWR C, FR D and SR E as having low amylose content. In this study, the MRQ50 and SR F could be considered as intermediate amylose rice and the MR84, LWR A and LWR B as having a high amylose content. In conclusion, these findings should provide beneficial information for the determination of GI value of the selected rice.

C12 Antioxidative Activities of *Morinda citrifolia* L. Extracts in the Market

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Research was conducted on two commercial *Morinda citrifolia* extracts in the local market to evaluate their antioxidant activities. These commercial extracts are registered under National Pharmaceutical Control Bureau, Ministry of Health Malaysia, and mainly consumed for health reasons. Samples were coded with A1, A2, A3, B1, B2, and B3 based on different solvent and extraction temperatures. Antioxidant activities of ethyl acetate, methanol, and water extracts were determined using Ferric (III) Reducing Antioxidant Power (FRAP), and Ferric Thiocyanate (FTC) test. Total phenolic compound was also determined using Folin-Ciocalteu method. This study found ethyl acetate, methanol, and water extracts of sample A2 with extraction temperature of 60°C to contain the highest phenolic compounds at 149.3 mg TAE/100 g extract, 137.0 mg TAE/100 g extract, and 129 mg TAE/100 g extract respectively. Ethyl acetate extract of sample A2 was significantly different ($p < 0.05$) with other extracts. For FRAP analysis, antioxidant activities were compared with ascorbic acid, α -tocopherol, and BHA. Sample A2 with extraction temperature of 60°C showed highest Fe^{3+} reducing antioxidant power compared to other extracts and was significantly different ($p < 0.05$) from all samples except BHA and α -tocopherol. Analysis of FTC showed that ethyl acetate extract and methanol extract can slow down linoleic acid oxidation compared to the control sample. Effects of linoleic acid inhibition oxidation started at day 3 for methanol extracts and day 4 for ethyl acetate extracts. Ethyl acetate and methanol extract with extraction temperature of 60°C showed antioxidant activities comparable to BHT and α -tocopherol and had significantly different ($p < 0.05$) compared to other samples. In conclusion antioxidant activity of ethyl acetate was higher compared to methanol extracts, and 60°C extraction temperatures showed the highest antioxidant activities.

C13 Macronutrient Content in Kelantan Glutinous Rice-based Foods

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Kelantan Darul Naim is not only known for its varied culture but is also well-known for its unique local food heritage. This study was conducted to investigate the nutrient composition of local foods which are widely available and popular among the citizens of Kelantan. Proximate and mineral composition of 8 different traditional and popular Kelantan foods, made from glutinous rice, was evaluated. The foods were selected because of the frequency of consumption

by the people of Kelantan. Food samples for analysis were purchased from three different locations. The selected local foods were *pengat pisang*, *pulut dakap*, *pulut ikan kering*, *pulut inti*, *pulut lepa*, *pulut pagi*, *pulut pisang*, and *seri kaya*. Proximate analysis was done using the standard methods of AOAC (1990). The results of the analysis per portion of food samples showed that the average energy was 241.19 kcal, carbohydrate - 46.84g, protein - 3.04g, fat - 4.63g, moisture - 44.88g and ash 0.61g. In addition, analysis results of the 8 selected foods also indicated that the range of energy was between 107.98 to 421.41 kcal, carbohydrate between 22.57 to 67.02g, protein between 1.32 - 4.56g, fat between 1.38 - 15.01g, and moisture was between 29.4 - 63.93g. This analysis will allow the estimation of nutrient intake and subsequent investigations into the relationship between diet and health in the population of this area.

C14 Sucralose and Glycation

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Sucralose is a low-calorie sweetener, about 600 times sweeter than sugar and is used regularly by obese and diabetic people. Glycation is the non-enzymatic glycosylation resulting from the bonding of sugar to the protein molecule. The process involves the evolution of the molecules through a complex series of reactions: Schiff base, Amadori product, Millard reactions and lastly formation of Advanced Glycation End Product (AGEs). The AGEs present in food are known to constitute an added chronic risk for renal-vascular injury in diabetics. Sucralose products have been shown to cause in rats a reduction in beneficial fecal microflora, increased fecal pH, and enhanced expression levels of P-gp, CYP3A4, and CYP2D1; these are known to limit the bioavailability of orally administered drugs. As to how this happens is unknown till now but AGEs have been known to cause disturbances in the gut. Therefore we studied for the first time the effect of glycation of sucralose on a model protein such as insulin, in-vitro by measurement of fluorescence at Ex 360nm/Em 440nm specifically known for the measurement of the AGEs. Sucralose showed increased fluorescence compared to sucrose (table sugar), clearly indicating higher glycation for sucralose compared to sucrose and therefore more AGEs formation. Thus glycation may be the mechanism by which gastrointestinal disturbances may be caused. Therefore sucralose and sucralose containing food products that have replaced sucrose for their calorie restriction along with a higher degree of sweetness needs to be further investigated for safety and efficacy.

C15 Studies on the Antioxidant Properties of Tualang Honey

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Honey has been used since ancient times for its nutritional as well as curative properties. Tualang honey is collected from wild honey bees' nectar on the Tualang tree in the Malaysian rainforests. This honey has been used traditionally for the treatment of various diseases. Honey shows a wide range of antioxidant activities depending on botanical source and high correlations have been reported between antioxidant activity and colour as well as antioxidant activity and total phenolic content. The therapeutic efficacy of the honey is being suggested partly because of their antioxidant effect. To understand the antioxidant properties of Tualang Honey, it was irradiated

with gamma rays, and assays were carried out for its colour intensity, total phenolic content, antioxidant activity and anti-radical activity. The colour intensity at ABS_{450} was shown to be 489.5 ± 1.7 mAU; total phenolic content was 251.7 ± 7.9 (mg of gallic acid equivalent/Kg honey); total anti oxidant activity by FRAP assay was 322.1 ± 9.7 (μmol of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ Eq/L) and the anti radical activity by DPPH assay was 17.76 ± 0.34 (μgram of ascorbic acid Eq/ml). The results of this study demonstrate that the antioxidant properties of Tualang honey that has been gamma irradiated are similar to other types of honeys reported in the literature.

C16 Nutritional Value of Food Served in a Fully Residential School

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School meals are an important component in creating a healthy school environment because students especially those residing in hostels consume a large proportion of their total food and nutrient intake at school. The objectives of this cross-sectional study were (1) to examine the nutritional value of food served in a residential school in Kota Kinabalu, Sabah and, (2) to compare the nutrients provided in school meals with the Recommended Nutrient Intakes. Triplicate samples of all foods served on four week-days and one weekend day were weighed. Information on recipe, method of preparation, and portion size served were obtained from the caterer. Nutrient content was obtained from the Nutrient Composition of Malaysian Foods. Mean energy was 2199 ± 246 kcal/day (CV=11.2%) which was adequate for females but not for male students aged 13 to 18 years. Energy from carbohydrate, protein and fat was 59.0%, 16.7% and 24.5% respectively. The main sources of energy were white rice and flour products whereas protein was derived from animal sources. Food served provided 81.7% of RNI for energy. Provision of protein, vitamin A (calculated as total RE), and vitamin C exceeded the RNI values (145.1%, 371.8%, and 189.8%). Nutrients which did not meet the RNI were zinc (14.6%), calcium (48.6%), thiamine (77.1%), niacin (80.5%), riboflavin (93.6%), and iron (96.6%). Subjects ($n=163$; $m=68$, $f=95$) were asked to record food served which was discarded in one day. Vegetables, rice, beef and fish were the most frequently discarded items during lunch and dinner. Over these two meals, 67.5% of subjects discarded vegetables served, 24.5% rice, 4.3% beef and 4.3% fish. These findings show that there might be a need to review the school menu in order to achieve the RNI values; and food presentation or cooking method to encourage higher consumption levels, particularly of vegetables.

C17 Determination of Vitamins A, C and E in Organic and Inorganic Brown Rice MRQ74

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Rice (*Oryza sativa* L.) is the most important staple crop. Half of the world's population depends on this source for their calories. Organic rice is rice certified by an independent body, to have been grown and processed according to set 'organic' standards. The organic as applied to most field crops generally means that no synthetic or artificial chemical pesticides and fertilisers have been used. Soil fertility is maintained through natural processes. Brown rice is unmilled or partly milled rice, a kind of whole grain, a natural grain that remains unbleached. It has a mild nutty flavor, is chewier than white rice and becomes rancid more quickly, but is far more nutritious. Vitamin A, C and E in Organic and inorganic Brown rice MRQ74 were determined. Vitamin A, C

and E contents increased significantly ($p < 0.05$) for organic rice over 0, 3 and 6 months. But vitamins A, C and E in inorganic rice decreased significantly ($p < 0.05$) over 0, 3 and 6 months. These results indicate that vitamins A, C and E increase during storage only for the organic rice.



Poster Presentations

Group D: Clinical Nutrition/Intervention Trials

D01 Readiness to Change among Overweight and Obese Patients Attending Counseling Diet Sessions at Folks Clinic, Medical Centre of National University Malaysia

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The objective of this study was to assess readiness to change among overweight and obese patients. This study was carried out by interviewing new patients and follow-up patients aged 19 to 59 years who were overweight and obese and enrolled in counseling diet sessions. Readiness to change was assessed by three dietary behaviour algorithms for reducing fat intake, increasing fruit and vegetable consumption and portion size control. These algorithms categorised patients according to their readiness to change status which may influence their food intake. Food intake was determined through food frequency questionnaire which consisted of 126 food items. This questionnaire originated from Malaysian Adults Nutrition Survey (MANS) study and was validated. Back to back translation was done on three readiness to change algorithms. It was hypothesised that respondents who classified in action and maintenance of stages of change tend to consume less fat, had higher intake of fruits and vegetables and were able to control portion size. A total of 76 respondents (38 new cases and 38 follow-up cases) completed the study. Stages of change consisted of five stages which were precontemplation, contemplation, preparation, action and maintenance. Result showed no respondent in precontemplation stage while 7.9%, 71.1%, 5.2% and 15.8% were found to be in the contemplation, preparation, action and maintenance stages, respectively in the fat reduction stage of the change algorithm. In the increasing fruits and vegetables algorithm, percentage of respondents in precontemplation, contemplation, preparation, action and maintenance stages were 14.5%, 7.9%, 61.8%, 6.6% and 9.2% respectively. For portion control algorithms, the highest percentage of respondents reported in action stage, followed by maintenance stage (30.3%), contemplation stage (10.5%), preparation stage (9.2%) and precontemplation stage (2.6%). Fruits and vegetables intake was significantly higher among those in action and maintenance stages compared to other stages (465.40 ± 248.23 ; 329.23 ± 209.95 , $p < 0.05$). The association between portion control behaviour and portion control stages of change was significantly higher in new cases compared to follow-up patients ($p < 0.001$). Readiness to change may assist in identifying patients who are ready to change current behaviour and these patients could be guided to achieve a reduction in weight.

D02 The Effect of Intake of Dates on Nutritional Status and Health Parameters among Middle-aged Women

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Dates are an antioxidant source and contain a higher total phenol content compared to other fruits like apricots and grapes. A clinical trial for five weeks was carried out among 25 middle-aged women aged 38 to 54 years. Subjects were support staff recruited from UKM (KL) and Wisma FELDA and were divided into intervention group (13 subjects) who had been given dates and control groups (12 subjects). The objective of this study was to examine the effect of date intake on nutritional status and health parameters. Subjects were given 10 dates per day, that is, 70 dates per week. A compliance form was also given to them as a record for date intake. Subjects were interviewed to obtain data on socio-demographic and health status and also food intake using the diet history questionnaire and a semi-quantitative food frequency questionnaire. Anthropometric measurements included weight, height, waist hip ratio, body fat percentage and basal metabolic rate. Health parameters were assessed by fasting blood glucose (FBG) test while Perceived Stress Scale (PSS) was used to assess subjects' perception of stress. All the tests mentioned above were done at baseline and repeated at week three and week five except for anthropometry measurements and PSS that were measured at baseline and at week five. Results showed no significant difference in macronutrients, vitamins and minerals intake between the two groups. The mean intake of energy, thiamin, calcium, iron, niacin and crude fibre did not meet RNI requirements. Body mass index classification indicated that 50% of the subjects from the control group were normal compared to the intervention group where 53.8% were classified as overweight. Results showed a significant difference ($p<0.05$) in Body Mass Index and body fat percentage after five weeks for intervention groups. FBG test showed a significant difference between ($p<0.05$) and within ($p<0.05$) subjects from the two groups after five weeks. Score for PSS for both groups was higher than the reference group (from PSS test manual) after five weeks; the score could have been influenced by current incidents or life events that may cause stress. Data from this study is important as a reference for further research on the efficacy of dates as a healthy snack that simultaneously provides antioxidant protective effects to the body.

D03 Moderate Left Hydronephrosis, Developmental Delay & Failure to Thrive: a Case Study

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Failure to thrive is common in children. The term failure to thrive is applied to a serious condition of undernutrition and poor growth usually identified in the first three years of life. Hydronephrosis is dilation or stretching of the area of kidneys where urine collects that can occur when there is an obstruction of urine flow somewhere along the urinary tract, most often in the upper section. Most children with hydronephrosis are born with the condition although it can develop during childhood. Girl A is a 16-month-old child diagnosed with moderate left hydronephrosis and developmental delay. She was referred to the dietitian due to poor weight gain. Girl A had a low birth weight of 2.15 kg. She and her mother were referred to the Dietetic Clinic for nutritional counseling. Girl A's weight and height were less than the 3rd percentile compared to the NCHS growth chart for a 16-month-old girl. Her biochemical results were not

available. From her mother's 24-hour diet recall, the child's intake was deduced to be approximately 988 kcal per day which is less than her energy requirements. She is currently on bottle feeding formula and takes weaning diet in small amounts. The goals of the diet treatment are to provide energy and protein to sustain catch-up growth and development. Diet planning is 1200 kcal per day for catch-up growth, 21.2g protein per day and 1000-1500 ml fluid per day. Girl A needed supplements to support her growth. It was estimated that Girl A would be able to consume 924 kcal from her feeding formula, with the remaining 276 kcal been provided from the weaning diet. In 6 sessions of follow-up within 1 year, the weight had increased from 5.6 kg to 7.4 kg. Girl A also showed improvement in her calorie intake from 988 kcal per day to 1255 kcal per day. Different strategies were used to improve the oral intake of Girl A. The supplements were provided and at the same time Girl A was encouraged to take her weaning diet so as to increase energy intake which will provide her with calories to promote growth. The patient's tolerance to the supplement is good and her oral intake shows a monthly increase. She also showed improved weight throughout the intervention. Although her weight had increased, continuous home monitoring is important to maintain her body weight targeted at the 50th percentile.

D04 Changes in Lipid Profiles, Anthropometry, Serum Leptin and Sugar Levels among Obese Adults in a Weight Loss Programme

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The purpose of this study was to assess the lipid profile, anthropometric measurements, serum leptin and sugar levels before and after a 12-week weight loss programme among obese adults. A total of 67 participants who fulfilled the required criteria and certified fit to participate in the programme were selected. They were required to perform 30 minutes aerobic exercises in the morning and jogging for 2 kilometers in the evening. They were also on a low fat and low sugar diets during the entire 12-week programme. Anthropometric measurements, lipid profile, serum leptin and fasting blood sugar samples were taken before and after the 12-week programme. Total serum cholesterol and triglyceride levels were significantly reduced, whereas HDL level and cholesterol ratio to HDL LDL ($p < 0.004$, $p < 0.033$, $p < 0.001$, $p < 0.037$), were increased among the obese participants whose body weight had reduced during the 12-week intervention but the control participants showed no significant changes. BMI and body fat percentage were also reduced significantly as compared to the control group ($p < 0.001$). The leptin serum and blood sugar level ($p < 0.040$) ($p < 0.442$) also showed a reduction with the lowering of the body weight. Thus, a weight loss programme using a selective diet and exercise approach certainly had a significant impact on the changes to lipid profile levels, serum leptin, anthropometry measurements and reduction of serum glucose among obese adults.

D05 Level of Plasma Adiponectin in Malay Subjects and its Association with Metabolic Syndrome Risk Factors by Using International Diabetes Federation (IDF) Criteria

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Reduced adiponectin levels have been associated with metabolic syndrome risk factors but their inter-relationships are poorly explored in the Malay population. The aim of this study was to investigate the association of plasma adiponectin level with phenotypes of metabolic syndrome among Malay adults based on IDF criteria. A total of 43 Malay adults aged between 19-61 years were recruited from Kg. Tawang, Bachok. Risk factors of metabolic syndrome were defined from International Diabetes Federation (IDF) criteria. Waist circumference was measured using standard procedure while digital blood pressure (Omron, Japan) was used to measure blood pressure. Plasma triglycerides and fasting glucose were measured using routine biochemistry method (Randox, UK) and serum adiponectin was measured using a commercial Human Adiponectin ELISA (Millipore, USA). Serum adiponectin concentration ranged from 3.7 μ g/ml to 42.6 μ g/ml with a mean of 16.2 μ g/ml. The level is significantly ($P<0.001$) higher in female (18.8 μ g/ml) than in male (9.4 μ g/ml) subjects. Of all the tested parameters of metabolic syndrome, the adiponectin level was only significantly associated with waist circumference ($r=-0.4$, $P<0.05$). Among the five IDF metabolic syndrome criteria, plasma adiponectin was only associated with waist circumference; which is a principal tool to define metabolic syndrome. Adiponectin is also found to have sexual dimorphism. Prospective analysis with a larger sample size will be carried out to investigate further the implications of lower plasma adiponectin in males and the influence of other metabolic abnormalities to better classify metabolic syndrome.

D06 Breakfast Composition and Cognitive Function in 11- year-old Primary Schoolchildren in Kota Kinabalu, Sabah

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This intervention study examined the effect of different breakfast compositions, specifically the Glycaemic Index (GI) values on cognitive function among 11-year-old primary schoolchildren. Students ($n=58$; $m=23$, $f=35$) aged 11 years were recruited from SK Likas, Kota Kinabalu, Sabah. Using a randomised cross-over design, students were divided into 3 groups; 2 groups were assigned as treatment groups, which either received a high GI breakfast or a low GI breakfast, while the remaining group acted as a control. The study was conducted for 3 consecutive days with the groups swapped each day (each subject acted as their own control), and students were required to fast over-night throughout the study. Compliance to study protocol was determined by using a questionnaire. Height and weight measurements were taken when each group acted as the control while the treatment groups were given breakfast. Four types of cognitive tests were administered 30 minutes after consumption of breakfast. Each of the 4 tests assessed were: (1) executive function of attention; (2) short-term memory; (3) information storing and recall, and (4) memory processes. This study has found that consumption of a low GI breakfast significantly improved memory processes in 11-year-old primary schoolchildren ($p=0.002$). Scores for the executive function of attention, short-term memory and information storing and recall tests were better when subjects

consumed a low GI breakfast. However, the difference was not significant ($p>0.05$). The findings of this study indicate that it is important for both parents and canteen operators to prepare the right type of breakfast which is more beneficial for children's cognitive function.

D07 Iodine Deficiency Disorder (IDD) amongst Schoolchildren in Districts without Water Iodisation in Kedah

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Kedah was one of the states that implemented the programme on prevention and elimination of Iodine Deficiency Disorder. The use of water iodisation in schools has been the principle intervention strategy in selected districts in Kedah. The districts involved in water iodisation in schools are Baling, Sik and Padang Terap. The objectives of the study were to determine the prevalence of goiter amongst schoolchildren in districts without water iodisation and to determine the urinary iodine status amongst schoolchildren in districts without water iodisation. This survey involved schoolchildren aged 8 to 10 years in selected primary schools in districts without water iodisation. A cluster method was used to select 30 schools using a systematic random sampling technique. A total of 902 children were selected by systematic sampling. Goiter or thyroid enlargement was assessed by palpation. Urinary iodine concentration was used to determine the average iodine intake amongst schoolchildren. Prevalence of goiter amongst schoolchildren in districts without water iodisation was 3.0% (grade 1 and grade 2). There was a higher prevalence of goiter among female (3.6%) than in male students (2.3%). Prevalence was also highest amongst students aged 8 years (4.5%) compared to 2.6% amongst 9 years and 1.8% among 10 years. Median Urinary Iodine Concentration (mUIC) status amongst school children in districts without water iodisation were 72.6mg/L. Median Urinary Iodine Concentration (mUIC) was lowest in the district of Bandar Baru (48.5mg/L) followed by Pendang (63.9mg/L), Langkawi (64.7 mg/L), Kulim (66.6mg/L), Kuala Muda (75.3mg/L), Kubang Pasu (76.9mg/L), Kota Star (80.4mg/L) and Yan (87.8 mg/L). Median Urinary Iodine Concentration (mUIC) amongst females was 69.2mg/L compared to males 71.1mg/L. Median Urinary Iodine Concentration (mUIC) was lowest among 10-year-old students (68.9mg/L) compared with 9-year-old students (71.1mg/L) and 8-year-old students (78.0mg/L). In conclusion the prevalence of goiter in districts without water iodisation in Kedah are in the normal range (<5%). Based on WHO criteria on Urine Iodine Concentration (UIC), 72.6% of school children in districts without water iodisation are still suffering from mild to moderate iodine deficiency. This study showed that there areas that are still threatened with the IDD problem. It is recommended that iodised salt be used as an effective method of iodine supplementation.

D08 Quality of Life of Breast Cancer Survivors as Assessed by EORTC QLQ-C30 and -BR23 Questionnaires

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Evaluation of quality of life among breast cancer survivors is important in assessing treatment outcomes and planning health programmes to prolong survivorship after diagnosis of breast cancer. Therefore, this cross-sectional study was carried out to determine the impact of breast cancer diagnosis and its treatment on quality of life among breast cancer survivors. A total of 116 two-year post-diagnosis Malay subjects who were currently undergoing follow-up treatment were recruited prior to their medical consultation at Breast Cancer Clinic, Hospital Kuala Lumpur (HKL) and Universiti Kebangsaan Malaysia Medical Centre (UKMMC). They had completed all primary clinical treatment, that is, surgery and/or chemotherapy and/or radiation therapy. Established and validated self-completion questionnaires which are the EORTC QLQ-C30 and -BR23 were used to assess quality of life with minimum value 0 and maximum value 100. QLQ-C30 is used to assess health related quality of life of cancer patients while BR23 is meant for use among patients varying in disease stage and treatment modality. Anthropometric measurements were also taken using calibrated tools. The results showed that subjects' mean age was 50.6 ± 9.7 years. Mean body weight, height and body mass index of the subjects were 62.2 ± 12.3 kg, 1.5 ± 0.1 m and 26.4 ± 5.3 kg/m² respectively. The majority of the subjects were married (76.7%), had secondary education (53.4%), not working (51.7%) with mean monthly household income of RM2334.48 \pm 2293.97. Surprisingly, from the assessment of QLQ-C30 functioning scales, all functioning scales declined. Physical ($p=0.009$), role ($p=0.005$) and cognitive ($p=0.022$) functioning scores lessened significantly after 3 months follow-up compared to baseline which indicated a lower degree of functioning scales. On the other hand, global health status increased from the baseline to 3 months follow-up (mean score 72.13 vs. 71.12) although it was not statistically significant. For QLQ-C30 symptoms scales or items, all symptom scores increased except for financial difficulties. Scores of nausea and vomiting ($p=0.001$), dyspnoea ($p=0.003$), constipation ($p<0.001$) and diarrhoea ($p<0.001$) were significantly elevated after 3 months follow-up compared to baseline. This represents a higher level of symptoms. For the QLQ-BR23 questionnaire, functioning scales, body image ($p=0.123$) and future perspective ($p<0.001$) scores increased while sexual functioning ($p=0.009$) and sexual enjoyment ($p=0.018$) scores were significantly reduced after 3 months follow-up compared to baseline. As for QLQ-BR23 symptoms scales or items, there was a significant increase in breast ($p<0.001$) and arm ($p<0.001$) symptoms scores. However, the multivariate analysis revealed that overall quality of life was not dependent on their socio-demographic background, clinical treatment and stage of the disease. As a conclusion, physical and mental health as well as body image and sexual functioning deteriorated and failed to improve patients' quality of life after a two-year diagnosis of breast cancer.

D09 A Study on the Effectiveness of the Ministry of Health Malaysia's Food Basket Programme in the Rehabilitation of Malnourished Children in Kelantan

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The purpose of this study was to compare the effectiveness of the Ministry of Health Malaysia's current food supplementation programme for malnourished children (food basket) with the previous version through a comparative assessment of the nutritional status of children aged 1 to 5 years in Kelantan. The study was done on 97 children comprising recipients of the current food basket, whereas the control group comprised 101 recipients of the previous food basket. Nutritional status was assessed through anthropometric measurements, nutritional intake and a study of the composition of both the previous and current food baskets. Knowledge, attitude and dietary practices of parents or caregivers were also assessed. Anthropometric measurements demonstrated that the mean z-score of weight-for-age and weight-for-height had improved after intervention in both groups. Mean z-scores in the intervention group improved from -2.79 to -2.60 ($p < 0.001$) while the control group registered an improvement of -1.90 to -1.67 ($P < 0.001$). Z-scores for weight-for-age and weight-for-height also improved in the intervention and control groups respectively [(-2.69 to -2.50 ($p < 0.001$)) and (-1.73 to -1.54 ($P < 0.001$))]. However, there were no significant improvements in height-for-age in both groups. Comparison of anthropometric outcomes between both groups showed no significant differences in weight-for-age [0.019 (-0.06, 0.10)], height-for-age [0.09 (-0.21, 0.04)] and weight-for-height [0.04 (-0.9, 0.17)] at 95% confidence interval. Dietary intake of calories, protein, fat, vitamins and minerals exceeded the levels recommended by the Malaysian RNI. However, intake of calcium and vitamin A were below recommended levels. An assessment of food preferences revealed that respondents preferred sweet biscuits to family cereals. A significant difference was noted in the level of knowledge between the respondents in the intervention and control groups, taking their educational level into consideration. In general, respondents had a positive perception of nutrition. However, only 25% of respondents viewed the monitoring of their children's weight positively. Overall, this study revealed that there were no significant differences in the measured indicators between both groups. Food type was not found to be a major factor in the improvement of nutritional status. Malnourishment is caused by various socio-economic factors such as caregivers' nutrition knowledge, household income and household size. Cooperation with other ministries and non-governmental bodies may be essential in achieving better nutritional status amongst malnourished children.



Poster Presentations

Group E: Food Science and Technology

E01 Development of Herbal Seasoning for Cookies Production

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The herbal cookie is the alternative trend in the Malaysian population to consume herbs. Two types of herbs were selected namely *Zingiber officinale* (ginger) and leaves of *Citrus hystrix DC.* (lime kaffir). These two herbs were processed into powder form before formulation in the seasoning. The herbs were hot air dried at low temperature. The seasoning comprised fine sugar, corn flour and the herbs powder. The percentage of ginger and lime kaffir leaves powder in each herbal seasoning was 33% and 15% respectively. Sensory evaluation showed that cookies made from storage seasoning were still acceptable until the sixth month. The microbiological quality showed the seasoning to be in good microbial load with a_w ranging from 0.4-0.5 throughout the storage period.

E02 Effect of Different Commercial Baker's Yeast (*Saccharomyces cerevisiae*) on the Texture and Colour of White Bread

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Saccharomyces cerevisiae is well known strain of yeast that is widely used as a leavening agent in bread making and other related products. The activity of yeast in the fermentation process contributes significantly to the physico-characteristics of bread. This study was conducted to determine these effects by using different commercial baker's yeast available in the market around Klang Valley. Six different brands were chosen and coded as A (Saf-Instant), B (Gold-Pakmaya), C (Mauripan), D (Fermipan), E (Meriah) and (F) Nona. The sources of all samples had been identified to ensure that they come from different manufacturers. The formulation for bread making consisted of high protein wheat flour (100%) and other ingredients: yeast (1.5%), sugar (6%), salt (1.5%), water (63%) based on weight flour. Results showed that the highest L^* (Lightness) value for crust and crumb colour was sample F (Nona) with 69.17 and 73.04 respectively. The L^* value for crust showed that there was significant difference ($p < 0.05$) between sample F and other samples. For a^* (Redness) values, sample A give the highest value while sample F the lowest. For b^* (Yellowness) values, all samples had similar values; however there was asignificant difference ($p < 0.05$) between sample F and samples C, D and E. For crumb a^* values, there was no significant difference ($p > 0.05$) between samples B to F. While for b^* values, there was significant difference ($p < 0.05$) only between samples C and E. Bread texture was evaluated based on the crumb firmness and the crustiness of crust. Sample D give highest value while sample F lowest with 58.73gf and 32.97gf respectively for the crust. For crumb values, there was no significant difference ($p > 0.05$) between samples A and E, and between samples C and D. However, there was a significant difference ($p < 0.05$) between sample F and other samples. As a conclusion, the use of different brands of baker's yeast for bread making gave different effects on physico-characteristics of white bread although it is not very significant.

E03 Development of Serunding from African Catfish (*Clarias gariepinus*)

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This research was conducted to develop serunding from African catfish (*Clarias gariepinus*). Proximate analysis, physical analysis, ascorbic acid analysis, mineral analysis and sensory evaluation were carried out to determine the nutrient composition and consumer acceptance of the products. Four samples of serunding were prepared with 3 different sizes (30-40 cm, 40-50 cm, 50-60 cm) of African catfish and control was prepared using round scad fish (*ikan selayang*) with the same amount of fish flesh in each sample. The proximate analysis showed that there were significant ($p < 0.05$) differences between each sample in moisture, ash, protein and carbohydrate content but there were no significant ($p < 0.05$) differences in fat and crude fibre content. 'L', 'a' and 'b' values slightly decreased as the larger sizes of African catfish used in making serunding. It showed that the larger the size of catfish, the darker the colour of the serunding produced. Water activity (a_w) values in serunding ranged from 0.76 to 0.91. However, a_w values in serunding tend to increase when the larger sized African catfish was used due to high moisture and fat content. Ascorbic acid content in serunding ranged between 19.54 to 41.11 mg/100g and increased with use of the larger sized catfish. In mineral analysis, 4 minerals (magnesium, copper, iron and calcium) were detected in this African catfish serunding. Results showed no significant ($p < 0.05$) differences in copper and iron content. It was observed that the smaller the size (30-40 cm) of the African catfish, the higher the mineral content in serunding. Results from sensory evaluation by 50 untrained panelists showed an increased level of panel acceptance for colour, taste, mouthfeel and overall acceptance attributes with increasing size of African catfish used in the serunding preparation. However, the acceptance of the panel for aroma attributes inclined towards the control while the panel preferred the texture of serunding made from 40-50cm sized African catfish. Overall, each sample was well accepted by the panel but the larger-sized (50-60 cm) African catfish was the most preferred although it contained less nutritional value as compared to the small-sized African catfish.

E04 Physico-chemical Changes in Soybean Oil during Frying in Different Types of Fryers

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The objective of this study was to determine the physico-chemical changes of soybean oil during frying using aluminium and stainless steel fryers for household use. Frying was done 5 times continuously and oil samples were taken after each frying. Physico-chemical changes of frying oil were assessed by determining the peroxide value, anisidine value, iodine value and free fatty acid (FFA). Result showed that peroxide value, anisidine value and FFA increased, while iodine value decreased with increased frying numbers. This showed that oils deteriorated and oxidised during frying. Results for peroxide value, iodine value, FFA and anisidine value was found to be significantly different ($P < 0.05$) for each fryer used. The peroxide value, anisidine value and FFA increased and iodine value decreased faster in a stainless steel fryer compared to the aluminium fryer. Peroxide value after fifth frying in a stainless steel was higher (14.0 meq./kg) than in aluminium (11.6 meq./kg) while the anisidine value in aluminium was lower (6.1) compared

to stainless steel (7.4) after fifth frying. Iodine value in aluminium was higher (101.1) than in stainless steel (94.9). FFA (as palmitic) was 0.120% in aluminium fryer and 0.15% in stainless steel.

E05 Effect of the Addition of *Tairu* on the Microbial Count and Microstructure of Mango-flavoured *Dadiah*

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Dadiah is a fermented milk product which is very popular in Malaysia and Indonesia. The addition of *tairu* (a locally made Indian yogurt) will provide beneficial bacteria to the *dadiah* and give it probiotic properties. *Dadiah* samples were prepared according to the traditional procedure with some modification in order to maintain the viability of the probiotic bacteria. Sugar, salt and carragenan were heated with cow's milk at 80-90°C for 10 minutes and then cooled to 40°C. *Tairu* at 5% and 10% were inoculated into the *dadiah* to serve as starter cultures in order to provide 'good' bacteria to the end product. Mango puree was added to provide nutrients, flavour, colour and to promote the growth of probiotic bacteria. Samples were then freeze-dried to reach a moisture content of less than 5%; the samples were then attached on the SEM stub using a double-sided cellophane tape. Samples were also subjected to microbiological analysis. Micrographs for the SEM showed that the addition of mango gave a more compact structure. Addition of *tairu* showed the presence of air bubbles generated by the microorganisms present in the *tairu*. Some areas also showed the presence of large air cavities which increased in size as the percentage of *tairu* increased. Anaerobic count showed that the sample with 5% *tairu* had the highest amount of bacteria (4.0×10^7 cfu/g sample).



Poster Presentations

Group F: Experimental Nutrition

F01 Anti-diabetic Effect of *Etligeria elatior* Extract on Streptozotocin-induced Diabetic Rats

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Diabetes is a chronic metabolic disorder that continues to present a major worldwide health problem. The conventional pharmacological treatment for diabetes has a number of limitations and medicinal herbs are expected to have a similar degree of efficacy without the troublesome side effects related to conventional drug treatment. Thus, this study aimed to investigate the efficacy of *Etligeria elatior* (*E. elatior*) on streptozotocin (STZ) diabetic-induced rats. *E. elatior* was freshly bought from the local market in Serdang. Sprague dawley (150-200g) (N=30) rats were purchased and were isolated for a week prior to the STZ induction procedure. After a week of isolation, the rats were induced by STZ (55mg/kg body weight; in 0.1M citrate buffer, pH4.5). Rats with blood glucose >15mmol/L were included in the study and were randomly divided into 5

groups with each group containing 6 rats [diabetic control (DC), glibenclamide treatment (DG), with *E. elatior* aqueous crude extract 1000mg/kg body weight (DK1), *E. elatior* aqueous crude extract 500mg/kg body weight (DK2), *E. elatior* aqueous crude extract 100mg/kg body weight (DK3)] and a group of normal control. (NC). The *E. elatior* fresh aqueous crude extract was given daily to the rats (DK1, DK2 and DK3) by oral gavage method. The blood plasma was collected on day-0 and day-30 and sent for biochemical analysis. After 30 days of study, blood glucose of all groups increased except for group DK2. Rats in DK2 showed a significant ($p < 0.001$) decrement in blood glucose level by 47.9% compared to day-0 which was 15.63mmol/L. Besides, HDL-C also exhibited increment in all groups except diabetic and normal control, where DK2 also had amongst the highest increment with 39.3% from 0.61mmol/L on day-0, followed by DK1 (34.3%), DG (18.8) and DK3 (14.5%). Thus, *E. elatior* might have high potential as an anti-diabetic nutraceutical and further in-depth investigation should be carried out.

F02 Effect of Red Pitaya (*Hylocereus polyrhizus*) Juice Supplementation on Plasma Lipid Profiles in Diet-induced Hypercholesterolemic Rats

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Hypercholesterolemia is one of the major risk factors for cardiovascular disease. Epidemiological studies strongly suggest that fruits and vegetables consumption has been shown to lower cholesterol levels in hypercholesterolemic patients. The aim of this study was to evaluate the hypocholesterolemic effects of red pitaya (*Hylocereus polyrhizus*) juice supplementation on plasma lipid profiles of diet-induced hypercholesterolemic rats. This study was done using forty-eight Sprague Dawley female rats, divided into six groups ($n = 8$ for each group). Group 1 (NC) and Group 2 (HC) were negative and positive control groups. Meanwhile, Groups 3 (HPJ1), 4 (HPJ2), 5 (HPJ3) and 6 (HL) were given treatment with Group 3 (HPJ1) being supplemented with pitaya juice (0.1ml/250g bw/day), Group 4 (HPJ2) with pitaya juice (0.2ml/250gbw/day), Group 5 (HPJ3) with pitaya juice (0.3ml/250gbw/day) and Group 6 (HL) with Lipitor drug (0.083mg/250gbw/day). For 10 weeks, the rats in NC group were fed with basal diet, while HC and treatment groups (HPJ1, HPJ2, HPJ3, and HL) were fed with basal diet enriched with 1% cholesterol and 0.1% cholic acid. This study consisted of 2 weeks for adaptation, 2 weeks for inducing hypercholesterolemia, 4 weeks for treatment and 2 weeks for the washout period. For lipid profile analysis, 5ml fasting blood was drawn from cardiac puncture taken five times (weeks 2, 4, 6, 8, 10) during the study and was analysed using Chemical auto-analyzer (Hitachi). All data were analysed using SPSS version 15.0. The results showed that there was a significant decrease ($p < 0.05$) in mean body weight of each group. After 4 weeks of treatment, results showed that HPJ3 group supplemented with pitaya juice (0.3ml/250gbw/day) showed the highest percent reduction in TC (82.65%), TG (29.76%) and LDL-C (90.70%) which was significant ($p < 0.05$). Meanwhile, HPJ3 and Lipitor treatment (HL) groups showed a significantly ($p < 0.05$) higher percentage increase in HDL-C level, that is, 82.18% and 81.00% respectively as compared with other treatment groups. Comparing the effectiveness between pitaya juice and Lipitor treatment, no significant difference ($p > 0.05$) was found between the groups. The result reveals that both of the treatments showed a similar effect in increasing HDL-C and lowering TC, TG and LDL-C levels. Overall, the group with pitaya juice supplementation showed a significant difference ($p < 0.05$) in mean of TC, TG, LDL-C and HDL-C level compared to positive (HC) and negative (NC) control group after 4 weeks of treatment. In conclusion, pitaya juice supplementation gave positive effects on plasma lipid profiles in hypercholesterolemic rats that might be due to the bioactive components present in the juice such as antioxidants, phytochemicals

and dietary fibre. Therefore, pitaya juice may have an indirect health benefit in reducing the risk factors of cardiovascular disease as well as an alternative to consuming more fruits in the diet.

F03 Antioxidant Activity and Effects of Red Pitaya (*Hylocereus polyrhizus*) Juice Supplementation on Plasma Total Antioxidant Level in Diet-Induced Hypercholesterolemic and Diabetic rats

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An antioxidant is a substance that prevents or slows the breakdown of another substance by oxygen. Antioxidants work by neutralising highly reactive, destructive compounds called free radicals. Antioxidants have been touted to prevent cardiovascular disease, cancer, Alzheimer's disease, and decrease the effects of aging. The objective of this study was to determine the antioxidant activity and the effect of red pitaya juice supplementation on plasma total antioxidant level in hypercholesterolemic and diabetic rats using FRAP and DPPH methods. Forty-eight female Sprague Dawley rats were randomly assigned into six groups. Hypercholesterolemia was induced in five of the six groups of rats by feeding with a high cholesterol diet (1% cholesterol + 0.1% cholic acid). The groups were normal control (NC), hypercholesterolemia control (HC), hypercholesterolemia with 0.08, 0.17 and 0.25 ml/gbw/day pitaya juice (HPJ1, HPJ2, HPJ3) and hypercholesterolemia with Lipitor treatment 0.08 ml/gbw/day (HL). Another 48 female Sprague Dawley rats were randomly assigned into six groups (n=8/group) and 5 of the groups were induced with injection of streptozotocin to produce diabetic condition. The groups were normal (NC), diabetic control (DC), diabetic with 0.08, 0.17 and 0.25 ml/gbw/day pitaya juice (TA, TB, TC) and diabetic with glibenclamide treatment (10 mg/kgbw). The FRAP values of pitaya juice was 3.65 mM of FeSO₄, while the percentage of free radical scavenging activity was lowest in 0.1mg/ml (20.96%) and highest in 0.5mg/ml (63.17%). Results shows that the total plasma antioxidant levels increased significantly ($p < 0.05$) about 27.6% (HPJ1), 32.08% (HPJ2) and 39.4% (HPJ3) in the hypercholesterolemic group. In the diabetic group, the total plasma antioxidant levels also increased significantly, about 12.2% (TA), 29.19% (TB) and 31.18% (TC). HPJ3 group showed the highest increase in plasma total antioxidant level in hyper-cholesterolemic rat compared to the other groups. Meanwhile, the TC group showed the highest increase in plasma total antioxidant level for diabetic rats. There was no significant increase in plasma total antioxidant level in the NC and HC groups. This result indicated that increasing concentration of pitaya juice supplementation increased the level of antioxidants in plasma significantly. Therefore, this study suggests that supplementation of red pitaya juice regularly in the diet has the potential to reduce risk factors of cardiovascular disease in hypercholesterolemic and diabetics subjects.

F04 Postnatal Development of Rat Reproductive Organs Prenatally Exposed to Genistein

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Genistein is a phytoestrogen that occurs naturally in the diet and is found in a wide variety of plant-derived foods especially in soybeans and soy-based foods. The aim of this study was to determine effects of prenatal exposure to genistein on the development of male reproductive organs namely the testis, epididymis, seminal vesicle and prostate. Time-mated pregnant Sprague-Dawley (SD) rats were divided into two groups and treated by oral gavage with either Tween80 (control) or genistein at 10mg/kg body weight/day. Offspring were sacrificed at postnatal day 28 (P28). Prior to necropsy, body weight (BWt) and anogenital distance (AGD) were measured and gross morphology of external genitalia were examined. During necropsy, the offspring were fixed via perfusion technique using 4% glutaraldehyde solution. Organs were harvested and weighed prior immersion to fixative. The specimens were processed, cut into ultrathin sections and viewed using transmission electron microscope (TEM). Neither the control nor the treated group showed any abnormality in the external genitalia. There was a significant transient difference in BWt and AGD at P14 between the control and treated group which however normalised at P28. Ultrastructural features of the genistein treated testis showed an early sign of cell necrosis in the germ cells. There was also some degree of delay in the maturation process of the Sertoli cells. The epididymis, seminal vesicle and prostate gland of the genistein treated group were suggestive of impairment in its absorptive function. In this study, *in utero* exposure of SD rats to genistein from GD 10 through GD 21 did have an apparent effect on the development of male reproductive organs at prepubertal stage.



Poster Presentations

Group G: Other Topics

G01 Tracing UKM Nutrition Programme Graduates to Ascertain Curriculum Relevance

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The objective of this study was to investigate the curriculum relevance of UKM's Nutrition Programme by tracing its past graduates. This tracer study was conducted retrospectively to assess the study conditions and provisions these graduates experienced throughout the course and to identify the relevance of knowledge and skills taught. Questionnaires were distributed by email or posted to all UKM Nutrition Programme students who graduated between 2005 and 2007 (a 3-study year programme). The questionnaire consisted of 50 questions and was divided into 8 sections, that is, course of study at UKM, retrospective assessment of study at UKM, job search and

sequence of professional activities after graduation, current employment and work, job requirements and use of qualifications, relationship between higher education and work, socio-biographic data, and concluding comments. Of the 111 graduates who were contacted, 60 (10% male; 90% female) completed the questionnaire. At the first month after graduation, 40% of the graduates reported being employed. This percentage increased to 88.3% at 6th month post-graduation. Nearly half of the graduates (46.7%) agreed that the knowledge and skills acquired during the course were used to a great extent in their current work tasks. Elements of the study programme such as course content, opportunity for specialisation and work experience were very useful in their current job. In the graduates' opinion, the strengths of the study conditions and provisions at UKM were varied course content (39.7%), experienced lecturers (27.6%), opportunity to undergo industrial training (5.2%) and public speaking (5.2%), good reputation of the programme in Malaysia (5.2%), conducive study environment (3.4%), strong emphasis on thesis (3.4%), and exposure to conference (1.7%). On the other hand, weaknesses of the programme were, too theoretical and less practical course content (29.3%), mismatch of the curriculum with employment requirements (25.9%), limited facilities available (15.5%), outdated subjects and teaching methods (13.8%), limited use of English language (8.6%), and a course that was too short in duration (6.9%). Taking into account these weaknesses, some changes were suggested by the graduates, i.e. updating the syllabus so that the curriculum matches the requirements of the job market and allows more opportunities for public speaking (58.6%), increase the number of community projects and duration of practical training (32.8%), and improving facilities especially laboratory and library facilities (8.6%). This first tracer study among nutrition graduates has highlighted some invaluable data for considerations in curriculum review of any tertiary institution offering similar courses.

G02 Nutrition Information on Cancer Prevention on the Web. Is it Credible?

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The Internet has become an important medium for consumers seeking health information and health care services online. However, there is a concern on the quality of health information on the World Wide Web. There have been constant evaluations of cancer information on the web from medical perspectives; however, a similar exercise on nutrition is still lacking. Therefore, this study was conducted to assess the quality and accuracy of nutrition information on cancer prevention on the Web. This study consisted of three phases. The first phase was conducted by typing the keyword into Google search engine and if the website fulfilled the inclusion and exclusion criteria, the second phase proceeded to where general information of a website was assessed. This was followed by assessment of the accuracy of nutrition information based on World Cancer Research Fund/American Institute of Cancer Research (WCRF/AICR) 2007 cancer prevention guidelines (third phase). A total of 400 websites was evaluated for suitability as sample in this study. Only 100 websites were further assessed for quality and accuracy. Overall, 54% of the websites provided poor quality information, with 48% not providing the author's name, 57% not providing the author's information, all of the websites not updating their information regularly and 86% not having the Health on the Net (HON) seal. When assessed for readability using Flesch Reading Ease test, up to 44% of the websites were categorised as 'quite difficult'. With regard to accuracy, 91% of the websites had poor accuracy with only 10.3% adhering to the 10 recommendations by WCRF/AICR. Results revealed that the scoring of quality and the scoring of accuracy were significantly correlated ($r=0.250$, $p<0.05$). In conclusion, the quality of the websites on cancer prevention was not satisfactory and there is a great concern about the accuracy of information being disseminated.

G03 Relationship between Maternal Dioxins Exposure and Birth Weight among Mother-infant Pairs in an Industrial Area

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Dioxins, a group of chemical pollutants which are toxic, lipophilic and persistent to biodegradability, can be found widely in the environment. Dioxins enter the food chain and accumulate in human fat tissues. In a woman's body, dioxins can be transferred into the foetus and cause long term health effects such as cancer, developmental deficit and suppression of the immune system. A cross-sectional study was carried out to determine maternal exposure to dioxins and its relationship to birth weight in an industrial area in Kuala Langat, Selangor. A total of 138 respondents were selected based on predetermined inclusion and exclusion criteria. Dioxin concentration in the breast milk sample was used as the maternal dioxins exposure indicator. It was measured using the High Resolution Gas Chromatography-Mass Spectrometry (HRGC-MS) model Thermofinnigan MAT XL. Birth weight was measured immediately after delivery. Respondent's socio-demographic and residential environmental data were studied to determine the relationship with maternal dioxin exposure and the birth weight. The study found that the median of maternal dioxin exposure were 0.245 pg TEQ/g fat and ranged between 0.13 to 4.81 pg TEQ/g fat. Mean of birth weight was 3053 ± 437 grams and ranged between 1900 to 4100 grams. After controlling for confounders, this study found that maternal dioxin exposure was not the influencing factor of birth weight but body mass index ($b=0.024$, $p=0.004$, 95% CI=0.008; 0.040), gestational age ($b=0.059$, $p=0.015$, 95% CI=0.004; 0.113) and gender of infant ($b=0.185$, $p=0.011$, 95% CI=0.044; 0.326) were the important factors. This study concludes that maternal dioxin exposure occurs but at a low level and shows no effect on birth weight. As a preventive measure and for continued surveillance on infants and child health, monitoring of dioxin level in food and other environmental media should be continued.

G04 A Case Study of Food and Nutrition Policy in a Childcare Centre

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The objective of this study was to evaluate the implementation of a food and nutrition policy in a university childcare centre in Sydney, Australia. The policy aimed to ensure adequate intakes of safe, appetising and nutritious foods in an environment which supported learning activities for the children. Five implementation strategies were undertaken. First, healthy food and drinks were to fulfill at least 50% of the Recommended Dietary Intake of all nutrients for children. Secondly, a food handling safety and hygiene policy and food safety training for staff ensured a safe food supply. Thirdly, regular cultural activity days addressed social aspects of foods, introducing children to new foods and to cultural and geographical knowledge. Fourthly, the children were provided with opportunities to learn about food and nutrition through being involved in food preparation and gardening activities. Finally, some special strategies addressed important aspects

of health and nutrition. These included special attention to handling food and liquids for infants under one year of age, regular physical activity for physical, social and emotional growth and development of the children and prevention of childhood obesity, and assuring sufficient intake of iron and calcium-rich foods, moderate consumption of sugar and sugar-added foods and adequate consumption of water. Special dietary needs were addressed, such as omitting pork and nut products and managing food refusal in children. The centre's staff also encouraged positive actions by parents, for example by promoting breastfeeding for infants and eating breakfast for older children. An increased awareness of food and nutrition among the staff and parents, a more pleasant and enjoyable eating time, and the children's growing participation in various activities indicated that the policy has been implemented effectively. It was suggested that regular health checks be implemented to evaluate the effect of the policy to the children's physical growth and development.

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Upcoming Conferences

2010

4th Asia Pacific Nutrigenomics conference

“Genes, Diet and Gut Health”

February 21-26, Auckland, New Zealand

Contact: : john.walker@auckland.ac.nz

Joint Conference - 50th Cardiovascular Disease Epidemiology and Prevention - and - Nutrition, Physical Activity and Metabolism

March 2-6, San Francisco, California, USA

E-mail: scientificconferences@heart.org

Food Safety Education Conference

“Advancements in Food Safety Education: Trends, Tools and Technologies”

March 23-26, Atlanta, Georgia, USA

www.fsis.usda.gov/Atlanta2010

3rd World Congress on Controversies to Consensus in Diabetes, Obesity and Hypertension

May 13-16, Prague, Czech Republic

<http://www.codhy.com>

The First International Vitamin Conference

May 19-21, Copenhagen, Denmark

<http://www.vitamin2010.dk>

78th European Atherosclerosis Society Congress

June 20-23, Hamburg, Germany

4th Scandinavian Pediatric Obesity Conference

July 9-10, Stockholm, Sweden

<http://www.childhoodobesity.info>

XV International Congress of Clinical Nutrition

September 19-22, Sokhna Resort, Egypt

Contact: egcairouw@yahoo.com

American Dietetic Association Food and Nutrition Conference and Expo

November 6 – 9, Boston, USA

www.eatright.org

14th Asia Oceania Congress of Endocrinology

December 2-5, Kuala Lumpur, Malaysia

<http://www.aoce2010.com>

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Manuscripts must be submitted in English (British English).

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Hard copies (original plus 2 copies) of the manuscript should be posted to the mailing address of the Editor provided at the end of these Guidelines. A soft copy of the manuscript will be requested when the manuscript is accepted.

Manuscript

Manuscripts should be typed on ISO A4 paper (210 x 297mm), 12-point font Times New Roman, double-spaced and on one side of the paper. There should be a margin of 2.5 cm on all sides.

The title page should state the title of the manuscript, full first name and surname of each author, authors' departments and institutions, city and country. Also enclose the complete postal address, telephone number, fax number and e-mail address of the author who will be responsible for all correspondences regarding the manuscript.

An abstract not exceeding 250 words in length should be provided on a page of its own. Make sure the title of the manuscript is included in the Abstract page. Do not include names and other details of author(s) on the Abstract page. Provide up to 5 keywords for indexing purposes.

Introduction, Materials and Methods, Results, Discussion, Acknowledgements and References should follow with each section beginning on a fresh page.

Citations and References

Citations and references should follow the Harvard referencing system.

In the text, references are cited by the surname(s) of the author(s) and year of publication parenthetically at the appropriate place. Three authors appear in full on first citation, e.g. Bray, Whipp & Koyal (1994), but subsequently as Bray *et al.* (1994). For four or more authors, indicate the first author followed by *et al.*

In the Reference section, list the references in alphabetical order. For each reference, all authors' names should be included. Examples of correct forms of references are given below:

1. Journal

Name of the journal abbreviated according to the "World list of scientific periodicals". Do not place full stops between initials.

Chong YH, Tee ES, Ng TKW, Yap SB & Mok SK (1982). A study of the food intake and nutritional status of the armed forces. *Med J Malaysia* 37:46-51.

2. Books and Monographs

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