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Symposium 1: Holistic Approach to Nutritional Wellbeing (I)

National Plan of Action for Nutrition (NPANM) for Malaysia 2006 – 2015: an update

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The second NPANM has a ten-year time frame from 2006 to 2015. It was developed through workshops, discussions and dialogues that involved many government and non-government (NGOs) agencies, academia, professional bodies and the private sector. It was based on the National Nutrition Policy and a review of the NPANM 1996 – 2000. NPANM 2006 - 2015 aims to achieve and maintain the optimal well-being of all Malaysians. Many activities have been outlined under the 11 strategies of the Plan which require collaboration and commitment from various agencies. The Plan has identified nutrition indicators and set targets to be achieved by 2015. To ensure commitment, continuous cooperation and collaboration with all stakeholders, advocacy of the Plan has been carried out to several departments and agencies. The Nutrition Society of Malaysia (NSM) as a professional body plays an important role to ensure the success of NPANM 2006 – 2015 as well as achievement of its targets. Several activities and strategies in the NPANM 2006 – 2015 that require collaboration and commitment from NSM have been identified. This presentation will highlight the progress in the implementation of NPANM 2006 – 2015 and the role of professional bodies in achieving its objectives. The Ministry of Health is responsible for monitoring the implementation of all activities indicated in the Plan by various agencies. It is important that the Plan is implemented with the guiding principle of close multisectoral collaboration.

Holistic approach to nutritional well being: a medical perspective

Norlaila Mustafa

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The impact of nutritional factors on the aetiology of disease has been well studied. The medical consequences of deranged nutritional status such as obesity and anorexia are well established. Similarly, a wide range of diseases also have important impact on nutritional status but are not well acknowledged. Three components of nutritional status that interact within an individual are body and tissue composition (what we are), internal and external factors (what we eat) and capacity to utilise and metabolise nutrients (what we can do). Nutritional status can be affected via one or all of these components in a disease state. Deranged nutritional status can further worsen physical, mental and social health and reduce resistance to other diseases. Identifying and managing impaired nutritional status is mandatory to break this cycle in medical practice.

Behavioural changes to promote healthy eating: challenges in starting and maintaining change

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The promotion of healthy eating usually focuses on providing education on nutritional aspects of food and the behavioural aspects of eating. While nutritional aspects focus on knowledge acquisition, behavioural aspects focus on actual behaviour change in an individual. It has been widely recognised that behaviour change is a major approach to healthy eating, simply because eating itself is a behaviour. As such, eating healthily requires behaviour management techniques. This paper briefly presents basics of behavioural management with regard to healthy eating in view of weight management as well as special needs such as illness management and performance sports. The application of basic learning theories of behavioural psychology will be discussed in terms of motivational use in the promotion of healthy eating.

Exercise to promote nutritional wellbeing – the whys and the hows

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Exercise has been universally accepted to be the 'magical pill' to prevent and cure a series of diseases and musculo-skeletal injuries. This in turn influences a person's 'wellness' and functionality to be able to cope and enjoy his daily challenges. Ideally, one should have an acceptable level of all the components of physical fitness in a perfectly balanced ratio. Precise exercise prescription based upon sound principles will yield positive acute changes and long term adaptations. On the other hand, exercising without conforming to sound guidelines may not only be a wasteful effort but may invite injuries and serious physiological implications. The important factor is to design and implement a simple and practical programme for the individual to provide the proper amount of physical stress to attain maximal benefit at the lowest risk. The real challenge here is to 'convert the unconverted' to adopt exercise as a way life.

Symposium 2: Holistic Approach to Nutritional Wellbeing (II)

Talking nutrition: getting through to consumers

Stephen Tan

VersaComm Sdn Bhd

Malaysia's economic and social progress over the last 50 years has led to major improvements in the general well-being of its people. However, this does not in any way reduce or displace the need to continually educate the public about the fundamentals of healthy eating. The promotion of good nutritional care has to be intensified, considering the ever-increasing prevalence of diet-related chronic diseases. At the same time, there is cause for guidance, if not caution, to temper the public's appetite for fads and controversy.

While eager to enlighten the public, nutrition educators must realise that it is much more challenging nowadays to communicate effectively with consumers. Decades ago, it would have sufficed to merely 'push' simple messages to an unsophisticated and readily-receptive community. Today's consumers, however, are more educated, affluent and opinionated about health and nutrition. They are also surrounded by 'noise' – a daily cacophony of advertising, media content and the Internet. On top of that, they are busy, highly selective of what they choose to see, hear and do, and tend to be highly dismissive of things that fail to interest, please or gratify.

Failure by nutrition educators to regard these traits will lead to swift dismissal by the targeted consumers, poor outcomes, and waste of financial and human resources employed in the exercise (talk is no longer cheap). Therefore, serious consideration should be given as to whether a 'push', 'pull' or 'push-and-pull' approach is required. Clarity, tone and manner, level of complexity and contextual relevance are equally vital factors, not to mention, a profound understanding of what makes different people 'tick'. With good planning, structure, creative and empathetic execution, evaluation and persistence, we are more likely to succeed in touching the hearts and minds of consumers and thus get through to them.

Promote Nutrition Month Malaysia 2008

Tee E Siong

Chairman, Steering Committee, Nutrition Month Malaysia 2008

Many years of health education campaigns by the government and professional bodies have successfully created a respectable level of awareness among the public about the importance of good nutrition. However, we should not be satisfied with such successes. Diet-related chronic diseases are still prevalent at an alarming level and remain a huge challenge; there is still insufficient understanding of the role of nutrition in the causation and prevention of nutritional disorders. Stemming from the realisation that there is indeed a need for continuous efforts to provide more unbiased nutrition information to the public, Nutrition Month Malaysia (NMM) was initiated in 2002 and inaugurated on 13 April 2002. Hence forth, NMM has been observed in the month of April in the country for the past 5 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 Family Health Development 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 to be carried out, using a variety of approaches, to further raise the visibility of nutrition. It is envisaged that a burst of activities throughout the country during NMM will be able to further raise public awareness on the importance of healthy eating in maintaining health and wellbeing.

Different themes are 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

For the year 2008, the Steering Committee of NMM has decided to emphasise that there should be a holistic approach to nutritional wellbeing. Through the theme: Eat Right, Enjoy Life, we hope to remind consumers that healthy eating is essential and indeed possible in a fast-paced society, with hectic schedules and a challenging work-life balance. The activities shall kick off in early April.

Launching activities for NMM at the national level alone is definitely insufficient to achieve the desired effects. A few articles in the press, a few radio and TV shows or even a seminar are not going to yield a great impact. National level activities must be reflected in similar activities in all states in the country. The cooperation of all state nutritionists and health staff is necessary to effectively disseminate the intended messages to the community. Success of NMM activities requires the cooperation of all.

Much more remains to be done to achieve the intended goals of the project. It is a worthy project to continue to pursue. I do believe there are segments of the community who benefit from these activities. It is important to push on with the project and work towards improving the overall programme and coverage.

Dumbbell exercise and missile nutrition of a high-protein snack to prevent obesity as well as sarcopenia and osteopenia

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Human aging leads to total weight loss and increase in amount of total fat, accompanied by a decrease in muscle mass induced from lowered synthesis of protein in the body. The loss of body weight due to the aging of muscular proteins is accompanied by a decrease in aerobic metabolic activity. Resistance exercise such as weight training is required to maintain a suitable amount of muscle. Suzuki has developed the Dumbbell exercise in 1983. It is an appropriate exercise for middle-aged and old people because of its easy performance using very light dumbbell weighing 300g to 2kg. In addition, the dumbbell exercise has the resistance (anaerobic) effect to increase the amount of muscle and also the aerobic effect to increase metabolic rate producing aerobic energy in muscle. The Dumbbell exercise is composed of twelve motions and is repeated 15 to 20 times per set during 15 minutes or so. Several scientific papers have been published concerning the health benefit resulting from the Dumbbell Exercise. The most remarkable result is its influence on weight control. When the 20-min Dumbbell Exercise was performed everyday for 12 weeks, a decreased body weight and body fat while maintaining body fat weight was observed. The results are due to the increased basal metabolism and diet-induced thermogenesis (DIT). The Dumbbell exercise is also helpful in reducing the risk of health problems occurring in middle-age. Middle-aged people with metabolic syndromes such as obesity, hypertension, hyperlipemia, diabetes and myocardial disease demonstrated improvement in health problems after performing Dumbbell exercise for one year during the rehabilitation period. Increased bone mineral density was observed when old-aged (70-80yr) women performed Dumbbell exercise for 20min/day with treatment of vitamin D and calcium. The exercise is also helpful to reduce the development of anaemia by activating heme protein synthesis.

Although sarcopenia and osteopenia are multi-faceted phenomena, it is clear that only two aspects, namely resistance exercise and protein intake positively effect protein in turn over promo maintenance and/or increase of human muscular mass and bone mass. Using a sarcopenia and osteopenia-model in rat given glucocorticoid-injection, we have demonstrated that feeding of high protein and snack 3 hours after a major meal could prevent the loss of muscle mass and bone mass with a combination of voluntary tower-climbing resistance exercise instead of human dumbbell exercise. The snack markedly elevated plasma amino acid concentration above the base line, suggesting overflow of amino acids derived from the snack from small intestine and liver which could satisfy the amino acid requirement with pre-fed meal protein. In our human experiment, we have studied the effect of Dumbbell exercise at the peak period of plasma amino acid concentration after the high protein snack to elevate blood flow and a consequent increase of amino acids was observed in resistance training among men. Young female adults were fed a high protein snack (15g egg white protein and 15g sucrose) 3 hours after breakfast, and 30 minutes later

they carried out a 15-minute brown rice Dumbbell exercise consisting of 15 repetitions each of 12 exercises. Results were as follows: plasma concentration of glucose and insulin as well as amino acids were elevated after a high protein snack, and then decreased or the elevation was depressed by the Dumbbell exercise. Muscle blood flow increased during Dumbbell exercise. The skeletal muscle mass increased significantly after a one-month experiment with snack and Dumbbell exercise. The results suggest that Dumbbell exercise after a snack might contribute to enhance amino acid intake and protein synthesis in the muscle.

The Third National Health and Morbidity Survey (NHMS III) 2006: nutritional status of adults aged 18 years and above

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The Third National Health and Morbidity Survey (NHMS III) was conducted in 2006 to determine the nutritional status of a nationally representative sample of Malaysian adults aged 18 years and above. Body weight, height and waist circumference measurements were taken by trained health nurses according to a standard procedure (WHO, 1998). Body Mass Index (BMI) was determined among 33,055 eligible adults, while risk of abdominal obesity based on waist circumference (WC) was obtained from 32,900 individuals. In addition, peripheral muscle wasting was determined using calf circumference (CC) among 4,282 older individuals aged 60 years and above. The national prevalence of normal BMI (BMI 18.5-24.9 kg/m²) was 48.4% (47.7-49.0)*. The prevalence of underweight (BMI <18.5 kg/m²) was 8.5% (8.2-8.9), being higher in rural areas {9.8% (9.2-10.4)} than in urban areas {7.8% (7.4-8.3)}. Meanwhile, 29.1% (28.6-29.7) of the adults were overweight (BMI 25.0-29.9 kg/m²). Among the ethnic groups, Indians had the highest prevalence of overweight followed by Malays and Chinese. In addition, 14.0% (13.6-14.5) of the adults were obese (BMI ≥30.0 kg/m²). Women had higher obesity prevalence at 17.4% (16.7-18.0) than men at 10.0% (9.5-10.5). In terms of ethnic groups, Indians and Malays had higher obesity prevalence than other groups. By occupation category, housewives showed the highest prevalence of obesity at 20.3% (19.4-21.3). The prevalence of abdominal obesity (WC for women >88 cm and men >102 cm) was 17.4% (16.9-17.9), with women showing higher prevalence {26.0% (25.2-26.8)} than men {7.3% (6.7-7.6)}. The prevalence of older persons with peripheral muscle wasting (calf circumference for women < 27.3 cm and men ≤ 30.1 cm) was 19.9% (18.5-21.6), with a higher prevalence of men {23.7% (21.6-25.9)} than women {16.8% (15.1-18.5)} at risk of malnutrition according to this indicator. In comparison, the present national prevalence of underweight of 8.5% was three times lower than that (25.2%) reported in the NHMS II in 1996. In contrast, the prevalence of overweight has increased from 16.6% in the NMHS II to 29.1% in the present study. The latter is comparable with the finding of 27.4% reported in another nationally representative sample involving over 5,000 adults namely, the Malaysian Adults Nutrition Survey (MANS) conducted in 2003. It is noted that obesity prevalence

* following each prevalence percentage are figures for 95% CI within brackets

of 14.0% in this study and 12.7% in the MANS were approximately three times the level of 4.4% found in 1996 (NHMS III). This alarming trend calls for serious re-examination of public health programmes for more effective reduction of obesity among Malaysian adults.

The Third National Health and Morbidity Survey (NHMS III) 2006: Nutritional Status of Children Aged 0 to Below 18 Years

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Children constitute a vulnerable group and their nutritional status is a sensitive indicator of community health and nutrition. For the first time in its series, the Third National Health and Morbidity Survey (NHMS III) 2006 included assessment of nutritional status of a nationally representative sample of children aged 0 to below 18 years. Body weight and stature (length or height) measurements were taken according to a standard procedure (WHO, 1998). Data for a total of 22,032 eligible children was analysed using the NutStat (CDC 2000) software. Weight for age was determined for 21,249 children while height for age was obtained for 21,078 children. In addition, weight for height was computed for 12,526 children aged 0 - 13 years. The national prevalence of normal weight for age (WAZ \geq -2SD to $<$ +2SD) was 81.4% (80.8-82.0)*, height for age (HAZ \geq -2SD to $<$ +2SD) was 80.5% (79.7-81.2) and weight for height (WHZ \geq -2SD to $<$ +2SD) was 81.6% (80.8-82.3). The prevalence of underweight (WAZ $<$ -2SD) was 13.2% (12.6-13.9), being higher in boys at 14.5% (13.7-15.3) than in girls at 12.0% (11.3-12.7). The prevalence of stunting (HAZ $<$ -2SD) was found in 15.8% (15.1-16.6) of the children, being higher among boys {16.6% (15.7-17.5)} than girls {15.0% (14.2-15.9)}. Meanwhile, the prevalence of wasting (WHZ $<$ -2SD) was recorded in 10.4% (9.8-11.1), being comparable among boys {10.6% (9.8-11.5)} and girls {10.2% (9.4-11.1)}. Meanwhile, 5.4% (5.0-5.7) of the children were overweight (WAZ $>$ +2SD), the level being 6.0% (5.6-6.5) for boys and 4.7% (4.3-5.1) for girls. Prevalence of underweight and stunting in rural areas was higher at 16.0% (15.1-17.1) and 19.4% (18.2-20.6) respectively, compared to urban areas at 11.4% (10.7-12.2) and 13.5% (12.7-14.5). However, overweight prevalence was lower in rural children {4.0% (3.5-4.5)} than their urban counterparts {6.3% (5.8-6.8)}. In conclusion, the majority of Malaysian children were found to have satisfactory nutritional status. Nonetheless, underweight and stunting prevail especially in rural areas. There should be appropriate public health promotion and socio-economic improvement interventions to further reduce childhood under nutrition in line with the National Nutrition Policy.

* following each prevalence percentage, the figures within the bracket stand for 95% CI

Symposium 3: Young Investigators Symposium

Diet-related psycho-social factors associated with fat, fruits and vegetable consumption in adults

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There is consistent evidence that eating fruits and vegetables (F&V) and reducing fat intake reduce risks of major chronic diseases, including cardiovascular diseases and some cancers. The purpose of this cross-sectional study was to determine the relationship between diet-related psycho-social factors such as stages of change, self-efficacy, perceived benefits, perceived barriers and fat, fruit, and vegetable intake among 100 UPM staff. The sample comprised academic (29%) and non-academic staff (71%) with a mean age of 34 years. Data on socio-economic status, self-efficacy, and stages of change (SOC), perceived benefits and barriers to fat, fruit and vegetable intake were collected using a pre-tested interviewer-administered questionnaire. Dietary fat, fruit and vegetable servings were determined from two days of 24-hour diet recall data. The mean fat intake was 54.98 ± 22.72 g with 63% of the subjects consuming more than 30% of total calories from fat. The mean serving size for fruit and vegetables was 1.57 ± 1.79 and 2.04 ± 1.91 respectively. A significantly higher intake of fruit was observed in the academic group compared to the non-academic group ($t=6.441$, $p<0.05$) but not for fat and vegetable intake. Using the SOC algorithm, 11% and 7% of the subjects were in Stage I (Pre-Contemplation), for fat and F&V (combined) intake respectively, 6% and 1% in Stage II (Contemplation), followed by 68% and 40% in Stage III (Preparation), 1% and 34% in Stage IV and in Stage V, 14% and 18%, respectively. Fruit mean serving size increased from lowest in Stage 1 (0.8) and highest in Stage 3 (1.79). A similar trend was seen for vegetable intake. Self-efficacy for fat showed a decrease in fat intake from highest in the 'not confident' group (58.57 ± 24.8 g) to lowest in the 'very confident' group (50.15 ± 17.45 g). The mean number of fruit servings was similar across self efficacy levels but vegetable intake was highest in the 'somewhat confident' group (2.21 ± 2.44) and lowest in the 'not confident' group (1.87 ± 1.18). Frequent eating out was the highest barrier for fat reduction (42%) while the highest benefit for fat reduction was its potential to reduce the risk for chronic diseases (56%). For benefits of consuming fruits and vegetables, 60% agreed that both are good for health while 8% identified price and shelf life as the most important barriers. Persons with more perceived benefits consumed less fat and more fruits and vegetables. The perceived benefits were negatively associated with perceived barriers for fat intake ($r=-0.204$, $p<0.05$) while there was no association between perceived benefits and barriers with fruit and vegetable servings. In conclusion, psychosocial factors appear to influence fat, fruit and vegetable intake in this group of adults. Nutrition education programmes should focus on staging, increasing self-efficacy and perceived benefits while trying to reduce perceived barriers for effective change in diet related health behaviours.

Phytate, iron, zinc and calcium contents and their molar ratios in selected raw and prepared food commonly consumed in Malaysia

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Bioavailability is the ability of the body to digest and absorb the mineral in the food consumed. There are several factors that can influence the bioavailability of the food such as oxalate, phytate, acidity of intestinal environment, fibre and also competition with other minerals. The objective of this study is to estimate the inhibitory effect of phytate on the bioavailability of iron, zinc and calcium by measuring their molar ratios. A total of 30 food samples consisting of 12 rice and rice products, 5 wheat and wheat products, 5 grains and cereal based products and 7 different popular varieties of cooked rice and rice products and 1 cooked wheat and wheat products were selected. The samples were purchased from three different supermarkets and shops in Serdang, Selangor. The phytate content in food was analysed using the anion-exchange chromatography followed by spectrophotometry whereas iron, zinc and calcium contents were analysed using atomic absorption spectrophotometry. One-way ANOVA test was used to statistically analyse the mean difference between the phytate and mineral contents and their molar ratios between the food samples. The lowest phytate content in food sample is chicken rice (0.210 ± 0.073 mg/100 g) whereas Quaker Oats has the highest phytate content (19.746 ± 0.985 mg/100 g). The food sample that has the highest content of iron is Quaker Oats (3.567 ± 0.120 mg/100 g) and the lowest is chicken rice (0.123 ± 0.003 mg/100 g). For zinc content, the food sample that has the highest values is Quaker Oats (2.940 ± 0.049 mg/100g) and the lowest is fried kueh-teow (0.126 ± 0.002 mg/100g). The food sample that has the highest calcium content is Cookie Crisps (203.616 ± 16.680 mg/100g) whereas the lowest is kueh-teow (0.262 ± 0.007 mg/100g). Generally results show that the cooked products mostly have lower content of phytate and minerals as compared to the raw products. This could be due to the cooking method that could have influenced the phytate and minerals content in the food. Of the 30 food samples, 24 foods have a phytate/iron ratio > 1.00 , 2 foods had phytate/zinc ratio > 15 and 22 foods had phytate/calcium ratio > 0.24 . This results show that although many foods analysed have high mineral content, they also contain high phytate that may impair the bioavailability of minerals in the body.

Antioxidant properties (components and capacity) in fresh, powder and fibre products prepared from *bacang* (*Mangifera foetida*) fruits

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Mangoes are a good source of dietary antioxidants such as ascorbic acid, carotenoids and phenolic compounds. This study was aimed at investigating the antioxidant capacity, total reducing activity, flavonoid, carotenoid and ascorbic acid contents of fresh mango, mango powder and mango fibre prepared from *bacang* (*Mangifera foetida*) fruits. The antioxidant capacities of the mango extracts were determined using Ferric Reducing Antioxidant Power (FRAP), Trolox Equivalent Antioxidant Capacity (TEAC) and β -carotene bleaching assays. One-way ANOVA and Turkey HSD tests were used to analyse statistically the mean differences in antioxidant properties among the fresh mango, mango powder and mango fibre. Pearson correlation test was used to analyse the correlation among the studied components at the significant level of $P < 0.05$. The range of antioxidant capacity as determined by FRAP, TEAC and β -carotene bleaching assay was 852.8 ± 49.2 to

2000.8 ± 112.6 µmol Fe(II)/100 g edible portion (EP), 558.1 ± 78.2 to 960.8 ± 0 µg Trolox/100 g EP and 59.7 ± 1.7 to 92.2 ± 5.7 % respectively. On the other hand, total reducing activity, flavonoid, carotenoid and ascorbic acid content in the mango extracts were in the range of 122.8 ± 1.8 to 199.8 ± 5.3 mg GAE/100 g EP, 493.5 ± 33.5 to 2360.7 ± 45.7 mg catechin/100 g EP, 96.5 ± 7.6 to 153.0 ± 2.9 µg β-carotene/100 g EP and 29.4 ± 0 to 59.4 ± 0 mg ascorbic acid/100 g EP respectively. Based on one-way ANOVA test, the antioxidant capacity, total reducing activity, flavonoid, carotenoid and ascorbic acid content were significantly different ($P < 0.05$) among all mango extracts. The FRAP and TEAC values were in the order of fresh mango > mango fibre > mango powder whereas for β-carotene bleaching assay, the order was mango fibre > mango powder > fresh mango. Total reducing activity, flavonoid and carotenoid content in mango extracts were in the order of mango fibre > fresh mango > mango powder while the ascorbic acid content in mango extracts was in the order of mango fibre > mango powder > fresh mango. Pearson correlation coefficient showed that there was a positive strong and significant correlation ($r > 0.8$) between FRAP assay with TEAC assay, total reducing activity, flavonoid and carotenoid content. Also, a strong and significant correlation ($r = 0.95$) was observed between β-carotene bleaching assay and ascorbic acid content. This study indicated that mango fibre possessed the highest antioxidant properties compared with fresh mango and mango powder.

Comparison of risk factors of Diabetes Mellitus type 2 between vegetarians and non-vegetarians in Kulim, Kedah

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The objective of this study was to compare the risk factors of Type 2 Diabetes mellitus between vegetarian and non-vegetarians aged 30 years and above in Kulim, Kedah. Socio-economic status, family history, anthropometric measurements, blood pressure, blood glucose, blood cholesterol, dietary intakes and physical activities were measured. Data was analysed by using Statistical Package for the Social Science for Window (SPSS) version 15.0 and the test used was Student t-test. Two days of 24-hour dietary recall data were assessed using a computer dietary analysis software program (Nutritionist-pro). Subjects consisted of 50 vegetarians (mean age: 46.8 ± 12.2 years) and 50 non-vegetarians (mean age: 55.8 ± 10.5 years). The mean monthly household income was RM2569.0 ± RM166.2 and RM 2111.2 ± RM 1257.3 for vegetarians and non-vegetarians, respectively. The mean total years of education was 9.2 ± 4.2 for vegetarians and 7.6 ± 2.6 for non-vegetarians. Most of the vegetarians were still working while most of the non-vegetarians were already retired or were housewives. There were less family members with history of diabetes in vegetarians than among non-vegetarians. Mean BMI for vegetarians was 22.98 ± 4.1 kg/m² whereas mean BMI for non-vegetarians was 22.99 ± 4.3 kg/m² and the difference was not significant. Mean body fat percentage was 28.0 ± 8.9% for the vegetarians and 28.5 ± 7.4% for non-vegetarians; the difference was not statistically significant. Body mass index (BMI) and body fat percentage did not differ by dietary pattern. The mean blood glucose level was 4.76 ± 1.02 mmol/L and 5.50 ± 1.24 mmol/L for vegetarians and non-vegetarians respectively, and it was significantly different ($p < 0.01$). The mean of blood cholesterol for vegetarians was 4.46 ± 0.82 mmol/L whereas for non-vegetarians, it was 6.22 ± 1.02 mmol/L; this difference was statistically significant ($p < 0.001$). Mean systolic blood pressure of non-vegetarians was 129.6 ± 23.3 mmHg compared to 140.5 ± 21.6 mmHg for vegetarians and these were also significantly different ($P < 0.05$). The mean diastolic blood pressure was 85.1 ± 12.0 mmHg and 89.3 ± 11.8 mmHg for vegetarians and non-vegetarians, respectively. There was no significant difference in diastolic blood pressure between the two groups. There was no significant difference observed for total energy and iron intake. However, vegetarians had a significantly lower intake of protein ($p < 0.001$), dietary fat ($p < 0.05$), cholesterol ($p < 0.001$) and

saturated fat ($p < 0.01$) than non-vegetarians. A significantly higher intake ($p < 0.05$) for carbohydrate, fibre, vitamin A, vitamin C and vitamin E was found in vegetarians compared to their counterparts. Examples of protein sources for vegetarians were *tau-kua*, *tau-hoo*, soya milk, lentils, peanut, broccoli and vegetarian meat-substitute. The total METs of physical activities was not significantly different between two groups. The mean total METs was 688.3 ± 1913.1 METs and 414.8 ± 664.6 METs for vegetarians and non-vegetarians, respectively. Therefore, the risk factors that were present in non-vegetarians but not in vegetarians were high blood glucose level, high blood cholesterol, high blood pressure, high fat intake, high saturated fat, high cholesterol intake and low fibre intake. Further studies with larger sample size should be carried out to further study the potential of a healthy vegetarian diet towards reducing risk of developing type 2 diabetes mellitus.

Symposium 4: Food innovations to promote nutritional wellbeing

Probiotics for infants and young children

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The intestinal microflora has an important impact on life and has important implications for health in every human being. Probiotics are live micro-organisms that might have, after consumption in specific quantities, an impact on human health. The mechanisms by which probiotics confer their health effects in general terms will be discussed. Specific reports on the probiotics *Bifidobacterium animalis* and *Lactobacillus paracasei* consistently contain statements that both short-term and long-term feeding of these probiotics to children aged 1-3 years, infants aged 0-12 months, and even to pre-term infants is not associated with differences in growth, stooling/defecation patterns, behavioural aspects or history of illness compared to control groups. With regard to beneficial clinical effects with probiotics in general, the consistent and world-wide emergence of data that indicate beneficial clinical effects of some probiotic strains like *Bifidobacterium animalis* and *Lactobacillus paracasei* in infants and children cannot be ignored. Especially their potential benefit in preventing or ameliorating gastrointestinal inflammation and diarrhoea appears to be a realistic notion. First, inflammatory effects should translate into enhanced immunity, diminishment of existing unresponsive inflammation and correction of existing immunological defects. Second, enzymatic activities of probiotic bacteria might correct functional deficits induced by infectious diseases. Although it is unclear what the relevance is at this moment in time, some probiotics strains clearly show immune modulating effects in infants.

Beneficial effects of prebiotics on intestinal flora and infant's immune system

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The intestinal flora of breast-fed infants is dominated by bifidobacteria and there is increasing recognition that this contributes to a relative protection against infection and tolerance induction to potential allergens. Formula-fed infants develop a more adult-like mixed-type flora. Although human milk oligosaccharides are very heterogeneous and specific structures can bind to pathogenic bacteria, it has become clear that they also have a universal prebiotic function. This was key to developing a prebiotic concept for artificial infant nutrition with the aim of simulating structures of human milk oligosaccharides. Our concept is based on galacto-oligosaccharides derived from lactose and long-chain fructo-oligosaccharides fractionated from inulin. It was designed for optimal efficacy over the full length of the gastrointestinal tract and to be free of side effects. It has been researched in model studies and in more than 12 independent clinical trials. It was demonstrated that the prebiotic mixture had indeed the expected effects on increasing bifidobacteria and lactobacilli, reduction of potential pathogens, lowering faecal pH and supporting acetate production upon fermentation. Tissue co-culture studies suggested that particularly acetate as a colonic fermentation product supports mucin production. There was also an effect towards a softer stool consistency. Mechanistic studies revealed that the specific prebiotic mixture supports the Th1 directed immune system because of a stimulation of the vaccination response. In similar model studies it was also found that the prebiotic mixture down regulated the Th2 directed immune system as a reduction of allergenic response was found. Results from clinical studies support these findings. Infants obtaining a formula with the specific prebiotic mixture have an earlier and increased intestinal secretory IgA production and two independent clinical trials reveal a reduction in upper respiratory tract and/or intestinal infections. This effect on reduction of infection was persistent at follow-up investigation at the age of 24 month, suggesting that optimal expansion and education of the immune system in the first year of life has long term beneficial effects. The amount of evidence, now extensively published in peer-reviewed journals, allows the claim for our specific prebiotic mixture: "helps to improve the intestinal immune system". In addition to the research in formula-fed infants, the prebiotic mixture was also investigated in studies with older infants using solid foods, in toddlers, in pregnant women, in elderly and in immune-compromised patients. In all these target groups, the prebiotic and bifidogenic characteristics have been confirmed.

The role of inulin and oligofructose in child nutrition: from birth to adolescence

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Establishment of the intestinal flora soon after birth plays a crucial role in the development of the innate and adaptive immune system. In normal circumstances, the newborn baby is inoculated by the mother's flora when passing through the birth canal. In the gastrointestinal system of breast-fed babies bifidobacteria are soon selected and become predominant. Oligosaccharides in breastmilk are substrates for bifidobacteria. This favorable situation remains until weaning. The introduction of formula or solid food immediately leads to diversification of the flora. Human milk is protective against atopy and infections. The aim of restoring a Bifidus predominance in the

infant's intestinal flora is to counteract the current rise of allergic diseases and to protect against gastro-intestinal infections.

Inulin and oligofructose have been used in infants and children because of their prebiotic potential to modulate the intestinal flora and influence the innate and adaptive immune response favorably. A mixture of long chain inulin HP in combination with galacto-oligosaccharides (3-7 monomers) has been added to infant formula in Europe for over 5 years. Clinical studies have demonstrated that these prebiotic formulas have significant effects on flora composition and metabolism, improve stool consistency, and reduce the incidence of gastrointestinal and respiratory infections. In a new study with 100 infants, the supplementation of a term formula with oligofructose-enriched inulin (Synergy1) at 0.4 g/dl and 0.8 g/dl for 4 weeks was well tolerated, allowed for normal growth and significantly improved stool frequency and had prebiotic effects.

The role of whole grain intake in human nutrition

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The objective of this paper is to review the role of whole grain intake in human nutrition. A whole grain is defined as the entire edible grain of cereals and related Gramineae, and other generally accepted grains. Whole grain foods generally provide more vitamins, minerals and fibre than their processed equivalents. Numerous population studies have found a positive association between whole grain consumption and a lower incidence of many chronic diseases such as heart disease, obesity, cancer and type 2 diabetes. Approved health claims in the UK, US, Chile and Sweden encourage the consumption of whole grain foods because of their known health benefits. While the mechanisms behind these effects are not yet fully understood, it is thought that they may be due to the combination of fibre, resistant starch, micronutrients and other bioactive substances found in whole grains. Whilst many countries encourage whole grain consumption in their national dietary guidelines, to date only the United States has a quantitative recommendation to consume at least three servings (48 g) of whole grain foods each day. Intakes amongst most populations remain low (for example, amongst British adults the average whole grain intake is 0.4 servings/day, so steps are needed to encourage people to eat more whole grains.

Fruits and vegetables: the link with diseases

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Dietary recommendations continue to stress that eating more servings of fruits and vegetables (F&V) is extremely important for good health. WHO estimates that low intake of F&V is responsible for up to 2.6 million deaths worldwide. The estimated intake levels of F&V varies considerably around the world with most populations falling well short of the WHO recommendation of 400 grams per day. The risk of chronic diseases including cardiovascular, Alzheimer's, cancer and obesity may be reduced by simply increasing consumption of F&V. Drinking fruit juice is one approach to increasing one's intake. As well as contributing to daily fluid intake, fruit juices can provide a valuable source of important vitamins, minerals and phytonutrients, including antioxidants. Research has been done to quantify the antioxidant capacity of various juices and identify specific components of juice that provide various health benefits. Processing techniques can also increase the level of phyto-nutrients delivered relative to pure fruit. Consumption of fruit juice has been shown in some studies to have cancer protective effects via probable mechanisms

including a decrease in oxidative damage. In addition, convincing evidence from clinical and epidemiological studies indicate that fruit juice consumption reduces cardiovascular disease risk. Emerging evidence has also indicated that consumption of fruit juice may lower the risk of Alzheimer's disease. Even though there is convincing evidence regarding the health benefits of juice, some studies have suggested a connection between fruit juice consumption and obesity, particularly with children; however no casual link has been shown. Overall, encouraging consumption of F&V including fruit juice can play a preventive role in decreasing the risk of numerous diseases as well as delivering essential nutrients.

Symposium 5: Nutrition Potpourri

The changing culture of infant feeding practices: experiences of a rural community

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Studies have shown the importance of nutrition not only for good health but also for the growth and development of children. This ethnographic study aims to describe the changing culture of infant feeding practices of a rural community. Triangulation methods of data collection were used, including sessions of interviews, participant observations and reviewing of documents. This study was conducted in three rural villages in Sarawak. The NuDIST software was used to analyse data.

This study highlights several issues concerning infant feeding practices. Cultural beliefs have influenced the feeding practices during infancy. In the early days, breastfeeding has been the practice. However, an infant is usually weaned at an early age to supplement breast milk. The changes in feeding are due to several factors. Bottle milk came to the rural communities in the late 50s and cereal in the 70s. Although most mothers gave breast milk to their infant, the duration of breastfeeding and exclusive breastfeeding has declined. Mothers and/ mother-in-laws, friends and peers, mass media as well as community health nurses have a strong influence in infant feeding practices. There is a need for policy makers to continue advocating breastfeeding during infancy.

All that sunshine and yet a low vitamin D status

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Vitamin D is required for bone development and maintenance in adults as well as for the prevention of osteoporosis and fracture in the elderly. The aim of the study was to assess the vitamin D status of young (n=105) (aged 20-30 years) and elderly (n=100) (aged >65 years) women in the capital city of Kuala Lumpur. Serum 25-OH vitamin D status was measured using Diasorin Liason platform while bone mineral density (BMD) was measured using dual energy X-ray absorptiometry (DEXA) (Hologic Inc., Waltham, MA, USA). Vitamin D status of young women

(73.3 ± 20.4 nmol/L) was significantly higher than in elderly women (45.3 ± 16.9 nmol/L) ($p < 0.01$). There were 28.0% elderly female adults with serum 25-OH vitamin D in the range of 50 - 100 nmol/L (defined as hypovitaminosis D) and 69.0 % with levels in the range of 25 - 50 nmol/L (defined as vitamin D insufficiency) compared to 84.8 % and 6.7 % young female adults respectively. Parathyroid hormone levels, however, were not elevated in any of the subjects. The prevalence of osteopenia and osteoporosis in elderly women was 46% and 11% respectively in the spine, and 9% and 1% respectively in the hip, compared to 15.2% osteopenia at the spine, and 2.9% osteopenia in the hip for young women. Osteoporosis was not present in the young women. Vitamin D status correlated negatively with age ($r = -0.59$, $P < 0.01$) and body fat ($r = -0.47$, $P < 0.01$) and positively correlated with bone mineral density (BMD) at the spine ($r = 0.56$, $P < 0.01$). The study found that despite being a country which receives sunshine all year round, there was still a relatively high prevalence of low vitamin D status and low bone mineral density amongst both young and elderly adults in Malaysia.

Preliminary study on factors contributing to obesity among married women – a qualitative approach

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A case study approach using in-depth interview as the primary data collection was utilised in this study to explore factors that contribute to obesity among Malay women ($BMI > 30 \text{ kg/m}^2$) in Hulu Langat, Selangor. Ten married women aged between 25 to 50 years old were interviewed at their homes and workplace. This study also explored coping mechanism anchored by these women in dealing with the obesity problem and other related issues such as treatment for obesity, support received from the spouse and the respondents' perceptions towards obesity, image, exercise, stress and healthy eating. Results from the interviews that was analysed using NVIVO revealed interesting emerging themes. Poor dietary habits and sedentary lifestyles were the main salient themes which were seen to be the major weight gain contributors. Physical, psychological and social environmental factors were the overriding themes generated as to the causes of weight gain among the Malay married women in Hulu Langat. The interpretation of the qualitative data provides a unique opportunity to shed light on the factors that contribute towards obesity among the married women.

The effects of a 12-week low glycemic load diet based on low glycemic index foods in overweight/obese children

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The objective of the study is to evaluate the effectiveness of a 12-week low Glycemic Load (GL) diet intervention based on low Glycemic Index (GI) foods on body weight, body composition, metabolic risk factors and satiety in overweight/obese pre-pubertal children. 13 healthy, 11.46 ± 1.94-year-old, Caucasian, pre-pubertal overweight/obese ($BMI = 28.38 \pm 5.86 \text{ kg/m}^2$) children participated in low-GL diet intervention; was based on the replacement of at least 50% of the high

GI foods with low-GI foods and participation in weekly nutrition consultations. Dietary changes were made based on weekly 4-day food-diaries.

Despite no change in body weight (BW), there was a significant ($p < 0.05$) reduction in BMI (28.38 ± 5.86 vs. 27.09 ± 6.2 kg/m²), fat mass (26.02 ± 12.8 vs. 23.64 ± 12.8 kg) % body fat (36.82 ± 6.1 vs. 33.81 ± 7.4), waist circumference (WC) (95.73 ± 14.01 vs. 90.76 ± 14.26 cm), hip circumference (97.23 ± 13.37 vs. 93.34 ± 18.80 cm), thigh circumference (59.08 ± 7.9 vs. 56.80 ± 8.1 cm), fasting blood glucose (4.85 ± 0.24 vs. 4.46 ± 0.31 mmol/l) and insulin (18.51 ± 7.80 vs. 12.30 ± 6.44 mU/ml). There was a significant decrease in self-reported hunger level (3.46 ± 0.92 vs. 1.51 ± 1.11). There was a strong correlation between BW and WC ($r = 0.97$), after the study ($p < 0.05$). The 12-week low-GI diet consultations significantly reduced BMI, percent of body fat and body fat mass, waist-, hip, thigh circumferences; fasting glucose, insulin and hunger levels, cardiovascular risk factors in overweight/obese children and showed practical, effective approach to treat obesity in children.

The challenge of measuring physical activity

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Measuring physical activity accurately and reliably is essential when physical activity is either an intervention or an outcome measure. Measurement of physical activity in population groups has been undertaken in a number of ways, including self-report, observation, heart rate measurement and activity monitors. The strengths and weaknesses of each of these methods will be reviewed. The measurement of physical activity in children is an additional challenge and data from the recently completed pilot study of the *Kajian Aktiviti Fizikal dan Sukan Pelajar Sekolah Malaysia 2008 (KAFS08)* will be used to illustrate these complexities. Questionnaire and activity monitoring data were collected from 163 children attending four schools in Kuala Lumpur with an age range of 9-18 years. Three models of activity monitors were used (YAMAX SW-700, OMRON HJ113, ACTIGRAPH GT1M) and on completion of data collection, significant differences were found between pedometer steps recorded on each monitor, after allowing for age and gender differences. A subsequent study on the differences between the three monitors was undertaken involving over 15 individuals and over 40 days of measurement where one individual wore each of the three monitors for a full day. In addition, the accuracy of each monitor was determined by comparing the step count registered by the monitor with actual number of steps counted.

Poster Presentations

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

A01 School Milk Programme: are we heading in the right direction?

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The School Milk Programme (SMP) was originally initiated by the administration of the British Army as a welfare Programme after World War II. Since then it has gone through much transformation under the administration and management of the Ministry of Education. Today the SMP is a part of the Supplementary Feeding Programme with the objective of upgrading the health status and dietary intake of school children by inculcating the milk drinking habit. This paper will highlight the changes that have taken place in the management and implementation of the SMP and provide suggestions to improve the existing problems to achieve its stipulated objective. It was observed that the SMP is widely accepted by parents and children but its irregular delivery and the amount given is not enough to encourage milk drinking among Malaysians throughout the growing years.

A02 Survey and comparison of physical fitness, dietary intake and body composition between students of sport sciences in UKM and University of Kerman

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A total of 86 students, 40 (16 men and 24 women) in UKM and 46 students (23 men and 23 women) in (UK) were recruited into the study. There was a significant difference in percent body fat (%BF) between female students (UKM 20.06±3.23 and UK 27.1± 4.34), in moderate energy expenditure level (UKM 2767.62±1338.25 and UK 2170.21±753.66 kcal/week) in males students, in aerobic fitness (UKM 37.82±2.76 and UK 35.45±2.34 ml.kg⁻¹.min⁻¹) among female and male students (UKM 55.15±6.90 and UK 50.01±6.39 ml.kg⁻¹.min⁻¹), in weight of food (UKM 2410.18±708.65 and UK 3134.07±790.85 g), total fat (UKM 95.04±33.25 and UK 72.49±23.10 g) and carbohydrate food intake (UKM 419.60±93.26 and UK 489.21±92.25 g) in females, in food weight (UKM 2330.40 ±915.79 and UK 4047.75 ±1073.17 g) in males students. There is no significant difference in weight, height, WHR and BMI among female students; in weight, height, WHR, BMI and %BF in males students; in moderate, strenuous, competitive, vigorous and total energy expenditure level in females and males; in energy and protein food intake in females, in energy, protein, carbohydrate and total fat intake in males. Mean BMI (males 22.94±3.67 kg/m² and females 21.36±2.90 kg/m²), WHR (males 0.80±0.13 and females 0.79±0.05), %BF (males 13.53±8.2 and females 21.57±5.55) and aerobic fitness (males 52.04±6.99 and females 36.66±2.80). It appears that physical activity has strong effects on

the health status of the students. In comparison with these standards, i.e. BMI (>25 overweight), WHR (0.94 males 0.82 females), %BF (18-21 as males and 26-28 females as fatter than average), aerobic fitness (36.5-42.4 males and 29-32.9 females ml.kg¹.min¹) sport students in both universities are in good condition and the outcomes indicated that physical activity and fitness in sport students have remarkable effects on health.

A03 Skeletal muscle mass and its relationship with physical activity and functional status among institutionalised elderly aged 60 and above in Penang

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The objective of this study is to determine the skeletal muscle mass (SMM) and its relationship with physical activity and functional status among elderly subjects, aged 60 years and above in the Home for the Infirm and Aged, Penang. A face-to-face interview questionnaire was used to collect the information on personal background and health-related characteristics. Activities of Daily Living (ADL), Instrumental Activities of Daily Living (IADL) and the International Physical Activity Questionnaire (IPAQ) were used to assess the functional status and physical activity. Anthropometric measurements (weight, height, waist, hip, calf and thigh circumferences, body fat mass, body fat percentage and handgrip strength) were measured using appropriate instruments and standard procedures. The anthropometric SMM prediction equation by *Lee et al.* (2000) was used to determine the SMM value. $SMM (kg) = 0.244 \times \text{body weight (kg)} + 7.80 \times \text{height (m)} - 0.098 \times \text{age (y)} + 6.6 \times \text{sex}$ (1= male; 0=female) - 1.2 (Asian) - 3.3. A total of 61 elderly (males=47.5%; females=52.5%) participated in this study and their age ranged from 61 to 87 years. Weight (55.28 ± 10.47 kg vs 50.56 ± 10.52 kg), height (162.07 ± 6.48 cm vs 152.34 ± 7.74 cm), and SMM (21.17 ± 2.98 kg vs 12.59 ± 2.78 kg) were significantly higher in males than females. According to age groups, younger respondents (60-69 years) had significantly higher weight (54.27 ± 9.59 kg), Body Mass Index (BMI) (22.12 ± 3.65 kg/m²), and Waist-Hip-Ratio (WHR) (0.90 ± 0.11) compared to older respondents (>70 years). There was no significant association between SMM and ADL scores, IADL and level of physical activity. However, SMM was significantly correlated with handgrip strength ($r = 0.637$, $p < 0.01$). Age was not significantly associated with ADL score, IADL score, level of physical activity, SMM and handgrip strength. In conclusion, males and the younger age group had higher SMM, functional status, physical activity, BMI, WHR and other anthropometric measurements. With increasing age, there will be further changes in body composition, decline in functional and physical ability thus affecting health of the elderly. Therefore, the elderly who are at increased risk need to be identified and provided with appropriate intervention programmes or activities.

A04 Relationship between selected socio-demographic and health-related factors with intake of fruits and vegetables among the elderly in Malaysia

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Food intake plays an important role in providing adequate nutrients. Several studies have indicated that diets relatively high in fruits and vegetables are associated with a lower risk of chronic diseases. The objective of this study is to identify the relationship between socio-

demographic and health-related variables with intake of fruits and vegetables among older persons aged 60 years and above in Malaysia. The subjects were a representative sample from 13 states and the Federal Territory of Kuala Lumpur. One older person within an available household in selected enumeration blocks was included in the study. Information on demographics, socio-economic status, and lifestyle characteristics was obtained using a pre-tested questionnaire. The frequency per week of fruits and vegetables intake was obtained through a face-to-face interview. The sample consisted of 2,980 older persons (males = 47.9%; female = 52.1%). The mean age of respondents was 70.46 ± 7.2 years, the majority were Malays (58.3%), married (55.8%), with no formal education (44.5%), with an average monthly income of RM551.02. About 75.3% of the respondents were taking vegetables daily and 38.1% were taking fruits daily. By gender, 51.9% of women and 45.7% of men had daily intake of vegetables, while 50.4% of the women and 48.1% of men reported daily intake of fruits. In terms of health status and other lifestyle variables, 54.2% rated their health as "good", 53.3% were inactive or sedentary and 17.2% were currently smoking. The results showed a significant association between intake of fruits with age ($c^2 = 7.077$, $df = 2$, $p = 0.029$), ethnicity ($c^2 = 42.23$, $df = 4$, $p = 0.000$), stratum ($c^2 = 15.126$, $df = 1$, $p = 0.000$) and self-rated health ($c^2 = 16.31$, $df = 3$, $p = 0.001$). On the other hand, only ethnicity ($c^2 = 11.352$, $df = 4$, $p = 0.023$) and self-rated health ($c^2 = 16.16$, $df = 3$, $p = 0.001$) were significantly associated with intake of vegetables. These findings indicate that there is a relationship between pattern of fruits and vegetables intake with selected demographic and health-related characteristics of the respondents. Therefore, appropriate nutrition intervention programs need to be formulated to encourage increased intake of fruits and vegetables among the elderly in Malaysia to promote optimal health and wellness.

A05 Nutritional status, energy and protein consumption among primary schoolchildren in Pulau Mantanani, Kota Belud, Sabah

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This study was conducted in April 2007 in Pulau Mantanani, an isolated island northwest of Kota Belud, 80 km north of Kota Kinabalu. Forty-six schoolchildren, boys and girls aged 10, 11 and 12 were included in the study. Anthropometric measurements were taken and compared with the growth charts of the National Centre for Health Statistics. Food consumption based on the 24-hours dietary recall was recorded and calculated using the NutriCal software. It was interesting to know that despite the acceptable protein consumption, the growth indicators showed otherwise. Results showed that 50.0% of the children were stunted (<-2 standard deviation of height for age), 52.2% were underweight (<-2 standard deviation of weight for age) and 17.4% were wasted (<-2 standard deviation of weight for height). 2.2% had a energy consumption of less than 1/3 of the Recommended Nutrient Intake (RNI) for Malaysia, 43.5% consumed energy between 1/3-2/3 of the RNI whereas 41.3% consumed between 2/3 to 100% of the RNI while 13% consumed energy more than the RNI. As for protein intake, 39.1% children had protein intake below the RNI. However, there was no significant correlation between growth indicators and energy consumption. In conclusion, this study showed poor nutritional status of the children as shown by the growth indicators. Energy intake was also inadequate among the majority of the children although protein consumption was higher than the RNI by 2/3 of the subjects.

A06 Weight management practices of adults in a worksite setting

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Healthy diet and physical activity are recommended to control body weight and thus reduce the overweight or obesity rates in populations. The purpose of this study was to determine weight management practices, barriers and readiness to change among adults in a worksite setting. A cross-sectional survey among 100 UPM employees aged 20-61 years was conducted. Height and weight were measured to compute BMI. The prevalence of overweight and obesity were 29.0% and 13.0% respectively. About 43% of respondents thought that they were overweight or obese while 55% were trying to lose weight. The respondents had tried an average of two types of weight management methods i.e. physical activity (2.23 ± 1.26), dietary fat reduction (1.91 ± 1.45), increasing fruits and vegetables consumption (1.85 ± 1.40) and reducing portion size (1.63 ± 1.13). However, 69% of respondents thought that 'lack of time' was an important barrier that caused them to fail in their weight management endeavours. By stages of readiness to change for weight management, 12% of the respondents were in the pre-contemplation stage, followed by contemplation (11%), preparation (18%), action (23%) and maintenance (36%). Chi-square tests showed significant relationships between the practice of portion size control and age ($p < 0.05$), marital status ($p < 0.05$), occupation ($p < 0.01$), income ($p < 0.05$) and body mass index of respondents ($p < 0.05$); between reducing dietary fat practice and age ($p < 0.05$), occupation ($p < 0.01$) and income ($p < 0.05$); and between the practice of increasing fruit and vegetable intake and gender (women) ($p < 0.05$) and occupation (academic) ($p < 0.05$). Attainable weight management goal was significantly associated with stages of change ($p < 0.05$) and gender of respondents ($p < 0.01$). Interventions to reduce overweight and obesity in worksite populations should emphasise on teaching employees practical strategies for food portion size control, and dietary fat reduction, increase fruit and vegetables consumption and to set an attainable weight management goal.

A07 Screening for anemia and iron deficiency among adolescent girls in Kuala Lumpur

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Iron deficiency anemia remains a major worldwide health problem, and brings about negative consequences on growth, school performance, morbidity and future reproductive status among adolescent girls. This cross-sectional study was aimed at determining the prevalence and factors influencing anemia and iron deficiency amongst adolescent girls. Subjects comprised 211 adolescent girls (Malays 57%; Chinese 26%; Indians 17%) from selected secondary schools in Kuala Lumpur. A set of questionnaire was used to obtain data on socio-economic characteristics, menstrual cycle, health status and symptoms of anemia. Anthropometric measurements included body weight and height. Multiple iron status indicators including serum ferritin, transferrin saturation, and hemoglobin were also determined in this study. Mean age of the subjects was 15.7 ± 1.1 years, ranging from 13 - 17 years. Mean body weight, height and BMI were 51.2 ± 10.3 kg, and 156.1 ± 5.2 cm, and 21.1 respectively. Mean duration of menstruation was 6.8 ± 2.1 days. The majority of the parents (78% father; 81% mother) were educated up to secondary school level, and had median household income of RM1500. Mean hemoglobin concentration was 131.3 ± 10.7 g/L, serum ferritin

37.8 ± 27.4 µg/L, and transferrin saturation 18.4 ± 9.1%. Prevalence of anemia among the subjects was 14.9%, while 20.2% had iron depletion, and 7.7% had iron deficiency anemia. These results show that there are other factors causing anemia besides iron deficiency. Family income, parents education level, ethnicity, and duration of menstruation are significantly associated ($p < 0.001$) with hemoglobin level. Although this prevalence is considered a mild public health problem according to WHO (2001), interventions should be taken to prevent iron depletion from worsening and to further reduce the prevalence of anemia.

A08 Theory based e-mail intervention for promoting cancer prevention through nutrition and lifestyle behaviour change: design of research protocol

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Increasing intake of fruits and vegetables, decreasing fat intake, as well as increasing daily physical activity, are believed to be helpful in preventing cancer and other chronic diseases. Prevalence of physical inactivity and unhealthy diets in the Malaysian population have been reported to be moderately high. Interventions that incorporate effective behaviour-change principles and that can be delivered inexpensively to large segments of the population are urgently needed. The e-mail is a promising mode of delivery for promoting physical activity and nutrition at the workplace. The purpose of this study is to implement and evaluate a 10-week workplace e-mail intervention designed to promote physical activity and healthy nutrition behaviour. This intervention will be carried out at Universiti Putra Malaysia, a campus with over 2000 employees and with state-of-the-art Internet technology. Employees with access to a personal e-mail will be randomly assigned to an intervention or a control group. The intervention group will receive a total of 10 physical activities and 10 nutrition paired messages to their e-mail address between June and August 2008. The control group will not receive any messages during the 10 week study period but the control will be notified that they would receive all the messages at the end of the intervention period. The intervention module will be in the Malay language and will be developed based on the World Cancer Research Fund Dietary Guidelines for Cancer Prevention (WCRF, 2007) and will be implemented by adopting the psychosocial constructs of the Theory of Planned Behaviour. In addition, 5-10 minutes phone call motivational support will be provided after 2-3 weeks of message delivery. Each participant will complete self-report measures of physical activity and nutrition related to knowledge, attitudes, and behaviours at baseline (time 1), 3 months (time 2) and 6 months (time 3) after the intervention.

A09 Development and preliminary validation of socio-cultural influences on body image scale for Malaysian female adolescents

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The present study aimed to develop and validate comprehensive multi-dimensional socio-cultural (parental, peers, media) influence on body image scale for Malaysian female adolescents. A total of 328 female adolescents from a secondary school in Kuantan district, Pahang, Malaysia

completed a self-administered questionnaire, which encompassed a multiple measure of sociocultural influence, Body Dissatisfaction and Body Importance subscales of Body Image Questionnaire (McCabe & Ricciardelli, 2001), and Body Change Inventory (Ricciardelli & McCabe, 2002). Through factor analysis, the three major components (parental, peers, media) of the sociocultural influence scale were found to consist of multi-dimensional constructs. Particularly, five dimensions were identified for the parental influence subscale: 1) parental teasing on weight, 2) parental encouragement on increasing muscle and weight, 3) parental social support, 4) parental preoccupation with thinness and dieting behaviour, and 5) parental feedback on body change behaviour; the peer influence subscale comprised four dimensions including 1) peer social support, 2) peer preoccupation with thinness and dieting behaviour, 3) peer teasing on weight, and 4) peer encouragement on increasing muscle and weight; and three dimensions were identified in the media influence subscale, which included 1) media encouragement on reducing weight, 2) media modeling on weight reducing behaviour, and 3) media encouragement on increasing muscle and weight. As for construct validity, there were positive correlations between the composite score of the subscales and body dissatisfaction, body importance, strategies to decrease body size and strategies to increase body size and muscle size. In short, the present study has developed a socio-cultural (parental, peer, media) influences on body image scale with construct validity and good internal consistency for Malaysian female adolescents. The scale can be used to assess the various dimensions of socio-cultural influences and will be useful to determine the etiology, prevention and treatment of negative body image and its related problems for Malaysian female adolescents.

A10 Bone health status of post-menopausal women in the Klang Valley: preliminary data

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Preliminary data from a study to determine the lipid profile and bone health status of free-living post-menopausal women in the Klang valley are presented. Anthropometry and dietary behaviour were assessed in a total of 105 subjects. Bone turnover markers were also measured using the Roche Elecsys system i.e. P1NP, Osteocalcin and CTX. Bone mineral density was measured using DEXA (Hologic, USA) at the lumbar spine, femoral neck and total hip. The subjects were predominantly Chinese women with a mean age of 60 ± 5 years and duration of menopause of 11 ± 9 years. About 4% of subjects were underweight, 61% normal weight, 29% overweight and 6% were obese. On average, 45% of the women had normal BMD, 49% had low bone mass (osteopenia) and 6% were osteoporotic, on any of the 3 sites. Mean calcium intake of the subjects assessed by a validated food frequency questionnaire was 562 ± 286 mg/day, of which only 26% met at least 70% of the RNI for calcium. About 66% of the women drank milk on a daily basis and 31% of women were consuming calcium supplements. A significant positive correlation was found between BMI and bone mineral density ($p < 0.05$). The results also showed a trend by which women who drank milk regularly had lower mean bone turnover marker levels than women who did not consume dairy products. In conclusion, this preliminary survey indicates that bone health status amongst free-living postmenopausal women warrants more attention.

A11 Maternal child feeding knowledge and practices and growth status of young children aged 6 to 24 months in Kuala Lumpur

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This study was conducted to determine the association between maternal child feeding knowledge and practices with the growth status of young children. A total of 102 young children (62 boys and 40 girls) aged between 6 and 24 months old and their mothers participated in this study. A set of structured questionnaire; was used to obtain information on socio-economic, demographic characteristics, maternal feeding knowledge and practices, and anthropometric measurements of the young children. Maternal feeding knowledge was assessed in three different constructs i.e. general nutrition, breastfeeding and complementary feeding. Maternal feeding practice was assessed by examining whether mothers met the WHO guidelines for continued breastfeeding or feeding of milk or milk products, number of feeding times and number of food groups. Anthropometric measurements of the children such as weight and recumbent length were obtained using TANITA weighing scale and wooden measuring board, respectively. The anthropometric measurements were then compared to the National Center for Health Statistics (NCHS) reference. The results indicated that 18.6% (n=19) of the young children were significantly underweight, 16.7% (n=17) mildly underweight, and 3.9% (n=4) were overweight. The percentage of children with significant and mild wasting were 17.6% (n=18) and 32.4% (n=33) respectively, while 14.7% (n=15) and 34.3 (n=35) were significantly and mildly stunted respectively. Maternal feeding data showed that the mean of maternal feeding knowledge score in the three constructs were 6.73±0.18, 5.97±0.19 and 6.57±0.18, for general nutrition, breastfeeding and complementary feeding respectively. The total score for each construct was 10. The mean total knowledge score obtained was 19.26±4.12. Maternal feeding practice data indicated that 97.1% (n=99) of the mothers continued breastfeeding or feeding milk or milk products, 33.3% (n=34) of the children were fed the recommended minimum number of times, and 81.4% (n=83) of the children were fed the recommended minimum number of food groups. Statistical test on the association between maternal child feeding knowledge and practices with the growth status of young children will be further conducted. Maternal nutritional knowledge and child feeding practices should not be overlooked as factors that may influence growth status of young children.

A12 Lipid profile and bone mineral density of post-menopausal women in the Klang valley: preliminary data

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Studies have shown that there is an association between blood cholesterol levels and bone metabolism. This is hypothesized to be mediated by a negative effect of lipoprotein metabolism on bone cell activity, favouring bone catabolism rather than bone formation and accumulation. Preliminary data from a study to determine the lipid profile and bone health status of free-living post-menopausal women in the Klang Valley are presented. Anthropometry and dietary behaviour were assessed in a total of 105 subjects. Lipid profile was assessed using automated enzymatic

assays (Cobas Autoanalyzer). Bone mineral density was measured using DEXA (Hologic, USA) at the lumbar spine, femoral neck and total hip. The subjects were predominantly Chinese women with a mean age of 60 ± 5 years and duration of menopause of 11 ± 9 years. About 4% of subjects were underweight, 61% normal weight, 29% overweight and 6% were obese. A total 68% of the subjects had normal lipid profile. However, 32% were hypercholesterolemic (total cholesterol >6.0 mmol/l), 65% had low HDL-C levels (<1.1 mmol/l), 86% had high LDL-C levels (>2.6 mmol/l) and 20% had hypertriglyceridemia (TG >1.7 mmol/l). The results indicated a significant ($p=0.001$) negative correlation between BMI and HDL-C levels. Total hip BMD was also found to be negatively correlated with total cholesterol levels ($p=0.008$). In conclusion, this preliminary data shows that a high percentage of postmenopausal women have hyperlipidemia and may be associated with lower bone mineral density.

A13 Psycho-social correlates of physical activity in young adolescents

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A cross-sectional study was conducted to determine the association between demographic and psychosocial factors with physical activity levels of four hundred, 13 year-old adolescents in Kuantan, Pahang, Malaysia. *Physical Activity Questionnaire for Older Children* (PAQ-C) was used to assess physical activity levels among the participants. The respondents comprised 41.8% males and 58.2% females encompassing 56.2% Malays, 42.0% Chinese, and 1.8% Indians. More than one third of the respondents were in the low physical activity level, most (61.5%) were in the moderate category and only 3.0% were in the high physical activity level. Males were more physically active than females ($\chi^2=23.667$, $p=0.0001$). Female adolescents (45.1%) were twice as many as male respondents (22.1%) to fall in the low physical activity level category. Physical activity level was not correlated with ethnicity, but there was a significant interaction effect of sex and ethnicity in mean physical activity score ($F=8.343$, $p=0.004$) which indicated that Malay males had a higher mean physical activity score compared to Chinese males while Chinese females had a higher mean physical activity score than Malay females. For psycho-social factors, physical activity was positively correlated with physical activity self-efficacy ($r=0.496$, $p=0.0001$), peer influence ($r=0.468$, $p=0.0001$), family influence ($r=0.298$, $p=0.0001$) and beliefs for physical activity outcome ($r=0.207$, $p=0.0001$) while negatively associated with depression ($r=-0.116$, $p=0.021$) and body size discrepancy ($r=-0.143$, $p<0.01$). Further, respondents who had a better perception of their current health status were more physically active ($\chi^2=21.062$, $p=0.0001$). However, physical activity was not correlated with perception of weight status and body parts satisfaction. Multivariate analysis showed that physical activity self-efficacy, sex and peer influence were found to be significant in explaining physical activity among adolescents. Findings from this study suggest that physical activity intervention should include physical activity self-efficacy and social influence components in interventions designed to promote regular physical activity in adolescence.

A14 Nutritional challenges among the elderly in an old folks home in Pahang

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Older adults are the fastest growing segment of the population worldwide. It is estimated that in 2025, there will be a total of about 1.2 billion people over the age of 60. The aim of this study is to determine the food habits among the elderly in the old folk's home, and assess their intake of macronutrients and micronutrients. This study was conducted in four old folk's home in Pahang, namely Alur Akar CARE Centre, Pusat Jagaan Orang Tua Indah, Grannies Old Folks Home, and Melodi Nursing Home. Respondents were divided into five groups; 51-60 years, 61-70 years, 71-80 years, 81-90 years and 91 above. Respondents were asked the types of food consumed per day. Frequency and amount of vitamin supplements intake was substantial. The mean energy intake was less than the Malaysian RNI (men= 2020 kcal, women= 1600 kcal) for all the five age groups. The carbohydrate intake was higher than fat and protein intake. The mean calcium intake (men=105.4 mg, woman= 136.5 mg), was found to be extremely low which could lead to problems like osteoporosis. For vitamin and mineral intake, all the age groups consumed less than Malaysian RNI for both sexes. The total mean of all nutrient intake were found to decline with age increment for both sexes. About 76% of the elderly had a normal weight, 18% were underweight, followed by 2% of them obese and 4% overweight. About 61% of the subjects consumed between 3-4 glasses plain water per day, followed by 13% consuming 1 - 2 glasses per day, 25% consumed 5-6 glasses and only 1% of them consumed between 7-8 glasses of plain water per day. This study shows that the nutrient intakes were lower than RNI for both sexes. Older people have a decreased thirst and more likely to become dehydrated. Primary care providers need to be vigilant when treating elderly patients under their care in the old folk's home.

A15 Knowledge, attitude and practice regarding nutrition labeling among support staff in Universiti Putra Malaysia, Serdang, Selangor

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The study was carried out to determine the knowledge, attitude and practice regarding nutrition labeling among support staff in Universiti Putra Malaysia (UPM), Serdang. The study location involved two faculties which are Faculty of Veterinary Medicine and Faculty of Education Studies. Data were collected in December 2007 using a questionnaire distributed to 100 subjects chosen through systematic sampling. Results showed that 77 subjects comprising 37 men and 40 women responded to the questionnaire (response rate = 77%). The mean age of the respondents was 36.1 ± 10.5 years while the mean monthly expenditure related to food was $RM 516.20 \pm 349.30$. Seventy-two (93.5 %) respondents had heard about nutrition labeling and more than half (87.0%) acquired the information from television, followed by magazines (68.8%) and newspapers (55.8%). More than three out of four respondents (76.6%) chose 'aiding in food selection and purchase' and 64.9% chose 'providing useful information to consumers' as what they understood about nutrition labeling. The study found that the overall respondents' knowledge on nutrition labeling was high with a mean score of $76.9 \pm 16.9\%$. In the attitude section, the respondents showed a positive attitude towards nutrition labeling, with 88.3% of them scoring above 75%. Thirty-nine respondents (50.6%) showed moderately good practice when purchasing food and reading nutrition labels

with a mean score of $78.2 \pm 12.1\%$. Most respondents (88.3%) indicated that they will read nutrition labels when purchasing a food product for the first time. The Pearson correlation test showed a significant correlation between knowledge and attitude ($r=0.597$, $p<0.01$) and between knowledge and practice ($r=0.247$, $p<0.05$) related to nutrition labeling. A significant correlation was also found between respondents' attitude and practice ($r=0.432$, $p<0.01$). However, there was no significant correlation between monthly food expenditure and knowledge, attitude and practice regarding nutrition labeling. Further, it was found that knowledge was dependent on education level ($c^2=13.562$, $p=0.035$) whereas attitude was dependent on ethnicity ($c^2=38.770$, $p=0.029$), education level ($c^2=105.325$, $p=0.000$) and monthly income ($c^2=79.054$, $p=0.000$). Overall, even though most respondents attained high scores, there are still gaps in their knowledge, attitude and practice regarding nutrition labeling. Therefore, efforts should be made to continue to promote nutrition labeling to the consumers.

A16 Reliability, technical error of measurements and validity of instruments for nutritional status assessment of children in the Third National Health and Morbidity Survey, Malaysia

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The Third National Health & Morbidity Survey, Malaysia 2006 included nutritional status assessment of children. This study estimated the reliability, technical error of measurement (TEM) and validity of those instruments in 130 children below two from a paediatric clinic. Two nurses measured weight (WT) using Tanita digital weighing scale and Seca beam scale and length (LT) using Seca measuring mat and Stadiometer. Absolute mean difference (AMD) and intra-class correlation (ICC) for WT and LT indicated high inter and intra-examiner reliability. However, by Bland and Altman plot, LT were less reliable. Relative TEMs for WT were within acceptable limits whereas that of LT was slightly above the acceptable limits. The AMD and ICC showed that the test instruments were highly valid, but LT was less accurate. This study suggests that WT and LT in children below two using the test instruments were reliable and valid for a community survey. However, LT measurements require special attention.

A17 Reliability, technical error of measurements and validity of instruments for nutritional status assessment of adults in Malaysia

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The Third National Health & Morbidity Survey, Malaysia 2006 included nutritional status assessment of children. This study was to assess inter-and intra-examiner reliability, the technical error of measurement (TEM) and the validity of instruments for measuring weight, length and

waist circumference. A convenience sample of 130 adults working in a selected office setting who fit the inclusion and exclusion criteria participated in the study. Two public health nurses, trained to follow a standard protocol, obtained the measurements. Weight was measured using Tanita digital weighing scale, 318, Japan (0.1 kg) and Seca Beam Scale, Germany (0.01 kg) weighing machines. Height was measured using Seca Bodymeter 206 Germany (0.1cm) and Stadiometer, Germany (0.1cm). Waist circumference was measured using Seca circumference tape, 206, Germany (0.1 cm). By comparison the inter-examiner reliability in descending order would be weight, height and lastly waist circumference. The intra-examiner reliability in descending order would be weight and height followed by waist circumference. Height measurement on average using test instrument reported that it was recording 0.4 cm higher than the reference instrument with upper limit and lower limit at 2.5 and 1.6 cm respectively. The technical error of measurement and coefficient of variation of weight and height for both inter-examiner and intra-examiner measurements are all within acceptable limit (below 5%). The findings of this study supports that weight, height and waist circumference measured in adults 30 years and above using Tanita digital weighing scale, 318, Japan (0.1 kg), Seca Bodymeter 206 Germany (0.1cm) and Seca circumference tape, 206, Germany (0.1 cm) are reliable and valid to be used in a community survey. Limiting the number of examiners especially for waist circumference measurements would yield higher degree of reliability and validity.

A18 Reliability and technical error of measurements of instruments for nutritional status assessment of elderly persons in Malaysia

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This study seeks to examine the reliability of instruments to be used in a community survey. A sample of 130 elderly persons aged 60 years and above seen consecutively in the Hospital Kuala Lumpur outpatient clinic during the period of December 2005 to January 2006, were recruited to the study. There was a high degree of reliability for both inter-and intra-examiner (r close to 1). For inter-examiner, on average the CC measurement taken by the first examiner is -0.3 cm lower than the second examiner. The upper and lower limit of the differences were +0.4 to -0.9 cm. Inter examiner MHAS measurements on average in first examiner was -0.2 lower than the second examiner. The upper and lower limits were +1.7 to -2.1 cm. By comparison the inter-examiner CC was more reliable than MHAS measurements. For intra-examiner, on average the CC measurements at Time1 was consistent with Time2 (mean difference =0) with limits of the difference being ± 0.5 cm. MHAS measurements at Time1 was on average -0.1 cm less than at Time2 with upper limit and lower limit at +1.7 and -1.8 cm. The technical error of measurement (TEM) and coefficient of variation of CC and MHAS for both inter-examiner and intra-examiner measurements were all within acceptable limits except for MHAS findings in TEM. This study suggests that CC and MHAS measured in elderly 60 years and above using Seca Circumference Tape ® 206, Germany (0.05 cm) are reliable for use in a community survey.

A19 Health and nutrition of Orang Asli (Che Wong) at Krau Wildlife Reserve, Pahang – a descriptive study

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This study was conducted to determine the nutritional status of Orang Asli (Che Wong) men, women and children. Through purposive sampling, 29 households consisting of 29 men, 28 women, and 20 children (10 female and 10 male) were chosen. Demographic and socioeconomic information were collected using structured questionnaire. Men and women were measured for height, weight, blood pressure and waist circumference while weight and height was measured for children. Mean age for men, women and children were 39.89±17.09 years, 33.7±16.08 years, and 3.25±1.33 years respectively. Only 6.9% of men and 14.3% of women completed 3 years of primary school education. The average household income was RM 261.56±254.40. Mean Body Mass Index (BMI) for men was 21.83±3.40 (underweight: 13.8%, normal: 72.4%, overweight: 10.3%, and obese: 3.3%). Mean Body Mass Index (BMI) for women was 28.6±4.05 (underweight: 23.3%, normal weight: 46.3%, and overweight: 26.7%). The mean circumference for men was 74.43±6.09cm and for women, it was 73.92±6.80 cm. However, caution should be exercised when interpreting the BMI results when none of them had waist circumference more than 102 cm (men) and 88 cm (women). About 10.3% of the men and 10.7% of women had blood pressure of more than 130/85 mmHg. The prevalence of underweight, stunting and wasting of children was 45%, 35% and 30% respectively. Food frequency questionnaire (FFQ) consisting of seven food groups (cereals, meats, fish, fruits, vegetables, dairy products and drinks) was used to determine the dietary diversity score. The minimum score was 0 and the maximum score was 37. Mean total score for men was 9.46±3.70 (maximum score of 18) and for women, it was 9.48 ± 4.63 (maximum score of 21). Food patterns for both male and female were similar whereby fruits and milk groups were the least consumed. In conclusion, further research should be conducted in the Che Wong community to determine the association between food intake and nutritional status of Orang Asli.

A20 Nutrigenomics: a survey on continuing education needs of registered dietitians in Malaysia

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Nutrigenomics or diet-gene interactions have become the focus of much nutritional research in recent years. However, little is known about Malaysian dietitians' involvement and education needs regarding nutrigenomics. The aim of this survey was to assess the awareness and continuing education needs for registered dietitians regarding nutrigenomics. A validated questionnaire was developed to assess involvement, knowledge, chances, barriers and continuing education needs on nutrigenomics among Malaysian dietitians. The questionnaire was distributed to all (n=90) registered dietitians who attended the Malaysian Dietitians' Association Scientific Conference in year 2007 which resulted in a 46% response rate (n=41). The majority of the respondents (91.5%) graduated from local universities between the years 1988 to 2007. All respondents used information on dietary pattern, lifestyle and body mass index for composing dietary advice. For the same purpose, a high percentage of respondents (91.4%) used family history but only two respondents

(5.7%) experienced relying on genetic tests. Although 85.7% of respondents are aware of nutrigenomics, only 22.3% understood its definition. More than 80% of dietitians are interested in learning and increase their knowledge on human genetics, nutrigenomics and ways to communicate this knowledge to the public. Three highest barriers to the application of nutrigenomics are lack of patient education materials (91.5%), lack of background knowledge among dietitians (85.7%) and lack of continuing education for dietitians (80%). The most preferred learning activity for continuing education was seminars. This survey revealed great interest among dietitians to increase and update their knowledge on nutrigenomics. There is a need to include genetics and nutrigenomics knowledge in the continuing education programmes for dietitians in Malaysia. This may help dietitians to make informed decision about the possible use of nutrigenomics in their practice.

A21 Knowledge and vaccination coverage of hepatitis A among dietetic & nutrition students in UKM

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Hepatitis A is a highly contagious but vaccine preventable disease. It is mostly transmitted by the fecal-oral route and can cause outbreaks with both morbidity and mortality. The objective of this study was to evaluate the level of knowledge and vaccination coverage of hepatitis A among dietetic and nutrition undergraduate students of the Faculty of Allied Health Sciences, Universiti Kebangsaan Malaysia (UKM). Questionnaires were distributed and completed by the undergraduate students ($n = 230$ with 52% of them being nutrition students). The results showed that the level of knowledge of respondents on hepatitis A was intermediate with no significant difference between dietetic and nutrition students ($t = 2.170, p > 0.05$). The difference in the level of knowledge between students from different academic years of study was also insignificant for both dietetic and nutrition courses ($F = 1.398, p > 0.05$ and $F = 2.425, p > 0.05$ respectively). Vaccination coverage among respondents was low (20.9%) and there was no significant difference between the two courses ($c^2 = 0.941, p > 0.05$). There was also no significant association between vaccination coverage and year of study for dietetic course ($c^2 = 1.828, p > 0.05$) and nutrition course ($c^2 = 4.319, p > 0.05$). In conclusion, more efforts should be extended to improve the knowledge and vaccination status of hepatitis A among dietetic and nutrition students. These can include introducing a course about the prevention of hepatitis A and other diseases that are transmitted through the fecal-oral route.

A22 The effects of socio-economic status on dietary intake, physical activity and body mass index among pregnant women

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This study was conducted to assess the association of socio-economic status measured by education, occupation and household income along with dietary intake, physical activity and body mass index among pregnant women. This study was carried out among 100 pregnant women at Hospital Kuala Lumpur. This survey was conducted by distributing questionnaires to the selected pregnant women. The questionnaires comprised questions relating to their demographic profile, physical activity and dietary intake. Dietary intake information was obtained by using a 3-day dietary recall method and analysed using Diet 4 soft ware. A Semi-quantitative Food Frequency

(SQFF) questionnaire was also administered in order to collect information on their dietary pattern. The results were collected and analysed using SPSS 12.0. The study sample comprised Malays (73%), Indians (21%), Chinese (3%) and others (3%). The weight before and during pregnancy showed a significant increase where the mean before pregnancy was 63.82 and during pregnancy was 74.34 ($p < 0.001$). The protein intake was found to be higher among Malays followed by Chinese, others and Indians ($p = 0.016$) whereas the intake of potassium was found to be significantly higher ($p < 0.001$). The education level and Body Mass Index (BMI) showed a strong relationship ($p < 0.001$) in paired samples T-test. The correlation between education and household income was strongly correlated with a mean of 0.530 ($p < 0.001$). Comparison of physical activity among the different races revealed that 66% of the sample were not engaged in any physical activity. Only 34% of the sample were involved in physical activities and had a strong relationship with the socioeconomic status ($p < 0.001$). Thus, education and household income together with Body Mass Index (BMI) is a strong predictor of socio-economic status together with dietary intake. Occupation and physical activities are used as additional information to assess the health related problems in the sample.

A23 Calcium intake, physical activity and bone health status among Chinese early adolescents

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The objective of this cross-sectional study was to determine the relationship between calcium intake and physical activity with bone health status among Chinese early adolescents. A self-administered questionnaire was used to obtain socio-demographic background, family history of osteoporosis, lifestyle practices and eating habits; while daily calcium intake was assessed using one-day dietary recall and two-day dietary record. Physical activity was examined using PAQ-A (Physical Activity Questionnaire for Adolescents). Height, weight and bone health status was assessed using stadiometer, weighing scale (TANITA), and ultrasonometry QUS-2, respectively. Data was analysed using the Statistical Package for Social Sciences (SPSS), version 15.0. A total of 236 Chinese subjects were recruited into this study. The mean age of subjects was 13.6 ± 0.5 years old. Mean daily calcium intake was low, that is 573.4 ± 405.1 mg. The mean score of PAQ-A was 2.14 ± 0.64 . Mean weight, height, and BMI were 50.9 ± 11.4 kg, 1.62 ± 0.08 m and 19.40 ± 3.72 kg/m², respectively. Based on CDC classification of BMI-for-age (2000), 68.2% of subjects were in the normal category, 16.1% were underweight, 11.4% were at risk of overweight and 4.2% overweight. Mean Broadband Ultrasound Attenuation (BUA) was 77.55 ± 11.73 dB/MHz. According to diagnostic criteria for osteoporosis by WHO (1994), 49.2% of subjects had normal bone mass (t-score > -1.0), more than half of the subjects were either osteopenic (49.6%) or osteopototic (1.3%). This might be due to subjects being in the early adolescents state and their peak bone mass has yet to be attained. T-test showed that there was significant difference between mean body weight among male and female subjects. There was also significant higher mean BUA among female subjects than their counterparts. Pearson correlation test showed that there was no significant relationship between BUA with calcium intake ($r = -0.05$, $p = 0.42$) or physical activity ($r = 0.03$, $p = 0.69$). However, weight had a significant positive correlation with BUA ($r = 0.39$, $p < 0.05$). In conclusion, female subjects have better bone health status as compared to males. Although no significant relationship was shown between calcium intake and physical activity with bone health, these two factors are known to reduce future risk of osteoporosis. It is recommended that prevention and management of low bone mass should be focused on factors recognised as determinants of bone health status among early adolescents. This is to ensure optimal bone health being attained among the young population in reducing risk of osteoporosis in future.

A24 Nutritional status of people living with HIV in Klang Valley

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The number of people living with HIV (PLHIV) is increasing rapidly. The availability of anti-retroviral therapy (ART) has prolonged the life of PLHIV. Therefore, there is a need to understand their nutritional status to enhance the quality of life. Improved nutrition can help to boost the immune system and slow down the rate of infection. Due to the issue of confidentiality, only 45 respondents recruited through the snowball method participated in this study to assess their nutritional status through anthropometry and dietary intake. Most of them (66.7%) were living in shelter homes while others were either living alone (13.3%), living with family (15.6%) or living with a partner (4.4%). All respondents were male with 18 (40.0%) Malays, 13 (28.9%) Chinese, 3 (6.7%) Indians and 11 (24.4%) from other ethnic groups. At the time of the study (from November 2007 to January 2008), 27 (60.0%) were on ART and 13 (28.7%) were taking dietary supplements. Study results show that 7 (15.6%) were underweight, 33 (73.3%) were normal and 5 (11.1%) were overweight according to their BMI. Mid-upper arm muscle circumference showed that 27 (60.0%) were wasted while 18 (40.0%) were normal. As for dietary intake, when compared with Recommended Nutrient Intakes for Malaysia, it was found that only 9 (20.0%) had energy intakes that met the recommended requirements. Most of them (64.4%) had sufficient protein intake while only 3 (6.7%) had sufficient calcium intakes, 5 (11.1%) had met the recommended intakes of both vitamins C and E and 10 (22.2%) had intake of zinc and selenium that met the recommended requirements. Most of them had adequate intakes of iron and vitamin A. Despite the fact that most of them had adequate intake of protein, 60.0% of them were wasted. Nutritional education appears to be necessary to ensure that PLHIV take adequate nutrition to ensure quality of life.

A25 Nutritional status and physical activity level of students of the Department of Nutrition and Dietetics, Universiti Putra Malaysia

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The objective of this study was to determine the nutritional status and physical activity level of students of the Department of Nutrition and Dietetics, Universiti Putra Malaysia. Socio-demographic information, smoking habit, alcohol intake and health status were obtained through a questionnaire. Dietary intake was assessed using 24-hour diet recall for three days. Physical activity level was assessed by International Physical Activity Questionnaire (IPAQ) and three days step counter using pedometer (Yamasa Allness 200s, Japan). Assessments of height (SECA, Germany), weight (SECA, Germany), waist circumference, hip circumference and percent body fat (Tanita TBF 305, Japan) were done on each respondent. Simple random sampling was used for sample selection and 73 students (19 males and 54 females) agreed to get involved in this study. Mean energy intake for male and female respondents was 1626.1 ± 396.6 kcal and 1416.7 ± 319.9 kcal, respectively. Mean percent of total energy intake for carbohydrate was $56.28 \pm 16.28\%$, $16.00 \pm 3.69\%$ for protein and $28.60 \pm 9.73\%$ for fat. Based on Body Mass Index (BMI) classification, 12.3% of the respondents were underweight, 6.8% were overweight and 4.2% were in the obese class I category. The majority of the male (94.7%) and female (94.4%) respondents had Waist-Hip Ratio

(WHR) less than 1.0 and 0.85. Mean body fat percentage of male and female respondents was 22.95 ± 8.16 and 27.26 ± 5.72 %. Mean steps per day counted by pedometer was 7248.9 ± 2954.1 . Almost 22% of respondents had <5000 steps per day and only 13.7% had ≥ 10000 steps per day. Metabolic Equivalent (MET) assessed by IPAQ showed that all the respondents scored more than 600 MET-minute/week. Only 4.4% of the respondents were classified as vigorous active. There was a significant correlation ($p < 0.05$, $r = 0.491$) between number of steps per day and MET. No significant correlations were observed between MET and BMI ($p > 0.05$, $r = -0.188$), MET and WHR ($p > 0.05$, $r = 0.013$), number of steps per day and BMI ($p > 0.05$, $r = -0.071$) or number of steps per day and WHR ($p > 0.05$, $r = 0.117$). There was no significant relationship between physical activity (steps per day) ($p > 0.05$, $r = 0.05$) and MET ($p > 0.05$, $r = -0.116$) with total energy intake (kcal). This study demonstrates that intake of nutrients is lower compared to the recommendation. Therefore it is recommended that these young adults increase their dietary intake to fulfill their requirements.

A26 Prevalence of metabolic syndrome among Iranian adolescent girls

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Metabolic syndrome has become one of the major public-health challenges worldwide. Recent data suggest that the incidence of this syndrome has an increasing trend in developing countries due to westernisation of diet and lifestyle. This study was carried out to determine the prevalence of metabolic syndrome among 15 to 18 years adolescent girls in Iran. A total of 622 high school children were recruited from five different educational zones in Mashhad, the second biggest city in Iran. A comprehensive questionnaire was used to assess socio-demographic characteristics, dietary and physical activity habits. Anthropometric assessment such as body weight, height, waist circumference (WC), hip circumference (HiC), and BMI, WHR, WC/Stature Ratio were measured. Biochemical assessment consisted of fasting blood sugar, triglyceride, HDL-cholesterol, total cholesterol and hsCRP. According to BMI percentiles, 10.5% and 5.6% of subjects suffered from overweight and obesity respectively. Enlarged waist circumference ($WC > 80$ cm) was seen in 9.5% of girls. The prevalence of hypertension was 24.1% for diastolic and 7.2% for systolic blood pressure which was increased by the severity of obesity. A total of 24.5% of subjects had hypertriglyceridemia and 57% of them had a low level of HDL-cholesterol. Metabolic syndrome was defined according to NCEP ATP III (2001) using percentiles for age and gender. The prevalence of metabolic syndrome was 6.5% which increased to 45.1% in obese subjects. Increasing BMI or WC, led to a significant increment in the number of metabolic syndrome criteria ($p < 0.001$). Sedentary life style ($p < 0.0001$), higher socio-economic status of family ($p < 0.0001$) and strong family medical history ($p < 0.001$) were found to be significant influencing factors for metabolic syndrome incidence. All anthropometric characteristics except height showed significant increase in metabolic syndrome subjects compared to non-metabolic syndrome subjects ($p < 0.001$). Biochemical parameters including fasting blood sugar, triglyceride, hsCRP, systolic and diastolic blood pressure were also seen with higher levels among metabolic syndrome subjects ($p < 0.05$). In conclusion, the prevalence of metabolic syndrome among Iranian adolescent girls was high especially among the obese, those leading a sedentary lifestyle, higher socio-economic status and strong family history. Therefore, early screening for identification of children and adolescents with obesity should be done to reduce the incidence of cardiovascular disease and diabetes mellitus type 2.

A27 Nutritional status assessment of female undergraduates in Universiti Sains Malaysia

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Anthropometric measurements like weight, height, and skin fold thickness were used to assess the nutritional status among female undergraduates of Universiti Sains Malaysia. 120 respondents aged between 19-24 years, were chosen randomly from the hostels in the Minden campus. It was found that the mean weight of female student was 51.59 ± 8.4 kg and the mean height was 158.83 ± 5.3 cm. Tricep skin fold thickness was 17.74 ± 4.7 mm, while Body Mass Index (BMI) was 20.46 ± 3.25 kg/m². The result showed that 55% of the subjects had normal BMIs. 26.7% of them fell in the category of Chronic Energy Deficiency I (CED I), 10.82% were pre-obese, 4.2% were in the CED II, while 1.7% were in the CED III category, and 1.7% were obese but none of them were obese III. Percentage of mean body fat was 28.2 ± 5.3 % (maximum value 40.3% and minimum value 19.32%). The ranges of body fat of the respondents can be classified into athletes (2.5%), fitness (7.5%), acceptable (80.8%) and obese (9.2%). This study showed that female students had low energy intakes (1258.56 ± 860.69 kcal/day), and this could be because they were watching their weight and also in the habit of not sticking to fixed meals but would prefer to take snacks.

A28 Food expenditure and coping strategy to household food insecurity in Kelantan

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The objectives of this study are to determine the differences in food expenditure by household food security status and the relationship between household food security and food expenditure. A multi-stage random sampling survey of 301 households with women and children was conducted in rural and urban areas in Kelantan. Household food insecurity determined by 11 items of food-related coping strategies was developed through rigorous in-depth interviews with 57 women of childbearing age from rural and urban areas in Selangor and Negeri Sembilan on their coping experiences to household food insecurity. The internal consistency for the 11 items of food related coping strategies was excellence (cronbrach $\alpha = 0.751$). The household food secure had significantly higher mean on total food expenditure, expenditure on fruits and vegetables, dairy products and food from outside than their food insecure counterpart. Multiple linear regression analyses showed that lower food expenditures on fruits and vegetables, snack food and food from outside are related to household food insecurity. These results suggest that the Coping Strategy Index based on food related coping strategies is able to distinguish between households at different levels of food security status. The Coping Strategy Index has a potential in assessing household food insecurity in the population.

A29 Nutritional status and household food insecurity among children aged 2-12 years in Kelantan

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A cross-sectional study was carried out to assess nutritional status and levels of food insecurity among children aged 2-12 years in Kelantan. A total of 301 children comprising 161 boys and 140 girls were measured for their height and weight using digital weighing scale (TANITA) and SECA body meter. Questionnaires were administered to mothers of all participants to obtain information on socio-demography, food insecurity and dietary intake pattern. Prevalence of underweight, stunting and wasting was 57.3%, 52.6% and 36.9% respectively. According to the Radimer/Cornell Food Insecurity instrument, 26.9% of the households are food secured, while 73.1% experienced some kind of food insecurity (72.4% experienced household food insecurity, 32.2% were individual food insecure and 35.9% were child hunger). The dietary intake pattern revealed that the main sources of calories in the children's diet were rice, noodle, sugar, and bread. Major source of protein in the children's diet were fresh fish, eggs, salted fish and anchovies. The consumption of meats, sea foods, vegetables and fruits was low but the consumption of junk food was quite high. Income per capita (OR=1.00, $p<0.01$), number of children going to school per household (OR=0.70, $p<0.0$), type of jobs (OR=1.84, $p<0.05$) and location (OR=0.39, $p<0.01$) were found to be significant risk factors for food insecurity. However, no significant relationship was found between food insecurity and nutritional status.

A30 Development of booklets on nutrition and health of preschoolers and adolescents in Kota Kinabalu, Sabah, Malaysia

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Studies were carried out to develop booklets on nutrition and health of pre-schoolers and adolescents and to determine the understanding of nutrition and healthy food aspects among the children in pre-school and adolescents in secondary school. One hundred and fifty pre-schoolers aged 1–6 years of Sunshine Nursery Schools in Petagas and their parents, were chosen as respondents. About 288 adolescents (aged of 13–19 years) from Sekolah Menengah All Saints, Tanjong Aru, were chosen as respondents. Questionnaires were used to test and assess their knowledge of nutrition and health based on their age. These studies were divided into two phases: first phase was the development of the booklets on nutrition and health for pre-schoolers and adolescents based on The Recommended Nutrient intakes for Malaysia. In the second phase, the booklets and questionnaires were used as instruments to assess knowledge and acceptance. Weight and height of respondents were measured to determine BMI for growth development. All data collected were analysed using the SPSS programme; scoring test was used to determine the knowledge level of parents, pre-schoolers and adolescents. The results showed that 72 (48.0%) of parents were moderate (score 8-9), 28 (18.7%) good (score 10-11) and 50 (33.3%) weak (score 0-7). For pre-schoolers, 73 (48.7%) were good (score 6 -7), 40 (26.7%) moderate and 37 (24.7%) weak (score 0-3). The Chi-square test showed a significant relationship ($p<0.05$) in factors affecting the knowledge level of children; which were sex $P=0.001$, age $P=0.000$ and BMI status $P=0.041$. For

parents, only monthly income showed a significant level ($P < 0.05$) with $P = 0.000$. Adolescent's knowledge was moderate, 146 (50.7%) scored 1519, 108 (37.5%) scored 10–14 and 34 (11.8%) scored 20–24. The Chi-square test showed the relationship between BMI and knowledge to be significant $\chi^2 = 17.795$, $df = 6$ and $p = 0.007$, while the correlation test showed the association between aged and knowledge to be strong at 0.867. As for the acceptance of the booklets, the majority -132 (88.0%) of the parents, 113 (75.4%) of the pre-schoolers and 266 (92.3%) of the adolescents accepted the booklet on nutrition and health. In conclusion, educational booklets could be used as guide in teaching nutrition and health.

A31 Prevalence of anemia: relationship between nutrient intake and hemoglobin level among non-pregnant non-lactating women in Kuala Lumpur

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Iron deficiency is the world's most common nutritional deficiency, and especially affects women at the reproductive age. This cross-sectional study was carried out in Kuala Lumpur to assess and determine the relationship between dietary intake and iron status among reproductive-aged non-pregnant non-lactating women. A total of 412 subjects were involved in the study comprising 60% Malay, 31% Chinese, 6% Indian and 3% others. Subjects were between 18 and 50 years old, with a mean of 30.7 ± 9.4 years. Anthropometric measurements including weight and height were taken, and dietary intakes were determined using 3-day 24-hour recall on a subsample of 200 subjects. Hemoglobin level, which represents hematologic variable, was measured using B-Hemoglobin Hemocue System (Hemocue AB, Angelholm, Sweden). Subjects were categorised as anemic when hemoglobin level < 12 g/dl (WHO 2001). A questionnaire set was used to assess socio-demographic status, menstrual cycle, health status, and anemia symptoms. Mean body weight was 58.2 ± 12.8 kg, height 156.8 ± 5.9 cm, and body mass index 23.7 ± 5.2 kg/m². Mean hemoglobin concentration was 12.3 ± 1.3 g/dl, representing 36.4% of anemia prevalence. Mean energy intake was 1621 ± 379 kcal (81.1% of RNI), while mean iron intake was 14.8 ± 6.8 mg (51% of RNI). Intakes of energy and iron were significantly ($p < 0.05$) lower among anemic as compared to the non-anemic group. The study also found correlations between hemoglobin and nutrient intake at $p < 0.05$ that is energy ($r = 0.153$) and calcium ($r = 0.168$). However, no correlation was found between hemoglobin levels and iron intake among this sample population. Based on the results found in the study, we speculate that other potential variables such as absorption factor and type of iron consumed may have affected the hemoglobin level rather than total dietary iron intake *per se*. Therefore, there is a need for future studies to focus on absorption factors and types of iron consumed by the population.

A32 Physical activity among adolescents in Jasin, Melaka

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A study was carried out to determine the physical levels of one hundred and seventeen form four students, who were selected from Sekolah Menengah Kebangsaan Simpang Bekoh, Jasin, Melaka. Data were collected using a self-administered questionnaire which consisted of four sections comprising questions on socio-demographic factors (sex, age, race, household size and parental background), Physical Activity Questionnaire for Adolescence (PAQ-A) and sedentary behaviour (watching television and playing video or computer games). Body weight and height of the respondents were measured by the researcher. Data were analysed using SPSS version 14.0. Results revealed that 45.3% of the respondents were males and 54.7% females; 66.7% were Malay, 16.2% Chinese, 14.5% Indian, and 2.6% others, largely from families with a total family income of below RM 1000 per month (mean family income = RM 904.30 \pm 644.52) and relatively large household size (mean household size = 6.54 \pm 1.96). Percentage for underweight, normal and overweight were 11.10%, 69.20% and 19.70% respectively. Mean physical activity score for all respondents was 2.55 \pm 0.58. In addition, only 8.5% of the respondents were categorised as in the high physical activity level category. For sedentary behaviour, overall mean hours of television viewing was 3.03 \pm 1.85. Conversely, overall mean hours of playing computer and video games was 0.95 \pm 1.44. There was a significant correlation between physical activity score and hours of playing video or computer games ($r=0.27$, $p<0.001$). It is suggested that future intervention programmes on adolescents should focus on an active lifestyle to prevent overweight and obesity problems and chronic diseases.

A33 Relationship between skeletal muscle mass, functional status and physical activity among elderly aged 60 years and above in a government health clinic

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A cross-sectional study was carried out to determine the relationship between skeletal muscle mass (SMM), functional status and physical activity among elderly aged 60 years and above in a government health clinic. A total of 107 elderly were recruited from the Jinjang Health Clinic using purposive sampling. The sample consisted of 60 males and 47 females whose age ranged from 60 to 86 years old. Data on personal background and general health characteristics were collected using a face-to-face interview. Elderly Mobility Scale (EMS), manual dexterity, cognitive function test were observed and measured using appropriate instruments. Physical activity for seven days was analysed using the International Physical Activity Questionnaire (IPAQ). Weight, height, waist, hip, calf and thigh circumferences, body fat mass, body fat percentage and handgrip strength were measured using standard procedures and appropriate equipments. The data were analysed using SPSS 14.0. The results revealed significant differences in the EMS score, cognitive function score, handgrip strength, body fat percentage and SMM ($p<0.05$) between the male and female subjects. The males were significantly heavier (66.03 \pm 9.72 kg vs 56.10 \pm 10.24 kg), taller (165.20 \pm 5.97 cm vs 150.91 \pm 8.26 cm), had larger waist circumference (92.79 \pm 8.18 cm vs 86.89 \pm 9.71 cm), higher waist-hip ratio (0.95 \pm 0.06 vs 0.88 \pm 0.09) and heavier SMM (24.54 \pm 0.36 kg vs 17.95 \pm

7.35 kg) compared to females. The mean weight was significantly higher among the younger subjects compared to the older subjects ($p < 0.05$). SMM was significantly correlated with weight ($r = 0.816$, $p < 0.01$), height ($r = 0.835$, $p < 0.01$), waist circumference ($r = 0.589$, $p < 0.01$) and handgrip strength ($r = 0.712$, $p < 0.01$). SMM was also significantly associated with manual dexterity ($r = 0.285$, $p < 0.01$), body mass index (BMI) ($r = 0.285$, $p < 0.01$), hip circumference ($r = 0.344$, $p < 0.01$), waist-hip ratio ($r = 0.373$, $p < 0.01$), thigh circumference ($r = 0.242$, $p < 0.05$) and body fat mass ($r = 0.379$, $p < 0.01$). Age was found to be negatively correlated to EMS score ($r = -0.485$, $p < 0.01$), cognitive score ($r = -0.278$, $p < 0.01$), weight ($r = -0.287$, $p < 0.01$), SMM ($r = -0.325$, $p < 0.01$) and handgrip strength ($r = -0.268$, $p < 0.01$). However, there was no significant correlation between SMM and age with physical activity level among the subjects. In conclusion, there was significant correlation between SMM and functional status among the subjects. The males and the younger age groups had higher SMM, functional status, physical activity level, and handgrip strength compared to the females. With increasing age, quality of life and health status of the elderly may be affected due to a decline in SMM and functional status. Therefore, appropriate interventions need to be carried out to address the consequences of low SMM to prevent associated morbidity and mortality among the elderly.

A34 Nutritional knowledge, attitude and practice towards healthy lifestyle among teachers from a selected primary school in Johor Bahru

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In Malaysia, the burden of non-communicable diseases is rapidly increasing and healthy lifestyle practices during childhood are important in the prevention of these diseases in adulthood. Hence, teachers play an important role in promoting a healthy lifestyle to students. This study aimed at assessing nutritional knowledge, attitude, and practice towards healthy lifestyle among teachers in a primary school in Johor Bahru. The design of this study was cross-sectional using a self-administered questionnaire. The age of the subjects ranged between <30 years to >50 years. Educational background of the teachers was categorised to STPM, diploma, degree, and others. All statistical analyses were performed using SPSS 15.0. A total of 83 primary school teachers participated in this study. The results showed that the mean score for nutritional knowledge, attitude and practice towards a healthy lifestyle were $76.65 \pm 8.73\%$, $80 \pm 12.20\%$ and $72 \pm 12.43\%$ respectively, indicating the teachers had a high level of nutritional knowledge, favourable attitude and good healthy lifestyle practices. Significant differences were found between mean education level of the teachers with nutritional knowledge and attitude towards a health lifestyle ($p < 0.05$). Teachers with STPM and diploma education scored significantly higher in both knowledge and attitude scores compared to teachers with other educational background. There were significant differences in mean practice score between the youngest age group (<30 years old) with the rest of the age groups. Positive correlation between attitude and practice was found ($r = 0.356$, $p < 0.05$) with no significant correlation between nutritional knowledge and attitude and nutritional knowledge with practice. It is suggested that nutrition education programmes be started in schools in order to increase nutrition knowledge of students and teachers, as well as positive changes in both attitude and practice.

A35 Factors contributing to the growth status of the Rohingya children aged 0 – 12 years in Selangor

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A refugee is defined by the United Nations as a person who is outside the country of their nationality caused by fear of persecution for reasons of race, nationality, religion and membership of a particular social group or political opinion and is unwilling to return to the country owing to such fear. The Rohingya is a group of refugees from Myanmar who are denied citizenship in their home country and have fled to Malaysia. They have been here since 1980s. At present, there is no published study on health and nutritional status of the refugee child population in Malaysia. This study was conducted to assess the growth status of the Rohingya children aged 0 to 12 years and to determine the associations between their growth status and socio-economic status, demographic status and health status. A total of 87 Rohingya children were recruited through purposive sampling in Selangor. The children were measured for weight and height while the socio-economic and demographic information was obtained by interviewing their parents. The World Health Organization (WHO) classifications of nutritional status (weight for age, height for age, weight for height and BMI for age) were used to determine the growth status of the children. Mean age of the children was 6.15 ± 2.86 years, with 32, 47 and 8 in the age groups of 0 – 4.9 years, 5 – 9.9 years and 10 – 11.9 years, respectively. About 21.8% of the Rohingya children are underweight, 11.5% stunted and 12.6% wasted. There was a significant correlation between weight-for-age-Z score with vaccination received by children ($p=0.016$, $r=0.259$) and mother's education level ($p=0.023$, $r=0.243$). Height-for-age-Z score was significantly correlated with vaccination ($p=0.027$, $r=0.237$) received and common childhood illnesses ($p=0.024$, $r=0.242$), respectively. In general, the growth status of the Rohingya children is comparable to that of the Malaysian children as a result of better access to health care services. It is recommended that further efforts be taken to improve the children's growth and nutritional status.

A36 Physical activity level, dietary behaviour, body weight status, body image perception and sedentary behaviour among primary school boys in Putrajaya

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A cross-sectional study was conducted to determine dietary behaviour, body weight status, body image perception, sedentary behaviour and their association with physical activity. A total of 91 male students from a selected primary school in Putrajaya participated in the study. A self-administered questionnaire which included the *Physical Activity Questionnaire for Older Children (PAQ-C)*, the *Children's version of Eating Attitudes Test (ChEAT)* and *food habit questionnaire*, and the *Children's Figure Rating Scale* was used in assessing general physical activity, eating attitude and dietary behaviour, and perceptions of current and ideal body shapes respectively. Weight and height were measured and Body Mass Index (BMI) was calculated to determine body weight status based on WHO (1995) percentiles of BMI-for-age. A self-report of the time spent daily on watching television, and playing video or computer games assessed sedentary behaviour. The subjects comprised 95.6% Malays, 2.2% Indians, 1.1% Chinese and 1.1% Punjabi, aged 10 to 12 years, with a

mean age of 10.77 ± 0.57 years. Mean Body Mass Index (BMI) was 18.89 ± 5.24 kg/m² with 16.5% underweight, 52.7% normal body weight and 30.8% overweight or obese. The mean physical activity level score was 2.97 ± 0.65 with 17.6% categorised in low, 61.5% in moderate and 20.9% in high activity level groups. With regard to the children's eating attitudes, 17.5% of subjects were found to be at risk of eating disorders. Further, 42.9% of subjects skipped breakfast and 67.0% were not drinking at least 8 glasses of plain water on 3 or more days per week; while only 25.2% and 22.0% ate fruits and vegetables respectively at least 5 times per week. The mean ideal body shape chosen by the respondents was slightly smaller (3.63 ± 0.69) than their mean current body shape (3.97 ± 1.07). The highest discrepancy score shown was -1 (28.6%) and 44.0% of the subjects desired a slimmer body shape. The mean hours spent on television viewing, video or computer games on weekdays were 2.47 ± 1.13 and 1.67 ± 1.18 respectively, which were less than the time spent on weekends (3.64 ± 1.52 hours for TV viewing and 2.85 ± 1.57 hours for video/computer games). Significant relationships were found between physical activity levels and mothers' education level ($\chi^2=10.391$, $p=0.006$), fathers' monthly income level ($r=0.281$, $p=0.01$), food habit scores ($r=0.221$, $p=0.035$) and Body Mass Index ($r=-0.218$, $p=0.038$). Conversely, there were no significant relationships between physical activity levels and fathers' and mothers' occupations, fathers' education level, mothers' monthly income, ChEAT scores, body figure discrepancy scores and time spent on sedentary behaviours. The findings from this study indicate that almost 1 in every 5 of the primary school boys was not physically active. Health promotion programmes on physical activity should focus on healthy eating practices, achieving healthy body weight status, correcting negative body image perceptions, as well as adopting an active lifestyle by reducing sedentary behaviours.

A37 Differences in nutritional status by stages of change in dietary fat reduction among non-academic staff in Universiti Putra Malaysia

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Non-communicable diseases have become a major health burden and a public health concern in Malaysia. The changes in lifestyle and food habits of Malaysian have been implicated in the changing disease pattern. The purpose of this cross-sectional study is to determine the differences in nutritional status by stage of change in dietary fat reduction among 174 non-academic UPM staff aged 19-56 years. Information on demographic, socio-economic and stages of change related to dietary fat reduction was collected using a pre-tested interview-administered questionnaire. Subjects were measured for weight, height and waist circumference. Blood samples for fasting triglycerides, LDL, HDL and total cholesterol were also obtained through venipuncture. Energy and dietary fat intake were obtained through two-day 24-hour dietary recalls. The mean Body Mass Index (BMI) of the subjects was 24.38 ± 4.55 kg/m² with 27% being overweight and 12.6% obese. The mean waist circumferences (WC) for males and females were 86.97 ± 12.08 cm and 77.88 ± 11.21 cm respectively, with 20% of respondents having at risk WC (Males = 94 - 101 cm; Females = 80 - 87 cm) and 16% had increased at risk WC (Males ≥ 102 cm; Females ≥ 88 cm). The fasting triglycerides, LDL-, HDL-, and total cholesterol were 1.64 ± 1.01 mmol/L, 5.27 ± 1.50 mmol/L, 1.77 ± 0.45 mmol/L and 7.78 ± 1.72 mmol/L, respectively. The mean energy intake was 1,460 \pm 429.51 kcal while the mean fat intake was 48.82 ± 17.06 g. The mean total calories contributed from fat were $30.14 \pm 5.80\%$ with 50% of subjects consuming more than 30% of total calories from fat. Using the Algorithm Stages of Change, 69% of subjects were in Preparation stage, followed by Pre-contemplation/Contemplation stage (20.7%) and Action/Maintenance stage (10.3%). The ANCOVA test was used to determine the differences in nutritional status across stages of change, adjusted for age, sex, years of education, individual and household income. There was a significant

difference in BMI by stages of change with respondents having improved BMI in the later stages ($F = 4.972; p < 0.05$). A significant difference was found in WC by stages of change for males ($F = 4.121; p < 0.05$) but no significant difference in WC for females. There was also significant difference in total calories intake across stages ($F = 3.174; p < 0.05$). The overall dietary fat intake (g) did not show significant difference across stages but a significant trend across stages in total fat intake was found for females ($F = 3.315; p < 0.05$). No significant trend across stages was found for fasting triglycerides, LDL-, HDL- and total cholesterol. In conclusion, a stage of change algorithms is a useful tool to guide researchers in designing and evaluating an intervention. Stage-match intervention may be more effective because the intervention messages and strategies reflect individual's needs and goals.

A38 Computer use, television viewing and other factors related to obesity among staff at UPM

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This cross-sectional study was conducted to determine the association between computer use and television viewing in relation to obesity among staff at UPM. Ninety-nine staff with a mean age of 34 years were randomly selected from various faculties. Data were collected through a pre-tested self-administered questionnaire. Weight, height, waist and hip circumferences were measured directly. The majority of the respondents were Malay, non-academic staff (71%) and the mean total household income was RM4228.90 ± 3875.79. The mean body mass index (BMI) was 24.44 ± 4.57 kg/m² with 8.1% respondents being underweight, 50.5% respondents normal, 29.3% overweight and 12.1% obese. Waist circumference (WC) revealed that 41.4% of the respondents were in the increased risk category while waist-hip ratio (WHR) indicated that 13% were at high risk for chronic diseases. The mean total time for computer use at the workplace and at home was 6.10 ± 2.35 hours/day and the average time for television viewing at weekdays and weekend was 3.35 ± 1.68 hours/day. Together, computer use and television viewing accounted for 9.17 ± 3.33 hours/day. T-test showed that there were no significant differences between computer use hours at workplace and at home with BMI ($p=0.170$, $t=1.388$), WC ($p=0.074$, $t=1.821$) and WHR ($p=0.292$, $t=1.060$). Chi square test showed no association between average TV viewing hours at weekday and weekend with BMI ($p=0.616$, $c^2=0.252$), WC ($p=0.616$, $c^2=0.252$) and WHR ($p=0.682$, $c^2=0.168$). However, there were significant differences between WC categories for total hours of computer use and TV viewing ($p=0.003$, $t=3.058$) but not for BMI ($p=0.062$, $t=1.892$) and WHR ($p=0.646$, $t=0.461$). Spearman correlations revealed significant relationships between age and BMI ($p=0.000$, $r=0.474$), WC ($p=0.000$, $r=0.593$) and WHR ($p=0.000$, $r=0.567$); total household income with BMI ($p=0.014$, $r=0.246$), WC ($p=0.002$, $r=0.314$) and WHR ($p=0.018$, $r=0.238$) respectively. In conclusion, these findings show that socio-economic factors may contribute to the development of abdominal obesity in this sample of adults while sedentary behaviours appear less important.

A39 Relationship between pedometer-determined physical activity, lifestyle factors, and body mass index among staff in Universiti Putra Malaysia

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The objective of this study was to determine the relationship between lifestyle factors, body mass index and pedometer determined physical activity among staff in Universiti Putra Malaysia. Physical activity level was assessed using pedometer (Yamax Allness 200S, Japan) and International Physical Activity Questionnaire (IPAQ). Respondents were instructed to wear the pedometer and to record the total number of steps taken during the whole day in a physical activity log, for three days. The questionnaire consisted of five sections, which were personal details, medical history, health status, IPAQ and dietary intake. Dietary intake was assessed using 24-hour diet recall for three days. Assessments of height (Bodymeter, Germany), weight (Tanita, Japan), waist circumference, hip circumference and percent body fat (Omron HBF 302, Japan) were done on each respondent. A total of 66 adults were involved in this study. Mean age was 41±11 years, 18.2% smoked and none of them consumed alcohol. Most of the respondents were married (69.7%) and worked as Administration Assistants (47.0%). Mean body mass index (BMI) was 25.96±4.69 kg/m², mean steps per day was 4260±1880 for women and 6118±2406 for men. Mean total energy intake was lower (1908.87±392.61 kcal for male and 1731.68±382.86 kcal for female) compared to the Recommended Nutrient Intakes (RNI) for Malaysians. The correlation between energy intake and steps per day was not significant ($r=0.063$, $p=0.614$). There was no significant correlation between number of steps per day assessed by pedometer and metabolic equivalent (MET) assessed by IPAQ ($r=0.168$ and $p=0.178$). Level of pedometer-determined physical activity as classified based on total number of steps per day was not significantly associated with income ($\chi^2=15.265$, $p=0.433$), education level ($\chi^2=18.321$, $p=0.434$) and smoking habit ($r=-0.086$, $p=0.494$). The results of this study showed that BMI ($\chi^2=16.109$, $p=0.186$), male fat percentage ($\chi^2=6.265$, $p=0.990$), female fat percentage ($\chi^2=2.149$, $p=0.708$) and female waist circumference ($\chi^2=2.182$, $p=0.336$) were not significantly associated with the level of pedometer-determined physical activity. Waist circumference for male was significantly associated with the level of pedometer-determined physical activity ($\chi^2=8.369$, $p=0.039$). These findings require further investigation to confirm the association between the variables studied.

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

B01 Fruits and vegetables preference of female undergraduates in Universiti Sains Malaysia

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This study was conducted to determine the preference for fruits and vegetables among female undergraduates in Universiti Sains Malaysia. Data was collected using Food Frequency Questionnaire (FFQ) completed by 120 female subjects aged between 19-24 years old, who were randomly chosen from all hostels in the main campus. Results showed that cabbage (*Brassica oleracea*) had the highest score (73.6%) for food frequency followed by kangkung (63.1%) and mustard (*Brassica juncea*) (61.7%). The three lowest scores were for pumpkin (*Cucurbita maxima*) (39.9%), celery (*Apium graveolens*) (41.4%) and brinjal (*Solanum melongena*) (42.5%). Most of the respondents chose apple (*Pyrus malus*) as their favourite fruit (75.7%) followed by orange (*Citrus nobilis*) (69.3%), papaya (*Carica papaya*) (61.0%) and guava (*Psidium guajava*) (60.6%). The lowest scores were for kiwi fruits (*Actinidia deliciosa*), dragon Fruit (*Hylocereus undatus*) and strawberry (*Fragaria grandiflora*) with scores of 32.5%, 32.8% and 35.8% respectively. The top eight favourite fruits and vegetables were then analysed for their ascorbic acid contents by the DCPIP method and mineral (Ca, K, Na, Fe and Zn) contents using atomic absorption spectrophotometer. From the experiment, it was found that French beans had the highest loss of ascorbic acid content during cooking (88.92%) followed by mustard (77.85%) and long beans (74.66%). Bean sprout (*Phaseolus aureus*) had an ascorbic acid loss of only 35%. This could be due to the cooking method employed for different vegetables. From all the samples that were examined, orange had the highest calcium (0.43%) and iron (0.021%). Except for sodium, the vitamin C and mineral daily intakes were below 2/3 of RNI requirements.

B02 Gender and food choice comparisons

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The objective of this study was to examine differences in food choice rating and ranking between males and females. A total of 285 respondents within Klang Valley area participated in this study. The questionnaires were distributed to respondents aged 18 and above from intact (husband-wife) families with at least one child. It consisted of questions that captured the psychological profiling of consumers with various food preferences and behaviours. The 36-item Food Choice Questionnaire (FCQ) was adapted from food choice scale developed by Steptoe, Pollard and Wardle (1995). The FCQ was utilised to assess the reported importance of nine factors (health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity and ethical concern) influencing food choice between males and females. It was hypothesised that male and female subjects differed in the food choice rating and ranking. The mean value for each of the nine factors was slightly different between male and female. However, only the mean for

factor related to the natural content of the food was found to be significantly different between male and female at $\alpha = 0.05$ ($t=2.75$). Male and female unanimously ranked health, price and weight control as the top three factors in their food choice, with ethical and familiarity factors as the last two factors to be considered in their selection. However, both sexes indicate different priorities in terms of convenience, sensory appeal, mood and natural content factors in their choice. Regardless of everyday life of Malaysians which has become so demanding and more hectic than ever, health still ranked the first priority of food choice instead of convenience. The findings provide an insight into consumer decisions in terms of food choice.

B03 Meal skipping behaviours of female adolescents in Kuantan, Pahang

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A disordered eating behaviour that may compromise growth and development of female adolescents is meal skipping. The present cross-sectional study determines meal skipping behaviours and their possible associated factors among 407 female adolescents aged between 13 to 19 years, who were randomly selected from two secondary schools in Kuantan, Pahang. All respondents were required to complete a set of Eating Behaviours Questionnaire, and their weight and height were measured by the researchers. A majority of the respondents were Malays (65.3%), followed by Chinese (28.3%) and Indians (6.4%). Based on WHO (1995) classification, 5.9% of the respondents were underweight, 75.4% were normal-weight and 18.7% were overweight. About one-third (35.9%) never skipped any of the daily three meals, but another half (52.6%) skipped at least one meal a day and the remaining (11.5%) even skipped all three meals in a day. The most frequently missed meals were breakfast (47.4%), followed by dinner (37.6%) and lunch (24.8%). Besides, 51.4% of the respondents snacked between meals everyday. A majority of respondents (76.9%) usually had their meals with family members, while 15.4% ate with peers and 7.7% ate alone. Those who usually skipped meals were more likely to be those who usually did not eat with family members ($\chi^2=16.933$, $p<0.05$), were overweight ($\chi^2=15.943$, $p<0.05$), and were Malays ($\chi^2=33.827$, $p<0.05$). However, age was not associated with meal skipping. In conclusion, a large proportion of adolescent girls in the present study skipped at least one meal a day. Promotion of healthy eating should stress the importance of regular intakes of the three daily main meals during adolescence.

B04 Knowledge on calcium and consumption of calcium among vegetarians from a Buddhist temple in Selangor

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Calcium consumption among vegetarians is lower than non-vegetarians due to the high amounts of low calcium bioavailability compounds such as oxalates, phytates and dietary fibre present in their diets. The purpose of this study is to assess the calcium knowledge and consumption as well as the correlation of calcium knowledge and calcium consumption among vegetarians. This study was conducted in a Buddhist temple, Selangor where 84 vegetarians: 40 males and 44 females participated in the study. A questionnaire consisting of demographic questions, calcium

knowledge quiz and food frequency questionnaire (FFQ) was designed to assess the subjects' calcium knowledge and daily calcium intakes. All statistical analyses were performed using SPSS 15.0. The mean calcium knowledge score of the subjects fell in the average level, $56.35 \pm 14.06\%$. More than half of the subjects had low level of calcium intake though the mean daily calcium intake ($811.00 \pm 357.20\text{mg/day}$) was within the average calcium intake level (800 to 1300mg/day). Nevertheless, there was a significant difference in mean when calcium intake was compared with gender ($t=-2.23, p<0.05$). Moreover, the subjects with university or college education had significantly higher calcium knowledge score and calcium consumption as compared to those with primary education, secondary education and other education levels. The results of this study also suggest a positive, significant correlation between calcium knowledge and calcium consumption among the subjects ($r=0.374, p<0.001$). Therefore, improvements in calcium knowledge among the vegetarians is particularly important to meet the RNI for calcium.

B05 Factors associated with fast food consumption among adolescents in Ipoh

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A cross-sectional study was conducted to determine the relationship between socio-economic and demographic, behavioral, psychosocial factors, body mass index and fast food consumption. Fast food consumption was defined by the following variables: frequency of fast food consumption in the previous one month and type of fast food consumed usually. A total of 108 male and 102 female Chinese adolescents living in Ipoh were recruited from five tuition centers by systematic sampling. A pre-tested structured self-administered questionnaire was used to collect data. Anthropometric data were obtained with direct measurements using established methods. The mean age of the subjects was 15.3 ± 1.7 years and comprised 51.4% males and 48.6% females. About 76% of them reported never or only occasionally eating fast food in the previous one month (less than once a week) while 23.8% of them always ate (at least once a week). Burgers (31.9%) were the most favorite fast food followed by fried chicken (25.2%), french fries, pizza and nuggets (23.3%), ice-cream and pie (19.5%). Frequency of fast food consumption in previous one month was significantly associated with fast food preferences ($p=0.018, p<0.05$), self-rated health ($p=0.000, p<0.05$), and confidence to eat more fruits and vegetables ($p=0.012, p<0.05$). No relationship was found between type of fast food consumed and all the socio-economic and demographic, behavioural and psycho-social factors. BMI ($p=0.000, p<0.05$) was significantly related to frequency of fast food consumption in the previous one month. In conclusion, personal and psycho-social factors appear to influence fast food consumption among Chinese adolescents.

B06 Relationship between osteoporosis health belief, self-efficacy and knowledge with dietary calcium intake and physical activity among nursing students

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The objective of this study was to determine the relationship between osteoporosis health belief (OHB), self-efficacy (SE) and knowledge with dietary calcium intake and physical activity among nursing students at Tun Tan Cheng Lock College of Nursing. The respondents were selected through purposive sampling method. Data on socio-demographic, family history of osteoporosis, OHB, SE and knowledge about osteoporosis were collected through a self-administered questionnaire. Dietary calcium intake was assessed by using a Semi-quantitative Food Frequency Questionnaire (SFFQ) while the physical activity level was assessed by using the International Physical Activity Questionnaire (IPAQ). The OHB Scale, Osteoporosis Self-efficacy Scale (OSES) and Osteoporosis Knowledge Test (OKT) instruments were copyrighted and permission to use had been obtained from the authors. Data were analysed by using the Statistical Package for Social Science (SPSS) version 15. A total of 195 respondents who fulfilled the selection criteria participated in this study. The mean age of the respondents was 20.56 ± 1.48 years. The mean weight, height and Body Mass Index (BMI) of the respondents were 51.60 ± 7.84 kg, 1.59 ± 0.06 m and 20.37 ± 2.77 kg/m², respectively. Based on the BMI classification, 25.6% of them were underweight (BMI < 18.5 kg/m²) and 6.2% were overweight (BMI ≥ 25 kg/m²). A majority (71.8%) of the respondents reported no family history of osteoporosis. Total OHB scores and total SE scores were 144.29 ± 12.91 and 697.74 ± 188.85 , respectively. The mean scores for OKT was 11.99 ± 2.92 . More than half (63.6%) of the respondents had a high level of physical activity (total MET-min per week > 1500 MET-min per week). The mean of dietary calcium intake was 589.14 ± 357.09 mg per day. A majority (75.9%) of respondents did not achieve the FAO/WHO recommendation (1000 mg) and only less than one-quarter (24.1%) fulfilled the Malaysian Recommended Nutrient Intake (RNI) of 800 mg. The results showed no significant correlation between perceived benefits of taking calcium and perceived barriers of taking calcium with dietary calcium intake. There was also no significant correlation between perceived benefits to exercise with physical activity. However, perceived barriers to exercise was significantly correlated ($r = -0.150$, $p < 0.05$) with physical activity, indicating that those with less barriers had a higher physical activity level. The results also revealed a significant relationship between SE of taking calcium with dietary calcium intake ($r = 0.170$, $p < 0.05$) and between SE to exercise with physical activity ($r = 0.280$, $p < 0.05$). No significant relationship was found between knowledge about osteoporosis with dietary calcium intake, physical activity and osteoporosis SE. However, OHB and knowledge about osteoporosis were significantly correlated ($r = 0.203$, $p < 0.05$) indicating that those with a high level of health beliefs had better knowledge about osteoporosis. In conclusion, the majority of respondents had moderate levels of OHB, SE and knowledge related to prevention of osteoporosis and their dietary calcium intake level was considered to be low. Therefore, health education interventions in improving osteoporosis preventive behaviour should be implemented to increase their level of OHB, SE and knowledge and dietary calcium intake. The osteoporosis preventive programme is essential for all age groups to promote optimal bone health status.

B07 Dietary intakes of soy products, fruits and vegetables in relation to risk of premenopausal breast cancer

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Diets rich in soy products, fruits and vegetables contain large amounts of antioxidants such as carotenoids, vitamin C, vitamin E and polyphenols. However, the risk reducing effect of soy products, fruits and vegetables were found to be inconclusive in epidemiological studies among pre-menopausal women. The aim of this study was to determine the association between dietary intakes of soy products, fruits and vegetables and risk of breast cancer among premenopausal women. This is a retrospective case-control study design. A total of 110 breast cancer cases were recruited from Hospital Kuala Lumpur and Hospital UKM. Community based control (n=105) were matched to the cases according to age and ethnicity with a ratio of 1:1. Inclusion criteria for the cases were primary breast cancer confirmed by histopathological examination and the control group consisted of healthy individuals without any underlying cancer diagnosis. Both cases and control were Malaysian women, aged between 27 to 54 years, pre-menopause, not pregnant or lactating during the study period and able to recall their dietary intake pattern. Dietary intake data were collected using an interviewer-administered food frequency questionnaire. Socio-demographic data were obtained using a standardised questionnaire and anthropometric measurements were taken at the end of the interview session. All data were analysed using Statistical Package for Social Sciences (SPSS) software version 15.0. The results of this study show that intake of soy products was associated with an increase in risk for breast cancer among premenopausal women. Intake of more than 2 servings per week of soy products will increase by twofold the risk for pre-menopausal breast cancer. Soy products that were identified to increase risk of pre-menopausal breast cancer when compared between highest to lowest intake were tofu (OR=1.86, *p* trend=0.042), *tofu-fah* (OR=2.30, *p* trend=0.026) and soy milk (OR=3.53, *p* trend=0.001). No specific fruits or vegetables were identified to effect risk of pre-menopausal breast cancer. However, total fruits intake was found to decrease risk by 79% when one serving daily was consumed at least. Intake of green leafy vegetables was also associated with decreased risk by significant dose-response relationship (*p* trend=0.019). Interestingly, mean dietary intake of beta carotene for control group which was 2119 ± 1250 ig/day was higher significantly from intake by case group which was 1698 ± 863 ig/day. The cases were also noted to be consuming a significantly lower intake of vitamin C than the control which were 71.3 ± 33.4 mg/day and 101.8 ± 56.2 mg/day respectively. Other nutrients studied were observed to be comparable between cases and control. This study concludes that among pre-menopausal women, soy product intake has strong association with risk of breast cancer. Risk of pre-menopausal breast cancer can be reduced by consuming at least one serving of fruits and one serving of green leafy vegetables daily.

B08 Relationship between osteoporosis health belief, dietary calcium intake and physical activity with bone health status among female employees at a public higher institution

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The objective of this cross-sectional study was to determine the relationship between osteoporosis health belief (OHB), dietary calcium intake and physical activity with bone health status among non-academic female employees in Universiti Putra Malaysia. Socio-demographic information, family history of osteoporosis, menopausal status, OHB scores, consumption pattern of milk and calcium supplements were obtained through a self-administered questionnaire. While calcium intake was assessed using a semi-quantitative Food Frequency Questionnaire (SFFQ), physical activity level was assessed using the International Physical Activity Questionnaire (IPAQ). Weight, height and bone health status were measured using a weighing scale (TANITA), body meter (SECA) and ultrasound machine (QUS-2™), respectively. Data were analysed using the Statistical Package for Social Science (SPSS) version 15. A total of 156 respondents aged 20-59 were recruited into this study. The mean age of the respondents was 34.62 ± 10.44 years old. About 93% of them reported no family history of osteoporosis. Only 9.6% of them had attained menopause at a mean age of 49.40 ± 2.85 years. The mean OHB score was 146.24 ± 11.99 . About 78.0% of the respondents consumed milk, particularly low fat milk (43.0%) and only 28.2% were taking calcium supplements. The mean calcium intake was 727.42 ± 325.50 mg per day. The majority of the respondents (81.4%) did not achieve FAO/WHO recommendation for calcium intake. On the other hand, only one-third of them meet the Malaysian Recommended Nutrient Intake (RNI). About 46% of them were classified to have high level of physical activity. The mean weight, height and body mass index (BMI) was 59.16 ± 14.57 kg, 1.54 ± 0.05 m, and 24.74 ± 5.75 kg/m² respectively. A total of 12.2% were underweight, 25.0% were overweight and 16% were obese. In the assessment of bone health status, the mean Broadband Ultrasound Attenuation (BUA) was 93.63 ± 18.18 dB/MHz and the mean T-score was 0.42 ± 1.35 . According to WHO classification, 16.7% were osteopenic and 1.3% were osteoporotic. Spearman correlation test showed a significant relationship between perceived susceptibility towards osteoporosis ($r = -0.176$, $p < 0.05$) with dietary calcium intake. However, it failed to show any significant relationship between perceived seriousness towards osteoporosis, perceived benefits of taking calcium and perceived barriers of taking calcium with dietary calcium intake. There was a significant correlation between perceived benefits of exercise ($r = -0.162$, $p < 0.05$) and perceived barriers to exercise ($r = -0.186$, $p < 0.05$) with physical activity. The results also revealed no significant correlation between dietary calcium intake and physical activity with BUA and T-score. In conclusion, the OHB score among the respondents was moderate. About one-fifth of them had poor bone health status and their dietary calcium intake and physical activity level were generally low. Therefore, appropriate health education and intervention programmes should be implemented to improve their dietary calcium intake and physical activity level so as to ensure optimal bone health especially among women who may be at increased risk of osteoporosis.

B09 Calcium intake, physical activity and bone health status among primary school children

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The objective of this cross-sectional study was to determine the calcium intake, physical activity and bone health status among primary school children. A total of 255 subjects (54.5% girls, 45.5% boys) aged 10 to 12 participated in this study. A questionnaire was used to assess socio-demographic characteristics and dietary habits while Physical Activity Questionnaire for Older Children (PAQ-C) was used to assess level of physical activity. One-day dietary recall and two-day food record were used to determine the dietary calcium intake of respondents. Body weight, height and bone health status were measured by using digital weighing scale, stadiometer and ultrasonometry (QUS-2TM), respectively. Data were analysed by using the Statistical Package for Social Sciences (SPSS) version 15.0. Mean height and weight of the respondents were 1.42±7.8 m and 37.3±9.2 kg respectively. About 65.1% of respondents had normal weight. Mean calcium intake was low with a mean of 503.7±264.8 mg/day. About 91.4% of the subjects had inadequate calcium intake as recommended by RNI for Malaysia. Mean physical activity score was 2.44±0.66. About 33.3% of the subjects were moderately active, 32.9% were sedentary and only 3.7% were highly active. The mean for Broadband Ultrasound Attenuation (BUA) was 70.41±0.63 dB/MHz. Majority (69.0%) of the respondents were osteopenic and only 22.7% had normal bone health status. These data should, however, be interpreted cautiously as children at these ages are still building their bones, hence peak bone mass has yet to be attained. In boys, there was a weak but positive relationship between BUA and calcium intake ($r=0.224$, $p=0.016$) but not in girls ($r=-0.056$, $p=0.510$). Body weight in boys ($r=0.285$, $p=0.002$) and girls ($r=0.311$, $p=0.000$) was positively but weakly associated with BUA. Physical activity level was associated with BUA in girls ($r=0.194$, $p=0.001$), but not in boys ($r=0.069$, $p=0.462$). There was significant difference in physical activity level ($z=2.324$, $p<0.05$) between boys and girls although no significant difference were noted between boys and girls in calcium intake ($t=0.239$, $p>0.05$), weight status ($t=0.461$, $p>0.05$) and BUA ($t=-1.193$, $p>0.05$). In conclusion, calcium intake, physical activity and bone health status among primary school children were unsatisfactory. Intervention programmes should be carried out to improve bone health status of children through appropriate lifestyle modification.

B10 Protein source preference among female undergraduate students in Universiti Sains Malaysia

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This study was conducted to obtain the preference pattern for protein source among USM female undergraduate students aged between 18-24 years old, living in hostels in the USM main campus in Penang. Analysis of protein and minerals was carried out on 9 samples of the most favourite food (protein source). 120 female undergraduate students were chosen randomly to complete the Food Frequency Questionnaire (FFQ). A score range of 60-79% indicated that the food was consumed in moderate frequency while a range of 20-59% showed that the food was consumed in low frequency. Results showed that the most popular dishes containing protein were fried eggs (66.53%), fried rice (65.69%), fried long beans (65.42%) baked beans (64.58%) and fried

chicken (64.58%). These dishes were consumed at least two or three times per week. On the other hand, the least popular dishes were beef kurma (25.97%), fried beef (26.25%), beef rendang (27.64%), beef curry (27.64%), and beef sambal (27.64%). From this study we can conclude that female students preferred to consume snack and small meals to save time. They do not have fixed meals. Price of food and religious factors could also influence their choice of protein sources. Only protein and iron intakes met 2/3 of the Malaysian RNI. The mineral intakes were below 2/3 of the RNI.

B11 Complementary feeding patterns among male infants in Kuala Lumpur

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This cross-sectional study was carried out to determine the complementary feeding patterns among male infants in Kuala Lumpur. A total of 99 infants comprising 57.6% Malays, 21.2% Chinese and 21.2% Indians from five Maternal and Child Health clinics situated around Kuala Lumpur participated in this study. The data collection involved a 24-hour infant's food intake and a structured questionnaire to determine the pattern of complementary food consumption and socio-demographic profile. Results obtained indicated that majority of the infants (51.7%) were introduced to complementary food at 4-5 months of age. Only 25% of infants were in accordance to WHO recommendation (2002) on timing of complementary food introduction at the age of 6 months after birth. Commercial cereals appeared to be the most common first complementary food introduced to infants (75%) followed by rice porridge (22%) and other foods (3%) which were glucose drinks and biscuits. The majority of mothers (61%) perceived that their infants were hungry and that appeared to be the main reason why complementary foods were introduced at an early age. Mother's age and the family's income were shown to have a significant correlation ($p < 0.05$) with the type of complementary foods given to the babies. The main source of knowledge on complementary food among mother's were reported to be from medical practitioners (66.7%), followed by subject's grandmothers (54.5%) and reading materials (43.4%). The mean energy intake for infants in the range of 0-6 month group was 700 ± 166 kcal while for infants in the range of 7-12 month group was 795 ± 223 kcal per day. Mean intake of energy and other nutrients (protein, vitamin A, thiamin, riboflavin, niacin, vitamin C, calcium, iron) of both groups 0-6 month and 7-12 month achieved the recommendation of RNI Malaysia (2005). Using the WHO-MGRS (2006) growth chart as reference, this study showed that 16.2% infants were found to be malnourished, 10.1% were stunted while infants categorised as wasting were 13.1%. In conclusion, the pattern of introduction of complementary foods in this study area does not follow internationally recognised practices, suggesting the need for further education of health professionals and parents.

B12 Effect of diet counseling on serum lipid profile among hyperlipidemia patients

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Changes in nutritional diet are the main principles suggested by Malaysian Dietetics Association (MDA) and National Heart Institute (IJN) to control risk factors for cardiovascular

disease especially hyperlipidemia. Therefore, the purpose of this study was to evaluate the effect of diet counseling on serum lipid profile among hyperlipidemia patients after undergoing non-pharmacological measures treatment. This study involved 40 subjects (22 male and 18 female), major ethnic groups (Malays; Chinese; India), aged between 45 to 67 years and not taking lipid lowering drugs. Serum lipid profile was analysed and subjects completed a questionnaire on knowledge, attitude & practice (KAP), cholesterol food frequency questionnaire (FFQ) and 24-hour diet recall before and after study. Subjects attended the diet counseling sessions over a three month period. Results obtained showed that there was a significant ($p < 0.05$) increase in subjects' knowledge after (71%) receiving diet counseling compared with before (60%) the study. Subjects' knowledge score after diet counseling was found to be positively ($r = 0.295$) and significantly ($p < 0.01$) correlated with their knowledge score before the intervention. There were significant ($p < 0.05$) differences in energy and fibre intake as well as the percentage of energy from macronutrients before and after subjects received the diet counseling. Percentage of energy from fat was found to be significantly ($p < 0.05$) but negatively ($r = 0.220$) correlated with the knowledge score after the intervention. For each category of foods, margarine (73.5%), chicken (98.8%), fish (98.8%) and egg white (100%) had relatively the highest frequency of consumption by subjects after receiving diet counseling. There were no significant changes in serum lipid profile [triglyceride (TG), total cholesterol (TC), high density lipoprotein-cholesterol (HDL-C) and low density lipoprotein-cholesterol (LDL-C)] among subjects after receiving diet counseling. This study showed that diet counseling may improve and control the serum lipid profile among hyperlipidemia patients.

B13 Relationship between nutritional status and lifestyle with hypertension among Chinese women in Klang Valley

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This presentation reports the relationship between nutritional status and lifestyle with hypertension. A total of 127 Chinese women aged between 20 to 59 years who were mainly church and temple goers from Klang Valley participated in the study. Nutritional status was evaluated by anthropometry. Anthropometric measurements such as weight, height, body mass index, waist circumference and percent body fat were determined. Habitual sodium intake was evaluated using a 74 food-itemed FFQ for sodium. Lifestyle factors such as smoking, alcohol intake and physical activity as well as demography were gathered using questionnaires. Blood pressure was measured using Omron Digital Automated Blood Pressure Monitor Model HEM-907. Mean BMI was 22.5 ± 3.4 while mean waist circumference was 71.7 ± 7.8 . Mean percent body fat was 30.1 ± 5.1 . Mean systolic blood pressure and diastolic blood pressure were 116.1 ± 15.9 mm Hg and 71.0 ± 11.35 mm Hg respectively, indicating normal blood pressure. Prevalence of hypertension among these Chinese women was only 8%. Physical activity evaluated using IPAQ showed moderate physical activity. 98% of these women never smoked nor drank alcohol. Mean habitual sodium intake was 2748 ± 890 mg per day, which was equivalent to 6.75 g of salt. There was a significant correlation between blood pressure with body weight, BMI, waist circumference and percent body fat. There was no significant correlation between sodium intake with systolic and diastolic blood pressure. This study showed that their healthy way of living such as no smoking and drinking, maintaining normal body weight, being moderately active and being at peace with life could be factors influencing the low prevalence of hypertension in the community.

B14 Breakfast habits among adolescents in Kulim, Kedah

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The main objective of this research was to evaluate the breakfast consumption habits and patterns among adolescents in Kulim, Kedah. A structured questionnaire consisting of questions on demographic, breakfast habits, 24-hour recall, food frequency for breakfast and nutrition knowledge was distributed to 350 respondents (males=147, females=203). Weight and height measurements were carried out and body mass index calculated. Respondents were categorised into breakfast regulars (consumed breakfast everyday or 5-6 times a week) or breakfast skippers (consumed <4 times a week). Data were analysed using SPSS. On the day that the study was carried out, 61.1% of respondents did take their breakfast. Only 40% of respondents were categorised as breakfast-regulars, whereas 60% were classified as breakfast skippers. Two main reasons for taking breakfast were parents' motivation and feeling good after breakfast. Time constraints and not feeling hungry were main influencing factors in skipping breakfast. Only 29% of respondents met 25 to 30% calories of their recommended daily intake from breakfast alone. Five most commonly consumed breakfast items were white bread, fried eggs, curry puff, fried rice and coconut rice. Drinks, most regularly taken, were plain water and chocolate drink. There was a significant but weak correlation between frequency of breakfast intake and BMI ($r=-0.159$, $p=0.03$) and level of nutrition knowledge ($r=-0.20$, $p=0.00$). In conclusion, the breakfast habits and practices among adolescents in Kulim are not satisfactory and must be improved through daily nutritious breakfast intake.

B15 Fruits and vegetables intake and the risk for colorectal adenomas: a Malaysian study

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Colorectal cancer ranked third and accounted for nearly seven percent of all cancer cases among Malaysians in 2003. A pre-dominantly plant-based diet is constantly associated with decreased risk of colorectal neoplasia and adenomatous polyps, a pre-cursor to colorectal cancer. In previous studies, the intake of fruits and vegetables were found to decrease the risk for colorectal adenomas (CRA) and subsequently colorectal cancer. This case-control study aimed to determine the intake of fruits and vegetables and the risk associated with colorectal adenomas in Malaysian subjects. Fifty-nine newly diagnosed patients were recruited as case subjects, while 59 polyp-free subjects served as control. Data on socio-economic status was obtained using a pre-tested questionnaire. A pre-tested food frequency questionnaire (FFQ) was used to record the types of fruit and vegetable consumed by the subjects, while the 24-hour dietary recall was used to quantify serving sizes. All data were analysed using SPSS version 13.0. Logistic regression was used to determine the adjusted odds ratios of the independent variables. Although there seems to be a protective effect of various types of fruit and vegetable, the effects were insignificant (OR citrus fruits = 0.710, 95% CI = 0.311 - 1.623; OR green vegetables = 0.371, 95% CI = 0.102 - 1.354; OR cruciferous = 0.556, 95% CI = 0.231 - 1.340). The number of servings of fruits and vegetables, however, appeared to significantly decrease the risk for CRA (OR fruits = 0.150, 95% CI = 0.052 - 0.434; OR vegetables = 0.344, 95% CI = 0.149 - 0.794). In conclusion, dietary fruit and vegetable intake influences the risk for developing colorectal adenomas and which may in the long term reduce the risk of colorectal cancer among Malaysian subjects.

B16 Food consumption survey: food away from home among households in Klang Valley

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The objective of this study was to examine the consumption of food away from home among households in Klang Valley. The study utilised stratified random sampling to choose the Gombak Town and sub district of Ulu Kelang. Two hundred and eighty-five households were chosen systematically. The questionnaire was used as a tool for assessment of food consumption pattern and consisted of four sections including household background, household Income and expenditure, food choices, and coping method. The descriptive analysis shows that 59.65% respondents were female and 40.35% respondents were male. The majority of respondents were Malay (94.0%). 35.8% of respondents were university graduates and upper secondary school (35.4%). Monthly household incomes of the respondents was between RM1000-3000 (39.7%) and RM3001-6000 (37.9%). 61.7% of respondents spent RM51-300 per month to buy away-from-home foods (mean=RM164.87±235.38). The respondents spent about 36.1% from the food monthly budget for away-from-home foods. Meal times showed that 21.1% of respondents had take away-from-home food for their breakfast (2-3 times a week), 22.2% for lunch (everyday) and 12.0% for dinner (2-3 times a week). Food shopping frequency showed that respondents bought their food from stalls everyday (6.7%), from restaurants (16.5%) and luxury restaurants (8.4%) 2-3 times a week, public eating-places (17.2%) and fast-food places (18.2%) 2-3 times a month. The main reasons for frequenting the shopping places were food was cheap (stall (33.3%), market (19.4%), public eating-places (20.2%)), regular place (restaurant (16.4%)), spending time with friends/relatives/family (luxury restaurants (19.2%), and ready-to-eat (fast food places (26.3%)). Overall, away-from-home foods showed one-third of monthly food spending budget. Consumers may regard eating out as an occasional treat that does not have effect on overall diet quality and not realise the extent to which eating out has become a part of their usual diets. Nutrition education and promotion strategies may be able to inform consumers of the effect of food-away-from home on overall diet.

B17 Attitude of young adults towards the consumption of sugary beverages

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The prevalence of obesity and diabetes mellitus particularly diabetes Type II is significantly increasing in Malaysia. As our eating habits are changing towards sweetened and refined types so will our taste buds, acceptance and ignorant level instead of the detrimental consequences. Therefore, there is a growing concern that sugar sweetened beverages may contribute to increasing obesity and diabetes rates. Hence, the present study was undertaken to compare the self-reported sugar sweetened beverage intake among university male and female students. About 140 college students, consisting of 61 male and 79 female were included in the study. The questionnaire comprised questions relating to their socio-demographic profile, general dietary patterns and consumption of sugary beverages. The data obtained was analysed using SPSS version 12. Results indicate that the majority of students from both genders prefer 3 to 4 teaspoons of sugar for a cup of drink. However, only very few of the respondents (2% male and 5% female) were willing to drink with the minimal amount (1 tsp) of sugar for a cup of drink. About 84% of males and 71% of

females prefer to drink *teh tarik*, coffee, Milo, Nescafe or syrup *bandung* for their breakfast. Due to high consumption of *teh tarik*, coffee, Milo, Nescafe, and syrup *bandung*, only a few of the males (2%) and females (7%) consumed milk. It can be concluded that majority of the respondents tended towards consumption of sugary beverages and tended to take a high level of calories from the sugar, in the beverages despite the recommended amount which is not more than 10% of our daily energy requirement. This increase in the consumption of sugary beverages can be attributed to the growing prevalence of obesity as well.

B18 Knowledge on dietary fibre and consumption of dietary fibre among household meal planners from a selected secondary school in Klang

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Dietary fibre (DF) deficiency is prevalent globally. Nutritional knowledge has proven to be helpful in increasing DF consumption. Moreover, household meal planners (HMP) are presented as a mediator of DF consumption of their household members. However, there are limited studies on nutritional knowledge of DF and DF intake among HMP. Hence, the purpose of this study was to determine and examine DF knowledge and DF intake as well as the correlation of DF knowledge and DF intake among HMPs. An auxiliary objective was to examine the influence of age, household income, and household size on DF intake and DF knowledge. A total of 95 female HMPs from a selected secondary school in Klang participated in this study. DF knowledge and the daily DF intake were evaluated using a set of questionnaires and the Food Frequency Questionnaire. All statistical analyses were performed using SPSS 15.0. The overall DF nutrition knowledge level of the female household meal planner fell in the moderate level with a mean DF intake of 18.64 ± 6.73 grams per day. Significant positive association was found between DF knowledge and DF intake ($r=0.251$, $p<0.05$), as the higher the HMP's nutrition knowledge level, the more DF consumed per day. Additionally, significant difference was found between age groups with DF intake ($p<0.05$) whereby DF intake increased as age group increased. Based on these results, improving DF knowledge via nutrition education may be an effective means of increasing DF consumption in the HMP.

B19 Effects of McDonalds, KFC and Pizza Hut meals on healthy recommended diets

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Rapid transition has generated marked changes in lifestyles, occupational patterns and dietary habits amongst Malaysians. The statistics compiled over the last two decades show that as the population achieves affluence, intakes of calories, fats and sugars increased (Ismail, 2002). KFC, McDonalds and Pizza Hut, three common takeaway meals which are reasonably priced, and readily available alternatives to home cooking, seem to be an absolute threshold to our recommended healthy diet. In the list of Top 10 global markets for weekly fast food consumption, Malaysia is ranked number 2 in the world with 59% after Hong Kong (61%) (ACNIELSEN, 2004). The objective was to compare the nutrient level in the 3 common takeaway foods with RNI for Malaysia 2005 and to study the effect of these three common takeaway meals on the RNI for

Malaysians. Ten healthy adults were selected as candidates for this study. Their selected evening meals in a week were substituted with the 3 common takeaway meals. These 3 meals were Big Mac from McDonalds, Snack Plate from KFC and Pepperoni Personal Pizza from Pizza Hut. The effects of each of these meals on average daily kilocalories, protein, fat, retinol, dietary intake, beta-carotene, thiamin, riboflavin, vitamin C, sodium, calcium and iron intakes were assessed. Results showed that all three takeaway meals resulted in increased energy and fat intake and were low in fibre; therefore, it was not in line with the Recommended Nutrient Intake for Malaysia 2005. It also showed an unfavourable amount of fat in all meals. Each of these meals exceeded the recommended RNI of 15-30% of energy with 46.48% of energy from a McDonalds' meal, 52.84% from Pizza Hut and 45.56% from KFC. The percentage of carbohydrate, protein and fat for all meals also explained the increase in the average daily carbohydrate consumption and energy contribution of fat. Takeaway meals may be convenient but the meals are too high in fat and kilocalories and too low in fibre to be a regular part of a balanced diet. This also addresses the causative factor of 1.9 million obese Malaysians.

B20 Maternal feeding behaviours and nutritional status of children 2 to 6 years

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This cross-sectional study was conducted to determine the association between demographic characteristics, socio-economic status and maternal feeding behaviors (monitoring, restriction and pressure to eat) as well as the association between maternal feeding behaviours and nutritional status of children. The subjects for this study were children 2 to 6 years selected from 7 day care centres and kindergartens in Seri Kembangan. A total of 100 children whose parents consented to participate in this study were measured for heights and weights. Mothers were interviewed using Child Feeding Questionnaire (CFQ). Data were analysed using SPSS version 14 software and associations between variables were examined using Pearson Correlation Test. There were 49 (49%) boys and 51 (51%) girls with a mean age of 4.60 ± 1.15 . The mean age for mothers was 35.24 ± 5.70 . There were 6% (n=6), 50% (n=50) and 44% (n=44) mothers with primary school, secondary school and college/university level of education respectively. About one-fourth of the mothers (26%) were not working. The mean of household income was $RM4235.50 \pm 2573.99$. Mean score for monitoring, restriction and pressure to eat were 7.07 ± 1.69 , 14.52 ± 2.44 and 10.01 ± 1.67 respectively. There were 5% (n=5), 10% (n=10) and 7% (n=7) of the children who were stunted, underweight and wasted. In this study, 10% of the children were overweight. There were significant correlations between household income ($p < 0.05$, $r = 0.423$), mother's education level ($p < 0.05$, $r = 0.432$), mother's working status ($p < 0.05$, $r = 0.201$) and children's age ($p < 0.05$, $r = -0.220$) with maternal monitoring. Mother's restriction was significantly correlated with household income ($p < 0.05$, $r = 0.253$) and mother's education level ($p < 0.05$, $r = 0.377$). There was no significant correlation between socio-economic status and pressure to eat as well as between maternal feeding behaviours and nutritional status of children. More research is required to understand the determinants and consequences of maternal feeding behaviours.

B21 Dietary intake and bone health status among vegetarians in Klang

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The objective of this study was to assess the bone health status, nutrient intakes, anthropometric indicators and level of knowledge on osteoporosis among vegetarians in Klang. Information on socio-economic status was obtained through a self-administered questionnaire. Dietary assessment was conducted by using one-day food recall and two-day food record. Weight, height, body fat percentage and bone health status were measured using electronic weighing balance (TANITA), body meter (SECA), body fat monitor (Omron), and ultrasonometry (QUS-2TM), respectively. Data were analysed by using Statistical Package for the Social Science for Window (SPSS) version 15.0 whereas dietary data was analysed using Nutritionist Pro software. A total of 78 subjects with 12 vegans and 66 lacto-ovo vegetarians participated in the study. Mean age of subjects was 40.1 ± 12.6 years. The mean daily energy intake for the subjects was 1808 ± 583 kcal. Approximately 73.3%, 33.3% and 73.3% of the male subjects had inadequate intakes of energy, protein and calcium, respectively. For females, approximately 81.3%, 25.0% and 89.6% had inadequate intakes of energy, protein and calcium, respectively. None of the subjects had adequate dietary intake of vitamin D. Their mean potassium, magnesium, vitamin B₁₂, and sodium intakes were 2440.3 ± 839.2 mg, 334.1 ± 158.5 mg, 0.41 ± 1.45 mg, and 2230.8 ± 1093.3 mg, respectively. Subjects had a high level of knowledge about osteoporosis, with a mean score of 10.0 ± 3.2 (range: 1 to 15). More than half (55.1%) of the vegetarians had normal Body Mass Index. The mean fat percentage of the vegetarians was 25.8 ± 7.48 %. There were approximately one-third (35.9%) of the subjects who had normal range of fat percentage, while approximately 26.9% had unhealthy (high) percentage of body fat. The Mean Broadband Ultrasound Attenuation (BUA) was 90.9 ± 17.9 dB/MHz. Approximately 73.1% of the vegetarians had normal BHS, that is, 83.3% of vegans and 71.2% of lacto-ovo vegetarians, respectively. Although none of the subjects were osteoporotic, approximately one-third of the subjects were osteopenic, putting them at risk for future osteoporotic fracture. There was no significant difference in bone health status between vegans and lacto-ovo vegetarians ($t = 0.705$, $p > 0.05$), most probably due to relatively smaller number of vegans compared to lacto-ovo vegetarians. A positive significant relationship was found between BUA with weight ($r = 0.444$, $p < 0.01$), and height ($r = 0.358$, $p < 0.01$). None of the nutrient intakes had a significant relationship with BUA. The dietary habits of the vegetarians varied considerably and did not comply with the average requirements for certain essential nutrients. In general, bone health status of subjects was not satisfactory. Therefore, identification of effective nutrition intervention programmes may be necessary to improve bone health status and to reduce the future risk of osteoporosis among vegetarians.

B22 Relationship between osteoporosis health beliefs, osteoporosis knowledge with dietary calcium intake and physical activity among adolescents

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The objective of this study was to determine the relationship between osteoporosis health belief (OHB), osteoporosis knowledge (OK) with dietary calcium intake and physical activity

among adolescents from SMK Yu Hua, Kajang. A total of 174 of respondents who fulfilled the inclusion criteria were recruited. The respondents were selected as a cluster unit through simple random sampling. Information on socio-demographic, family history of osteoporosis, OHB, OK, consumption pattern of milk, calcium supplement and soft drink were obtained through a set of questionnaires. Physical activity level was assessed using the Physical Activity Questionnaire Adolescents (PAQ-A) while dietary calcium intake was assessed using a Semi-quantitative Food Frequency Questionnaire (SFFQ). The data were analysed using the Statistical Package for Social Science (SPSS) version 15. The mean age of the respondents was 15.84 ± 0.42 years. A total of 90.8% of them reported no family history of osteoporosis. The total mean score for OHB was 145.06 ± 15.81 and OK was 10.39 ± 3.07 . For physical activity, the mean score was 2.16 ± 0.59 which indicate a low level of physical activity among the adolescents. About 64% of them reported consuming milk regularly and the most common type of milk consumed was low fat milk (51.4%). Another 36.2% of the respondents did not drink milk. The most common reason cited by 68.3% of them was 'not liking milk'. A total of 31.6% of the respondents were taking calcium supplements, mainly recommended by family members (47.3%). More than half of the respondents (67.2%) did not consume soft drinks regularly. For dietary calcium intake, the mean intake was 792.32 ± 760.00 mg/day. Less than one-quarter of the respondents did not fulfill the Malaysian Recommended Nutrient Intake (RNI). This study showed no significant correlation between sub-scales of OHB, perceived seriousness towards osteoporosis, perceived benefits of taking calcium, perceived barriers to taking calcium and perceived benefits to exercise with dietary calcium intake with physical activity ($p > 0.05$). However, there was a negative, very weak and significant correlation ($r = -0.154$, $p = 0.042$) between perceived susceptibility towards osteoporosis with dietary calcium intake. There was also a positive, weak and significant correlation between perceived barriers to exercise ($r = 0.223$, $p = 0.003$) and health motivation ($r = 0.216$, $p = 0.004$). The results also revealed that OK was not significantly related to dietary calcium intake ($p > 0.05$); but showed a negative, very weak and significant correlation with physical activity ($r = -0.173$, $p = 0.023$). OK was also significantly correlated to OHB ($r = 0.219$, $p = 0.004$). In conclusion, only 23.0% of the respondents had satisfactory dietary calcium intake. Overall, the physical activity level of the respondents was quite low. Since adolescence is the critical period for peak bone mass, therefore appropriate intervention programmes should be implemented to improve their dietary calcium intake, physical activity level, osteoporosis knowledge and incorrect beliefs and perceptions about osteoporosis among adolescents.

Group C: Nutrients and Other Components in Food

C01 Proximate composition, mineral content, colour and sensory characteristics of 'fish flakes' made from stingrays (*Himantura, sp.*)

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The objectives of the study were to determine the proximate composition, mineral content, colour and sensory characteristics of 'fish flakes' made from stingrays with different levels of tapioca starch (10%, 15%, 20%, 25% and 30%). Fish flakes were prepared from minced fish, tapioca starch and spices. The formulations were mixed to form a dough and then spread into layers in a tray to a thickness of 3mm and then steamed at 100°C for 1 hour. Fish flakes were cut into 12cm x 4cm dimensions and dried using an oven at a temperature of 60°C until the moisture content was about 25%. Result showed that there was a significant difference ($p < 0.05$) in proximate composition among the samples. Addition of tapioca starch reduced protein, fat and ash content but increased

carbohydrate content. Mineral content also decreased with a high level of tapioca starch. There were significant differences ($p < 0.05$) among the fish flake samples with respect to mineral content. The range of mineral contents for Na, Mg, Ca, Zn, Fe and P were 1746.11-5416.88mg/100g, 50.05-116.96mg/100g, 37.91-45.60mg/100g, 0.85-1.25mg/100g, 3.45-6.03mg/100g and 31.00-44.89mg/100g respectively. Colour analysis showed that there was a significant difference ($p < 0.05$) among the samples, except for redness (a^*) values. The range of L(lightness), a^* (redness) and b^* (yellowness) values of the samples were 25.23-26.80, 3.91-4.16 and 5.59-6.52 respectively. According to sensory evaluation, all samples were moderately acceptable but there were no significant difference among the samples. In conclusion, the addition of different levels of tapioca starch decreased proximate composition, mineral content and altered lightness values of fish flakes significantly.

C02 Determination of chemical characteristic of oils extracted from flesh and kernel of *Canarium odontophyllum* and Vitamin C content in flesh and skin of *Canarium odontophyllum*

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Chemical characteristics of oils extracted from dabai fruit (*Canarium odontophyllum*) were determined to ascertain the quality and establish the nature of oils or fats before they are used for either domestic or industrial applications. The chemical characteristics determined were iodine value, acid value, saponification value, peroxide value and color determination. Besides, the vitamin C content in the fresh fruit was also determined using high performance liquid chromatography (HPLC). The oils were extracted using the Soxhlet method from the flesh and kernel of dabai fruit. The extracted oil is a crude oil as it has not undergone filtering, distillation and other refining processes. The chemical characteristics of the oil extracted from flesh were 7.99 ± 0.01 mEq peroxide/kg fat for peroxide value, 8.4 ± 0.00 mg KOH for acid value, 52.8 ± 1.48 g iodine/100 g fat for iodine value and 181.62 ± 0.99 mg KOH/g fat for saponification value. Whereas the characteristics for the oil extracted from kernel were 16.0 ± 0.07 mEq peroxide/kg fat for peroxide value, 5.55 ± 0.02 mg KOH for acid value, 37.7 ± 0.14 g iodine/100 g fat for iodine value and 171.33 ± 1.05 mg KOH/g fat for saponification value. For colour determination, the L, a, b values for the flesh oil were 75.5 ± 0.01 , 8.98 ± 0.01 , 49.33 ± 0.00 , respectively while the values for kernel oil were 64.12 ± 1.01 , -3.05 ± 0.18 , 32.91 ± 0.47 for L, a, b, respectively. The vitamin C content in the flesh and skin were 2.59 ± 0.01 mg vit C/100g and 5.85 ± 0.00 mg vit C/100g, respectively. The chemical results obtained show that both oils have similar values to palm oil. The vitamin C content of dabai fruit has been shown to be similar to that of the olive fruit. Hence, these extracted oils can be recommended for use margarine and as edible oil for commercial use.

C03 Antioxidant capacity and linoleic acid content of seeds of three types of pitaya

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The total antioxidant capacity and total phenolic content of seeds of three types of pitaya namely *Hylocereus polyrhizus*, *Hylocereus undatus* and *Selenicereus megalanthus* were studied. In addition, the fatty acid content of pitaya seeds was also determined. The results of the study showed that the ethanolic extracts of *H. polyrhizus* seeds contained significantly higher ($p < 0.05$) total phenolic (43.85 GAE mg/100 g dry weight) and flavonoid (50.84 catechin equivalent mg/100 dry weight) as compared to *H. undatus* and *S. megalanthus*. However, ethanolic extracts generally contained higher phenolic and flavonoid than its aqueous counterpart. 2,2-diphenyl-1-picrylhydrazyl assay indicated similar trend showing that *H. polyrhizus* seeds had significantly higher ($p < 0.05$) scavenging capacities at EC_{50} (46.63%). Ferric reducing antioxidant power test also indicated that the ethanolic extracts of *H. polyrhizus* seeds had significantly higher ($p < 0.05$) reducing capacity (59.14 at EC_{50}). The main fatty acids of pitaya seeds oil were palmitic acid ($C_{16:0}$), stearic acid ($C_{18:0}$), oleic acid ($C_{18:1}$), and linoleic acid ($C_{18:2}$) with an exceptionally high level of linoleic acid amounting to 660, 540 and 480 g/kg for *S. megalanthus*, *H. undatus* and *H. polyrhizus* respectively.

C04 Determination of phenolic content and its compounds in commercial dark, milk and white chocolates

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Cocoa contains a wide range of antioxidants that includes soluble phenolic compounds (phenolic acids, catechin, epicatechin, proanthocyanidins), insoluble polymeric phenolics and methylxanthines. Polyphenols are currently receiving increasing interest from consumers and food manufacturers due to their ability to act as antioxidant agents. Since polyphenols are reducing agents, they may provide valuable health benefits in protecting our tissues against oxidative stress, and prevent various diseases associated with oxidative stress. The objective of this study was to investigate the phenolic content and its compounds in different type of chocolates that are commonly found in the market. To estimate the total phenolic content, flavonoid, catechin, epicatechin, and theobromine, the Folin-Ciocalteu assay, colorimetric assay, and high performance liquid chromatography (HPLC) were used respectively. The total phenolic content in chocolates was in the range of 119 - 585 mg CAE/100 g, which was found abundantly in dark chocolate and the least in white chocolate. The flavonoid content was in the range of 6 - 31 mg CAE/100 g. The flavonoid content also followed the same order of total phenolic content. The total phenolic content as well as flavonoid content in all chocolate samples was significantly different (phenolic content: 129.6 ± 9.4 ; 160.2 ± 7.1 ; 578.6 ± 6.1 , $p < 0.05$); (flavonoid content: 7.5 ± 0.8 ; 13.7 ± 1.4 ; 28.9 ± 1.7 , $p < 0.05$). The present study detected catechin and epicatechin (major phenolic compounds in cocoa) only in dark chocolate, while theobromine was found in dark and milk chocolates and not in white chocolate. A strong correlation ($r = 0.967$) between total phenolic content and flavonoid content was observed in all types of chocolates. The study recommends dark chocolates over milk and white chocolates.

C05 Effects of reheating, storage times and temperatures on nitrate and nitrite contents in blanched *bayam merah* (*Amaranthus gangeticus*) and *bayam putih* (*Amaranthus paniculatus*)

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Interest in the dietary intakes of nitrates and nitrites has risen from concerns about their possible adverse effects on health. The role of the nitrate-converting bacteria in nitrate and nitrite metabolism is poorly understood and there are few studies on this subject. Epidemiological and clinical studies have shown that a high level of nitrites in vegetables has a significant effect on increasing the prevalence of methaemoglobinemia or the 'blue baby syndrome' and stomach cancer. The aim of the study was to investigate the effect of reheating, storage times and temperatures on nitrates and nitrites contents in *Amaranthus* (bayam). Two *Amaranthus* species were chosen: *Amaranthus gangeticus* (bayam merah) and *Amaranthus paniculatus* (bayam putih). The contents of nitrate and nitrite in edible portions (leaves and stems) were determined using a UV-vis spectrophotometer. Results showed that fresh *bayam merah* (BM) (1.79 ± 4.95 mg/kg) had a higher nitrate content compared to *bayam putih* (BP) (0.49 ± 0.00 mg/kg). The nitrite content was in the range of 0.64 - 1.67 mg/kg for BM and 0.86 - 1.79 mg/kg for BP. Reheating and storage times significantly increased the conversion of nitrate to nitrite in BM and BP. However, there was no significant difference in nitrate and nitrite contents between BM and BP on the effect of reheating and storage times. Storage at different temperatures (0°C and 4°C) exhibited significant changes in the means of nitrate and nitrite contents for BM and BP. Higher nitrite content was found in BP when stored at 4°C and 0°C compared to BM. The present study indicates that storage time and temperature affects the conversion of nitrate to nitrite in blanched *bayam putih* and *bayam merah* when stored in refrigeration (4°C) and frozen (0°C). In addition, the reheating process of blanched *bayam* after storage at low temperature also affected the formation of nitrite content.

C06 Cytotoxic effects of *Pandanus amaryllifolius*, *Curcuma longa* and *Etlingera elatior*

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Tropical plants produce a variety of phytochemicals and secondary metabolites which have potential pharmaceutical values important for synthesizing pharmaceuticals and botanical medicines. The *Pandanus amaryllifolius* are of commercial interest for the uniquely distinct fragrant flavour. Ethnomedical literature describes *Pandanus* as having purgative, stimulant, diuretic, antispasmodic and cardiotoxic properties and used as remedy against many ailments. *Curcuma longa*, a flowering plant with yellow tuberous root, is widely used as food additive to impart flavour and colour. Traditionally, it is used as a blood purifier tonic and for the treatment of coryza, hepatic disorders and rheumatism. *Etlingera elatior*, a species native to Sumatra, Indonesia is used as part of cooking condiments to give the aromatic fragrance. A decoction of *Etlingera elatior* is used to treat earache, and promote wound healing. Cytotoxic evaluation of samples was conducted using 72-hr MTT-assay. Cancer cells were treated with ethanolic extracts of plant samples

incubated at 5% CO₂ and 37°C. Insoluble colored formazan products, proportionate to the number of viable cells, were measured spectrophotometrically using the ELISA reader (LX-800) at 550nm. The dose-response curve was plotted and the concentration which gave 50% inhibition of cell growth (IC₅₀) was calculated. Exposure of all plants extracts reduced cell viability in a dose-dependent manner in HepG2 (hepatocellular carcinoma), HT-29 (colon carcinoma), MDA-MB-231 (non-hormone dependent breast cancer), MCF-7 (hormone dependent breast cancer) and HeLa (cervical cancer) cell lines across all concentrations of the plant extracts. IC₅₀ value for Pandan extracts against MDA-MB-231 cell lines was 86.5mg/m. IC₅₀ values for Etlingera and Curcuma extracts against HepG2 were 97.5mg/ml and 62.5mg/ml respectively while IC₅₀ values of Curcuma extracts against HT-29 tissue was 87.5mg/ml. Pandanus, Etlingera and Curcuma samples within the concentrations of 10-100 µg/ml were found not to be effective against proliferation of MCF-7 and HeLa.

C07 Olive oil and antioxidant agent

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Homer called it 'liquid gold'. In ancient Greece, athletes ritually rubbed it all over their body. Its mystical glow illuminated history. Drops of it seeped into the bones of dead saints and martyrs through holes in their tombs. Olive oil has been more than mere food to the peoples of the Mediterranean: it has been medicinal, magical, an endless source of fascination and wonder and the fountain of great wealth and power. The olive tree, symbol of abundance, glory and peace, gave its leafy branches to crown the victorious in friendly games and bloody wars, and the oil of its fruit has anointed the noblest of heads throughout history. Olive crowns and olive branches, emblems of benediction and purification, were ritually offered to deities and powerful figures: some were even found in Tutankhamen's tomb. Olive trees have an almost titanic resistance, a vital force which renders them nearly immortal. Despite harsh winters and burning summers, despite truncations, they continue to grow, proud and strong reaching towards the sky, bearing fruit that nourishes and heals inspires and amazes. Temperate climactic conditions, characterised by warm dry summers and rainy winters, favour plentiful harvests; stone, drought, silence, and solitude are the ideal habitat for the majestic olive tree.

Beginning in 5000 B.C. and until 1400 B.C., olive cultivation spread from Crete to Syria, Palestine, and Israel. Commercial networking and application of new knowledge then brought it to Southern Turkey, Cyprus, and Egypt. Until 1500 B.C., Greece—particularly Mycenae—was the area most heavily cultivated. With the expansion of the Greek colonies, olive cultivation reached Southern Italy and Northern Africa in the eighth century BC, then into Southern France. Olive trees were planted in the entire Mediterranean basin under Roman rule. According to the historian Pliny, Italy had "excellent olive oil at reasonable prices" by the first century AD, "the best in the Mediterranean," he maintained.

Olive oil has a number of characteristics that may benefit humans, especially natural antioxidants. The use of synthetic preservatives like butylhydroxyanisole (BHA) and butylhydroxytoluene (BHT) by many factories to slow down the oxidative deterioration of food is gaining interest. This synthetic alternatives may be harmful to the body. On the other hand, olive oil has natural antioxidants that are essential for the body, such as vitamin E (tocopherol), polyphenols (Hydroxytyrosol, Oleuropein, Tyrosol). There is as much as 5 mg of antioxidant polyphenols in every 10 grams of olive oil. Many other nut and seed oils have no polyphenols. The antioxidants hydroxytyrosol and tyrosol are some of the many phenol compounds in olive oil that contribute to bitter taste, astringency, and resistance to oxidation. They are now being played up in the press as a desirable health component of olive oil. The flavanoid polyphenols in olive

oil are natural anti-oxidants which have been shown to have a host of beneficial effects from healing sunburn to lowering cholesterol, blood pressure, and risk of coronary disease.

C08 A multi-component approach to improve nutrition and physical activity behaviours for cancer prevention

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Cancer is rapidly gaining public health importance in Malaysia. Epidemiological studies have consistently shown that diet and lifestyle play a substantial role in cancer etiology. The purpose of this study was to determine the effect of an educational intervention designed to promote physical activity and healthy nutrition behaviour among female secondary school teachers in Selangor. The intervention module was developed based on the guidelines for cancer prevention from the World Cancer Research Fund (WCRF, 1997) and the Guidelines for Cancer Prevention of The National Cancer Society of Malaysia. Psycho-social constructs of the Social Cognitive Theory were used as mediators of change in behaviours. Teachers from eight randomly selected schools in Selangor were randomised into intervention (n= 108) and control (n= 108) groups. A multi-component approach was used to deliver the intervention viz: a one-day seminar, a self-help educational module, face-to-face motivational counselling and counselling via telephone calls while the control group received only the self-help educational material at the end of the intervention. The women were predominantly Malays, and married with the mean age of 37 years. Multivariate analysis showed a significant difference in change in the intervention group for fruit and vegetable consumption (+0.68 serving/ day), body fat percentage(-.61%), and in multiples of resting metabolic rates (+210.56 MET) and the time spent for high, moderate and walking activities. A reduction in barriers, increase in knowledge and self efficacy were found to be significant mediators for reduction in body fat percentage, increase in fruit and vegetable intake, METs and a reduction in body fat percentage in the intervention group. These findings suggest that an intervention with multiple strategies can successfully promote positive diet and lifestyle behaviour changes in healthy, educated women.

C09 Isoflavone and calcium contents in raw and fried tempeh

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This study was aimed to determine the isoflavone and calcium contents in raw and fried tempeh. Tempeh produced at Bukit Dukung, Kajang was chosen to provide a consistent supply of tempeh for the study. Raw tempeh and fried tempeh in batter were analysed. Reversed-phase HPLC with diode array detector and atomic absorption spectrophotometer were used to determine the isoflavone and calcium contents, respectively. Isoflavone content (based on wet weight) in fried and raw tempeh were 40.4 ± 3.8% daidzein (Da); 43.9 ± 2.9% genestein (Ge) and 27.1 ± 0.7% Da; 48.9 ± 1.9% Ge, respectively. Isoflavone content based on dry weight showed that Da (92%) and Ge (84%) contents in raw tempeh were higher compared to the fried ones (86% Da and 62% Ge). Calcium content in raw and fried tempeh was 56.8 ± 1.9% mg Ca/100g and 63.3 ± 2.9% mg Ca/

100g, respectively. Standard Reference Material (SRM) was used for determining calcium analysis accuracy. Calcium content for SRM used in this study (485 ± 14 mg Ca/100 g) was in the range of the consensus value (491 ± 32 mg Ca/100 g) obtained for the SRM. Fried tempeh contained $41.8 \pm 5.1\%$ moisture, $18.6 \pm 1.2\%$ crude protein, $18.8 \pm 7.2\%$ crude fat, $19.9 \pm 3.4\%$ total carbohydrate and $0.8 \pm 0.2\%$ ash content. Raw tempeh contained $65.1 \pm 1.4\%$ moisture, $17.5 \pm 0.8\%$ crude protein, $9.2 \pm 2.9\%$ crude fat, $7.6 \pm 3.1\%$ total carbohydrate and $0.6 \pm 0.1\%$ ash content. This study indicates that calcium content of fried tempeh in batter was not significantly different ($p > 0.05$) to fried tempeh (without batter). Fried tempeh in batter was used during the clinical trial for the study of bioavailability of isoflavone and calcium in post-menopausal Malay women consuming tempeh. All biological specimens collected during the clinical trial are still being analysed.

C10 Antioxidant activity of MRQ74: a preliminary study

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The objective of this study was to examine and evaluate the antioxidant activity of milled & brown rice from the specific variety of local rice. MRQ74 is a specialty fragrant rice developed and grown by MARDI. Antioxidant activity for aged and unaged milled and brown rice were determined. Antioxidant activity of methanolic extract was evaluated according to the DPPH radical scavenging method. Powdered samples were extracted using methanol for 2 hours. The extracts were evaporated to dryness by a rotary evaporator and stored in a freezer at -18°C until further analysis. The yield of extraction for milled and brown rice ranged from 2-3%. Antioxidant activities ranged from 57% to 97% for both samples at various aging intervals. A preliminary study showed antioxidant activity of brown rice to be higher and more stable compared to milled rice. Through the aging process, brown rice was also found to sustain antioxidant activity when compared to milled rice.

C11 Physicochemical and sensory properties of commercial chicken nuggets

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Physico-chemical (proximate composition, colour, toughness) and sensory properties of five brands of commercial chicken nuggets were evaluated. The proximate composition of commercial chicken nugget showed significant difference ($p < 0.05$) between samples. The range of moisture, protein, fat, ash and carbohydrate content were 34.71-56.51%, 12.52-16.62%, 18.14-25.00%, 1.20-1.58% and 7.52-26.49% respectively. The L^* , a and b values of cooked chicken nuggets ranged between 64.38 - 68.41, 0.51 - 3.51 and 16.46 - 19.35, respectively. The toughness of all chicken nugget was not significantly different ($p < 0.05$). From sensory evaluation test (colour, odour, taste, gumminess, hardness, juiciness and overall acceptability), it was shown that generally all panellist acceptable of the samples. These results showed that Malaysian chicken nuggets produced from different manufactures, were significantly different in chemical composition, colour, textural properties and sensory evaluation test.

C12 Total flavonoids, vitamin A, C and E of pandan (*Pandanus amaryllifolius*), turmeric (*Curcuma longa*) leaves and torch ginger (*Etlingera elatior*)

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Thousands of biologically active phytochemicals such as antioxidants have been identified in plants food such as grains, nuts, legumes, vegetables and fruits. Of these plant food groups, vegetables and fruits are the most botanically diverse. In a Western diet, vegetables and fruits include roots, leaves, stem, fruit and seed from more than 40 botanical families. Consumption of fruits and vegetables is known to protect against most aging-related and chronic diseases including the major causes for death in industrialised nations such as cardiovascular disorders and cancer. This study was conducted to determine the total flavonoids and vitamin A, C and E of fresh and oven-dried pandan, turmeric leaves as well as torch ginger. The determination of vitamin A, C and E was conducted using the HPLC whereas the total flavonoids of methanolic and aqueous extract of the three plants were determined spectrophotometrically and the absorbance measured at 430nm. Overall, assessment of total flavonoids (aqueous and methanolic extract) and vitamins resulted in statistically significant ($p < 0.05$) readings and varied in each of the plants. The results showed that oven-dried turmeric leaves possess the highest concentrations of total flavonoids as well as vitamins A, C and E. For vitamins A, C and E, the second highest concentrations were found in fresh turmeric leaves (vitamin A and E) and dried torch ginger (vitamin C). The total flavonoids in the methanolic extracts for all three plants was higher compared to aqueous extracts. The second highest concentration of total flavonoids was found in dried pandan leaves, followed by fresh turmeric leaves. Meanwhile, fresh torch ginger is found to possess the lowest concentrations of total flavonoids and vitamins A, C and E.

C13 Total phenolic and flavonoid contents and antioxidant capacity of pink guava (*Psidium guajava*) puree industry by-products

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This study aimed to determine the total phenolic content, flavonoid content and antioxidant capacity of dried pink guava by-products (DPGB). To optimise the drying conditions, response surface methodology (RSM) was used. Based on Central Composite Design (CCD), 13 treatments were assigned for the experiments. The highest total phenolic content (908.3 ± 62.9 GAE/100g) of DPGB was obtained at 80°C for 4h compared to other conditions except for the control (freeze-dried; 625.0 ± 195.2 GAE/100g). Among the treatments, the highest value of flavonoid content was found at 86.2°C 5h (635.0 ± 30.4 CAE/100g) and was higher than the control (588.3 ± 34.1 CAE/100g). Antioxidant capacity was measured using DPPH radicals scavenging and TEAC assays. The highest antioxidant capacity values were obtained at 50°C 4h (1398.1 ± 32.2 mM TE/100g for scavenging activity and 1335.8 ± 5.0 of mM TE/100g for TEAC) but lower than the control (1843.0 ± 81.1 mM TE/100g and 1339.8 ± 1.2 mM TE/100g). There were moderate correlations ($r=0.66$; $p < 0.05$) between the scavenging activity and total phenolic content and the TEAC and total phenolic content ($r=0.43$; $p < 0.05$). In addition, a moderate correlation was found between the scavenging

activity and flavonoids content ($r=0.49$; $p<0.05$). However, a low correlations between?? and the TEAC and flavonoids content ($r=0.35$; $p<0.05$).

C14 Antioxidant potential in several by-products of local tropical fruits

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Various studies have reported that by-products of some fruits such as the peel and seed fraction have higher antioxidant activity than the pulp fraction. However, limited information is available for by-products of fruits from the tropics. Hence, the aim of this study is to assess the antioxidant potential of by-products of several local tropical fruits (skin, seed and core) in comparison with vitamin C and butylated hydroxytoluene (BHT). Nine different types of local tropical fruits were selected for the assessment of antioxidant potential in their by-products namely guava, mango, jackfruit, papaya, starfruit, watermelon, pineapple, mangosteen and durian. Samples were extracted using methanol and DPPH radical scavenging activity was used to determine the antioxidant potential. The percentage yields of extracts varied from starfruit seed extract (4.56%) to guava skin extract (40.53%). Results revealed that tropical fruit skin had higher antioxidant potential followed by the seed and core of the fruits. The highest radical scavenging activity was found to be in guava skin (96.33 ± 0.19 %) and the lowest in pineapple core (20.31 ± 0.94 %). Vitamin C and BHT demonstrated 96.87 ± 0.04 % and 95.66 ± 0.05 % respectively for the radical scavenging activity. Therefore, the high percentage of antioxidant activity in the by-products of local tropical fruits such as skin and seed can be promoted as a potential source of natural antioxidant and functional ingredients.

C15 Nutritional composition of several wild seaweed species found in Semporna, Sabah

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Nine species of wild seaweeds found in Semporna seawater off Sabah were studied to determine their nutritional values based on proximate composition. Effects of different drying treatments on total polyphenol content and antioxidant activity were also determined. Antioxidant activity was determined based on free radical-scavenging capacity (DPPH) and ferric-reducing antioxidant power (FRAP). Results showed that proximate values of wild seaweeds were significantly different ($p<0.05$) especially in the moisture, ash and protein contents. *Sargassum sp.* was found to have higher ash, protein and crude fibre contents ($p<0.05$) as compared to the other samples. The total polyphenol of *Caulerpa lentilifera* and *Sargassum sp.* were also found to be higher with values of 35.45 ± 4.21 and 40.45 ± 2.86 g PGE/kg DM respectively ($p<0.05$) when compared to the other samples. These two samples were also significantly higher ($p<0.05$) in antioxidant activity with values of 5.77 ± 0.56 , 4.46 ± 0.16 g DM/DPPH for DPPH, and 57.46 ± 1.97 , 65.67 ± 2.79 μmol Trolox/g DM for FRAP respectively compared to the other samples. Drying under shade was seen to be

better than direct sun-drying in preventing reduction in total polyphenol and antioxidant activity of the wild seaweeds.

C16 Antioxidative activity of selected local vegetables

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Antioxidants are substances that can fight and destroy excess free radicals and repair oxidative damage in biomolecules. They are natural substances found in plants that protect fats, oils, proteins and nucleic acids from premature aging and destruction caused by ultraviolet (UV) light from sunlight, cosmic radiation, chemicals, pollutants and internally generated free radicals. The aim of this study is to determine the antioxidative activity of extracts from five types of green leafy vegetables that are commonly consumed in Malaysia. The vegetable leaves were extracted with 60% methanol and antioxidative activity measured by the 2,2-Diphenyl-1-Picrylhydrazyl (DPPH). The antioxidative activities were then compared to that of α -tocopherol (natural antioxidant) and butylated hydroxyl toluene or BHT (synthetic antioxidant). Results obtained showed that the highest amount of antioxidative activity was exhibited by fern shoots (94.32 % inhibition). This is followed by sweet shoots (94.10 % inhibition), coriander leaves (91.54 % inhibition), water cress (91.00 % inhibition) and water convolvulus (88.06 % inhibition). The antioxidative activity of fern shoots was not significantly different ($p > 0.05$) from sweet shoots, coriander leaves, water cress, BHT and α -tocopherol, however significantly different with water convolvulus. Meanwhile, antioxidative activity of coriander leaves was not significantly different from water cress and water convolvulus. It is encouraging to note that only water convolvulus exhibited comparable antioxidative activity to that of BHT and α -tocopherol.

C17 Antioxidant and antiproliferative properties of daun kesum (*Polygonum odoratum* Lour) and torch ginger (*Etlingera elatior*) extracts

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Malaysia is one of the countries in Asia which is endowed with highly diverse biological resources. The use of plants in traditional medicine systems of many cultures has been extensively documented. The objective of this study was to determine the antioxidant and antiproliferative properties of ethanol extracts of daun kesum (*Polygonum odoratum*) and torch ginger (*Etlingera elatior*). These two herbs found abundantly in Malaysia, are usually mixed together when we eat Malaysian *laksa*. DPPH assay was carried out to measure the capacity of the extracts to scavenge free radicals, while the inhibition of lipid peroxidation of the extracts was done using β -carotene bleaching method. The phenolics content was quantified using Folin Ciocalteu reagent and the

correlation between total phenolics content and antioxidant activity was tested. Antiproliferative property of the extracts was assessed using MTT assay on different cancer cell lines, namely CaOV₃, HeLa, HepG2 and MDA-MB231. Determination of vitamins A, C and E was also carried out. From both antioxidant assays, these extract showed high antioxidant activities, which could be attributed to the occurrence of phenolics. Results obtained from MTT assay showed that the proliferations of HeLa and CaOV3 cells were effectively inhibited by the polygonum extracts while torch ginger was not effective for all cancer cells. In conclusion, all plant extracts studied demonstrated high antioxidative and antiproliferative properties, which could be attributed to the phytochemical contents.

C18 Polyphenol, antioxidant activity and phytic acid of fermented *Canarium odonthophyllum*

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Natural antioxidants, particularly from fruits and vegetables have received great deal of attention among consumers and the scientific community because epidemiological studies have demonstrated a negative correlation between the intake of natural antioxidants and coronary heart disease, cancer, and stroke. However, foods that are high in fibre also contain phytic acid, which is harmful to our health because it can bind with essential divalent cations such as calcium, magnesium, iron, zinc and manganese, forming largely insoluble complexes. *Canarium odonthophyllum* of the family *Bruseracea* or known as Dabai among the local people is one of the indigenous fruits in Sarawak, which can be eaten freshly or in a fermented form. Several studies show that fermentation might reduce the amount of phytic acid. Hence, this study was designed to analyse the antioxidant activity, total polyphenol content (TPC) and phytic acid of fermented *Canarium odonthophyllum* (FCO). Antioxidant activity and total phenolic content of FCO was analysed in methanol 70% (v/v) extract. The 2, 2-diphenyl-1-picryl-hydrazyl (DPPH) assay, β -carotene bleaching (BCB) assay and ferric reducing/antioxidant power (FRAP) assay were used for determining antioxidant activity. Meanwhile, to estimate the TPC, the assay using Folin-Ciocalteu reagent was used. Phytic acid was extracted using 0.4N hydrochloride acid (HCl) at pH 0.50 ± 0.05 and identified by using spectrophotometry principle. Independent sample t-test was used to compare the mean between antioxidant activity of FCO and BHT. Meanwhile, Pearson correlation was used to correlate the antioxidant activity, TPC and phytic acid. Average antioxidant activity [mM Trolox equivalent (TE)/g] of FCO were 23.59 ± 0.83 , 14.75 ± 5.49 and 11.37 ± 0.35 as determined by the DPPH, BCB, and FRAP assay respectively. TPC and amount of phytic acid for FCO was 2.39 ± 0.05 mg GAE/g and $0.04g \pm 0.02g/100g$ respectively. The value of phytic acid in FCO is lower if compared with *Glycine max* (Soya bean) (1.31g/100g) and *Arachis hypogaea* (groundnut) (1.42g/100g). Antioxidant activity of FCO is significantly lower than BHT in DPPH ($t=13.983$, $p=0.000$). However, there was no significant difference between antioxidant activity of FCO and BHT in BCB ($t=2.105$, $p=0.157$) and FRAP assay ($t=3.696$, $p=0.065$). On the other hand, there was no correlation between antioxidant activity with TPC and phytic acid in all assays. Findings obtained shows that the TPC and phytic acid was not contributed to the antioxidant activity of FCO. In conclusion, the antioxidant activity of FCO is considered high and comparable to BHT. Besides, the low amount of phytic acid in FCO might be due to fermentation process that is known to destroy the phytic acid.

C19 Determination of fatty acid composition and vitamin E content in oils extracted from flesh and kernel of *Canarium odontophyllum*

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In Malaysia, palm oil is the main source of fat in the habitual diet of the community. *Canarium odontophyllum*, an indigenous fruit of Sarawak also contains a high percentage of fat, just like palm and olive fruits. Therefore, the oils extracted from flesh and kernel of *Canarium odontophyllum* might have the potential to be commercialised as a healthy cooking oil in Malaysia. The objective of this study was to determine fatty acid composition and vitamin E content of oils extracted from the flesh and kernel of *Canarium odontophyllum*. The analysis of fatty acid composition was carried out by using gas chromatography (GC), while analysis of vitamin E was carried out by using high performance liquid chromatography (HPLC). Fatty acid composition of oil was expressed as a percentage of total fatty acid, while vitamin E content of oil was calculated as sum of 7 vitamin E isomers without β -tocotrienol. For these analyses, commercial palm and olive oils were used for comparisons with the oil samples. The oil extracted from flesh of *Canarium odontophyllum* contained $44.43 \pm 0.07\%$ saturated fatty acid (SFA), $42.82 \pm 0.06\%$ monounsaturated fatty acid (MUFA) and $12.76 \pm 0.03\%$ polyunsaturated fatty acid (PUFA). In comparison, fatty acid composition of oil extracted from kernel of *Canarium odontophyllum* was higher in SFA, with a percentage of $60.79 \pm 0.04\%$, followed by MUFA at $35.58 \pm 0.04\%$ and PUFA at $3.78 \pm 0.25\%$. The fatty acid composition for palm oil was $47.94 \pm 0.02\%$ SFA, $40.14 \pm 0.01\%$ MUFA and $11.92 \pm 0.02\%$ PUFA. While the fatty acid composition for olive oil was $25.46 \pm 0.02\%$ SFA, $65.77 \pm 0.03\%$ MUFA, and $8.77 \pm 0.01\%$ PUFA. Vitamin E content was not detected in oil extracted from flesh of *Canarium odontophyllum*, while, vitamin E was at 120.39 ± 3.66 ppm in oil extracted from kernel of *Canarium odontophyllum*. The vitamin E content in palm and olive oils were at 913.69 ± 18.54 ppm and 10.40 ± 0.18 ppm, respectively. ANOVA test showed that the vitamin E content of oil extracted from kernel of *Canarium odontophyllum* was significantly lower ($p < 0.05$) than the level in palm oil, but, was significantly higher ($p < 0.05$) than the level in olive oil. Therefore, based on these findings, *Canarium odontophyllum* fruit has a great potential to be promoted as a healthy cooking oil in Malaysia.

C20 Evaluation of antioxidant activity and proximate analysis of Asam Gelugur (*Garcinia atroviridis*) fruits and leaves

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Garcinia atroviridis, or locally known as asam gelugur, belongs to the family Guttiferae. In Malaysia, it is traditionally used in daily life for culinary and medicinal purposes. The fruits are sliced and sun-dried to produce asam keping. Fresh fish are steamed with the matured leaves to delay spoilage, while the young leaves are consumed fresh as ulam. The fruits and leaves are also useful in treatment of earache, cough, dandruff and stomach pains. This study was carried out to evaluate the antioxidant activity of the fruits and leaves of *G. atroviridis*. Proximate analysis was also done to measure the protein, fat, carbohydrate, ash and moisture content of the samples. The determination of antioxidant activity was based on DPPH (1,1-diphenyl-2-picrylhydrazyl) Assay and Ferric Reducing Antioxidant Power (FRAP) Assay. The fresh fruits and leaves were classified as either matured or young, based on their physical properties such as firmness and color. 10%

aqueous crude extract was prepared at 60°C for 6 hours. Results from both DPPH and FRAP Assay respectively showed that the matured leaves (92.34%, 2.47mmol/L) have the highest antioxidant activity, followed by the young leaves (80.70%, 1.90mmol/L). Measurement of the antioxidant activity of the young fruits (1.63mmol/L) via FRAP assay showed significantly higher level compared to the matured fruits (1.47mmol/L). However, DPPH assay showed that there is no significant difference between the antioxidant activities of these two samples. Meanwhile, based on proximate analysis, matured leaves contained the highest level of protein (2.16% (w/w)), carbohydrates (15.98% (w/w)) and ash (0.72% (w/w)) compared to other samples. Matured fruits have the highest moisture (90.52% (w/w)) content among all samples. The highest level of fat (0.30% (w/w)) was found in young fruits. The results indicate that the fruits and leaves of *G. Atroviridis* are a good source of antioxidants, which is beneficial to combat free radicals.

C21 Determination of antioxidant activities of skin, flesh, and kernel in methanolic extract of *Canarium odontophyllum*

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Natural antioxidants which are most abundant in fruits and vegetables have gained increasing interest among researchers based on epidemiological studies that have shown that natural dietary antioxidants may provide protection against chronic diseases such as cardiovascular disease and cancer. In Malaysia, Sarawak is one of the states that is rich in many types of flora which have not been well investigated including *Canarium odontophyllum*. Therefore, a study that determines the presence of antioxidants especially in underutilized fruits is very useful. This study was conducted with the objective of determining the antioxidant activities of methanolic extracts from skin, flesh, and kernel of *Canarium odontophyllum*. The extracts were screened for their total phenolic content and potential antioxidant activities using several assays. Folin-Ciocalteu method was used to determine the total phenolic content whereas the DPPH, FRAP, β -Carotene bleaching and free radical OH assays were used for determining total antioxidant capacities in samples. The antioxidant capacities obtained from DPPH, FRAP, and β -Carotene bleaching methods were stated as mM Trolox Equivalent (TE)/g fresh mass (FM) while the OH scavenging activity obtained from free radical OH assay was stated as mg DMSO Equivalent (DMSOE)/mg fresh mass (FM). The phenolic contents were expressed as mg Gallic Acid Equivalent (GAE)/100 g fresh mass (FM). Averaged antioxidant capacity measured in methanol extract (mM TE/g FM) in skin, flesh, and kernel of *Canarium odontophyllum* were 16.46 \pm 0.24, 20.54 \pm 0.35, and 8.89 \pm 0.29 respectively as determined by DPPH assay; 151.24 \pm 9.75, 70.58 \pm 2.98, and 5.65 \pm 0.02 respectively as determined by FRAP assay; and 47.9 \pm 0.00, 11.61 \pm 1.14, and 3.00 \pm 0.00 respectively as determined by β -carotene bleaching method. Averaged OH scavenging activity measured in methanol extract (mg DMSOE/mg FM) in skin, flesh, and kernel of *Canarium odontophyllum* were 43.33 \pm 13.85, 7.81 \pm 1.42, and 3.31 \pm 0.80 respectively. Averaged values for total phenolic content (mg GAE/100g FM) were 387.5 \pm 33.23, 267.0 \pm 4.24, and 51.0 \pm 0.00 for skin, flesh, and kernel respectively. Antioxidant activities determined by all assays were positively correlated with total phenolic content ($0.74 \leq r \leq 0.84$). Findings from this study showed that antioxidant capacities exist in different fractions of *Canarium odontophyllum* with the highest value in skin.

C22 Determination of total phenolic content and antioxidant activity of water and methanol extracts of *Rhaphidophora decursiva* (Roxb.) Schott leaves

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Prevention and treatment of chronic diseases such as cancer using natural sources such as herbs have attracted increasing interest in recent years. In order to prevent the *in vivo* formation of free radicals and to antagonise their destructive actions on DNA, lipids, proteins and other biomolecules in human body, that contribute to the development of diseases, antioxidants must be present. *Rhaphidophora decursiva* (Roxb.) Schott or locally known as “,rhTMY” (*Pa Shu Long*) is a plant that has been believed by the Chinese community in Malaysia in curing colon cancer. Since most plants contain compounds that possess primary antioxidant activity which act as acceptors of free radicals and as chain breakers, this study has been conducted to investigate the total phenolic content and antioxidant activity of *Rhaphidophora decursiva* (Roxb.) Schott leaves extracted with methanol and water. The total phenolic content was assessed using the Folin-Ciocalteu method with absorbance at 725nm. Meanwhile, the antioxidant activity was estimated with the following methods: β -carotene bleaching, 2, 2-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging, and ferric reducing antioxidant power (FRAP) assay with absorbance at 470nm, 517nm and 593nm respectively. T-test was used to determine the difference in antioxidant activity and total phenolic content for water and methanol extracts of *Rhaphidophora decursiva* (Roxb.) Schott leaves at the level $p < 0.05$. Pearson correlation was used to determine the relationship between total antioxidant activity and total phenolic content at the level $p < 0.05$. The total phenolic content of water and methanol extracts were 11.74 ± 0.50 and 18.24 ± 1.43 mg GAE/100g, respectively. The total antioxidant activity of water extracts assessed by β -carotene bleaching was $81.90 \pm 10.34\%$, while for methanol extracts, the antioxidant activity was $91.21 \pm 3.86\%$. For this method, BHT was used to compare its antioxidant activity with the other extracts. It was found that the total antioxidant activity of methanol extracts was higher than that of BHT. However, the difference between methanol and BHT in terms of antioxidant activity was not significant ($t = 3.882$, $p = 0.06$) at $p < 0.05$. The EC_{50} value (the total antioxidant necessary to decrease the initial DPPH radical concentration by 50%) was determined from the plotted graph of scavenging activity against the concentration of extracts. EC_{50} values for both water and methanol extracts were 3.60 ± 0.10 and 1.18 ± 0.05 mg/ml respectively. The lowest EC_{50} value indicates the strongest ability of the extracts to act as DPPH radical scavenger. The FRAP value measured in μ M Fe/g was 15.35 ± 1.77 for water extracts and 41.60 ± 6.36 for methanol extracts. T-test results showed significant differences in the scavenging activity, EC_{50} value and total phenolic contents between the water and methanol extracts. The samples, which were extracted with methanol showed both higher antioxidant activity and total phenolic contents than water extracts. Pearson correlation showed that there was no significant relationship ($p > 0.05$) between total phenolic content and total antioxidant activity for both water and methanol extracts. These results showed that the antioxidant activity produced by the extracts did not originate from phenolic compounds, and it might be attributed to other components, which also have strong radical neutralising properties. However, the FRAP assay did show a significant relationship between total phenolic content and total antioxidant activity for both water and methanol extracts at $p < 0.01$ level. In conclusion, the study showed that the methanol extracts of the plant possess both higher total phenolic content and total antioxidant activity compared to water extracts, and this was supported by the consistent results showed by all antioxidant activity assays. The antioxidant properties of the plant are presumed to have originated mainly from the non-phenolic compounds, which possess high antioxidant activity, instead of phenolic compounds.

C23 Macronutrient content in Kelantan sweets

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Proximate and mineral compositions of 10 different traditional and popular Kelantan foods, categorised as sweets, were evaluated. The diet among the people of this region has not previously been described in detail and composition data for certain foods consumed by Kelantanese do not exist. The sweets are selected because of the frequency with which they are consumed by Kelantanese. The selected sweets were *nekbat, taik itik, jala mas, buah tanjung, akok, cek mek molek, labu sira, gerodok telur, koleh lemak, and lompat tikam*. The energy, protein, fat, moisture, fibre, and mineral content were determined in the selected foods by using food composition database (Nutrical) version 11.01. The results showed that the average amounts of energy were 592.42 kcal, carbohydrate (93.57g), protein (12.49g), fat (18.69g), moisture (95.35g), fibre (0.43g), calcium (71.77mg), sodium (335.25mg), potassium (331.50mg), and iron (3.81mg). Energy values ranged between 370.67 to 1061.70 kcal, while for carbohydrate between 49.94 to 159.5 g, protein (0.93 - 26.86g), fat (0.11 - 10.41g), moisture (11.65 - 211.30g), fibre (0-21.11g), calcium (23.8 - 221.61mg) sodium (20-1260.58mg), potassium (26.22 - 779.10mg) and iron (0.81 - 8.85mg). The mean value for energy and carbohydrates is slightly higher because most of the foods that were evaluated used substantial amounts of eggs, especially goose eggs in their ingredients. Goose eggs are bigger compared to chicken eggs. Furthermore it also used a lot of coconut milk and sugar. Fat content in all the products varied, depending on the amount of oil used in their preparations. The micronutrient composition of each of the products varied with the different ingredients going into their preparation. This analysis will allow the estimation of nutrient intake and subsequent investigations into the relationship between diet and health in Kelantan.

C24 Mutagenicity evaluation of processed shrimp paste (Belacan) from Sabah, Malaysia: an *in vitro* study

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Processed shrimp paste is commonly used in Malaysian cuisines. A preliminary retrospective study showed that intake of several raw food products (shrimp pastes, salted fishes, dried shrimps and anchovies) was associated in cancer risk. This study was conducted to evaluate *in vitro* mutagenicity effect of the processed shrimp paste from Sabah. Food sampling was done in two popular places in Sabah (Sandakan and Papar). The mutagenic evaluation was carried out by using the Ames test pre-incubation method in the presence and absence of S9 mixture. *Salmonella typhimurium* TA 1535 and TA 1538 were applied as the tester strain. At 5 mg/ml, following treatment after 48 hours, in the absence of S9 liver microsomal fraction, only methanol extract from Sandakan showed positive mutagenic effect in *S. typhimurium* TA 1538 with 23.00 ± 5.82 revertant colonies compared to two-fold of negative control. After metabolic activation with S9 liver microsomal fraction, several extracts showed increase in mutagenicity responses. Aqueous extracts from Sandakan showed highest number of revertant colonies with 54.50 ± 1.71 followed by methanol extract from Papar with 39.75 ± 5.27 . Both of these extracts indicated positive frame shift mutagens as it was compared to low number of negative control (10.57 ± 1.98). For base pair mutagen which had been evaluated via *S. typhimurium* TA 1538, only methanol extract from Sandakan showed positive

response with a high number of revertant colonies (34.00 ± 3.72) compared to negative control (10.80 ± 2.26). Numerous reasons could be the causal factors for the mutagenic responses. Further in-depth study should be conducted in the near future to understand the possible mutagenic effect of this food product.

C25 Development of nutrient composition of Kelantan foods as a nutrition education tool for residence of Kelantan

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This study was conducted for the development of a nutrition education tool in the form of a nutrient composition booklet based on foods which are widely available and popular among the residents of Kelantan. This booklet will consist of nutrient content and nutrient composition for hundred food items that are commonly served in Kelantan. Food samples for analysis were purchased from three different producers throughout Kelantan. The foods will be analysed for total calories, macronutrients such as carbohydrate, protein, fat and fibre. Micronutrients such as sodium, potassium, iron, zinc, magnesium and calcium will also be included in the analysis. The standard methods of AOAC (1990) will be used in proximate analysis, while minerals (Na, K, Ca, Mg, Fe, Cu, Zn), will be determined by flame photometry technique or atomic absorption spectrophotometer (AAS) instrument. Pictures of the foods will be photographed according to the serving size. All foods will be categorised into various groups such as rice and noodles (*nasi dagang*, *nasi kerabu*, *laksa kelantan* and *nasi tumpang*), accompaniments and vegetables (*acar timun*, *sayur masak lemak*, *kerabu jantung pisang*, and *solok lada*), meal dishes included fish (*singgang asam pedas*, *satar*, *solok ikan* and *lawa ikan*), meat (*daging panggang ala Kelantan*, *singgang daging*, *kerutup daging* and *gulai daging*), poultry (*ayam golek*, *ayam goreng berempah*, *gulai itik serati* and *ayam masak merah*), offal (*colek perut*), sweets (*kuih akok*, *kuih taik itik*, *beko pulut* and *cek mek molek*), miscellaneous (*budu* and *colek*) and processed foods (*getah buah rotan*, *kerepek ubi pedas* and *kerepek pisang*). The development of the booklet is very important in providing reliable data on nutrient composition of foods consumed by residents of Kelantan and will be a great assistance, especially in diet therapy sessions in hospitals and related healthcare programs.

C26 Comparative study between antioxidative activities of cactus fruit *Hylocereus polyrhizus* peel and flesh extracts

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Hylocereus polyrhizus (red dragon fruit) is a commonly consumed fruit in Malaysia. This study analysed the antioxidant potential of the fruit waste material, the peel, in comparison with the edible flesh. *H. polyrhizus* flesh and peel extracts were analysed for phenolic content and antioxidant properties of radical scavenging, reducing potential and lipid peroxidation protective activities. Four different assays were carried out, 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging assay, ferric reducing antioxidant power assay (FRAP), *tert*-butylhydroxide induced lipid peroxidation and iron-NADPH induced lipid peroxidation in rat liver microsomal systems. *H. polyrhizus* flesh and peel extracts were prepared by 80% acetone extraction. The total phenolic content was measured in gallic acid equivalents (GAE) which showed the peel to contain 25.6 ± 1.4

$\mu\text{g GAE/mg}$ dry weight as compared to $6.8 \pm 1.5 \mu\text{g GAE/mg}$ dry weight in the flesh extract. The ferric reducing antioxidant power of the flesh extract was comparatively lower than the peel extract. The DPPH radical scavenging activity of the peel also showed to be more potent than the flesh. Both the peel and flesh extracts protected against microsomal lipid peroxidation induced by *tert*-butylhydroxide with IC_{50} values of 5.01 ± 0.69 and $3.83 \pm 0.14 \text{ mg/mL}$, respectively compared to those of betanin ($\text{IC}_{50} = 10.73 \pm 0.64 \text{ mg/mL}$) and TROLOX ($\text{IC}_{50} = 4.14 \pm 0.28 \mu\text{g/mL}$). Both the peel and flesh extracts effectively inhibited iron-NADPH induced microsomal lipid peroxidation with IC_{50} values of 2.61 ± 0.03 and $2.29 \pm 0.09 \text{ mg/mL}$, respectively. In summary, *H. polyrhizus* peel and flesh extracts showed antioxidant potential which was greater than betanin, the red pigment present in the fruit. However the antioxidant capacity was not as high as TROLOX, a vitamin E derivative. The antioxidant capacity of the fruit paralleled its total phenolic content, indicating that it is most probably attributable to the polyphenols contained therein.

C27 Comparison of total phenolic content and antioxidant activity of fresh turmeric leaf (*Curcuma longa*), pandan leaf (*Pandanus amaryllifolius*) and torch ginger flower (*Etligeria elatior*) to their powder forms

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Turmeric (*Curcuma longa*), pandan (*Pandanus amaryllifolius*) and torch ginger (*Etligeria elatior*) are some of the herbs and spices widely used in South East Asian cooking. Herbs and spices have been recognised to have medicinal properties and beneficial impact on health. Therefore, the objective of this study was to determine the total phenolic content and antioxidant activity of turmeric leaf (TL), pandan leaf (PL) and torch ginger flower (GF) in their fresh forms and powder forms. Samples that were purchased fresh were used as fresh forms while samples that were freeze-dried and ground were used in its powder forms. Folin-Ciocalteu method was used to determine total phenolic content whereas β -carotene bleaching method and DPPH radical scavenging method were used to determine antioxidant activity. Among the fresh samples, PL had the highest total phenolic content ($356.42 \pm 1.32 \text{ mg GAE/100 g}$ fresh samples), followed by TL ($348.75 \pm 1.26 \text{ mg GAE/100 g}$ fresh samples) and GF ($211.59 \pm 6.29 \text{ mg GAE/100 g}$ fresh samples). However, in the powder forms, TL had the highest total phenolic content ($2013.09 \pm 5.13 \text{ mg GAE/100 g}$ powder samples) followed by GF ($1937.42 \pm 6.61 \text{ mg GAE/100 g}$ powder samples) and PL ($1784.25 \pm 7.59 \text{ mg GAE/100 g}$ powder samples). On the other hand, for antioxidant activity, fresh forms of TL had the highest antioxidant activity ($24.93 \pm 0.71 \%$) followed by PL ($16.91 \pm 0.70 \%$) and GF ($1.45 \pm 0.10 \%$). Whereas, in powder forms, PL had the highest antioxidant activity ($65.09 \pm 0.74 \%$) followed by TL ($64.31 \pm 0.99 \%$) and GF ($11.80 \pm 0.40 \%$). Finally, for scavenging activity, all samples in their fresh forms had very low scavenging effect on DPPH radicals. Therefore, EC_{50} values were not able to be detected. Meanwhile scavenging activity of powder forms was contradictory to the results obtained for fresh forms, whereby EC_{50} values could be detected for all samples. TL had the highest EC_{50} value ($0.51 \pm 0.02 \text{ mg/ml}$) followed by GF ($0.46 \pm 0.01 \text{ mg/ml}$) and PL ($0.44 \pm 0.01 \text{ mg/ml}$). In conclusion, all samples in their powder forms were found to have higher total phenolic content and antioxidant activity than their respective fresh forms.

Group D: Clinical Nutrition/Intervention Trials

D01 Patient satisfaction with the foodservices (bulk system) in a government hospital in Perak

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Hospital foodservices are an important component of the health care management among patients. Patient satisfaction towards foodservices is viewed as a vital aspect in each research field in the efforts to improve food quality as well as catering services. The objective of this study was to determine patients' satisfaction toward hospital foodservices (bulk system) in Hospital Taiping. Seventy patients participated in the study. An interview-based questionnaire was used to measure patients' satisfaction with the hospital foodservices. Dietary intake was determined through weighed food intake for hospital food and food record for non-hospital food. From the findings, 98.6% (n=70) of the patients were satisfied and 1.4% (n=1) was very satisfied with the hospital foodservices. Mean score for overall satisfaction was 83.63 ± 11.15 whereas mean score for food quality was 25.10 ± 4.24 . For foodservice quality, the mean score was 22.54 ± 3.82 , followed by 24.00 ± 3.03 for staff issues, and 11.99 ± 1.96 for the hospital environmental factors. Energy and protein intake from hospital food were higher compared to outside food. The mean energy intake from hospital food was 1036.70 ± 316.10 kcal compared to 354.91 ± 329.68 kcal from outside food. The mean protein intake from hospital food was 36.68 ± 14.14 g while the intake from outside food was 11.04 ± 10.73 g. Only 39.1% and 49.1% of patients met their energy and protein individual requirement through hospital food. There was no correlation between patients' energy and protein intake with satisfaction with the foodservices ($p > 0.05$). However, there was a very strong correlation between food quality and patient satisfaction ($r = 0.812$, $p < 0.05$) and between food service quality and patient satisfaction ($r = 0.886$, $p < 0.05$). There was a strong correlation between staff issues and patient satisfaction ($r = 0.793$, $p < 0.05$) and very strong correlation between environment factor and patient satisfaction ($r = 0.855$, $p < 0.05$). There was no correlation between patients' age, gender, race and income with patient satisfaction with the foodservices. Even though more than 50% of the patients were satisfied with the hospital foodservices, initiatives towards service improvements and patient satisfaction analysis should be done continuously to increase foodservice quality in hospitals.

D02 Glycemic Index of foods: relevance to health and management of chronic diseases in the Arab Gulf Region

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Changes in lifestyle and food consumption patterns during the past three decades in the Arabian Gulf countries have resulted in shifting of health problems from survival issues to diet and lifestyle related problems such as diabetes, heart diseases, hypertension and obesity. According to the National Health Survey (2000), the prevalence of these non-communicable diseases is high in Oman. The glycemic index (GI) of foods has shown its significance as a useful nutrition concept for classifying the carbohydrate-rich foods based on their post-prandial blood glucose responses,

which relate to the rate at which these foods are digested. Low glycemic index foods have been shown to lower the risk of type 2 diabetes, reduce the rate of cardiovascular diseases, and certain types of cancers as well as promote weight loss and help in controlling obesity. The chronic consumption of high glycemic index foods is thought to challenge the glucose homeostasis mechanisms and consequently may lead to insulin resistance and other related conditions. Despite inconsistencies in the existing data, sufficient positive findings have emerged to suggest that the dietary glycemic index is of potential significance in the prevention and treatment of chronic diseases. A data bank of foodstuffs with their GI values is therefore important to make appropriate diet plans for both the diabetic and healthy people. We have evaluated the nutritional quality and glycemic index of some of the traditional Omani foods including different types of breads, dates and Omani halwa. These foods were found to have low to medium glycemic index values. The paper will discuss the significance of glycemic index in chronic diseases and the importance of developing a data bank of local/regional foods for their chemical composition and GI values to draw up appropriate diet plans for both the normal population as well as for the people with physiologic abnormalities in the prevention and control of chronic diseases.

D03 Folic acid, cognitive function and DNA damage among elderly: is there any link

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This cross-sectional study was conducted to determine the relationship between folic acid status, cognitive function and DNA damage among elderly people in a health clinic. The study consisted of 232 subjects (aged 60-82 years), [115 (49.6%) men and 117 (50.4%) women]. Anthropometric measurements taken were height, weight, mid-upper arm circumference and calf circumference, which were used to determine the nutritional status of elderly people. Food intake data were collected using dietary history method and complemented with food frequency questionnaire on 212 sub-samples. Serum folic acid status was analysed using immunoassay method. Cognitive achievement was assessed using a validated Elderly Cognitive Assessment Questionnaire (ECAQ). DNA damage status was determined using alkaline comet assay method. The results showed that the prevalence of folic acid deficiency was 13.9% for men and 13.7% for women, respectively. Mean energy and protein intake achieved was 61.2% of RNI (1231 ± 303 kcal/day) and 71.2% of RNI (42 ± 13 g) for men and 69.5% of RNI (1237 ± 356 kcal/day) and 84.3% of RNI (43 ± 17 g) for women. Median cognitive score for men (7.0 ± 2.3) was approximately similar to women (7.0 ± 1.8). However, the prevalence of cognitive disturbance was higher in men (33.0%) as compared to women (25.6%). Prevalence of DNA damage (% TD) was 27.0% for men and 15.4% for women. Prevalence of DNA damage with reference to TM was also higher in men (22.6%) than women (15.4%). A higher percentage of those with DNA damage (19.0%) was classified as having poor cognitive function. Binary logistic regression test showed that poor cognitive function was related to low serum folic acid status ($\beta=-1.312$; $p<0.01$), older age ($\beta=0.909$; $p<0.05$) and smoking habit ($\beta=-1.621$; $p<0.01$). While, in a man ($\beta=-1.029$; $p<0.05$), a poor serum folic acid status ($\beta=-1.312$; $p<0.01$) were determinants of DNA damage. There is a significant relationship between serum folic acid status and cognitive function (13.8%; $p<0.01$), serum folic acid status and DNA damage status (62.5%; $p<0.01$) and cognitive function with DNA damage status (32.4%; $p<0.01$). In conclusion, the study indicated the importance of achieving good folic acid status, especially for the older age group in maintaining a good cognitive function.

D04 Assessment of nutritional status and health-related quality of life among hemodialysis patients in Klang Valley

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The purpose of this cross-sectional study was to assess the nutritional status and health-related quality of life among hemodialysis patients in Klang Valley. A total of 75 subjects (35 males, 40 females) were recruited with informed consent at Charis NKF Dialysis Centre, Cheras. Subjects were predominantly Chinese (67%), with a mean age of 59.6 ± 12.7 years. A set of questionnaires was used to collect subjects' socio-economic and demographic data and health-related quality of life (adapted from KDQOL-SF). Dietary intake of subjects was assessed by using 24-hour dietary recall on dialysis day and 24-hour dietary record on non-dialysis day. Biochemical and medical history were retrospectively obtained from medical record as secondary data while anthropometric data were collected by using appropriate and non-invasive techniques. Data were analysed using Statistical Package for Social Sciences (SPSS), version 15.0 while dietary data were analysed using Nutritionist Pro. Less than 60% of the subjects had body mass index (BMI) of less than 24 while 41.3% of them had BMI of more than 24. About 32% of subjects exceeded the normal interdialytic weight gain (IDWG) range of 2-3 kg. The mean of serum albumin (39.79 ± 2.92 g/L), sodium (134.91 ± 14.51 mmol/L), total cholesterol (4.69 ± 1.07 mmol/L) and HDL (1.06 ± 0.32 mmol/L) were within the normal range. However, there was elevation in mean levels for serum phosphate, potassium, triglyceride and LDL. All of the subjects had elevated serum creatinine, low hemoglobin and total iron binding capacity (TIBC). A total of 94.7% of subjects were hypertensive, 52% were anemic and 48% were diabetic. Mean dietary intake for energy, protein, potassium, calcium and phosphorus was low, with only 9.3%, 18.7%, 1.3%, 0% and 10.7% of subjects achieved the dietary recommendation, respectively. There was a significant difference between dietary energy intake on dialysis and non-dialysis day ($p=0.00$). Subjects' health-related quality of life (HRQOL) score was unsatisfactory. Total score for each scale was 100 with higher score indicating better HRQOL. Mean score of symptom/problem scale was 80.61 ± 12.38 , effects of kidney disease was 63.62 ± 19.18 , burden of kidney disease was 26.17 ± 24.39 , mental health composite was 52.17 ± 10.31 and physical health composite 37.97 ± 8.86 . The symptom/problem scale scored the highest and burden of kidney disease scale scored the lowest. Spearman correlation coefficient test showed that there was a negative significant correlation between personal income and mental health composite ($r=-0.283$, $p=0.014$). Similarly, there was a positive significant correlation between albumin level with mental health composite ($r=0.363$, $p=0.001$) and symptom/problem list ($r=0.223$, $p<0.05$). There was negative significant correlation between years suffered from kidney failure and effects of kidney disease ($r=-0.227$, $p<0.05$). In general, the subjects showed moderate level of nutritional status and an unsatisfactory HRQOL score. Nutrient intakes were inadequate, especially for energy, protein, potassium, calcium and phosphorus. In conclusion, appropriate intervention programmes and counseling are needed to improve nutritional status and HRQOL of hemodialysis patients.

D05 Patients' satisfaction toward the foodservices (plated system) in a government hospital in Selangor

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The majority of hospitalised patients depend on the food provided by the hospital in order to fulfill their nutritional requirements. Patients' satisfaction is a very important tool in improving the quality of foodservices in hospital. The objectives of this study were to measure patients' satisfaction towards hospital foodservices (plated system) in a government hospital in Selangor and to compare the patients' intake between hospital foods and outside foods. Sixty-eight patients participated in the study. Data collection involved anthropometry, questionnaire on determination of patients' satisfaction toward hospital foodservices and patients' dietary intake and diet records. Patients' dietary intake was determined by weighing patients' foods before and after eating. Questionnaires on foodservices consisted of five dimensions which were food quality, meal service quality, staff/service issues, physical environment and total satisfaction. The results showed that 47% (n=32) patients met the individual energy requirements whereas 53% (n=36) patients did not meet the requirements. For protein intake, the majority of the patients (n=46) met the requirement. The highest score obtained for satisfaction with foodservices was meal service quality (mean 24.13 ± 6.22) whereas the lowest score was from the food quality dimension (mean 22.90 ± 3.97). This showed that patients were mostly satisfied with the meal service quality dimension. Most of the patients were not very satisfied with the food quality. Sixty-seven (98.5%) patients were satisfied with the hospital foodservices (mean 4.42 ± 0.50) whereas only one patient was moderately satisfied. The mean of patients' energy intake from hospital food was 1518.80 ± 373.49 kcal/day whereas energy intake from outside food was 269.06 ± 266.37 kcal/day. For protein, the mean intake from hospital food was 51.42 ± 17.72 g/day whereas from outside food, the mean intake was 10.49 ± 14.94 g/day. There was no significant correlation between energy and protein intake from hospital food with patients' satisfaction (p>0.05). The analysis from the questionnaire showed that the mean score of patients' satisfaction was 6.57 ± 1.60. In conclusion, patients' energy and protein intake did not correlate with patients' satisfaction with the foodservices. Even though most of the patients were satisfied with the foodservices, there were still a high number of patients who did not meet their nutritional requirement from hospital food. Thus, the hospital should improve the foodservices especially in the food quality aspect.

D06 Fluid intake among hemodialysis patients in selected Klang Valley hemodialysis centres

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End stage renal disease (ESRD) is a worldwide public health problem. A ESRD patient has total and long-lasting kidney failure, which requires Renal Replacement Therapy (RRT), either through dialysis treatment or transplantation. Previous studies had documented a high degree of non-adherence to fluid intake recommendation among HD patients. The objective of this cross-sectional study was to determine the relationship between fluid intake and Quality of life (QOL) among hemodialysis (HD) patients. A study was conducted among HD patients in Hospital Kuala Lumpur (HKL) and National Kidney Foundation Dialysis Centre. A total of 90 (44 male and 46

female) patients maintained on a minimum of three months of HD treatment and aged 18 years old and above were included in the study. Patients were in stable condition, defined as having non-hospital admission at least three months prior to data collection. Patients' background were obtained from subjects' medical record. Interdialytic Weight Gain (IDWG) was computed. The patient measures of non-adherence used in this study was IDWG set at >5.7% of body weight. Kidney Disease Quality of Life Short Form (KDQOL-SFTM) was used to determine the QOL among subjects. The study was approved by Medical Ethics Committee HKL, permission from NKF of Malaysia and subject's written informed consent was obtained. All statistical analyses were done using SPSS v.12.0. About 26.7% of the subjects had IDWG exceeding 3.0 kg. Approximately, 23.3% of the subjects did not adhere to fluid intake recommendation. For the QOL assessment, encouragement from dialysis staff had the highest mean score (75.3 ± 23.6), while the lowest score was work status with a mean of 27.78 ± 34.44 . Patient who complied with fluid intake recommendation had a significantly higher score for physical function ($t=3.244$, $p=0.002$), energy/fatigue ($t=1.715$, $p=0.37$), SF-12 physical health composite ($t=2.798$, $p=0.007$), patients satisfaction ($p=0.045$) and role limitation-physical ($p=0.036$). These results suggest that QOL among HD patients was affected by their fluid intake. Combination of different methods and approaches are important as key to improving adherence to fluid-intake recommendation in patients receiving HD.

D07 Food intake amongst renal transplant recipients receiving follow-up treatment at Hospital Kuala Lumpur

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This study aimed to determine the food intake of renal transplant recipients receiving follow-up treatment at Hospital Kuala Lumpur. A total of 50 renal transplant recipients between 18 to 65 years old participated. Anthropometry measurements, three-day diet recalls (2-week-day and 1 week-end) and biochemistry assessments from medical records were included. Subjects were Malay ($n=20$, 40%), Chinese ($n=19$, 38%) and Indian ($n=11$, 22%). All underwent either living or cadaver renal grafting not less than 3 months previous to this study. Means for age, body weight and body mass index (BMI) were 40.7 ± 13.2 years, 62.8 ± 11.1 kg and 22.9 ± 3.4 kg/m² for men, whilst for women, they were 32.8 ± 9.4 years, 53.5 ± 11.1 kg and 21.2 ± 4.9 kg/m² respectively. Classification of BMI revealed that 38% men were normal, 12% pre-obese, 4% obese class I and 2% were underweight and for women, 26% were normal, 2% underweight, 2% pre-obese, 2% obese class I and 2% obese class II. Mean daily energy intake were 1878 ± 471 kcal/day for men and 1622 ± 346 kcal/day for women. About 30% of subjects achieved energy recommendation (25-30 kcal/kg ideal body weight/day), but 46% exceeded the recommendation whilst 24% consumed less energy than their recommendation. For protein intake, 14% achieved recommendation (0.8 g/kg ideal body weight/day), 78% exceeded and 8% consumed less than the recommendation. A total of 70% subjects reported having good appetite and 28% having very good appetite. Chewing and swallowing problems were reported by subjects (4%) whilst some subjects had dentures (6%). It was found that 74% of subjects had received diet counseling, of which 74% were complying to dietary advice. Eating out practice was common in 74% of subjects. Co-morbidity diseases of the subjects included hypertension (64%), diabetes (14%), liver disease (12%), cardiovascular disease (4%) and cancer (4%). The results of the study indicate that diet and lifestyle intervention should be incorporated as part of post-transplant renal care.

D08 Beyond convention: Use of complementary therapy by breast cancer survivors

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Use of complementary therapy is prevalent amongst cancer survivors as it may be associated with a healthy, holistic approach to cancer recovery. Therefore, this cross-sectional study was carried out to determine the prevalence of complementary therapy use by breast cancer survivors. A total of 67 Malay subjects aged from 21 to 67 years who attended Breast Cancer Clinic at Hospital Kuala Lumpur (HKL) and Hospital Universiti Kebangsaan Malaysia (HUKM) for follow-up appointment were recruited. The inclusion criteria included subjects who had completed all three modalities of clinical treatment which were surgery, chemotherapy and radiotherapy. A modified self-administered questionnaire was used to obtain information on socio-demographic characteristics, cancer clinical treatment history and use of complementary therapy. The results showed that 57% of the subjects were identified as complementary therapy user. Almost half of the subjects (44.7%) began to use complementary therapy while undergoing clinical treatments. The duration of complementary therapy usage varied from one month to five years. Most of the subjects (50%) used the therapy for about one to six months period. About RM100 was spent monthly on complementary therapy by 73% of the subjects. According to the type of complementary therapy used by the subjects, dietary supplements was the common form (81.6%) followed by Islamic medicine (15.8%) and 7.9% used homeopathic medicine, prayer and massage respectively. For type of dietary supplements, most of the subjects had taken multivitamins (41.9%) followed by vitamin C (19.4%) and sea cucumber jelly (16.1%). The subjects believed that complementary therapy could assist their body's natural forces to heal (36.8%), cure cancer (31.6%) and reduce stress (5.3%) while some of them were encouraged by family members (18.4%). Family members (31.6%), friends or relatives (31.6%), doctor or healthcare providers (28.9%) and printed materials (7.9%) were the source of information on complementary therapy. Complementary therapy was found to be effective and beneficial for their disease state (78.9%) and they were contented with the usage of the therapy (81.6%). Only one-third of the subjects (36.8%) consulted with their physician regarding the safety usage of the complementary therapy. Contrary to other findings, the subjects who used complementary therapy presently were found to be older (37.3%), less educated (46.3%) and not working (37.3%). This study also indicated that users and non-users of complementary therapy were similar in socio-demographic background and cancer clinical treatment history. In conclusion, complementary therapy is commonly used by breast cancer survivors as part of coping mechanisms towards battling the disease.

D09 Bioelectrical impedance analysis and muscle mass change

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There is now greater interest in the assessment of muscle mass due to the increasing popularity of resistance exercise. However, it is not known whether the bioelectrical impedance analysis (BIA) method is capable of monitoring a daily change in muscle mass, thus indirectly reflecting

muscle glycogen change. Therefore, a 5-day change in fat-free mass (FFM) and skeletal muscle mass (SMM) after a single bout of resistance exercise was observed and compared, using the BIA, in this cross-sectional, observational study. A total of 7 subjects (4 females, 3 males) who were members of the London Metropolitan University Sports Gym, involved in regular resistance training, participated in this study. Weight, height, body mass index (BMI) and waist circumference (WC) were measured. The body composition of subjects was measured for 5 consecutive days on the *Tanita Body Composition Analyzer BC-418* (single frequency) and the *InBody 720 Body Composition Analysis* (multi-frequency). Subjects were measured before and after a single bout of resistance exercise on Day 1 and measured once daily during the subsequent 4 days, without any forms of exercise. Percentage body fat and fat mass significantly decreased, whilst FFM and SMM increased significantly immediately after a single bout of resistance exercise ($p < 0.05$), as measured on both BIA. No significant differences were found between the body compositional measurements of Day 1 vs. Day 5 ($p > 0.05$). Between-day variations in FFM and SMM measured across the 5 consecutive days also did not show significant differences ($p > 0.05$). BIA did not manage to measure any significant changes in FFM and SMM across 5 consecutive days, following a single bout of resistance exercise, thus failing to indirectly reflect muscle glycogen change. As this study boasts of a relatively new aspect of investigation, there are inevitably several limitations and shortcomings to be overcome for the improvement and benefits of future investigations.

D10 Nutritional status and functional status assessment among chronic obstructive pulmonary disease (COPD) outpatient at hospital Universiti Kebangsaan Malaysia

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Acknowledging the importance of improving and maintaining nutritional and functional status among Chronic Obstructive Pulmonary Disease (COPD) outpatients, a cross sectional study was conducted at Hospital Universiti Kebangsaan Malaysia. The aim of the study was to assess the nutritional and functional status among adult COPD outpatient through assessment of dietary intake, food habits, body composition analysis, subjective global assessment (SGA), anthropometric measurements, biochemistry indicators and functional status assessment. A total of 31 subjects with 26 (83.9%) men and 5 (16.1%) women aged between 57-85 (68.3 ± 7.1) years with the majority being Chinese (54.8%), followed by Malays (35.5%) and Indians (9.7%) participated in this study. Body mass index (BMI) of the subjects was 22.3 ± 5.0 kg/m², and within the normal range, however 12.9% had chronic energy deficiency (CED) III, 16.1% had CED I-II, 19.4% were overweight and 6.5% were classified as obese. Clinical assessment using SGA showed that 51.6% were malnourished with 16.1% severely malnourished and 35% mild to moderately malnourished. Body composition index indicated that 38.7% of the subjects were malnourished with 35.5% cachexic and 3.2% had muscle atrophy. Overall, 38.7% were malnourished based on combined classification of SGA and body composition index. Malnutrition was more prevalent among men (66.7%) aged below 75 years, Chinese (58.3%), unemployed (91.7%), had more severe COPD (stage 3 and 4) (83.3%), not being referred to dietician (91.7%) and had not participated in pulmonary rehabilitation (58.3%). The mean energy intake of the malnourished male (1542 ± 465 kcal/day) was lower than the normal group (1826 ± 352 kcal/day) of which 79% and 82.1% met the individual requirement for energy. Malnourished subjects also had lower values for weight (45.7 ± 6.2) kg, Body Mass Index (BMI) (17.0 ± 1.6 kg/m²), Forced Expiratory Volume [FEV₁ (% predicted)] (33.3 ± 13.8 % predicted),

Fat Free Mass Index (FFMI) (13.7 ± 1.5 kg/m²), Fat Mass Index (FMI) (3.3 ± 0.4 kg/m²) and haemoglobin level (13.4 ± 0.9 g/dL) compared to normal subjects ($p < 0.05$ for all parameters). BMI, mid-upper arm circumference (MUAC), handgrip strength, FFMI, FMI, haemoglobin and albumin level decreased with the increment in severity of malnutrition as assessed using SGA ($p < 0.05$ for all parameters). However, urea level increased with the increment in severity of malnutrition ($p < 0.05$). Pulmonary functional status and dyspnea modified questionnaire (PFSMQ-M) score and C-Reactive Protein (CRP) showed an increased trend with severity of malnutrition. In conclusion, almost a third of the COPD outpatients had malnutrition and this was related to inadequate dietary intake, poor lung function and poor nutritional and functional status.

D11 Anti-epileptic drugs decrease bone mineral density

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Patients with epilepsy often express concerns about the potential for chronic side effects with the use of antiepileptic drugs (AEDs). Antiepileptic drugs can affect bone metabolism. Bone mineral content (BMC) or density (BMD) may be decreased in children with epilepsy. Decreased bone mineral density (BMD) has been found in adults and children receiving AEDs drugs. AEDs may decrease serum 25-hydroxyvitamin D (25-OHD) levels and increase bone turnover. The aim of this study was to determine the bone mineral density (BMD) and serum levels of 25-hydroxy vitamin D (25OHD) in a group of patients taking antiepileptic drugs (AED) for a seizure disorder.

This article reviews new studies on the effects of antiepileptic drugs (AED) on bone density and serum vitamin D levels. Patients receiving long-term AED should be monitored for indices of BMD and Vit.D status. Carbamazepine caused a significant decrease in BMD, which was accompanied by a decrease in the level of vitamin D (25-OHD(3)). BMD and vitamin D were not affected by 6 months of valproic acid or lamotrigine therapy. Six studies were available for carbamazepine, and none of these showed a decrease in BMD in any skeletal site. For valproate, results were diverse; two studies reported a decrease in spine BMD. Two studies reported a decrease in hip BMD with valproate. All three studies on forearm BMD in users of valproate described a decrease. Three studies reported an improvement in BMC with vitamin D supplementation in children on AEDs. The available studies have all been cross-sectional, and longitudinal studies are needed along with studies on potential interventions in children with decreased BMD. Patients on chronic use of AED have alterations in bone metabolism characterised in this study by lower BMD. As these conditions are difficult to treat medically, this paper suggests that nutritional interventions, such as supplemental calcium, magnesium and/or vitamin D, might well be considered in epileptic disorders.

D12 Knowledge, attitude and practices regarding hypertension among outpatients in Klinik Perubatan 2, Hospital Universiti Kebangsaan Malaysia, Kuala Lumpur

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A cross-sectional study was carried out in Klinik Perubatan 2, Hospital Universiti Kebangsaan Malaysia, Kuala Lumpur to measure the level of knowledge, attitude and practices among outpatients who received treatment at the clinic for hypertension. A total of 100 respondents including those with cardiovascular disease, diabetes mellitus and hypertension were interviewed by using a questionnaire. Majority (63%) of the respondents were Malay women, with a mean age

of 49 ± 8.743 years. About 46% of the respondents had an education level of up to secondary school and 40% had their own business with a mean income of RM2933 \pm 983.36. BMI and blood pressure readings of the respondents were taken from the patients' cards during the study. About 30% of the respondents were overweight (BMI of 25.92 ± 5.03) and 44% of them had blood pressure exceeding 140/90 mmHg. The majority of the respondents (94%) had knowledge that blood pressure could be controlled through the intake of high fibre foods, and excessive intake of salt in cooking could elevate their blood pressure. The result of this study found that the respondents' level of knowledge on the hypertension risk factors was high, with mean score of 23.34 ± 8.74 from a total of 30 marks. The results of their attitude scores showed that 74% of the respondents had shown positive attitudes towards hypertension risk factors. Most of the respondents (90%) agreed that a change to a more active lifestyle could control their blood pressure while 72% agreed that high intake of caffeine could elevate blood pressure. Pearson Correlation Test showed that there was a significant correlation ($P < 0.05$) between the level of knowledge of respondents with attitudes toward hypertension ($r: 0.454$). However, Pearson Correlation Test also showed that there was no significant correlation between the number of cigarettes smoked everyday with the level of knowledge ($r: 0.371$) and attitude ($r: 0.349$). There was also no significant correlation between the intake of alcohol with the level of knowledge ($r: 0.432$) and attitude ($r: 0.544$). The level of physical activities of respondents was considered to be inactive based on the mean of MET-min per week, which was 567.00 ± 5.842 . Busy lifestyle with no free time to do exercise were the main factors for the low physical activity level among the respondents. Meanwhile 80% of respondents liked to drink coffee everyday, 69.6% had eggs in their daily menu and 64.2% took soy sauce everyday. High level of knowledge and attitude among respondents did not influence their practices towards hypertension risks positively. This showed that the exposure of information and knowledge through counselling and mass media was not enough to facilitate the change in respondents' attitudes and practices towards maintaining their normal blood pressure. Therefore, more rigorous and effective programmes should be implemented which focus on behaviour changes especially among those diagnosed with hypertension and related problems.

D13 The effect of supplementation with fish oil rich in ω -3 fatty acids on anthropometric measurement among leukemia children

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Weight loss is common among pediatric oncology patients. Many factors contribute to the weight loss such as physiological abnormalities, response to the tumors and the side effects of the treatment. A quasi-experimental and randomised trial was carried out to determine the effect of supplementation of fish oil among leukemia children in increasing their body weight. A total of 51 leukaemia children (32 boys and 19 girls) aged 4 to 12 years from Hematology & Oncology Pediatric Ward of the Hospital National Universiti Malaysia and Institut Pediatrik Kuala Lumpur were recruited in this study between January to November 2006. They were randomly allocated into two groups, which were 26 subjects in trial group (TG) and 25 subjects in the control group (CG). Subjects in TG were asked to consume one capsule of fish oil per day [each capsule provided 1200 mg containing 360 mg eicosapentaenoic acid (EPA) and 240 mg docosahexaenoic acid (DHA)]. In order to increase their dietary intake, both groups were asked to consume full cream milk (394 kcal/day, twice a day) throughout 60 days of the study. Their anthropometric assessments were assessed at baseline, day 30 dan day 60. At baseline, 30.8% of TG subjects and 44.0% of CG subjects were malnourished (z score < -2 for indices weight-for-age), whilst 7.7% of subject from TG and

28.0% of subject from CG were classified as stunted for height-for-age (z score < -2) according to WHO (1995). The majority of subjects from TG and CG were in the mild malnutrition category (>5th to 15th percentile) for mid-upper arm muscle circumference (MUAMC)-for-age. Repeated one-way ANOVA was used to determine the effectiveness of fish oil supplementation in anthropometric measurement between TG and CG subjects at baseline, day 30 and day 60. Results showed that there was a significant change in body weight ($F=24.769$; $p<0.0001$) and MUAMC ($F=163.100$; $p<0.0001$) in TG subjects. Mean differences in anthropometric measurements between TG and CG subjects were assessed. Results showed that there was a significant increase ($p<0.05$) in body weight and MUAMC among TG subjects. In conclusion, supplementation of omega-3 (fish oil) fatty acids had a positive effect in increasing body weight among leukemia children.

Group E: Food Science and Technology

E01 Determination of hydrolytic stability (free fatty acid), oxidative stability (peroxide value, conjugated dienes) and fatty acid composition of selected blended palm oils

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In Malaysia, vegetable cooking oils are the main sources of fat in habitual diets, especially palm oil. Blended oil is combined or mixed oil at a certain ratio which has been shown to offer additional benefits due to the presence of minor components in the oils. This study was carried out to determine free fatty acid (FFA), peroxide value (PV), conjugated dienes (CD), and fatty acid composition (FAC) of selected blended palm oils, at 0 and after 20 times of frying. The blended oils were palm oil and corn oil (POCO); palm oil and sesame oil (POSO); and palm oil and rice bran oil (PORBO), prepared in a ratio of 1 to 1. These oils were selected based on our preliminary work which showed that the oils have favourable FAC and antioxidant content following blending. PO was used for comparison. Oils were used to fry potato slices. FFA and PV were determined by titration method, while CD and FAC were determined by using spectrophotometer and Gas Chromatography (GC), respectively. FFA at 0 and 20 times of fryings were $0.181 \pm 0.13\%$ and $0.272 \pm 0.13\%$ respectively for PO, and $0.199 \pm 0.13\%$ and $0.798 \pm 0.13\%$ accordingly for POSO. Similarly, POCO and PORBO also showed an increment in the percentage of FFA after 20 fryings. CD values which were expressed in the extinction value were also increased with number of frying. For POCO and POSO, the values were 4.967 ± 0.86 and 4.413 ± 0.08 at 0 frying, and 5.017 ± 0 and 6.383 ± 0.48 at 20 times of frying. The increase in CD was also observed in PO and PORBO at 20 times of fryings as compared to 0 frying. As for PV, there were also increments in all samples where the values for PO, POCO, POSO, and PORBO were 11.241 ± 0 mEq/kg, 17.492 ± 3.53 mEq/kg, 28.739 ± 1.77 mEq/kg, and 7.500 ± 0 mEq/kg respectively at 20 times of frying, compared to 2.500 ± 0 mEq/kg, 16.243 ± 1.770 mEq/kg, 4.999 ± 3.54 mEq/kg, and 6.240 ± 1.76 mEq/kg respectively at 0 frying. FAC for PO and the blended oils were expressed as the percentage of total fatty acids. For PO, the SFA increased from 41.87% at 0 frying, to 42.12% at 20 times of frying while the total unsaturated fatty acid reduced from 58.12% at 0 frying to 57.88% at 20 times of frying. The initial SFA (0 frying) for POCO, POSO, and PORBO were 28.69%, 6.15%, and 32.36% respectively while PUFA were 33.30%, 27.73%, and 24.38% respectively. The SFA of POCO, POSO, and PORBO increased after 20 times of frying to 29.30%, 6.19%, and 36.63% while the PUFA decreased to 31.73%, 25.81%, and 18.45% accordingly. It can be concluded that at 20 times of frying, FFA, CD, PV, and SFA increased, while PUFA decreased in all samples. However, POCO is most stable in terms of hydrolytic and oxidative stabilities, compared to POSO and PORBO.

E02 Effect of different ratio fish and cassava flour on chemical composition and physicochemical properties of crackers (*keropok*)

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The objective of this study was to examine the effect of the ratio of fish and cassava flour on chemical composition and physico-chemical properties of crackers (*keropok*) using different formulations. Four different ratios of fish and cassava flour were used in the formulation of *keropok*. The *keropok* were analysed for their proximate composition (moisture, protein, fat, ash and total carbohydrate) and physicochemical properties. Results showed that moisture content was 8.50-9.86%, protein content was 4.07-8.49%, fat content was 0.99-2.70%, non-combustible material or ash content was 5.75-6.52%, and carbohydrate content was 74.20-79.47%. On the other hand, for the physico-chemical analysis, the linear expansion was 37.18 - 107.69%, oil absorption was 7.89 - 39.79%, crispness was 1312.34-2366.49% and colour measurement was significantly different ($p > 0.05$) before compared with after puffing of *keropok*. There were no significant differences in sensory analysis ($n=27$) using a 7-point hedonic scale in terms of appearance (4.89-5.63), crispiness (5.00-5.82), colour (5.15-5.70), flavour (4.96-5.33), taste (4.93-5.48), overall acceptance (4.96-5.70).

E03 Healthy meatballs containing legume flours as extenders: Nutrient composition and sensory evaluation

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With the expansion of the food industry in our fast developing world, there is an increased demand in the production of new products, which are nutritionally balanced and palatable. Legumes are components of the diet that are widely known for their health benefits among the population, food industries and health sectors. This study was conducted to produce healthy meatballs using legume flours as extenders. Proximate analysis and sensory evaluation were carried out as part of the research. Meatballs were prepared using lean chicken breast, chicken fat, legume flours and seasonings. Proximate analysis was carried out on both uncooked and cooked batches for sample C (Control), T1 (10 % lentil flour), T2 (10 % chickpea flour) and T3 (10 % green bean flour). Sensory evaluation was assessed using 50 untrained panelists for attributes: appearance, colour, aroma, texture, flavour, palatability, firmness, grittiness, juiciness and overall acceptability. Significant differences ($P < 0.05$) were obtained for fat and protein analysis in both uncooked and cooked batches. However, for moisture analysis in the cooked batch, non-significant difference ($P > 0.05$) was obtained among samples T1 and T3, which were extended with 10% lentil flour and 10% green bean flour respectively. Significant difference ($P < 0.05$) was obtained for sample T1, for palatability and overall acceptability. In terms of firmness, significant difference ($P < 0.05$) was obtained for samples T1 and T2. Therefore, by developing healthier meatballs, which are extended with legumes flours, the sensory attributes and nutritional composition are increased.

E04 Quality properties of duck sausage with added different types of flours

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Different types of flours (tapioca, wheat, sago and potato) were evaluated in order to determine their effects of their addition on the quality properties of low-fat duck sausages viz. proximate composition, cooking yield, color, folding score, texture profile analysis (TPA), and sensory properties. Different types of flours were shown to have no significant effects on moisture, ash, and cooking yield ($P>0.05$). On the other hand, significant differences were found for protein, fat, carbohydrate, color, TPA and sensory properties ($P<0.05$). Duck sausage with wheat flour was found to be the highest for lightness (58.4). Duck sausage with sago showed the highest for fat (15.1%), folding score (4.6) and overall acceptability in sensory properties (4.4). Duck sausage with potato showed higher hardness texture (7.93N) and odour in sensory properties (5.6) than other duck sausages. Overall acceptability of duck sausage using sago flour was higher among panelists. These results showed that different types of flours influenced the quality of duck sausage.

E05 Detection of non-fish plasma protein in surimi and surimi-based products

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The halal status of some surimi-based products marketed in Malaysia is doubtful because of the possible incorporation of non-halal ingredients. The additives are believed to be blood plasma from various types of animals. Thus this research was conducted to determine the presence of these additives using species-specific polymerase chain reaction (PCR) method. Two pairs of primers were used in this study (FW1 and RW1 which are specific for cow species and FW2 and RW2 that are specific for pig). Twelve different surimi-based product samples were randomly obtained from the local market and compared to positive controls of beef, pork and pork sausage while the negative control is own-made surimi. Only PCR done using FW1 and RW1 primers yield result of a 279bp band for three out of the 12 product samples. This indicates the presence of products originating from the cow has been incorporated into the samples. According to previous studies, the product was assumed to be beef blood plasma. Sequencing results showed that the sequence obtained scored high similarities with sequence encoding the cytochrom b mitochondrial of *Bos indicus*. In conclusion, the species-specific PCR method is reliable and will be able to provide precise results of tracing non-halal surimi in food products.

E06 Physicochemical properties of Malaysian commercial beef frankfurters

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Five brands of Malaysian commercial beef frankfurters were analysed for physico-chemical properties. The main ingredient of beef frankfurters is beef meat and two types of fat sources, namely beef fat and vegetable oil. Binders and extenders are popularly used in the formulation of beef frankfurters, such as soy protein, potato starch and modified corn starch. The proximate contents were significantly different among samples. The range of moisture content was 63.0-73.9%, protein content was 10.63-16.43% while fat content was 1.71-12.22%. The lightness value (L*) of raw sausage was significantly different among the samples and was in the range of 47.02-52.28. The lightness of cooked sausages decreased in all samples and was in the range of 39.72 - 46.20. No significance difference was observed for folding test. Folding test scores of beef frankfurters were in a range of 4.40 to 5.00. All samples showed no crack after folding in half. However significance difference was found for texture analysis. The hardness, cohesiveness, chewiness, springiness, gumminess and shear force ranged between 4.59-10.30kg, 0.26-0.35, 16.15-51.72kgmm, 12.73-14.79mm, 1.17-3.49 and 1.67-7.08kg. The research results showed that Malaysian commercial beef frankfurters are significantly different in their physico-chemical properties.

E07 Changes in the physico-chemical properties, mineral composition and sensory characteristics of shark *dendeng* using different drying methods

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The physico-chemical, mineral composition and sensory properties of shark *dendeng* prepared using different drying treatments (sun drying, oven drying and oven vacuum drying at 60°C) were analysed. *Dendeng* was made using shark (*Chiloscyllium sp*) flesh. Before drying, the slices (dimension of 4 cm x 12 cm x 3 mm) were soaked in a mixture of sugar (20%), salt (1%), tamarind (4%), coriander (1.5%), ginger (0.5%), garlic (1.0%), onion (1.0%), and galangal root (2.5%) until the moisture content was about 23-25%. Proximate analysis showed that there were no significant differences among these samples. The range for moisture, protein, fat, ash, and carbohydrate among the sample were 24.57-24.82%, 63.38-64.78%, 1.25-1.52%, 6.07-6.21%, and 27.81-29.17%, respectively. A significant influence of different drying methods on the colour was observed. The L, a* and b* values of the sample were about 28.92-32.19; 3.06-5.43; 8.14-12.74 respectively. The lightness value for vacuum drying was 32.19 followed by oven drying (29.97) and sun drying (28.92). The mineral content (Na, Ca, Mg, P, Zn, K, Fe, and Cu) was highly variable. However, there were no significant differences in mineral values except for sodium (Na). Sensory test was used to determine the most acceptable products, in which five characteristics (colour, odour, taste, bite-texture, and overall acceptance) were investigated. There were no significant differences for sensory analysis (n=30) using a 7-point hedonic scale (1 equals dislike very much and 7 equals like very much). However, shark *dendeng* using oven drying was most preferred.

E08 Effect of heating temperatures and heating times on antioxidant and dietary fibre content of red pitaya (*Hylocereus polyrhizus*) fruit extract

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Several ecological, case-control and cohort studies have indicated that diets rich in fruit and vegetables provide protection against cardiovascular disease (CVD), several common types of cancer, and other chronic diseases, due to the varieties of plant antioxidants, dietary fibres and phytochemicals present in them. Among the tropical fruits investigated, red pitaya (*Hylocereus polyrhizus*) fruit have been shown able to reduce the risk factors of CVD and certain cancers. Besides consuming fresh fruits, some of these fruits are processed into juices and other forms of products before being consumed. Therefore, the purpose of this study was to investigate the effect of heating temperatures and duration of heating times on antioxidant and dietary fibre content of red pitaya fruit extract. Five heating temperatures with different heating times were applied on homogenised pitaya fruit extract. The temperatures and heating times used were 95°C for 30 min, 95°C for 60 min, 105°C for 60 min, 140°C for 10 min and 173°C for 3.5 min. Total phenolic compounds, radical scavenging activity and total dietary fibre (soluble and insoluble fibre) of these heated pitayas were determined and compared with fresh pitaya fruit. Results showed that antioxidants of red pitaya fruit extract were sensitive to long time heating as compared to high temperature. The content of total phenolic compound was highest in the heated pitaya at 140°C for 10 min (374.38 mg/L) as compared to other temperatures. The total antioxidant activity also highest (5.30 mg/100ml) in the sample heated at this temperature and heating time. In contrast to antioxidant content, dietary fibre of red pitaya was stable over long time heating and not in high temperature (105°C for 60 min). In conclusion, two different products with distinct proportions of antioxidants and dietary fibres were observed: heated pitaya at 95°C, 30 min (containing 62% phenolic compounds in 32% total antioxidant activity + 92% soluble fibre in 98% total dietary fibre) and heated pitaya at 105°C, 60 min (containing 59% phenolic compounds in 24% total antioxidant activity + 42% soluble fibre in 93% total dietary fibre) receiving the two highest scores of 8.99 and 7.91, respectively. Therefore, temperature and heating times are important in processing fruit products so that the most antioxidant and dietary fibre content retained could give better health benefits to the consumers.

Group F: Experimental Nutrition

F01 Potential of roselle in weight reduction in Sprague Dawley rats

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This research was conducted to study the effect of intake of roselle tea on the growth of *Sprague Dawley* rats. Rats were divided randomly into two groups of control (distilled water and 11% sucrose solution) and two groups of treatment (roselle tea without sucrose and with added sucrose up to 11° Brix). Two sessions of study were carried out using white and red dried roselle calyxes. The rats were placed in metabolic cages and given food and drink *ad libitum* for 28 days. The result of the study using dried white roselle showed that the rats consuming sucrose (Control

II) achieved the highest growth (110%) while the lowest (86%) was in rats consuming roselle with sucrose (Treatment II). The growth for Control group I and treatment I was 105% and 103% respectively. For the study of red roselle, the results showed the highest growth was Control group 1(237%) and the lowest was Treatment II (168%). Meanwhile growth of Control II group rats was 178% and Treatment I group was 212%. Thus the results showed that the growth for treatment group was lower than in the control group. Body weight, urine analysis, blood analysis and serum analysis were done as parameters for normality of rat and results showed that there were significant differences ($p < 0.05$) for all analyses except the organ weight, which was found to be not significant ($p > 0.05$). From this experiment, it can be concluded that roselle tea has potential to reduce the growth of rat and that the white roselle tea has greater growth reduction potential than red roselle tea.

F02 Effects of aspartame treatment on growth and blood profile of Sprague-Dawley rats

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The objectives of this study were to investigate the effects of artificial sweetener aspartame on feed intake, weight gain and blood profile of rats. Twenty-four Sprague-Dawley rats were divided into control (water) and three treatment groups (sucrose, aspartame A and aspartame B). The rats were given the sweetener in drinking water and feed *ad libitum* for 28 days in individual metabolic cages. Final body weight for sucrose group was the lowest (mean=135±43g) with a mean weight increase of 85±17g. Control group had the highest body weight (226±52g) with an increased mean weight of 170±48g. Body weight values for aspartame A and aspartame B were 144±25g and 160±29g respectively. Mean food intake for sucrose group was 9.4±4.0g/day, while for aspartame A and B, they were 10.9±2.7g/day and 14.8±3.4g/day respectively. These results showed that food intake for aspartame groups was higher than in the sucrose group. Cholesterol and blood glucose values were not significantly different between the treatment groups. Urine analyses were normal and no protein or blood cells were detected. In conclusion, intake of aspartame in drinking water has no significant effect on body weight of rats.

F03 Evaluation on the safety of mixture of *Strobilanthes crispus* and roselle tea in rats

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Liver and kidney diseases are two main diseases that have potential to arise because of nutrient intoxication. The objective of this study was to determine the acute effect of *Strobilanthes crispus* tea (SCT), roselle tea (R), and the mixture of *Strobilanthes crispus* and roselle tea (M) on the liver and kidney function test compared to normal control (NC). The treatments were given for 7 days to a total number of 120 rats which were divided into 12 groups whereby 4 groups received low dose at 2.5% (L) for each treatment (LNC, LSCT, LR, and LM), 4 groups received medium dose at 25% (M) for each treatment (MNC, MSCT, MR, and MM), and the other 4 groups received high

dose at 50% (H) for each treatment (HNC, HSCT, HR, and HM). Each group contained 10 rats with 5 males and 5 females. They were housed in standard cages at the animal house of Faculty of Medicine and Health Sciences and fed with standard rat chow with water *ad libitum*. The results showed that there were significant differences in the mean body weight for all groups in each concentration at different treatments. The groups that received different concentrations of *Strobilanthes crispus* tea showed an increased in creatinine at 25% dose and an increase in ALT, AST, creatinine, and BUN at 50% dose. Meanwhile, the groups that received roselle as treatment showed increasing ALT, creatinine, and BUN at 25% and an increase in creatinine and BUN at 50% dose. However, the mixture groups showed no increment at different doses except for creatinine at 50%. In conclusion, the mixture of *Strobilanthes crispus* and roselle tea has no toxicity effect at low and medium doses on the rats based on the parameters studied.

F04 Acute and subacute toxicity of the ethyl acetate extract of *Kaempferia galanga*, Zingiberaceae

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Kaempferia galanga, Zingiberaceae, known locally as *cekur*, is used to flavour Indo-Malay food and is a common ingredient in jamu preparations which are consumed for wellness. The leaves are eaten fresh and the rhizome is used in folk medicine for hypertension, rheumatism and asthma. The aim of this study was to assess the acute and subacute toxicity of the ethyl acetate extracts of the leaves and rhizomes of *K. galanga* in male mice (25-35g). For acute toxicity determination, a single dose of the extracts (5 g/kg) was administered orally and the animals observed for 24 hours. In the subacute toxicity test, extracts were administered daily at 0.5 g/kg by the oral route. At the end of the observation period, surviving animals were killed and blood collected for hematology and blood biochemistry determinations. No deaths occurred and no significant behavioral changes were noted in the mice that were dosed acutely or subacutely with the extracts. There was also no significant differences in hematology and blood biochemistry parameters in treated animals to controls. The food intake of mice given the *K. galanga* leaf extracts for 7 days significantly increased compared to the control group. No such changes were observed with the rhizome extract. In summary, the ethyl acetate extracts of the leaves and rhizomes of *K. galanga* that were given orally either acutely or daily for 7 days, did not elicit any toxic effects. Daily intake for 7 days of the leaf extract brought about an increase in food intake possibly indicating stimulation of appetite which could explain its use as a food flavouring agent.