Abstracts of the

21st Scientific Conference of the Nutrition Society of Malaysia

Theme:

Women & Nutrition

30-31 March 2006
Kuala Lumpur

Supplement editor

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President,
Nutrition Society of Malaysia

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Mal J Nutr 12(2): S1-S127, 2006

Keynote Lectures

Engendering Development

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Gender equality is a core development issue. Attaining the goal of gender equality is no mean task. It requires a conscious effort to incorporate the interests of both men and women in society's vision for progress. The CEDAW Convention is the principal legal instrument addressing women's rights and equality. Its uniqueness lies in its mandate for the achievement of substantive equality for women requiring not only formal legal equality but also equality of results in real terms, in other words the practical realisation of equal rights. By identifying that discrimination is socially constructed and that laws, policies and practices can unintentionally have the "effect" of discriminating against women, the Convention sets the pace for a dynamic proactive approach to women's advancement. This is because women have been discriminated against historically, and do not necessarily come in as equals of men. They may have less power, less access to resources, less mobility, less years of experience etc. The realisation of gender equality requires careful planning, as well as effective and efficient implementation and evaluation. Gender perspectives need to be mainstreamed into the development processes. Development must be engendered, otherwise it will be endangered.

National Nutrition Policy and NPAN II Malaysia: the role of Nutrition Society of Malaysia

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President, Nutrition Society of Malaysia

For the first time in the country, a National Nutrition Policy has been formulated and approved by the Cabinet. Based on that Policy and a review of the NPANM I (1996-2000), the National Plan of Action for Nutrition of Malaysia (NPANM) II has been prepared. It is a 10-year plan for the period of 2006 to 2015. NPANM II has been drafted with the input from various government agencies, academia, non-government organisations, professional bodies and the private sectors. Current and emerging issues in nutrition were also taken into consideration in the development of NPANM II.

The General Objective of the NPANM II is to achieve and maintain optimal nutritional well-being of Malaysians. Specifically, the Plan aims to enhance the nutritional status of the population and to prevent and control diet-related non-communicable diseases. Various indicators and targets have been set to meet these objectives.

To ensure effective implementation, monitoring and evaluation of the Plan of Action, strategies of the Plan are oriented into the Foundation, Enabling and Facilitating Strategies. The Foundation Strategy, "Incorporating nutrition objectives, considerations and components into national developmental policies and programmes" forms the over-

arching strategy and is vital for the effective operationalisation of the Plan. Five strategies of the Policy, identified as having direct impact on achieving the specific objectives of the Plan, serve as the Enabling Strategies. Five other strategies, identified as providing the mechanism and support for the realisation of the Enabling Strategies, form the Facilitating Strategies of the Plan. For each of the above strategies, various activities were identified, each with its estimated time frame, performance indicators, target and implementing agency identified.

The National Coordinating Committeee for Food and Nutrition (NCCFN), being the highest body in the country, has the overall responsibility to monitor and evaluate the implementation of the Plan. Appropriate technical working groups and committees are established to focus on relevant nutritional issues to implement activities accordingly. These include TWG for Nutrition Policy, Nutrition Guidelines, Nutrition Training, Nutrition Research and Nutrition Promotion. It is vital that the Plan be implemented with the guiding principle of close collaboration within the multi sectoral framework. The professional bodies, including the Nutrition Society of Malaysia, should play an active role in realising the objectives of the Plan. Members of NSM should contribute and participate effectively in the various activities identified. This presentation highlights some of the activities that the Society can carry out to fulfil its role.

Symposium 1: Women & Nutrition (I)

The Malaysian Adult Nutrition Survey 2002/2003: how did our women fare?

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This paper reports the key results of the first nationwide nutrition survey in Malaysia conducted from October 2002 until December 2003. Subjects were representative samples of the adult Malaysian population aged 18 to 59 years, stratified by zones, urban/rural, sex and age groups. The survey collected data on socio-demography, physical activity, 24-hour dietary intake, meal pattern, frequency of food intake, weight, height and intake of supplements. The total number of subjects interviewed was 6928. The mean weight of Malaysian adults was 62.7 kg (95% CI: 62.2 - 63.1). Men were heavier (66.6kg, 95% CI: 65.9 – 67.2) than women (58.4kg, 95% CI: 57.9 – 59.0). However, mean BMI of women (24.6 kg/m², 95% CI: 24.4 – 24.8) was significantly higher than men (24.2 kg/m², 95% CI: 23.9 – 24.4). There was a higher prevalence of overweight among men compared to women (28.6 versus 24.8%). However, women were more obese than men (14.7 versus 9.7%). On frequency of food intakes, 97.3% reported eating rice twice a day

with mean serving size of one plate (120g) per meal. Other foods eaten daily are marine fish (42.9%, 1.6 times per day) and vegetables (40.0%, 1.5 times per day). A total of 46.9 % drink tea daily (1.8 times per day) and 28% drink coffee daily (1.6 times per day). Malaysians add an average of 1.9 teaspoons of sugar or 1.8 teaspoons of sweetened condensed milk (SCM) per cup of tea or coffee. This survey also showed that 23.9% of adults use vitamin and mineral supplements, higher among women (29.1%) compared to men (18.9%). About 31.5% (95% CI; 30.1 – 32.9) reported they were involved in sports or exercise during the two weeks prior to the interview, while only 14.4% (95% CI: 13.4 – 15.5) had adequate exercise, that is 3 times a week at 20 minutes per session. The percentage of men (19.5%, 95% CI: 17.9 – 21.3) with adequate exercise was higher than women (9.1%, 95% CI: 8.0 – 10.4). The most common types of sports or exercise were jogging, football, badminton, brisk walking and aerobic exercise. In conclusion, the Malaysian women are mostly sedentary and they have an increasing problem of obesity. The results for 24-hour physical activity patterns and 24-hour dietary recall will also be presented.

Women, nutrition and bone health

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Optimal bone health contributes significantly to overall health and quality of life of all individuals. Osteoporosis is one of the bone diseases that is becoming a major public health problem worldwide and affects many millions of people around the world. It is a complex, multi-factorial condition characterised by reduced bone mass and impaired micro-architectural structure, leading to an increased susceptibility to fractures. With prolonged life expectancy and the increasing number of older adults, it is predicted that osteoporotic fractures will reach epidemic proportions. Such fractures are a major cause of morbidity and mortality among older adults and may impose considerable economic burden on health care services of the nation. Many factors, including genetic, nutritional, environmental and lifestyle, influence the bone strength, bone mass and its quality. Women are at increased risk due to a number of physiological and lifestyle factors. Nutrition is an important modifiable factor in the development and maintenance of bone health as well as the prevention and treatment of osteoporosis. Of all the nutrients or food components that affect bone, calcium and vitamin D are the most important. Other dietary components, such as protein, certain vitamins, trace elements, and electrolytes may be required for normal bone metabolism, while other substances consumed (caffeine, alcohol, phytoestrogen) may also influence bone health. This paper reviews some of the nutritional determinants of bone health throughout different stages of life, presents local data and intervention studies related to diet, nutrition and bone health, and discusses some of the approaches and strategies that healthcare professionals, especially nutritionists and dietitians can do to promote bone health, particularly among women. The emphasis should be on prevention and early intervention to promote strong bones, and to prevent fractures and their consequences.

Symposium 2: Women & Nutrition (II)

Promoting breastfeeding amongst Malaysian women

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Breastfeeding plays an important role in child survival and development. The Ministry of Health Malaysia, since late 1970s, has implemented several strategies and activities to promote breastfeeding. The National Policy on Breastfeeding formulated in 1992 has been revised and it now states that all mothers are to breastfeed their babies exclusively for the first six months of life, thereafter, to continue breastfeeding for two years and beyond. Complementary foods should be introduced when the baby is six months of age. The prevalence of ever breastfed amongst children less than two years is 88.6% whilst that of exclusive breastfeeding and continued breastfeeding up to two years is 29.0% and 11.7% respectively (National Health and Morbidity Survey II, 1996/97). The prevalence is significantly higher amongst Malays (97.0%) compared to the Chinese (61.0%) and Indians (83.3%). The overall mean duration of breastfeeding is 18.0 weeks. The prevalence of continued breastfeeding is higher in the rural area (13.2%) compared to the urban area (10.2%). Prevalence of timely first suckling is 41.4%. The multi-pronged strategies implemented to promote breastfeeding include the development of the Malaysian Code of Ethics for Infant Formula Products implemented in 1979 to ensure the provision of safe and adequate nutrition amongst infants and an adequate standard and proper use of infant formula products. Legal provisions are also made in the Food Regulations 1985 to preserve breastfeeding. In-service training of health and other professionals on breastfeeding and breastfeeding education to the public through the electronic and printed media remain the long-term strategy adopted to promote breastfeeding. The teaching of breastfeeding to school children is conducted through various curricular subjects such as Health Education and Biology. The environmental and social support also play a vital role in encouraging women to breastfeed such as the establishment of mother-to-mother support groups, 60 days maternity leave and building by-laws. Community support includes the provision of a conducive breastfeeding environment in public places and special support for working mothers to breastfeed such as the establishment of crèches at or near the workplace. The Baby-friendly Hospital Initiative (BFHI), through the 10 Steps To Successful Breastfeeding, implemented in 1993 to make maternity facilities support mothers to breastfeed their infants, is considered to be an effective strategy leading to the increase of timely first suckling practice. Whilst Malaysia is undergoing a reversal upward trend in breastfeeding since 1970s, continued research on breastfeeding and infant feeding is needed to improve existing strategies.

Effect of palm oil-vitamin E supplementation on PECAM-1 expression in pregnant women and its role in the prophylaxis of pregnancy-induced hypertension (REPP Study)

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This study evaluates the effect of palm-oil vitamin E supplementation on the indices of oxidative stress in pregnant women and further determines its possible role as a prophylactic measurement of pre-eclampsia (PE). PE is a type of pregnancy-induced hypertension (PIH) (diastolic blood pressure ≥90 mmHg at least twice over 4 to 6 hours or one single reading of diastolic ≥ 110 mmHg) occurring after 20th week of pregnancy, accompanied by proteinuria (≥300mg in a 24-hour period). It is predominantly a disorder of primigravidae and likely to have higher prevalence in less-developed countries. Although the exact mechanism in the pathophysiology of PE is unknown, poor placentation is believed to play an important role. Current hypothesis postulates the involvement of oxidative stress that causes the endothelial dysfunction in PE. In view of that, prophylactic treatment with antioxidants such as vitamin E may prevent PE. We hypothesised that supplementation early in pregnancy could reduce the risk of PE and conducted a study to determine its possible inhibiting effect on platelet endothelial cell adhesion molecule (PECAM-1) expression on peripheral blood mononuclear cells (PBMNs). PECAM-1, a type of cell adhesion molecule that is highly expressed on the surface of endothelial cells, has been shown to be involved in leukocyte-endothelial and endothelial-endothelial interactions in favour to a condition of inflammation. 299 normotensive, non-proteinuric primigravidae with singleton pregnancy were recruited in a randomised, double-blind placebo controlled clinical trial named as REPP STUDY (study on the role of palm-oil vitamin E in the prevention of pre-eclampsia) conducted in HUKM. Of 299 subjects, 29 subjects have been analysed and subdivided into palm-tocotrienol supplementation (n=15) and placebo (n=14) group. We collected maternal peripheral blood on week 28, 32 and 36′ as well as cord and maternal blood upon delivery to investigate PECAM-1 expression by reverse-transcription polymerase chain reaction (RT-PCR). We collected PBMNs from subjects in the clinical trial who later developed PIH (n=5) and PE (n=3) to compare with normal pregnancy. Student's t-test was performed to compare variables. PECAM-1 expression was found to be significantly lower throughout pregnancy in the supplemented group, when compared to placebo group ($p<0.05$). In the supplemented group, significant increase of expression was observed specifically during admissions for PIH ($p<0.05$), compared to other visits throughout their pregnancies. Even though the same pattern was observed in PE subjects, no significant difference was observed probably because of the low subject number. On the other hand, subjects in the placebo group who developed PIH and PE showed steadily high expression throughout their gestation period. Our study provides evidence of PECAM-1 expression as a marker

of endothelial dysfunction in PIH subjects. Based on low incidence of PIH and PE in our clinical trial, we suggest that palm-oil vitamin E could have beneficial effect as a possible preventive measurement of the disorder.

Primary prevention of women's cancers: lifestyle, nutrition, exercise

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A total of 21,464 cancer cases were diagnosed among Malaysians in Peninsular Malaysia in the year 2003, comprising 9,400 males and 12,064 females. The age standardised incidence rate for all cancers was 134.3 per 100,000 males and 154.2 per 100,000 females. In women below 50 years the most common cancers were cancers of the breast, cervix, ovary, uterus, thyroid gland and leukaemia while cancers of the breast, cervix, colon, uterus, lung and rectum occurred commonly in older women. Overall, the top three cancers in women were breast (31%), cervix (12.9%) followed by colorectal cancer (10.1%). Large international variation in cancer incidence and mortality rates has provided important evidence that environmental factors influence the development of this disease. In addition, there is convincing evidence from epidemiological and experimental studies that several lifestyle and nutrition factors are likely to have a major impact on cancer development. Physical inactivity and to a lesser extent, excess body weight, have been consistently shown to be risk factors particularly for breast, colorectal and uterine cancers. Dietary factors are also clearly important. Diets high in red and processed meat, fat, low in fruits, vegetables and fibre appear to increase risk of several cancers. In recent years, several large-scale intervention studies have been undertaken for primary prevention of cancers. This paper will review evidence from epidemiological and interventional studies and highlight opportunities for nutrition and lifestyle interventions to help reduce the cancer burden in Malaysia.

Symposium 3: Young Investigators Symposium

Metabolic syndrome status among type 2 diabetic patients in an endocrine clinic in Hospital Universiti Kebangsaan Malaysia

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A cross sectional study was carried out to identify metabolic syndrome status based on International Diabetes Federation (2005) among type 2 diabetic patients in an endocrine clinic in Hospital Universiti Kebangsaan Malaysia. A total of 217 subjects were tested with questionnaires including demography, anthropometry measurements and their secondary biochemistry data was recorded. Anthropometry measurements taken

were height, weight and waist circumference. Biochemical assessments recorded were triglyceride, fasting blood glucose, high density lipoprotein cholesterol and glycated haemoglobin. Their systolic and diastolic blood pressures were also recorded. A total of 115 subjects completed the questionnaire and dietary assessments. A 24-hour diet recall combined with food frequency questionnaire was used to evaluate nutrient intake. Results showed that 71% (154 subjects) were having metabolic syndrome while 29% (63 subjects) were without metabolic syndrome. There is no significant relationship between smoking habits, alcohol consumption and physical activity level among subjects with metabolic syndrome. Subjects with a positive family history having metabolic syndrome was 77.9% (120 subjects) and without metabolic syndrome was 61.9% (39 subjects). This indicates that there is a significant association between family history and metabolic syndrome status ($p<0.05$). Among 115 subjects that took part in the dietary assessment, 71% (82 subjects) had metabolic syndrome while 29% (33 subjects) were without metabolic syndrome. There is a higher energy (1614±99 kcal/day) and fat (50.1±8.5 g/day) intake among those with metabolic syndrome as compared to subjects without metabolic syndrome 1569±80 kcal/day, 41.8±7.5 g/day respectively. The percentage of fat and carbohydrate intake for subjects having metabolic syndrome was 56% and 27% respectively, while subjects without metabolic syndrome consumed 59% and 24% respectively. The percentage of saturated fat and monounsaturated fat intake for those with metabolic syndrome was 14% and 11% respectively, while for those without metabolic syndrome was 12% and 10%. There is a significantly higher intake of saturated and monounsaturated fat with metabolic syndrome ($p<0.05$). Since diabetes is a risk factor for metabolic syndrome, diabetes control is therefore very important in the prevention of cardiovascular disease.

Relationship between nutritional intake, physical activity and weight gain during the third trimester of pregnancy with birth weight

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A study was conducted to examine the relationship between nutritional intake, physical activity and weight gain of pregnant women in the third trimester and baby birth weight in Kuala Lumpur. Seventy respondents were randomly selected at the Obstetric and Gynaecology Clinic, Hospital Kuala Lumpur, with the respondent age ranging between 19 and 42 years old. From the calculation of Pre Pregnancy Body Mass Index, 5.71% respondents were underweight, 24.29% were normal weight, 17.14% were overweight, 31.43% were obese I and 21.43% were obese II. For weight gain during pregnancy, 30% of the respondents gained normal weight, 10% had low weight gain and 60% had high weight gain. Assessment of the haemoglobin status of the pregnant women showed that 28 of them (40%) were anaemic with haemoglobin levels <11 g/dl. The mean caloric intake was 90.42% of the Recommended Nutrient Intake (RNI). The mean percentage of macronutrient intake for carbohydrate, protein and fat was 54.81% ± 6.56, 14.65% ± 2.53 and 30.65% ± 5.75 respectively. All the mean percentages of these macronutrients followed the RNI recommendations accordingly. Assessment of the FFQ shows food such

as rice, bread, fish, chicken, egg, green vegetables, tea, chocolate drink, salt and sugars had the highest scores and were frequently consumed by the respondents. The mean energy use for physical activity of these respondents was very low at 297.56 ± 286.70 kcal/day. For baby birth weight, the mean birth weight was 3.23 ± 0.41 kg. Of all the babies, 97.1% were born with normal weight and 2.9% were underweight (weight < 2.5 kg). Pearson correlation test shows a significant relationship between weight gain of pregnant women and birth weight of the baby (r=0.245, p=0.041). The test also shows a significant relationship between the haemoglobin levels of the pregnant women and baby birth weight (r=0.253, p=0.035). But the test shows that there was no significant relationship between Pre Pregnancy Body Mass Index and the pregnancy weight gain (r=-0.231, p=0.054). Overall, this study shows a positive relationship between pregnancy weight gains and the baby's normal birth weight.

Body image perception among Indian primary school girls in Kuala Lumpur

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This cross sectional study was carried out to assess body image perception among Indian primary school girls in Kuala Lumpur. A total of 315 girls aged between 10 and 12 years participated in this study. Questionnaires were used to collect information on social demography, socioeconomic status and birth weight. Body image perception was evaluated by using a modified questionnaire from Collins (1991). Breast development was evaluated by using Tanner Stages of Female Puberty (1969). Anthropometric measurements such as weight, height and Body Mass Index were measured. Subjects were categorised into three groups that were underweight, normal weight and at risk of overweight according to WHO (1995) BMI-for-age classification. 89.5% of the subjects were concerned about their body shape. This study found that 34.9% (1:3) underweight subjects, 36.0% (1:3) normal weight subjects and 54.1% (1:2) at risk of overweight subjects had body image distortion. Based on the Tanner Stages of Female Puberty, from the earliest (B1) to the latest (B5), 42.9% of subjects from breast growth stage B3, 20.6% of subjects from B4 and B5 were concerned about their body shapes. The results revealed that subjects started to be concerned about their body shapes at the age of 4. However, a majority of them (26.5%) started to do so at the age of 10. Most of the subjects (50.4%) were influenced by their mothers with regard to their body image while 35.6% of them were not influenced by anyone. 69.2% of subjects cited that health was the main factor that influenced their body shapes. 35.6% of subjects were mildly dissatisfied with their body image and 29.8% of subjects were satisfied with their body image. The results also indicated that there was a strong positive correlation between their current body figure with their actual body mass index (r=0.688, p=0.000). Overall, this study showed that body image distortion and body image awareness have developed since young. Therefore, appropriate education on body image and nutrition should be implemented in primary schools to curb body image distortion among young children.

Assessment of antioxidant capacity and phenolic contents in selected commercial beverages

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This study was aimed at assessing the antioxidant capacity and phenolic (free, bound, and total) contents in selected commercial beverages as prepared per serving size. The correlation between antioxidant capacity and phenolic contents, and quantification of major phenolic contents in beverages were also assessed. Six types of beverages (cocoa, coffee, and tea) commonly available in Malaysian supermarkets, namely cocoa (Cocoa A and B), coffee (coffee A and B), and tea (Tea A and B) were selected. Phenolic contents were determined using Folin-Ciocalteu assay. Antioxidant capacity (ferric reducing power and scavenging activity) was determined using FRAP and TEAC assays. Based on Tukey's test, phenolic (free, bound, and total) contents were significantly different ($p < 0.05$) in the same and different groups of beverages, except for free phenolics between Tea A and Coffee B. A major phenolic in Coffee A was higher compared to Coffee B. Cocoa and tea beverages have a similar content of catechins. Free phenolic was in the order of Coffee A > Cocoa A > Tea A ≈ Coffee B > Cocoa B > Tea B. Bound phenolic was in the order of Cocoa B > Cocoa A > Tea A > Coffee A > Coffee B, while total phenolics was in the order Cocoa A > Coffee A > Cocoa B > Coffee B > Tea A > Tea B. The reducing power of the beverages was in the order of Coffee A > Coffee B > Tea A > Cocoa A > Tea B > Cocoa B, while scavenging activity of beverages was in the order of Coffee A ≈ Tea A ≈ Coffee B ≈ Cocoa A > Cocoa B ≈ Tea B. A strong and significant correlation ($r = 0.77$; $p < 0.01$) was found between free phenolic and reducing power. A strong and significant correlation ($r = 0.87$; $p < 0.01$) was found between free phenolic and scavenging activity. Moderate correlation ($r = 0.58$, $p < 0.05$) was found between total phenolic and scavenging activity. Bound phenolic content was inversely related to antioxidant activity, but not significantly different. This study indicated that coffee beverages, namely Coffee A, showed the highest antioxidant capacity. Chlorogenic acid could be one of the phenolic compounds that contribute to antioxidant capacity. The addition of herbal extracts (Tongkat Ali and ginseng) did not significantly contribute to the antioxidant capacity of the studied beverage. In addition, the study showed that beverages possessed varying degrees of antioxidant capacity and phenolic contents per serving size.

Eating disorders, menstrual irregularity and low bone quality among Malaysian female elite athletes

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Although the health benefits of regular exercise are innumerable, vigorous exercise can put women at risk of serious health consequences. The purpose of this study is to examine the prevalence of 'at risk' behaviour of eating disorders, menstrual irregularity

and low bone quality among female elite athletes. Participants were 67 athletes from 9 sports, aged between 13 and 28 years who are involved in AsiaComm and Gemilang Projects. Athletes were subdivided into leanness and non-leanness sports. Disordered eating was assessed using the Eating Disorder Inventory (EDI), body dissatisfaction (BD), drive for thinness (DT), bulimic (B) and perfectionism (P) subscales. An elevated score on any one of the EDI subscales was associated with 'at risk' of disordered eating. Menstrual irregularity was assessed with a self-reported menstrual history questionnaire while bone quality was measured using quantitative ultrasound device (Omnisense) that measures speed of sound (SOS) at distal radius. Prevalence of 'at risk' of eating disorders was higher in athletes participating in leanness sports (54%) compared with non-leanness sports (30%). Mann Whitney test revealed that the leanness and non-leanness groups differed significantly ($p<0.05$) on EDI-DT and EDI-BD. Menstrual irregularity such as amenorrhea and oligomenorrhea was reported in 27% athletes, with a much higher prevalence among athletes in leanness sports (73%). Mean SOS showed that athletes in leanness sports (4062 ± 210 m/s) had significantly lower bone quality compared with athletes in non-leanness sports (4278 ± 247 m/s). Prevalence of 'at risk' of eating disorders and menstrual dysfunction (23%) was highest; followed by 'at risk' of eating disorder and low bone quality (10.8%); and 'at risk' of menstrual dysfunction and low bone quality (1.8%). However, the prevalence of athletes who were 'at risk' of all three disorders was low (1.8%) among Malaysian female elite athletes. It may be concluded that athletes competing in leanness sports were at higher risk of eating disorders, menstrual irregularity and low bone quality.

The effect of red pitaya (*Hylocereus spp.)* consumption on blood pressure, blood glucose and lipid profile of hypertensive staff of UPM, Serdang

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Consumption of fruits and vegetables has been encouraged because of the potential health benefits which are attributed to specific components and the synergistic effects of components therein namely, vitamins, minerals, dietary fibre and a spectrum of phytochemicals and antioxidants. Epidemiologic and clinical data support the association of high intake of fruits and vegetables with a lower risk of chronic diseases, particularly cardiovascular diseases and its risk factors. Therefore, this study was conducted to evaluate the effect of two different treatments of red pitaya (*Hylocereus spp.)* on blood pressure, blood glucose and lipid profile of hypertensive subjects for seven weeks. Subjects were divided into 4 groups; 2 groups received red pitaya supplementation consisting of two different amounts (400g/d and 600g/d), while positive control and negative control groups were not given any fruit supplementation. Blood pressure and fasting blood samples were collected every fortnightly. Blood glucose and plasma lipid profiles were analysed using chemistry auto-analyser (Hitachi). Results showed that after 4 weeks of red pitaya supplementation, blood pressure was reduced - systolic by 8% (146 to 135 mmHg) and diastolic by 6% (90 to 85mmHg) - in the group that consumed 600g red

pitaya. Meanwhile, systolic blood pressure reduced by 1% (135 to 131 mmHg) in the group that was supplemented with 400g red pitaya fruit. The level of blood glucose reduced significantly ($p<0.05$) by 67% (8.31 to 6.93 mmol/L; 600g) and 33% (5.39 to 3.59 mmol/L; 400g) respectively, as compared to the baseline. There was also a 25% (6.33 to 4.73 mmol/L) reduction of total cholesterol, 28% (5.01 to 3.61 mmol/L) of LDL-cholesterol and an increase of 10% (0.79 to 0.87 mmol/L) of HDL-cholesterol among subjects who received 600g supplementation of red pitaya fruit. In conclusion, this study reveals that red pitaya has potential in lowering blood pressure, blood glucose, total cholesterol, LDL-cholesterol and increasing HDL-cholesterol among hypertensive subjects. Therefore consumption of red pitaya fruit may reduce risk factors of cardiovascular disease.

Symposium 4: Role of Foods in Health & Nutrition Promotion

Dietary Fibre and Women's Health – A closer look at current evidence

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In 1975, Burkitt and Trowell proposed a hypothesis on fibre based on their observation that African natives who ate a plant-based diet and had large stool output containing undigested plant materials had a lower prevalence of coronary heart disease, diabetes, and cancer than did Westerners (Burkitt et al 1975). This "fibre hypothesis" has since been examined in numerous basic, clinical, and population studies. The scientific consensus gathered from the output of these studies has led many national authorities to recommend a diet high in fibre and promote the consumption of whole grains.

Several recent scientific publications have strengthened our conviction that dietary fibres may have a role to play in reducing risk of heart disease, diabetes and obesity – common health concerns of women worldwide. However, a report of the Pooling Project of Prospective Studies of Diet and Cancer (Park Y et al, JAMA. 2005 14; 294 (22):2849-57) stated that dietary fibre does not reduce the risk for colon cancer.

Consumers and health professionals who picked up the media reports are now skeptical about the benefits of fibre. So, what is the jury's verdict out there? Is dietary fibre just another over-rated food component or are we finally at a stage when we can begin to tease apart the health benefits of various dietary fibres?

For a fact, we know that despite much scientific scrutiny, confusion still abounds in defining dietary fibre and whole grains. Much of the confusion arises because these terms are nutritional concepts rather than an exact description of a chemical component of food.

The Diet, Nutrition and the Prevention of Chronic Diseases Report of the joint WHO/FAO expert consultation stated that there is convincing evidence that a high intake of dietary fibre may protect against weight gain or obesity. They highlight two reviews of randomised trials that have concluded that the majority of studies show that a high intake of dietary fibres promotes weight loss. Pereira et al (Pediatric Clinics of North America, 2001, 48:969-980) found that 12 out of 19 trials showed weight loss. Howarth et al (Nutrition Reviews, 2001, 59:129-139) in their review of 11 studies of more than 4 weeks duration, involving ad libitum eating, reported a mean weight loss of 1.9 kg over 3.8 months on diets high in fibre.

With regard to cardiovascular disease (CVD) risk factors, it has been demonstrated that soluble fibre decreases serum total and low-density lipoprotein cholesterol concentrations and improves insulin resistance. On the other hand, food sources of mainly insoluble fibres, primarily contributed by cereal products, have been most consistently associated with lower incidence of CVD. Alicja Wolk et al (JAMA, 1999, 281:1998-2004), working on The Nurses Health Study, also showed that the long-term intake of dietary fibre decreased the risk of coronary heart disease among women. Ludwith et al (JAMA, 1999, 282:1539-1546) demonstrated that fibre consumption predicted insulin levels, weight gain, and other CVD risk factors more strongly than did total or saturated fat consumption and attributed this effect to the ability of high fibre diets to lower insulin levels.

A meta-analysis of 12 studies providing appropriate risk ratios for CHD showed that regular intake of whole grain foods was associated with a 26% reduction in risk for CHD (Anderson JW et al, Journal of American College of Nutrition, 2000, 19(3):291S-299S). Higher intakes of cereal fibre and whole-grain products are associated with less progression of coronary atherosclerosis in postmenopausal women with established coronary artery disease (Erkkila AT et al, Am Heart J, 2005, 150(1):94-101). Based on the totality of the evidence, in 1999, the US Food and Drug Administration approved the health claim: "Diets rich in whole-grain foods and other plant foods and low in total fat, saturated fat and cholesterol may reduce the risk for heart disease and certain cancers" (FDA Docket #99P-2209).

Epidemiologic studies find that whole grains are protective against cancer, especially gastrointestinal cancers such as gastric and colonic, and hormonally-dependent cancers including breast and prostate. Potential mechanisms for the protection provided by whole grains are the fermentation of carbohydrates in the colon to produce short chain fatty acids that lower colonic pH; natural antioxidant and phytoestrogens content; and mediation of glucose response (Slavin JL, Journal of American College of Nutrition, 2000, 19 (3): 300S-307S).

Qi L et al (Diabetes Care, 2006, 29(2):207-11) also showed that whole grains and a low-glycaemic index diet may reduce systemic inflammation among women with type 2 diabetes, now considered as a potent causative factor for several chronic diseases.

While the scientific endeavours continue to answer the more complex questions about the role of particular dietary fibres and health outcomes, public policy favors a food-based approach for healthy individuals – recommending the increased intake of whole-grain cereals, fruits, and vegetables as part of a well balanced diet – to provide a mixture of fibres as well as the protective benefits of the nutrients intimately associated with these foods.

The utilisation of resistant maltodextrin for healthy eating

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Dietary fibre is one of the essential nutrients that tend to be deficient in ordinary eating. The lack of dietary fibre is believed to increase a risk of so-called lifestyle-associated diseases like diabetes, colon cancer, coronary heart diseases, etc. Resistant maltodextrin (RMD) is a soluble dietary fibre derived from starch. The structure resistant to human digestive enzymes is formed during the dextrinisation process, and the dietary

fibre content is increased to 85-90% through the succeeding purification process with amylases, chromatographic separation, and ion-exchange resins. To determine the dietary fibre content in foods added with RMD, AOAC Official Method 2001.03 is applicable. The bland taste, high solubility with low viscosity, and stability to heat and acid make it possible to formulate RMD easily into food products at a substantial amount. RMD is one of the ideal dietary fibres to increase the daily intake for people who often eat processed food products.

RMD has been developed and investigated for its physiological functionalities as a dietary fibre, largely in Japan. Since RMD is not hydrolysed by human digestive enzymes, it reaches the lower gastrointestinal tract and is then partially digested and utilised by intestinal microflora. The amount excreted into faeces is ~30-40%. As a result, the intestinal regularity is improved with 5 grams per day of RMD intake. The improvements in faecal volume and frequencies have been confirmed with a total of 1,089 subjects in 25 scientific papers. When 5 grams of RMD is taken with a starchy or sugary meal, it controls the postprandial rise in blood glucose and insulin levels, which has been confirmed with 1,146 subjects in 38 reports. These effects were remarkable in subjects who had higher peak blood glucose levels than average. It is considered to be due to the competitive inhibitory activity of RMD to small intestinal mucosal alpha-glucosidase. These effects on the body are believed to work synergistically on fat metabolisms, resulting in the decrease in serum triglyceride and cholesterol levels, which has been confirmed with 144 subjects in 9 reports.

Postprandial lipaemia, palm olein and other dietary fats- a paradigm shift in assessing nutritional worth

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The phenomenon of elevated blood triacylglycerol (TAG) levels after a meal, otherwise known as postprandial lipaemia, is important in the development of coronary artery disease. The increased generation of TAG-rich lipoproteins (TRL) and suppression of HDL-C concentrations resultant from enhanced postprandial lipaemia are independently linked to atherogenicity progression and early death in type 2 diabetes. These endpoints are also central components of the metabolic syndrome. In line with this new field of scientific enquiry, the postprandial model is used to explore lipaemic response to various dietary fat manipulations. The presentation highlights the use of palm olein as a basis for comparisons with other dietary fats *vis à vis* the effect of varying P/S ratios, chain length of saturates and modification by hydrogenation and interesterification. The presentation will also review current findings in this field and the relevance of postprandial lipaemia in the dietary management of hyperlipidaemia and diabetes.

Dietary and blood folate status of Malaysian women of childbearing age

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Evidence of folic acid taken during the periconceptual period in reducing the occurrence of neural tube defects (NTD) is well documented. In United Sates, the prevalence of NTD decreased by 19% when pre-folic acid fortification data were compared with the post-folic acid fortification. While the NTD prevalence is not known nation-wide, it is estimated as 10 per 10, 000 births based on data from the Kuala Lumpur Hospital. There is also a dearth of data on folate intake and blood folate status of Malaysian women of childbearing age. This study was undertaken to determine the dietary and red blood cell folate status of a sample of women aged 18-40 years. A total of 389 subjects comprising 139 Malay, 127 Chinese and 121 Indians, were recruited from universities and worksites in the suburbs of Kuala Lumpur. Blood folate concentrations were determined on non-fasting blood samples using a microbiological technique with *L. Casei* as test microorganism. Dietary intake was assessed using 24-hour recall. The median (5-95th percentiles) intake of dietary folate equivalent (DFE) was 204.3 mg (59.4-507.8 mg), which amounted to only 51.1% of the Malaysian Recommended Nutrient Intakes level. There were no significant differences in the median DFE intakes among the ethnic groups. The mean RBC folate for all subjects was 673.8 nmol/L. Prevalence of folate deficiency was 9.3% (RBC folate < 363 nmol/L), with Malays showing a significantly lower mean level than the other ethnic groups. In terms of attaining RBC folate concentration of 906 nmol/L, which is associated with very low risk of NTD, only 15.2% exceeded this level. Thus, the majority of the subjects appear not to have the threshold level of RBC folate for full protection against NTD risk. These results indicate a need for intervention strategies for improving the dietary intake and blood folate status of Malaysian women of childbearing age.

Symposium 5: Nutrition Potpourri

Predicting cardiovascular risks among the Malay participants using the Framingham Risk Scores and anthropometric measurements

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Framingham Risk Scores is one of the established methods used to predict an individual's 10-year risk in coronary heart disease (CHD). It is calculated using the individual's risk in age, total cholesterol, high-density lipoprotein cholesterol, blood pressure and smoking status. The Framingham Risk Scores provide a more precise delineation of

risk which might lead to a more precise selection of appropriate therapy as well as provide opportunities for patient education and motivation.

A Healthy Lifestyle Project was initiated to decrease the modifiable risk factors for CHD in a worksite in Kuala Lumpur. The participants were Malay males (n=186) working as security guards in a public university. Their mean age was 46.6 ± 6.6 years. The majority of them had secondary education and were married. The categories of 10-year risks based on the Framingham Risk Scores were low (< 10%), intermediate (10 to 20%) and high (>20%) with the corresponding proportion of participants at 55.4%, 39.8% and 4.8% respectively. The Framingham Risk Scores were than compared with anthropometric measurements such as the Body Mass Index (BMI), waist circumference and waist-hip-ratio (WHR). All the anthropometric measurements had weak but significant correlation with the Framingham Risk Scores (WHR: r=0.26; waist circumference: r=0.23; BMI: r=0.16). In conclusion, 44.6% of our participants had more than 10% risk in developing CHD in the coming 10 years. Hence, they are suitable candidates to be targeted for the promotion of healthy lifestyle such as smoking cessation, weight control, healthy dietary patterns and increased physical activities. Indicators on abdominal obesity like WHR or waist circumference could be used to complement the Framingham Risk Scores for the prediction of CHD risk in this population.

Subsequent running endurance capacity in heat improves by consuming a soy-based beverage during recovery period

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The objective of this study was to determine the effect of a local soy-based beverage (15% carbohydrate) that was given at a rate of 1.2 g. kg body weight^{-1}.h^{-1} during the 4-hour recovery period on the subsequent exercise performance under hot and humid conditions (31ºC; relative humidity 70%). Eight healthy male subjects (Age: 34.5 ± 11.3 years; Weight: 59.9 ± 10.7 kg; Height: 167.9 ± 4.8 cm and VO_{2max}: 53.2 ± 6.1 ml.kg^{-1}. min^{-1}) participated in two trials, at least 7 days apart. During each trial, subjects ran at 65% VO_{2max} on a treadmill for 90 min (Run-1) in hot and humid conditions, followed by 4-hour recovery period (REC) in thermoneutral environment (25ºC) and then ran to exhaustion (Run-2) at the same speed in the similar hot and humid conditions to determine the running endurance capacity. Water at a rate of 2 ml.kg body weight^{-1} was ingested every 20 minutes during running (Run-1 and Run-2). During the 4-hour recovery period, a soy-based beverage (15% CHO) (C) or placebo (P) together with water was ingested in a volume equivalent to 150% of body weight loss. Room temperature and humidity were well maintained during both the C and P trials (31.1 ± 0.1°C; 70.0 ± 0.5% and 31.1 ± 0.1°C; 70.3 ± 0.8% respectively). Time to exhaustion was 27.9 ± 15.2 min or 38% longer in the C trial compared to the P trial (72.9 ± 35.8 min Vs. 45.0 ± 20.6 min; $p<0.05$). Heart rate, rate of perceived exertion and core body temperature increased over time during Run-1 and Run-2 in both trials but were not significantly different between trials. Thus, ingesting a soy-based beverage (15% CHO) during recovery following prolonged running exercise delayed onset of fatigue and enhanced endurance running capacity during the subsequent running performance in the heat and humidity.

Use of glycaemic index in dietary management of diabetics

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The use of low glycaemic index (GI) foods has been shown to improve blood glucose and metabolic control in diabetics. Nevertheless, controversy exists regarding its effectiveness. The GI concept is not recommended by the American Diabetes Association but it has been advocated by major diabetes associations, including Diabetes UK, Canadian Diabetes Association and Diabetes Australia. In Malaysia, research into GI of foods is still at its infancy particularly to the practical application of GI in dietary management. However, the interest in this subject has been increasing. As such, there is a need to assess the significant problems on the matter before starting any GI-based dietary intervention programme. A mail-survey has been sent to the dietitians (n=114) to determine the current practice and their perception towards the use of GI concept in dietary management of diabetes. The knowledge of type 2 diabetics (n=33) on GI concept was also assessed. From this needs assessment study, results showed that most of the dietitians (85%) emphasised the quantity of carbohydrates (carbohydrate counting and foods exchange list), 12% of them used Healthy Guidelines based on the Malaysian Food Pyramid and 2% used other methods (Traffic Light Guide and Food Group) as a primary strategy of delivering dietary advice. Only 1% recommended the GI concept. They also perceived that counselling patients on the GI concept was complicated and only suitable for those patients who are highly educated. Among the type 2 diabetics, every one of them showed poor knowledge of GI (30±20%). However, when education material on GI was given and simplified, the knowledge on GI increased significantly (87±15%). Thus, further research is needed to confirm the long term impact of GI application notably in dietary management of diabetes.

Can tocotrienols protect women against breast cancer?

Kalanithi Nesaretnam

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Breast cancer worldwide affects nearly one million women per year and although current treatments do help many patients, more than 350,000 die from the disease. In the United States, 215,990 women were diagnosed with breast cancer in 2004 and 40,110 died from the disease. In Malaysia, breast cancer is the most frequent cancer amongst women. In 2002, the National Cancer Registry recorded 4,337 new cases of breast cancer in Malaysia, which comprised 30.4% of all cancers in women.

International variation in breast cancer incidence rates and changes in incidence amongst migrant populations have indicated that breast cancer risk is influenced by environmental factors, in particular diet, and therefore preventable. A lot of scientific investigations have been performed to discover possible functional properties, antioxi-

dant or otherwise, in the diet, which could be efficient in preventing diseases like cancer. One such antioxidant is vitamin E which exits in eight dietary components α-, β-, γ-, δ-tocopherols (T) and α-, β-, γ-, δ-tocotrienols (T3). α-T is thought to be the most biologically important form of vitamin E. Tocopherols and tocotrienols are present in the oil fraction of cereal grains, seeds and nuts. Palm oil is a particularly rich source of α-, γ-and δ-tocotrienol. Observational studies that have assessed exposure to vitamin E by plasma or adipose tissue concentrations of α-T have failed to provide consistent support for the idea that α-T provides any protection against breast cancer. In contrast, studies in human breast cancer cells indicate that of α-, γ-, δ-T3 have potent anti-proliferative and pro-apoptotic effects that would be expected to reduce the risk of breast cancer, whilst α-T had no effect. Thus it seems plausible that the modest protection from breast cancer associated with dietary vitamin E may be due to the effects of the other T and T3 in the diet.

Some of our current findings in this area will be presented.

Ensuring food availability in the household: evidence from rural areas of Northeast Malaysia

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Household food insecurity is increasingly being recognised as a serious public health concern in Malaysia. While starvation seldom occurs in this country, children and adults do go hungry and chronic mild undernutrition occurs when financial resources are low. The problem of food insecurity can be broadly defined as limited, inadequate or insecure access by individuals and households to sufficient, safe, nutritious and personally acceptable foods to meet their dietary requirements for a healthy life. The aim of this study was to investigate the relationship between food insecurity and nutritional outcome among preschool children in a rural district and examine how low-income families meet their food and nutrition needs. In this cross-sectional study, weight and height / length were measured in a sample of mothers and children from 296 selected households. Questionnaires were used to collect socio-economic and other related information. The validated Radimer / Cornell Food Insecurity instrument was utilised to assess food security. Hunger and food insecurity was reported by 54% (n=159) of the mothers surveyed, which include 21% (n=62) individual (mother) food insecure and 21% (n=62) child hunger. Among food insecure households with children; 70.4% reported that at times they could not afford to feed their children with balanced meals, 35.2% of the children were not eating enough and 34.6% of the children reported ever getting hungry as the family could not afford to provide enough food. This study also revealed that the mothers play prime roles in ensuring food security and nutrition status of their household members by practising some coping strategies. Although foods were spared for the children, the quality of the food is insufficient to meet the recommended needs. This study suggests that food insecurity is one possible reason that may contribute to poor growth and development of young children in the study area.

Poster Presentations

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

A01 Nutrition education and sun exposure increases vitamin D status among postmenopausal Malaysian women

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The aim of this research is to analyse the effect of nutrition education and sun exposure on vitamin D status. This experimental research involved 169 postmenopausal Malaysian women who live in the rural community in the region of Sepang, Selangor, Malaysia. However, after giving the nutritional and sun exposure treatments, the number of subjects decreased to 151 persons. The treatment was designed with four groups: control (37 subjects), sun exposure (38 subjects), education (38 subjects) and education with sun exposure (38 subjects). The treatment was done for 3 months. The medium of nutrition education was module, VCD and leaflet. The subjects were exposed to sunlight at 10am for 20 – 30 minutes, twice or three times a week. Age of the research subjects ranged between 49 and 74 years with the average of 62.1 ± 7.33 years. Vitamin D status is most accurately reflected by serum 25(OH)D, determined using ELIZA kit. Questionnaires were handed out to obtain demographic data of the subjects. The results of this research before treatment shows that average of serum 25(OH)D was 49.75 ± 18.73 nmol/l from the control group, 57.09 ± 21.43 nmol/l from the education group, 50.01 ± 15.39 nmol/l from the sun exposure group and 53.17 ± 17.97 nmol/l from the education with sun exposure group. The average of serum 25(OH)D after treatment was 53.09 ± 21.54 nmol/l from the control group, 61.95 ± 25.86 nmol/l from the education group, 60.61 ± 21.13 nmol/l from the sun exposure group and 67.79 ± 23.17 nmol/l from the education with sun exposure group. The treatment increased the average of serum 25(OH)D from control by 3.34 nmol, education by 4.86 nmol/l, sun exposure by 10.6 nmol/l and education with sun exposure by 14.62 nmol/l. Analysis of covariance showed that there were significant differences between groups ($p<0.05$).

A02 Factors influencing vitamin D status among postmenopausal Malay women aged 49-74 years in Sepang, Selangor

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Serum levels of 25-hydroxyvitamin D (25(OH)D) were determined in 153 postmenopausal Malay women aged 49 to 74 years in Sepang, Selangor. Anthropometric

measurements of the subjects were recorded. The average serum levels of 25-hydroxyvitamin D was 24.04 ± 3.36 nmol/L while the average parathyroid hormone level was 5.57 ± 2.32 pmol/L. Most of the subjects were in the moderate range of body fat percentage (67.3%) and pre-obese (37.3%) with body mass index (BMI) in the range of 25.0 – 29.9 kg/m^2. There were 6.5% Malay women with normal serum (25(OH)D) (defined as serum vitamin D > 100 nmol/L). About 61.4% subjects had serum (25(OH)D) in the range of 50 – 100 nmol/L (defined as lowered vitamin D status, or hypovitaminosis D) and 24.2% had levels in the range of 25 – 50 nmol/L (defined as vitamin D insufficiency). The overall prevalence of vitamin D deficiency with serum (25(OH)D) < 25 nmol/L was 7.8%. Serum (25(OH)D) was found to significantly correlate with BMI (r=-0.238, P<0.01), body fat percentage (r=-0.162, P<0.05) and parathyroid hormone level (r=-0.159, P<0.05). The high prevalence of lowered vitamin D status of the subjects found in this study warrants the development of a strategy to increase it to the normal level of vitamin D status.

A03 The prevalence of metabolic syndrome among a sample of women in a land development community in Gemas, Negeri Sembilan

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A cross-sectional study was carried out to determine the prevalence of metabolic syndrome (MS) among a sample of rural women in Felda Palong, Negeri Sembilan. A total of 106 women comprising Malays, Chinese and Indians, aged between 45 and 59 years old participated in this study. Data on demographic, socioeconomic background, anthropometric (weight, height, BMI), biochemical variables, blood pressure, three days 24-hour Dietary Intake Record and three days 24-hour Physical Activity Record of the subjects were assessed. Metabolic syndrome (MS) was determined using NCEP ATPIII and WHO criteria. The mean age of the subjects was 51.1 ± 4.8 years old. Based on the BMI categories, about 73% of the subjects were overweight or obese (BMI ≥ 25 kg/m^2). Android obesity, according to indicators of waist hip ratio (WHR) and waist circumferences (WC), revealed 74.5% of the subjects had WHR of more than 0.85 and 81.1% had WC of more than 80cm. The lipid profile of the subjects showed high prevalence of dyslipidaemia. About 69% had cholesterol levels of more than 5.2 mmol/L, the cut-off point for increased risk of heart disease. A total of 17.0% subjects had high levels of triglycerides (TG>2.3 mmol/L). About 14% and 43% of the subjects were considered at increased risk of developing heart disease based on their levels of HDL-C (<1.03 mmol/L) and LDL-C(>4.1 mmol/L), respectively. Meanwhile, 21.7% had levels of fasting plasma glucose of more than 7.0 mmol/L, putting them at increased risk of developing diabetes mellitus. For blood pressure (BP), the results shows that 75.5% subjects had normal blood pressure and 24.5% subjects were in the category of increased risk of high blood pressure. Using WHO criteria, the prevalence of MS is significantly increased from 48.1% (NCEP ATPIII criteria) to 54.7% (r=0.724, p<0.01). Low HDL-C was the most common metabolic abnormality (80.2%), followed by large WC (79.2%) and high BP (40.6%). Subjects with MS had significantly higher mean WC, WHR, systolic blood pressure (SBP), diastolic blood pressure (DBP), fasting plasma glucose (FPG), LDL-C and HDL-C (p<0.05). BMI was also higher in those with MS, but the difference was not significant (p>0.05). The

results revealed a high prevalence of obesity, dyslipidemia and metabolic syndrome among rural women residing in land development communities. Therefore, appropriate promotive and preventive programmes, including dietary and lifestyle interventions need to be formulated for the target population to reduce the risk of cardiovascular diseases and other health problems.

A04 An assessment of nutritional status of elderly in an old folks home

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This study was conducted in an old folks home, Rumah Seri Kenangan, Kajang to determine the nutritional status of the elderly people. The questionnaire was administered to 70 respondents who were 60 years and above. The questionnaire was divided into 3 sections which consisted of background characteristics, dietary assessment and anthropometric measurement. Findings revealed that the mean age of the respondents was 69.2±6.9. The race distributions were Malay (41.7%), Chinese (37.1%), Indian (12.9%), Punjabi (1.4%) and Thai (1.4%). Results showed that among all the ailments, hypertension (32.9%) was most frequently observed. There were 37.9% females and 26.8% males who consumed supplements. 51.4% of them consumed 4-8 glasses of water per day while only 11.4% of them consumed more than 8 glasses of water per day. 43.9% of males and 55.2% of females did light aerobics for exercise while the others did some walking. The mean score of BMI status for females was 23.6±3.8 and males was 22.5±3.1. 87.7% of females and 85.4% of males were at high risk of getting diabetes, hypertension, and other related metabolic disorders according to WHR measurements. About 41.4% of women and 24.4% of men were in Hypertension Stage I. 20.7% of women and 34.2% of men were in Hypertension Stage II. The frequency of intake of cereal grains, meat, legumes and beverages was high. Very low consumption of eggs, nuts, seeds and products, vegetables and sweets was observed. Calorie consumption, Vitamin A, Vitamin B_1, Vitamin B_2, Vitamin C and Calcium was less than two-thirds of RDA for men and women. Protein intake was barely more than two-thirds of RDA for both the sexes. The information of this study can be used by researchers to do further investigation to find out the ways to maintain and improve the functional abilities of ageing people.

A05 Impact of the School Supplementary Feeding Program among primary school children in Kuala Lumpur

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This study was conducted to evaluate dietary intake and nutritional status of primary school pupils on the School Supplement Feeding Program (SSFP). A total of 275

children from national, Chinese and Tamil vernacular schools in Primary 4, 5 and 6; comprising 139 SSFP and 136 non-SSFP students took part in this study. Anthropometric measurements carried out included body weight and height. Dietary intake was evaluated using 24-hour dietary recall and a questionnaire was used to obtain the children's view on SSFP. The SSFP boys had lower mean body weight 34.2 ± 9.9 kg and height 139.9 ± 11.0 cm as compared to nSSFP boys who had mean weight 40.1 ± 12.5 kg and height 142.1 ± 8.3 cm. The same is seen for SSFP girls (mean weight 32.9 ± 8.4 kg; height 139.4 ± 8.3 cm) when compared with their nSSFP counterparts (mean weight 37.8 ± 12.9 kg; height 142.2 ± 9.2 cm). Overall, energy intake of SSFP group (1355 ± 368 kcal/d) was lower than nSSFP group (1424 ± 447 kcal/d). Intakes of other nutrients were also lower among SSFP, especially calcium (SSFP 231.0 ± 117.5 mg, nSSFP 311.6 ± 194.4 mg) and vitamin C (SSFP 20.2 ± 25.0 mg, non-SSFP 28.9 ± 29.9 mg). Nutrient intakes of subjects do not meet RNI, with the exception of protein and niacin for both groups, and vitamin A and iron among nSSFP boys. Foods served to SSFP children contributed to 28% of total daily energy intake, 34% of protein, and approximately 30% for all other nutrients analysed. Children on SSFP reported that the foods served were delicious (85%), sufficient (81%), hygienic (75%), and hot (58%). The majority of children on SSFP felt that the program was satisfactory (78%). In conclusion, children participating in the SSFP were shorter and lighter than their non-SSFP counterparts. The SSFP program is important as it helps to fulfil a third of the children's daily nutrient requirements.

A06 Birth weight and cognitive performance among Malay primary school children in Kuala Lumpur

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This presentation is a part of a larger study on breakfast consumption and cognitive performance among primary school children in Kuala Lumpur. The subjects consisted of 160 children, 80 (50%) boys and 80 (50%) girls. All subjects were healthy 9-year-old Malays and had normal weight according to NCHS (1983). Data on birth weight was collected based on their birth certificates. Cognitive performance was assessed using a validated Wechsler Intelligent Scale for Children-III^{UK} (WISC) subtests, which was translated into Bahasa Malaysia. Three subtests were run, which was coding, digit span and arithmetic. The birth weights were then categorised into 4 different groups. Birth weight for group (I) was less than 2.500kg, group (II) was for birth weight between 2.500 kg to 3.499 kg, group (III) was for birth weight between 3.500 kg to 4.499 kg and birth weight for group (IV) was same or greater than 4.500 kg. There was no significant difference in mean birth weight for boys (3.19 ± 0.60 kg) and girls (3.06 ± 0.47 kg). For all the 3 WISC subtests and cognitive performance, there were significant differences ($p<0.05$) among the different birth weight groups. The subjects tended to achieve better scores in all the 3 WISC sub-tests and also for the cognitive performance as their birth weight increased. Regression analysis showed that birth weight significantly contributed to the cognitive performance. This study further strengthens the relationship of birth weight on cognitive performance among primary school children.

A07 Nutritional status among Chinese elderly 60 years and above in Bakri New Village, Muar, Johore

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The objective of this study was to assess the nutritional status of a sample of elderly respondents in Bakri New Village, Muar. Data were collected using a questionnaire-guided face-to-face interview. The information collected included socio-demographics and health characteristics of the respondents. Dietary intakes were obtained from 24-hour dietary recall. Height, weight, waist circumference (WC), hip circumference (HC), hand-grip strength and arm span were measured using standard procedures and appropriate instruments. The respondents were 75 Chinese elderly (males=33, female=42) living at home. Their ages ranged from 60 to 95 years old and the mean age was 68.3 years. Most of the anthropometric measurements tended to decrease with increasing age except for WC and HC. Based on the Body Mass Index (BMI) classification, about 24% and 12% of the respondents were overweight and obese, respectively, while about 13% of them were underweight. Android obesity was prevalent among 33.3% and 46.7% of the respondents based on the WC and waist hip ratio (WHR) classification, respectively. Females were considered at higher risk for android obesity. Mean energy intakes for both sexes were lower than the Malaysian Recommended Nutrient Intakes (RNI). For intake of micronutrients, all of the respondents consumed less than two-thirds RNI for calcium and vitamin D, and more than 50% of them consumed less than two-thirds RNI for niacin, folate, vitamin E and dietary fibre for both sexes. The independent t-test showed significant differences for weight ($t=2.154$, $p<0.05$), hand-grip strengths (L: $t=7.382$, $p<0.001$; R: $t=8.193$, $p<0.001$), arm span ($t=6.849$, $p<0.001$) and WHR ($t=3.632$, $p<0.01$) between sexes. There were significant differences for fat ($t=-2.207$, $p<0.05$), calcium ($t=-2.387$, $p<0.05$), iron ($t=-2.721$, $p<0.01$), riboflavin ($t=-3.417$, $p<0.01$), vitamin A ($t=-2.179$, $p<0.05$) and vitamin C ($t=-2.704$, $p<0.01$) between educational levels, as well as for vitamin A ($t=2.490$, $p<0.05$) and vitamin C ($t=3.411$, $p<0.01$) between age groups. In conclusion, anthropometric measurements revealed the prevalence of both underweight and obesity among the respondents. Dietary intakes showed inadequate intakes for some nutrients, especially for calcium and vitamin D. Nutrients intakes also tended to vary according to age and educational levels. Therefore, targeted promotive and preventive measures are needed to improve the dietary patterns and lifestyle habits of the elderly, thus reducing the risk and delaying the onset of chronic diseases and other health problems.

A08 A comparative study of nutritional status of men with differing meat intakes, vegetarians and vegans

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Dietary factors play a role in human health. The aim of this study was to assess the nutrient intakes of meat eaters, eating different quantities of meat, with that of habitual vegetarians or vegans. 80 healthy male subjects (vegans, n=20; ovolacto-vegetarians, n=20; moderate meat eaters, n=20; high meat eaters, n=20) aged 25-50 years were selected randomly in Ipoh, Perak. Each subject completed a semiquantitative food frequency questionnaire (FFQ) and their blood samples (fasting venous blood sample) were tested for haemoglobin and serum ferritin levels. The characteristic of samples showed that high meat eaters had significantly higher BMI. Blood pressure showed a decreasing trend from both meat eaters to vegan and OV groups. Dietary energy and fat were higher among high meat- eaters. Vegan diets showed a lower amount of protein and iron intakes than the other groups. Dietary sodium/potassium ratio was lower while fibre was higher in both vegan and OV groups. Retinol intakes were higher in high meat eaters than the other groups. This study showed that haemoglobin was within the normal range while ferritin concentrations were lower in the vegan group. There are differences between the four diet groups that have the potential to affect the subjects' health and susceptibility to chronic diseases including cardiovascular disease and cancer. Based on the present data, high meat-eaters may benefit from altering their dietary patterns to reduce their sodium and fat intake, and moderate meat-eaters from increasing their fibre and antioxidant consumption. Vegetarians, especially vegans, may need to increase their protein and iron intake.

A09 Energy balance and body composition studies of national footballers during centralised training

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This study examined the energy balance and body composition of national footballers during their centralised training. 23 male players (21.91 ± 1.3 years) of the National Team under 23 years old recorded daily activities and food intake over 3 days. All anthropometry measurements were taken after the training and 10 players were selected randomly for Basal Metabolic Rate (BMR) measurements. The height and body weight of the players were measured using SECA and TANITA digital balance. Skinfold thickness measurements were taken using Harpenden skinfold calipers at seven sites (biceps,

triceps, subscapular, supraspinal, abdominal, thigh, medial calf). Basal metabolic rate (BMR) measurements were measured using Deltatrac (MBM – 100 Datec-Ohmeda, Finland). The daily total energy intake of the players, divided by BMR, which was less than 1.2, was underreported. This subject data was excluded from the study. Mean weight and height of the players were 70.2 ± 6.4 kg and 173.4 ± 5.4 cm, respectively. Mean percentage of fat for all players was 12.1 ± 3.1%. Percentage of fat estimated using anthropometry was significantly different ($p<0.1$) from the percentage of fat estimated using BIA measurement. Daily energy expenditure was 3053 ± 252.6 kcal and energy intake was 2276 ± 194.9 kcal, of which 69.46% was from carbohydrates, 13.6% from fat and 17% from protein. However, the energy balance was -777kcal, in which energy expenditure was higher than energy intake. Statistically significant differences ($p<0.001$) were seen between energy intake and energy expenditure. Mean micronutrients intake compared to RNI Malaysia (2005) seems to be lower in thiamin, riboflavin, niacin, calcium and iron. Activity patterns revealed that the subjects spent 48% of their time on light activity, 44% on moderate activity and 8% on the heavy activity of the day. Mean study BMR was 1696 ± 125 kcal, which was significantly different ($p<0.05$) from BMR expected with formulas by Harris & Benedict (1919), FAO/WHO/UNU (1985) and Ismail et al (1998). The survey also found that 34.8% players were smokers. In conclusion, studies should continue to be targeted at managing good, balanced nutrition among the players, with a suggested energy requirement of 40 kcal/kg/day.

A10 Nutritional status and cognitive skills performance of primary Malay school children: are they important?

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This cross-sectional study was conducted to determine the relationship between nutritional status and cognitive skills performance of Malay primary school children in Kuala Lumpur. The study consisted of 257 subjects (aged 9-12 years); 121 (47.1%) boys and 136 (52.9%) girls. Anthropometric measurements taken were height, weight and mid-upper arm circumference, which will be used to determine the nutritional status of students according to reference values of the National Centre for Health Statistics (NCHS/WHO 1983) and Frisancho (1981). Food intake data were collected using 24-hour dietary recall method by interview on 203 sub-samples. Students' cognitive skills performance was assessed using a validated Wechsler Intelligence Scale for Children-III^{uk} (WISC-3rd) (Edition 1991), which consisted of arithmetic, coding and digit span subtests. The results showed that the prevalence of underweight, stunting and wasting were 7.0%, 9.7% and 7.5% respectively, while the prevalence of low protein-energy reserve was 9.3%. Mean energy and protein intake achieved 81.0% and 128.9% of the Recommended Nutrient Intake for Malaysia (RNI 2005), which were 1765 ± 299 kcal/day and 58 ± 15 g for boys; 88.9% and 128.3% of the Recommended Nutrient Intake for Malaysia (RNI 2005) which were 1770 ± 311 kcal/day and 59 ± 15 g for girls. Mean cognitive skills' score for three subtests were 26.53 ± 6.25, which is categorised as moderate achiever. Pearson's correlation tests showed that there was no significant correlation

between all nutritional status indicators and the total score of the WISC subtests. However, a positive and significant correlation was observed for riboflavin ($r=0.162$, $p<0.05$) and calcium ($r=0.158$, $p<0.05$) intake with the WISC subtests total score. A significant positive correlation ($p<0.01$) was found between mother's education level ($r=0.193$) and the family's social economic status ($r=0.168$). Father's education level and accessibility to media computers at home were significantly correlated with the WISC subtests total score ($r=0.128$, $p<0.05$; $r=0.140$, $p<0.05$). Regression analysis showed that only mother's education level ($p<0.05$) contributed to WISC subtests total score. In conclusion, the study indicated the importance of good nutritional status, nutrient intake, environmental conditions and optimal stimulation in influencing the cognitive development of children.

A11 Comparison of body image perception among Malay, Iban and Chinese adolescent girls in government secondary schools in Sibu, Sarawak

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A study to compare the body image perception of Malay, Iban and Chinese adolescent girls was carried out on 384 Form Four female students (Malay: 19%, Iban: 35.9%, Chinese: 45.1%) from six government schools in Sibu, Sarawak. Data were collected using a self-administered questionnaire and weight and height were measured using standard procedures. The mean ages were 15.9±0.9, 16.4±0.5, and 16.0±04 years for the Malay, Iban and Chinese respondents respectively. Results showed no significant differences in the means of body mass index (BMI) between the three groups (Malay: 21.0±4.0, Iban: 20.9±3.5, Chinese: 21.7±4.6 kg/m^2). However, there was a significant difference in the accuracy of body weight perception ($c2=10.068$, $p<0.05$) between the groups even though the majority of respondents were *correct estimators* (Malay: 75.3%, Iban: 60.1%, Chinese: 52.9%). More of the Iban respondents were *under-estimators* (Iban: 20.2%, Malay: 16.4%, Chinese: 14.5%) but a large percentage of the Chinese were *over-estimators* (Chinese: 32.6%, Iban: 19.7%, Malay: 8.2%) compared to the other respondents ($c^2=19.194$, $p<0.05$). The *Contour Drawing Rating Scale,* which was used to determine the difference in perception of current and ideal body sizes, showed significant differences in current body size perception mean scores ($F=3.302$, $p<0.05$) and ideal body size perception mean scores ($F=9.399$, $p<0.05$) between the three groups. Iban respondents chose slimmer current body sizes compared to their Malay and Chinese counterparts as indicated by the means of current body size scores (Malay: 4.21±1.5, Iban: 3.9±1.5, Chinese: 4.3±1.7) whereas the Chinese respondents chose slimmer ideal body sizes (Malay: 3.5±1.1, Iban: 3.5±0.91, Chinese: 3.1±0.9). Thus, there were significant differences in the means of *discrepancy scores* ($F=6.355$, $p<0.05$) between the three groups (Malay: 1.3±0.8, Iban: 1.2±0.9, and Chinese: 1.6±1.1). Nevertheless, most respondents (Malay: 41.1%, Iban: 51.4%, Chinese: 39.9%) perceived their body size incorrectly and this was not associated with ethnic grouping ($c^2=4.808$, $p>0.05$). More than half of the respondents (Malay: 61.6%, Iban: 56.6%, Chinese: 79.0%) were dissatisfied with their body parts, especially their height, body weight, waist, hips, and thighs. There were significant differences in body parts

satisfaction mean scores (F=14.453, p<0.05) with the Chinese the least satisfied of the three groups (Malay: 31.0±5.5, Iban: 31.3±7.0, Chinese: 27.5±6.6). Further, there were no significant differences in mean scores for EAT-26 between the three groups (F=0.109, p=0.897). The Malay respondents had the lowest EAT-26 mean score (14.8±10.1) compared to the Iban (15.4±9.5) and Chinese (15.4±12.7) respondents. In conclusion, this study showed significant differences in subjects' perception of their body image and body parts satisfaction according to their ethnic grouping. It is recommended that planning for health and nutrition promotion programmes on body image should consider these differences.

A12 Food insecurity, health and nutritional status of Indian women in selected palm plantations in Negeri Sembilan

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A cross sectional study was conducted to assess the food security, health and nutritional status of 169 Indian women (19-49 years, non pregnant and non lactating) from seven palm plantations in Negeri Sembilan. The women were interviewed for socioeconomic, demographic and food insecurity information and measured for waist circumferences, blood pressure, energy, nutrients and diet diversity. Fasting blood sample was collected from 147 women and analysed for triglyceride, HDL- cholesterol and plasma glucose. Using the Radimer/Cornell Hunger and Food Insecurity Instrument, it was found that a majority (85.2%) of the households experienced some form of food insecurity, namely household insecurity (24.9%), individual insecurity (19.5%) and child hunger (40.8%). In general, compared to food secure women, the food insecure women had significantly lower years of education, total income, income per capita, intake of vitamin A, diet diversity and higher number of children and abdominal adiposity (p<0.05). There was no significant difference in blood pressure, lipid and glucose value among the levels of food insecurity due to homogeneity or small sample. The distribution of health and nutritional risk was higher in child hunger (42.9%) and other food insecure groups compared to food secure groups (17.6%). Binary logistic regression showed that diet diversity (OR=0.87, 95% C= 0.76-0.99) remained significantly protective against at risk health outcomes even after adjusting for other variables. Diet diversity is a useful indicator of household food security and the current study showed that the food secure households had significantly higher diet diversity compared to the food insecure. Food insecure people could be more likely to have health risks. The high prevalence of food insecurity among Indian women is alarming, as it indicates poor health and nutritional status among them. Therefore, more investigation about the risk factors and outcomes of food insecurity and their association is important.

A13 The evaluation of a nutrition education programme among Malay primary school children in Seremban, Negeri Sembilan

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This study was done to evaluate the effectiveness of a nutrition education programme among Malay primary school children in Seremban, Negeri Sembilan. A total of 141 children aged 9 years participated in this study. There were 70 children from Sekolah Kebangsaan Senawang as the intervention group and 71 children from Sekolah Kebangsaan Tasik Jaya as the control group. The effectiveness of the study was determined by changes in knowledge, attitude and practice (KAP) in nutrition among the children after receiving the nutrition education package. The nutrition education package consisted of video presentation, comic reading and group activity. The contents of the video presentation and comic were the same, which was on the "Food Pyramid". The children were asked to draw a food pyramid as a group activity after they had completed the video presentation. The video was presented to the children once in the first week and the food pyramid drawing session was conducted as a group activity. Then, the comic reading session was conducted in the second week and fill-in-the-blank questions were given as an exercise. The questionnaires on KAP were distributed to the children before and after receiving the nutrition education package to assess the changes of KAP in nutrition. Significant changes in the nutrition knowledge scores were found in the intervention group, from 68 ± 12 % to 82 ± 12 % ($p<0.05$), compared to the control group. Nutrition attitude scores also increased significantly from 80 ± 16 % to 90 ± 9 % ($p<0.05$) in the intervention group compared to control group. There were some significant changes in eating habits ($p<0.05$), including breakfast practice, vegetable and fruit consumption, exercise, and fast food intake in the intervention group compared to the control group. This study indicates that KAP in nutrition could increase significantly after the nutrition education programme.

A14 Birth weight and current nutritional status: its relationship with blood pressure among primary school children

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This cross-sectional study was conducted to determine the relationship between birth weight and nutritional status with blood pressure among primary school children aged 9 to 11 years. 326 healthy Malay subjects, consisting of 159 (49%) boys and 167 (51%) girls, were recruited from six primary schools in Kelantan. The birth weight data was taken from the birth certificate or child health record book. Demographic questionnaires completed by parents of subjects were used to collect the demographic data. Blood pressure was measured in triplicate at one minute interval with mercurial sphygmo-

manometer (SPIRIT CK-101C) (cuff size 18x9 cm) and stethoscope. Current weight and height were measured and BMI were determined using the percentiles of BMI-for-age (WHO 1995). Mean birth weights for boys were 3.1 ± 0.478 kg and girls were 3.1 ± 0.43 kg. About 11.3% boys and 9.6% girls had low birth weight (<2500g). Mean current weight for boys and girls were 31.6 ± 9.16 kg and 30.5 ± 7.81 kg respectively while mean height were 133.8 ± 7.91 cm for boys and 133.4 ± 8.26 cm for girls. Mean BMI for boys and girls were 17.4 ± 3.66 kg/m and 16.9 ± 2.88 kg/m respectively. According to BMI-for-age, 39 (11.96%) subjects were underweight, 241 (73.93%) were normal, 25 (7.67%) were at risk of overweight and 21 (6.44%) were overweight. There were no significant differences ($p>0.05$) between both sexes in mean birth weight, current weight, height and BMI. This study also found that there were no significant differences for the mean systolic and diastolic blood pressure between boys (106.5 ± 10.53; 66.8 ± 8.86) mm Hg and girls (105.5 ± 10.67; 66.4 ± 8.28) mm Hg. Based on the classification of National High Blood Pressure Education Program (NHBPEP) Working Group on High Blood Pressure in Children and Adolescents (2004), about 13 (8.18%) boys and 20 (11.98%) girls had pre-hypertension while 23 (14.47%) boys and 25 (14.97%) girls in this study had high blood pressure. The Pearson Correlation analysis showed that mean current weight ($r=0.541$, $p<0.001$), height ($r=0.403$, $p<0.001$) and BMI ($r=0.502$, $p<0.001$) were significantly correlated with mean systolic blood pressure. The results revealed that subjects with low birth weight and high current BMI had higher mean SBP and DBP. After adjusting for current BMI, SBP was inversely and significantly ($p<0.05$) related to their birth weight. For each decreasing 1 kg of birth weight, SBP rose by 1.71 mm Hg. In clinical practice, this would be a small difference; however this difference may have a larger impact in the population. Therefore, prevention of hypertension in young children may depend on improving the nutrition and health of pregnant mothers.

A15 Development of Coping Strategy Index (CSI) to measure household food insecurity

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Valid and reliable indicators for measuring the prevalence and severity of food insecurity are important to gauge the progress of reducing the incidence of food insecurity. There are indirect and direct indicators to measure food insecurity; however, direct measures of food insecurity are not readily available in Malaysia. The objectives of this study were to identify coping strategies for food insecurity among low-income households and to determine the frequency and severity of coping responses to food insecurity. In-depth interviews were conducted with 57 women of childbearing age from rural and urban areas in Selangor and Negeri Sembilan regarding their experiences with coping strategy responses to food insecurity. Audiotapes were transcribed verbatim and transcripts were read to identify emerging themes. Results showed that in order to offset the effect of economic shortfalls, households displayed a variety of short-term consumption coping strategies and longer-term coping strategies. The short-term consumption

coping strategies fall into four basic categories. First, households change their diets to less expensive and less preferred foods. Second, households increase food supplies through consumption of wild food, and purchase of foods on credit. Third, households decrease the number of people by sending the children to family members' or neighbours' homes. Finally, they ration the money to buy preferred foods and skip eating for a whole day. The longer-term coping strategies included engagement in odd jobs, decrease in school allowances, no new purchases on clothes, borrowing money from moneylenders for business, and sale of jewelry. The results of the study depict that all these types of behaviours indicate a problem of household food insecurity with different levels of frequency and severity. With these findings, further analysis should be conducted to combine the frequency and severity of these coping strategies into a single score of Coping Strategy Index (CSI) which can be utilised as a direct indicator to measure household food insecurity.

A16 Assessment of nutritional status, dietary intake and appetite among haemodialysis patients

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The purpose of this cross-sectional study was to assess the nutritional status, dietary intake and appetite among haemodialysis patients. A total of 60 subjects from three non-governmental dialysis centres were recruited in this study. Information on socio-demography and level of appetite was obtained through a self-administered questionnaire. Anthropometric data (dry weight, height, interdialytic weight gain, triceps skinfold thickness (TSF), mid-upper circumference (MUAC) and percentage of body fat) were obtained using appropriate techniques while relevant biochemical data were obtained from medical records as secondary data. Dietary intake was assessed using a 2-day 24-hour dietary recall. Data were analysed using the Statistical Package for Social Sciences (SPSS), version 12.0. Data on dietary intake was analysed using the Nutritionist Pro™. It was hypothesised that subjects with a satisfactory nutrient intake would have better nutritional status and higher scores of Appetite and Dietary Assessment Tool (ADAT) and Food Enjoyment in Dialysis (FED). Mean age of respondents was 47.4 ± 12.5 years. Most of the subjects (60%) had BMI less then 24, 33.3% of them had BMI from 24 to 30 while only 6.7 % were obese according to BMI classification for haemodialysis patients. The mean Interdialytic weight gain, triceps skinfold thickness (TSF), mid-upper arm circumference (MUAC) and percentage of body fat was 2.2 ± 0.9 kg, 12.2 ± 6.4 mm and 27.5 ± 4.7 cm and 26.4 ± 8.4% respectively. Mean levels of serum albumin (40.7 ± 2.9), calcium (2.3 ± 0.1), sodium (138.5 ± 1.6) and potassium level (4.7 ± 0.5) were in the normal range. However, mean serum phosphate (1.9 ± 0.5) was elevated. About 2.5% of subjects had serum albumin < 35 g/L. Mean dietary intakes for energy, protein, sodium, potassium, phosphate and calcium were 1298 ± 454 kcal/day (22 ± 8 kcal/kg/day), 53.5 ± 20.4 g/day (0.9 ± 0.3 g/kg/day), 1532.7 ± 767.3 mg/day, 1099.9 ± 553.7mg/day, 926.9 ± 445.6 mg/day and 342.8 ± 188.6 mg/day, respectively. Mean dietary intakes for energy, protein and calcium were low with only 6.7%, 25%, and 1.7% of subjects achieving the dietary

recommendations for haemodialysis patients. Using ADAT and FED questionnaires, it was found that 63.3% of the subjects had good appetites while 36.7% had moderate appetites with an overall mean score of 119.5 ± 8.5. There was a significant difference between dialysis and non-dialysis day for protein (p=0.01) and calcium (p=0.05) intake, but not with energy (p=0.32), phosphate (p=0.37), sodium (p=0.39) or potassium (p=0.82) intake. Pearson correlation test indicated that there was a negative significant correlation between BMI with energy (r=-0.51, p=0.00) and protein (r=-0.43, p=0.00). Similarly, there was a positive significant correlation between ADAT-FED score with energy (r=0.27, p=0.03) but not with protein intake (r=0.17, p=0.18). Protein intake was found to have no significant correlation with serum albumin level (r=0.23, p=0.16). A positive moderate correlation was shown between BMI and TSF (r=0.67, p=0.00). The nutritional status of this cohort of subjects was moderate. Mean dietary intake for energy, protein and calcium was low while mean intake for sodium and phosphate was adequate. However, mean intake of potassium was elevated. Increasing level of appetite was correlated with higher energy intake. As a conclusion, regular assessment of dietary intake, anthropometry measurements and appetite are important in the monitoring of nutritional status among haemodialysis patients.

A17 Iodine status among school children in Kampar regency

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The objective of the survey was to map the Iodine Status among school children in Kampar Regency, Riau Province, Indonesia, using their urinary iodine and thiocyanate excretion (UIE and UTE). About 1233 school children aged 6-12 years selected from 13 sub-districts in Kampar Regency were involved in this study. Each sub-district was represented by 2 schools and every level (1-6) was represented by 6-8 school children. Urine samples were collected from early morning urine specimens in a double fix plastic container that already contained thymol. Analysis of UIE and UTE were performed in the authorised Iodine Deficiency Disorder laboratory at the University of Diponegoro, Semarang. Analysis showed that the average urinary iodine level was 221 μg/l (n=991). The percentages of severe (UIE <20 μg/l), moderate (UIE 20-49 μg/l), and mild iodine deficiency (UIE 50-99 μg/l), were only 0.3, 0.4 and 5.8%, respectively. About 93.5% of the sample was categorised as no iodine deficiency with UIE >100 μg/l. The survey also found about 52.7% of the non-iodine deficiency populations showed higher concentrations of UIE (>200 μg/l) and about 14.1% already in iodine excess with UIE >300 μg/l. Higher levels of urinary iodine are followed by lower levels of UTE, which average at about 4.0 μg/l (n=242). This survey showed that iodine deficiency disorder is not prevalent in Kampar Regency.

A18 Iron status among school children in Kampar regency

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The objective of the survey was to map Iron Status among school children in Kampar Regency, Riau Province, Indonesia using Haemoglobin levels in their red blood cells. About 1350 school children aged 6-12 years selected from 13 sub-districts in Kampar Regency were involved in this study. Each sub-district was represented by 2 schools and every level (1-6) was represented by 8-10 school children. Haemoglobin level measurements using Haemocytometer, were carried out by medical doctors and nurses from the health centers. The analysis showed that the average haemoglobin levels for children aged 6-7, 8-9, 10-12 and >12 years old were about 9.74, 9.70, 9.93 and 10.02 gr/dL, respectively. The haemoglobin levels of the girl populations (9.77) were higher than boy populations (9.70 gr/dL) for ages 6-7 years old; 9.74 compared to 9.64 gr/dL for ages 8-9 years old and 9.98 compared to 9.87 gr/dL for ages 10-11 years old. However, the haemoglobin levels of the girl populations for ages >12 years old (9.94 gr/dL) were lower than boy populations (10.09 gr/dL). Comparison with the normal haemoglobin levels of Indonesian school children showed about 69% of samples involved in this survey did not have adequate haemoglobin levels. The percentage of boy populations in the lower levels of haemoglobin for ages 6-7, 8-9, 10-11 and >12 years olds were 75, 73, 61 and 68%, respectively. The percentages of lower levels of haemoglobin in girl populations in same ages were 74, 70, 65 and 68%. This survey shows that iron deficiency is prevalent among the school children in Kampar Regency.

A19 Nutrition and lifestyle for cancer prevention: Knowledge, attitudes and practices among female students of Universiti Putra Malaysia

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The objective of this study was to determine nutrition and lifestyle knowledge, attitudes and practices for cancer prevention among female students. The World Cancer Research Fund (WCRF) guidelines for cancer prevention were used for comparison. Eighty-six subjects (52 Malays and 34 Chinese), comprising female students of University Putra Malaysia, participated in this study by purposive sampling. Knowledge, attitudes and practices (KAP) data were collected using a self-administered questionnaire. Dietary intake was assessed using semi-quantitative food frequency questionnaire (SFFQ). Physical activity level was determined using the International Physical Activity Questionnaire (IPAQ). Height and weight were measured directly using appropriate instruments and procedures. BMI was computed for all respondents. Mean BMI of the respondents was 20.055 ± 2.387. Majority (72.3%) were in the normal category. The results

show that 36% of respondents had low levels of knowledge (<33rd percentile), 43% moderate (33rd to <66th percentile) and 20.9% obtained high levels (>66th percentile). For attitudes, only 43% were in the satisfactory category (>50th percentile). For daily fat intake, 76.7% of the respondents were in the satisfactory category (< 30% from overall energy intake). For intake of fruits and vegetables, 61.6% of the respondents complied with the guidelines (≥ 400 g per day), while for red meat intake, 97.7% of subjects were in the satisfactory category (< 80 g per day). For intake of plant-based food, approximately 90.7% of the respondents met the guidelines for daily intake (≥ 600 g per day). None of the respondents were smokers. The results revealed a significant relationship between knowledge level and ethnicity (c^2=6.539, p=0.010); and field of education (c^2=4.933, p=0.023). There is also a significant relationship between knowledge level and attitude level (c^2=6.048, p=0.014). Neither knowledge nor attitudes showed significant relationship with BMI. Attitudes did not influence dietary practices. In conclusion, the knowledge levels of female students were moderate but Malays have higher knowledge than Chinese. Female students should be exposed to cancer preventive nutrition education, which may reduce the risk of cancer and other chronic diseases in the future.

A20 A case study on nutritional status of children living with HIV and AIDS in shelter homes around Kuala Lumpur

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As the number of AIDS orphans increases in Malaysia, there is an urgent need to know their nutritional status in order to help them fight the effects of the infection through improved nutrition. This is even more pertinent at a time when they are going through rapid development both in weight and height. Because of the issue of confidentiality and inability to recruit enough respondents, this case study of 25 children (most of whom were orphaned) living in shelter homes was designed to provide some insight into the nutritional status of HIV positive children using anthropometry as well as dietary intake (covering three days). Other relevant data were also obtained from their case cards at the Paediatrics Department of the Kuala Lumpur General Hospital. In this study eleven children were from "Pertubuhan Wanita Dan Kesihatan KL (WAKE)", eleven from "Rumah SOLEHA", two from "Persatuan Kebajikan Anak Pesakit HIV/AIDS Nurul Iman Malaysia (PERNIM)" and one from Home For HIV+ WOMEN And Children and Those with Special Needs ("Rumah JAIREH"). By gender, thirteen (52%) were boys and the other twelve (48%) were girls. A total of seven were Malays, four were Chinese, three Indians and one was a Sarawakian. At the time of study in November/December 2005, twenty two (88%) were on antiretroviral therapy. Indicators of HIV progression such as viral loads and CD4 counts showed that the majority of the children, nineteen (76%), had low viral load and twenty (80%) of them showed no evidence of immune suppression when their CD4 counts were tested. Only four (16%) of them had high viral loads and three (12%) displayed severe immune suppression. In this study group, 32% were underweight and 48% were stunted. More boys than girls tended to be underweight (61.5% boys and 33% girls) and stunted (46% boys and 50%). Mid-upper arm circumference

(MUAMC) measurements showed that 36% of them were at risk of being malnourished. This is to be expected considering the fact that HIV positive children are frequently ill due to their compromised immune state. Comparison of Z scores before ARV was given with current Z scores showed that percentage of underweight increased after ARV was administrated and percentage of stunting decreased after ARV was administrated. When dietary intakes of these children were compared to the recommended dietary intake of Malaysian children, it was found to be sufficient in all areas. At the same time, twenty three children in this study were taking daily supplements of multivitamins. All this implies that their nutrient intake was adequate but WHO recommended that children with HIV/AIDS should increase their macronutrient intake by as much as 50 to 100% although daily recommended levels for micronutrients may remain the same as normal children (WHO, 2005). Despite adequate nutrient intake, many children remain underweight and stunted, partly due to frequent and prolonged bouts of infection. Nevertheless, the study provided an in-depth view of the nutritional status of HIV and AIDS children in Malaysia.

A21 Assessment of nutritional status in haemodialysis patients using Patient-Generated Subjective Global Assessment

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The purpose of the study was to evaluate the use of the scored Patient-Generated Subjective Global Assessment (PG-SGA) as a nutrition assessment tool in haemodialysis patients. It was a cross-sectional study, in which 67 patients (39 males, 28 females) were recruited with informed consent from 5 dialysis centers in Manjung, Perak. Subjects were predominantly Malay (83.6 %), with a mean age of 48 ± 15 years. Data collected were socio-economic background, medical history, scored PG-SGA, Subjective Global Assessment (SGA), anthropometric measurements (body mass index (BMI), mid-upper arm circumference (MUAC), triceps skinfold (TSF) thickness, mid-upper arm muscle area (MAMA), body fat mass and lean body fat mass), dietary data and secondary data for biochemical parameters. Data were analysed using the Statistical Package for Social Science Version 12 (SPSS Version 12). According to SGA classification, 80.6% of patients were well-nourished and 19.4% of patients were moderately or suspected of being malnourished. There were 71.7% subjects who were not at risk and 28.3% at a nutritional risk according to PG-SGA, respectively. A PG-SGA score $\geq$9 had a sensitivity of 69% and a specificity of 81% at predicting SGA classification. A total of 34.3% subjects exhibited grade I overweight, 50.7% had normal body weight and 10.4% were underweight. There were 25.4% and 3% subjects below the 5th percentile for TSF and MAMA, respectively. Approximately 1.9 % of well-nourished (SGA-A) and 38.5% of malnourished (SGA-B) subjects had muscle wasting as assessed by MUAC. There were 64.2% subjects with no weight loss, 23.9% subjects with weight loss <5% while the remaining 8% had weight loss >5% in the past 1 month. The results showed that the dietary energy intake (24.2 ± 7.1 kcal/kg/day), dietary protein intake (0.8 ± 0.4 g/kg/day) and energy derived from fat (31.8 ± 6.5%) failed to meet the dietary intake recommendations for haemodialysis

patients. There were 3.3% subjects who had serum albumin < 35 g/L with a mean serum albumin level of 41.0 ± 4.8 g/L. Spearman correlation coefficient test showed that there was a significant correlation between the PG-SGA score with serum albumin (r= -0.359, p<0.01). There was no significant association between PG-SGA score with BMI (r= -0.126, p= 0.311), TSF (r= -0.172, p= 0.163), energy intake (r= 0.105, p=0.4) or protein intake (r=0.2, p= 0.105). In conclusion, this study found that PG-SGA is an easy-to-use tool for assessing the nutritional status of haemodialysis patients as well as identifying those who require nutritional intervention.

A22 A multi-component physical activity intervention among female staff in Universiti Putra Malaysia

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Physical inactivity is now a global health concern. The majority of modern workplaces have contributed to sedentariness, resulting in many employees being physically inactive during working hours. The aim of this study was to assess the effects of a workplace-based physical activity intervention on changes in physical activity. A total of 77 female employees from six randomly selected faculties in Universiti Putra Malaysia were randomly allocated into control (n=40) and intervention groups (n=37). Participants completed the International Physical Activity Questionnaire (IPAQ) on physical activity level and walking energy expenditure, and the physical activity stages of change questionnaire (SOCQ) at baseline and at post-intervention along with questions on demographics. Over a six-week period, the intervention group received a multi-component intervention consisting of lecture-discussions, group counselling sessions, exercise demonstrations, posters, weekly booklets and telephone reminders. The control group received weekly booklets only. At the end of the study, the intervention group showed greater improvements in physical activity level, walking energy expenditure and physical activity stages of change than the control group. The proportion of inactive females in the intervention group showed a larger decrease than in the control group (-37.9% vs. -15%), and the proportion of females in the minimally active (+16.3% vs. 10%) and HEPA (Health Enhancing Physical Activity) active group showed a greater increase than the control group (+27% vs. +5%). The walking energy expenditure in the intervention group significantly increased (p<0.05) at post-intervention, whereas no significant change was found in the control group. The proportion of subjects in the lower stages of change (pre-contemplation/contemplation) decreased more (-21.6% vs. -12.5%) in the intervention group than in the control group, while the proportion in the higher stage (action/maintenance) increased more in the intervention group than the control group (+24.3% vs. +2.5%). In conclusion, this study has demonstrated that a multi-component physical activity intervention in a worksite setting encourages participants to become more physically active during work.

A23 An analysis of acceptance towards healthy ageing intervention package among elderly and health staffs

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The development of a nutrition intervention tool for the elderly is an important effort in improving the dietary intake and lifestyle of the elderly in Malaysia. A nutritional education package has been developed based on a needs assessment study. It comprises a booklet, a flipchart and placemats on healthy ageing and information on reducing the risk of chronic diseases. An analysis of the acceptance towards the tool was carried out among 33 non-institutionalised elderly aged 60 years and above (men=63.6% and women=36.4%, mean age=67.1 ± 4.5 years) and 14 health clinic staff (men=21.4% and women=78.6%, mean age=30.9 ± 8.3 years). The survey was held at two health clinics i.e. Klinik Kesihatan Beranang and Klinik Kesihatan Pelabuhan Klang, Selangor with "Klinik Warga Emas" and in two other locations i.e. Kampung Baru and Kg. Datuk Keramat, Kuala Lumpur. The inclusion criteria for elderly subjects were: able to read, no hearing and vision impairment and generally healthy. The subjects were asked to read the package before a set of questionnaires was given. The questionnaire consisted of information on socio demographic data and assessment was done on their understanding, the presentation of the pictures and the format of the intervention package. Results indicated that 78.8%, 97% and 93.9% of the elderly understood the flipchart, booklet and placemats' contents respectively. Meanwhile among the health providers, all respondents understood the contents. A total of 42.4% of the elderly subjects expressed that the sentences in the flipchart needed to be simplified and some terminologies in the flipchart (e.g. obesity, hyperlipidemia, hypertension, diabetes mellitus and fibre) needed to be explained further. Similar suggestions (39.4%) were received for the booklet as well. Majority of the health staff suggested that more illustrations should be included in the flipchart and booklet. Majority of the elderly subjects and all of the health staff expressed that the illustrations were suitable and the combination of the colours were attractive. Acceptance of two concepts of eating guidelines (i.e. the food pyramid [conventional concept] and food plate [new concept]) was also assessed. Results revealed that the majority (69.7%) of the elderly subjects preferred the food plate concept whereas, 57.1% of the health staff preferred the food pyramid concept. In conclusion, this nutritional intervention package on healthy ageing and chronic disease risk reduction is deemed important in achieving healthy ageing. However, some modifications with respect to medical terminologies and addition of more illustrations are needed to improve the acceptance, understanding and thus the effectiveness of the package.

A24 Nutritional status of the Bangladeshi women migrants

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Women are vulnerable to malnutrition, for social and biological reasons, throughout their life-cycle. The objective of the study was to study the nutritional status of the Bangladeshi women migrants who have been settled in India since the 1960s, till date. The area selected for the study was Orissa, India. The study involved 303 adult women in the age group of 20 to 59 years, drawn from 276 families. The experimental procedure consisted of selection of the area and sample, formulation of the schedule, conduct of socio-economic survey, measurement of the nutritional status and estimation of haemoglobin. The method used for the collection of data was by direct interview using a structured schedule. Assessment of the nutritional status was done using anthropometric measurements, clinical assessments, haemoglobin estimations, dietary surveys and measurements of food consumption and estimations of nutrient intake. The findings revealed that these women were economically deprived. The females outnumbered the males. Their average family size was 4.89. It was quite encouraging to note that the literacy rate was about 68.3%. The 24-h diet recall survey revealed that the mean consumption of different foodstuffs by different age groups compared to the RDA was grossly inadequate. BMI results revealed the majority (65.6%) of the women were normal. The findings of the study showed gross anomalies in the dietary pattern of women and calls for a more detailed investigation into the same.

A25 Nutritional assessment of adult females in Tok Muda village, Selangor

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The study was conducted to assess the nutritional status of 111 Malay adult females, aged 19-50 years in Tok Muda village, Klang, Selangor Darul Ehsan. They were selected by simple random sampling from this village. This paper highlights findings on the nutrient intakes, body mass index (BMI) status, socio-economic status, clinical assessment and the micronutrient (iron) status of the adult women. Socio-economic results show that the majority of adult women were housewives (60.36%), had attended secondary school (70.27%) and had moderate incomes (32.4%) from RM 1000-RM 1499. Mean intake of energy and other nutrients of all the groups was found to be lower than the Malaysian Recommended Nutrient Intake (RNI). Intake of protein seemed to be very close to the requirements where the percentages of deficit for RNI vary from 18.1% to 32.0%. From the

BMI measurements, it was found that more than half of the adult women (50.5%) had normal weight. This study also shows that problems related to weight, such as overweight (23.4%) and underweight 26.1%), are of remarkably similar magnitude. About 86% of the respondents had normal haemoglobin values whereas 4% of the pregnant mothers had less than 11 g/dL. Clinical assessment findings indicated that the 66.7% of rural adult women did not show any signs and symptoms of nutrient deficiencies. Some of the adult women showed signs of calorie (4.5%) and riboflavin (4.5%) deficiencies. Hence, the nutritional status of adult women needs to be improved since there is a risk for some major nutritional deficiencies.

A26 Assessment of functional status among elderly in the Segambut Region, Kuala Lumpur

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The purpose of this study is to assess the functional status among a sample of elderly in the Segambut Region, Kuala Lumpur. Information on personal background and health characteristics was collected using a questionnaire. Weight, height and hand grip strength of the subjects were measured using standard procedures and appropriate instruments. The physical ability test, basic activities of daily living (BADL), instrumental activities of daily living (IADL) and cognitive function test were observed and recorded using appropriate instruments. A total of 94 elderly volunteered to participate in the study, whose age ranged from 60 to 86 years. About 39% of the subjects were males and 60.6% were females. The weight and height of the males (67.90 ± 10.56 kg, 1.65 ± 0.04 m) were significantly higher than those of the females (54.16 ± 10.43 kg, 1.52 ± 0.06 m). Weight and body mass index (BMI) measurements were significantly different according to age groups ($p<0.05$). For the handgrip strength measurement, females (4.39 ± 4.12 kg) had significantly ($p<0.01$) lower values compared to the males (9.97 ± 8.97 kg). The males had significantly ($p<0.01$) higher cognitive scores (7.35 ± 1.23) compared to the females (6.12 ± 2.16). According to age group, the mean for physical ability test scores, BADL scores, IADL scores and cognitive scores were significantly higher in the 60-74 years age category compared to those in the older age category. Age was negatively correlated with physical ability test scores ($r=-0.436$, $p<0.001$), BADL scores ($r=-0.252$, $p<0.05$), IADL scores ($r=-0.336$, $p<0.001$) and cognitive scores ($r=-0.529$, $p<0.001$). Number of years of formal education was positively correlated only with cognitive scores ($r= 0.415$, $p<0.001$). The number of acute health problems was negatively correlated with physical ability test scores ($r=-0.353$, $p<0.001$), BADL scores ($r=-0.349$, $p<0.001$) and IADL scores ($r=-0.203$, $p<0.05$). The number of chronic disease was negatively correlated with physical ability test scores ($r= -0.512$, $p<0.001$), BADL scores ($r= -0.368$, $p<0.001$), IADL scores ($r= -0.338$, $p<0.001$) and cognitive scores ($r= -0.238$, $p<0.05$). Weight ($r=0.436$, $p<0.001$) and height ($r=0.415$, $p<0.001$) measurements were positively correlated with cognitive scores. BMI measurement was weakly correlated with BADL scores ($r= 0.262$, $p<0.05$), IADL scores ($r= 0.281$, $p<0.01$) and cognitive scores ($r= 0.325$, $p<0.001$). In conclusion, there were differences in the functional status and cognitive function according to sex and between

the younger and older age groups. With increasing age, there may be further decline in some of the functional abilities which may affect their nutritional and health status. Therefore, monitoring and periodic assessment may be necessary to identify elderly who may be at risk and to provide them with appropriate intervention.

A27 Nutritional status, eating habits and at-risk of eating disorders among adolescent girls in Kelantan

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A cross sectional study was carried out in Kelantan from May until October 2004 to determine body mass index (BMI), nutrient intake, eating habits and at-risk of eating disorder symptoms among adolescent girls aged 15 to 17 years. A total of 489 secondary school girls comprising 97.1% Malays, 2.5% Chinese and 0.4% Indians were selected using cluster sampling from seven national secondary schools chosen randomly in six identified districts of Kelantan. Background information and pattern of food intakes were obtained through a self-administered questionnaire. Nutrient intakes were assessed using a 3-day dietary record that was completed by 390 of the subjects. Independent t-test showed the retained (n=390) and dropped-out (n=99) samples did not differ significantly in demographic data, socio-economic status and eating habits. Eating Attitudes Test (EAT-26) was administered to determine subjects' eating attitudes. Subjects' mean body weight, height and BMI were 51.1±12.5 kg, 152.6±5.3 cm and 21.9±4.8 kg/m^2, respectively. According to BMI-for-age (WHO, 1995) reference, 3.1% of the subjects were categorised as underweight, 78.5% normal weight and 18.4% overweight. On average, subjects consumed 81.1% of recommended energy allowances (RNI Malaysia, 2005) daily. All nutrient intakes of subjects were less than the recommended intake except for protein and total vitamin A whereby the intakes achieved 102.6% and 128.7% of RNI Malaysia (2005) respectively. Remarkably, calcium intake was the lowest (30.7%of RNI Malaysia) among all nutrient intakes. A majority of the subjects (92.2%) consumed snacks not more than three times daily. The findings indicated only 29.0% of subjects consumed breakfast every morning. The main reasons for skipping breakfast were a dislike for eating in the morning (38.2%) and lack of appetite (33.4%). Only 57.9% of the subjects reported taking lunch everyday; 26.8% consumed dinner only once or twice weekly and 4.9% admitted they totally skipped dinner. The mean value of the EAT-26 scores was 13.1±8.9 with 22.3% (n=109) of the subjects categorised as at-risk of eating disorders (EAT-26 scores^{3}20). Intakes for calorie, protein, carbohydrate, iron and niacin were significantly lower for the at-risk of eating disorders (RE) group compared to the normal eating (NE) group. However, percentage of calories contributed by protein, carbohydrate and fat were not significantly different between the two groups. Notably, the RE group was more likely to omit dinner than the NE group (c^2=28.148, $p<0.01$). Spearman's rho correlation showed significant associations between most of the nutrient intakes and EAT-26 scores except for fibre, calcium, vitamin C and thiamine. In conclusion, this study suggests disordered eating habits and unbalanced diet are sufficiently common among Kelantan adolescent girls. Multidisciplinary and well-designed studies are needed to systematically and

accurately examine eating habits of adolescents to tackle more efficiently the increasing spread of disordered eating.

A28 Validation of skinfold thickness and bioelectrical impedance analysis for estimation of body composition among healthy Indian women aged 20 to 40 years old

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The aim of this study is to validate skinfold thickness and bioelectrical impedance analysis for estimation of body composition among healthy Malaysian Chinese, Malay and Indian women. A total of 71 respondents aged 20 to 40 years old voluntarily participated in the study that was carried out at Kuala Lumpur University Hospital. Body composition was determined by dual-energy X-ray absorptiometry (DEXA) (an accepted reference method), skinfold thickness, Maltron 906, Maltron 916 and Omron BF302. Fat percentage, fat mass and fat free mass (FFM) were observed to be the highest in overweight subjects followed by normal weight subjects and underweight subjects. Significant correlation was shown between fat percentage (DEXA) and BMI ($r=0.79$, $p<0.0001$), waist circumference ($r=0.771$, $p<0.0001$), hip circumference ($r=0.764$, $p<0.0001$), body weight ($r=0.739$, $p<0.0001$), WHR ($r=0.506$, $p<0.0001$), systolic blood pressure ($r=0.355$, $p<0.002$), age ($r=0.306$, $p<0.009$) and diastolic blood pressure ($r=0.255$, $p<0.032$). There was a significant mean difference in fat percentage between Malays and Chinese, where the fat percentage of the Malays (35.907±7.515%) was higher than the Chinese (30.692±6.2310%) ($p<0.004$). A significant correlation was observed between DEXA and skinfold thickness in the percentage of body fat ($r=0.973$, $p<0.0001$), fat mass ($r=0.994$, $p<0.0001$) and FFM ($r=0.980$, $p<0.0001$); between DEXA and Maltron 906 in the percentage of body fat ($r=0.745$, $p<0.0001$), fat mass ($r=0.928$, $p<0.0001$) and FFM ($r=0.849$, $p<0.0001$); between DEXA and Maltron 916 in the percentage of body fat ($r=0.741$, $p<0.0001$), fat mass ($r=0.853$, $p<0.0001$) and FFM ($r=0.701$, $p<0.0001$); and between DEXA and Omron BF302 in the percentage of body fat ($r=0.871$, $p<0.0001$) and fat mass ($r=0.978$, $p<0.0001$). Good agreements between all methods were shown using Bland-Altman plot. In comparison to DEXA, skinfold thickness and Maltron 906 device appeared to underestimate percentage of body fat whilst Maltron 916 and Omron BF302 devices showed the opposite result. For fat mass, only Maltron 906 device appeared to underestimate fat mass whereas the other three devices overestimated fat mass. This study also showed that all three methods including skinfold thickness, Maltron 906 and Maltron 916 devices gave an overestimation of FFM value.

A29 Vitamin D status of Chinese female adults in Klang Valley

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Vitamin D is normally produced beginning with a reaction in the skin in which pre-vitamin D is activated by Ultraviolet sunlight. Vitamin D aids in the absorption of calcium, helping to form and maintain strong bones. Without vitamin D, bones can become thin, brittle, soft or misshapen. The aim of the study was to assess the vitamin D status of young female adults (aged 20-30 years) and elderly (aged >65 years) female adults in the Klang valley, using ELISA Kits (Octeia Direct ELISA, IDS, UK). Mean ± SD for age, weight, height and body mass index (BMI) for young female adults, were 24.4 ± 2.3 years, 50.6 ± 8.0 kg, 157.7 ± 5.6 cm and 20.4 ± 3.1 kg/m^2, respectively. Mean ± SD for age, weight, height and body mass index (BMI) for elderly female adults, were 68.9 ± 4.2 years, 55.1 ± 8.4 kg, 151.8 ± 4.8 cm and 26.9 ± 5.1 kg/m^2 respectively. Mean ± SD for vitamin D status for young female adults and elderly female adults were 73.3 ± 20.4 nmol/L and 45.3 ± 16.9 nmol/L. Mean Vitamin D for the 2 groups of subjects were significantly different (P< 0.001). There were 28.0 % elderly female adults with serum 25(OH)D in the range of 50 – 100 nmol/L (defined as lowered vitamin D status, or 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. 32 % of elderly adults used sunscreen compared to 44.8 % young adults. The high prevalence of inadequate levels of serum vitamin D was found in the elderly female adults in this study.

A30 Validation of malnutrition risk screening tool (MRST-C) among Chinese elderly in a rural area of Penang

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This cross-sectional study was conducted to determine the validity of the Malnutrition Risk Screening Tool (MRST-C) among 150 Chinese elderly residing in a rural area of Penang. MRST-C was validated against functional and anthropometric status. Subjects were aged between 60 and 89 years with 52.0% (78) men and 48.0% (72) women. Anthropometric indicators being measured were weight, height, (equation from arm-span), waist circumference, mid-upper arm circumference and calf circumference. A set of questionnaires on mobility, muscular strength (handgrip), instrumental activity daily living and cognitive test were used to assess the functional ability. Results indicated that mean body weight, height and waist circumference of men were higher than women which is 66.4 ± 11.2kg, 159.6 ± 6.6cm and 90.7 ± 11.5cm for men and 60.9 ± 9.8kg, 150.1 ± 7.0cm and 86.5 ± 9.0cm for women ($p<0.05$ for these parameters). Men had a higher prevalence of low calf circumference than women ($p<0.05$). Men had higher IADL scores for

using the phone, shopping, housework, management of money, walking 100m and meal preparation than females ($p<0.05$). Men had higher scores of cognitive function, mobility and handgrip strength than females ($p<0.05$ for all parameters). Older subjects had lower mobility ($r=-0.405$, $p<0.001$), IADL ($r=-0.547$, $p<0.01$) and cognitive ($r=-0.356$, $p<0.001$) scores. Lock and Key Test had a negative correlation with waist circumference ($r=-0.162$, $p<0.05$) while muscular strength (handgrip) had a positive correlation with waist circumference ($r=0.198$ ($p<0.05$). Based on MRST-C, 15.4% (12) men and 13.9% (10) women were malnourished. MRST-C correlated with body mass index ($r=-0.217$, $p<0.05$), mid-upper arm circumference ($r=-0.232$, $p<0.05$) and calf circumference ($r=-0.179$, $p<0.05$). MRST-C score also correlated significantly with functional status such as mobility scores ($r=-0.219$, $p<0.05$), IADL scores ($r=-0.368$, $p<0.001$) and cognitive function ($r=-0.309$, $p<0.001$). MRST-C showed sensitivity of 13.6%, 14.7%, 75.0%, 25.0% and 24.5% and specificity of 82.5%, 85.4%, 87.0%, 87.3% and 90.7% in BMI, BMI (equation from arm-span), mid-upper arm circumference, calf circumference and waist circumference, respectively. MRST-C is valid for determination of malnutrition among Chinese elderly.

A31 Bone health status and anthropometric measurements among institutionalised elderly in Klang Valley

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The rising incidence of osteoporosis is well established especially among institutionalised residents. The aim of the study was to determine the bone health status and anthropometric measurements among institutionalised elderly in Klang Valley. Bone Health Status was assessed using Quantitative Ultrasound Sonometry (QUS-2), which measures Broadband Ultrasound Attenuation (BUA, dB/MHz) at the calcaneus. Weight, height and body fat were assessed using SECA 767 and body fat analyser (HBF-302 Omron). Sociodemographic background, reproductive history, history of bone fractures, lifestyle habits and dietary intake of subjects were assessed using appropriate instruments. Data were analysed using SPSS software version 12.0 and Diet 4. A total of 363 respondents that comprised of 158 males (43.5%) and 205 females (56.5%), were recruited from 48 old folks homes in the Klang Valley. Respondents comprised of 79.3% Chinese, 11.3% Indians, 5.8% Malays and 3.6% other races. The mean age of respondents was 75.8 ± 9.1 years old. The mean weight, height and body fat mass were 53.3 ± 13.3 kg, 155.0 ± 11.8 cm and 16.2 ± 10.0 kg, respectively. Mean Body Mass Index (BMI) was 22.1 ± 5.1 kg/m^2. Based on BMI classification, 22.3% of the respondents were underweight, 50.7% had normal weight and 22.9% were overweight. Approximately one-fifth (21.3%) of respondents had experienced a previous fracture. The mean BUA was 61.4 ± 19.8 dB/MHz and the mean T-score was -2.26 ± 2.08. Most of the respondents had low bone mass, with 45.5% having osteopaenia and 49.0% having osteoporosis according to WHO criteria. There was a significant difference between males and females in weight ($t=4.382$, $p=0.001$), height ($t=11.295$, $p=0.001$), fat mass ($t=-3.767$, $p=0.000$) and BUA ($t=6.686$, $p=0.001$). Significant correlation was shown between BUA and age ($r=-0.275$, $p=0.000$).

BUA was found to have significant positive correlations with body weight (r=0.381, p=0.000) and fat mass (r=0.147, p=0.006). As a conclusion, higher body weight and fat mass appears to correlate with better bone health status. However, the implication that higher body weight is more beneficial must be carefully scrutinised as it is always linked to several comorbidities such as non-insulin dependent diabetes mellitus, hypertension and dyslipidaemia. Acknowledging that the physiological changes in stature and body composition that accompany aging may affect the elderly bone health, proper health education should be directed to caregivers to improve bone health status among the elderly.

A32 Changes in nutrition knowledge, attitude and practice among Chinese school children in Pontian, Johor after following nutrition education

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This study was conducted to determine changes in nutrition knowledge, attitude and practice in 8-year-old schoolchildren after receiving a nutrition education package. A total of 63 school children from Pontian participated in this study. The intervention group consisted of 33 children while 30 children who did not receive the nutrition education package, acted as controls. The nutrition education programme, which was conducted for 2 weeks, comprised of a video viewing session and a comic reading session followed by exercise questions as reinforcement for each session and also classroom activities. A 13-minute video clip entitled "Food Pyramid" was shown to the children in week 1, while a comic reading session and classroom activities were presented in the following week. KAP questionnaires were distributed to the children before (pre-test) and after receiving the nutrition education package (post-test). The results obtained indicated that the nutrition knowledge scores increased significantly in the intervention group from 57 ± 11% at pre-test to 70 ± 11% in post-test ($p<0.05$). The nutrition attitude scores also increased from 68 ± 17% before receiving nutrition education to 71 ± 16% during post-test. There were no significant changes in the control group in knowledge, attitude and practice scores at pre- and post-test. Overall, there were significant improvements in knowledge scores in the intervention as compared to the control group ($p<0.05$). The percentage of schoolchildren who had breakfast increased among the intervention group from 64% to 76% after following the programme. There was a decrease, from 73% to 82%, in the percentage of students who had snacks between meals after following this programme. Percentage of students taking fruits every day increased almost 12% for the intervention group. Meanwhile, percentage of students taking vegetables every day also increased from 67% to 82%. In conclusion, the nutrition education programme improved the nutrition knowledge, attitudes and practice among student children whom were involved in the programme.

A33 Changes in nutrition knowledge, attitude and practice (KAP) among Chinese school children in Bandar Maharani, Johor after receiving nutrition education

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This study was conducted to determine changes in nutrition knowledge, attitude and practice in 8-year-old school children after receiving a nutrition education package. A total of 173 Chinese school children from Bandar Maharani participated in this study. The intervention group consisted of 97 children while 76 who did not receive the nutrition education package, acted as controls. The nutrition education programme, which was conducted for 2 weeks, comprised of a video viewing session and a comic reading session followed by exercise questions as reinforcement for each session, and also group activity. A 13-minute video clip entitled 'Food Pyramid' was shown to the children in week 1, while a comic reading session and classroom activities were conducted in the following week. These children had to answer the KAP questionnaire before (pre-test) and after receiving the nutrition education programme (post-test). The results obtained indicated that the nutrition knowledge scores increased significantly in the intervention group from 51±16% to 60±14% after receiving the nutrition education package ($p<0.001$). Mean scores of attitude also increased significantly from 85±15% to 86±13% after following the package ($p<0.001$). The attitude of the control group increased significantly ($p<0.05$) from 78±15% to 82±16%. The nutrition knowledge scores decreased significantly in the control group from 61±18% to 57±17% during post-test ($p<0.05$). The percentage of school children who had chosen fruits as a snack increased significantly ($p<0.001$) among the intervention group from 55% to 90%. For the intervention group, the percentage of students who ate sweets/ice-cream every day decreased from 10% to 6% and there were no differences within the control group. Frequency of school children who consumed vegetables every day increased from 62% to 70%. For the intervention group, there were 33% of children who consumed fruits after receiving the programme as compared to the 25% before the programme. In conclusion, the nutrition education package improved the nutrition knowledge but had little effect in changing food habits among school children who had been involved in the programme.

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

B01 Knowledge of food and nutrition among primary school children in Malaysia

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A total of 1,477 primary school children aged between 10 and 12 years were selected and were interviewed on food and nutrition knowledge using a standard questionnaire. The results of the study indicated that majority of the primary school children interviewed had poor nutrition knowledge with 33% scoring less than 50% while 38% did not answer the questions. Slightly more than 50% of the children interviewed were males and 49% were females. Ethnically, there were 56% Malays, 21% Chinese, 7.2% Indians and 14% other races. When asked their knowledge about a balanced diet, 48% of the respondents answered correctly and 20% admitted they did not know, while 31% answered incorrectly. More than 50% indicated correct knowledge on food practices while only 26% gave the correct response on foods to be consumed most. About 56% of the respondents indicated that vegetables and fruits were considered as foods to be consumed most. Respondents seemed to have good knowledge on foods to be eaten the least (75%), protein foods (45%), carbohydrate-rich foods (43%) and surprisingly, 88% seemed to know about diseases associated with consuming excessive sugar. This paper will highlight other food and nutrition knowledge such as nutrient content in food and knowledge on nutrition and diseases.

B02 Body image, dietary intake and physical activity among PERMATA (UPM) middle-aged women

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This cross sectional study was conducted to determine the body image, dietary intake and physical activity among middle-aged women in *Persatuan Wanita* (PERMATA), University Putra Malaysia (UPM). The study also assessed the relationship between all the three variables. Data were collected using a self-administered questionnaire in order to obtain respondents' body weight perception, body size perception and body parts satisfaction. Anthropometric measurements were taken using the electric digital TANITA body and SECA body meter. Dietary intake over two days was analysed using the Nutri-Pro, and physical activity over seven days was analysed using International Physical Activity Questionnaire (IPAQ). A total of 83 middle-aged women (40 to 55)

systematically sampled from the *Persatuan Wanita* (PERMATA) UPM membership list were recruited for the study. The respondents comprised 97.6% Malays, 1.2% Chinese, and 1.2% Indians. Their mean Body Mass Index (BMI) was 26.28 ± 4.63 kg/m^2. Results showed that 3 (3.6%) were underweight, 35 (42.2%) normal weight, and 45 (54.2%) overweight. Forty-seven respondents (56.6%) perceived themselves correctly while 36 (43.4%) respondents misperceived their body weight status. Most of the respondents, 69 (83.1%), had intentions to change their body weight status with five of them (7.2%) desiring to gain weight while the rest (92.8%) desired to lose weight. Using the modified figure rating scale, the mean ideal body size chosen by the respondents was smaller (3.3±0.7) than their mean current body size (4.7±1.4) with regard to body parts satisfaction, the respondents were mostly dissatisfied with their weight (55.0%), waist (39.7%), hips (38.5%), abdomen (53.1%), and thighs (36.1%). Mean energy intake among the respondents was 1973.1098 kcal ± 486.77 per day. At the same time, only 15 (18.1%) were found to be physically active while 34 (41%) were moderately active, and 34 (41%) were inactive. The study revealed a significant relationship between body weight status and body weight perception (c^2=37.029, p=0.00). The degree of body parts satisfaction decreased with increased BMI ($r = -0.413^{**}$, p=0.00). As the BMI of the women increased, dietary energy intake per day also increased ($r = 0.796^{**}$, p = 0.00). As activity increased (according to IPAQ), their daily energy intake became higher ($r = 0.52^{**}$, p = 0.00). As the BMI of the women increased, their daily energy intake also increased ($r = 0.796^{**}$, p = 0.00). As age increased, their dietary energy intake also increased ($r = 0.246^{*}$, p = 0.025). As years of formal education increased, BMI ($r = -0.32^{**}$, p = 0.00) as well as total energy intake ($r = -0.251^{*}$, p = 0.022) also decreased. PERMATA should organise programmes aimed at reducing the weight of their members, giving more attention to women with lower income levels.

B03 Self-reported dietary compliance amongst women with gestational diabetes

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Gestational diabetes mellitus (GDM) is associated with increased risk of foetal and maternal complications. Good diabetes control with good compliance of dietary therapy is vital for the prevention of complications. The aim of this study was to determine the self-reported dietary compliance amongst the women with GDM after receiving dietary counseling from dietitians. This cross-sectional study was conducted amongst the women with GDM at an antenatal clinic in UMMC from 11 February to 9 December 2005. A questionnaire comprising 23 questions (3 subjective and 13 multiple choices questions) was asked through interviews. A total of 80 respondents with mean age of 32.7 ± 5.8 years completed this questionnaire. Most of the respondents were Malays (61.3%), followed by Indians (20%) and Chinese (18.8%). 45% of them required insulin therapy besides diet therapy. Advice was previously given on meal distribution with regular meals and snacks, restricting sugar intake and adopting a healthy pregnancy diet. Among the respondents, 20% reported skipping their main meals. Most of them (56.3%) skipped their

breakfast. There were 5% of them reported to be taking sweet drinks every day, while fewer (2.5%) were reported to be taking sweet foods every day. Snack intake was most frequently skipped at bedtime. Most of them were taking at least 11 servings of milk (65 %) or vegetables (84%) a week. However, only 44% of them were taking at least 11 serving of fruits a week. In summary, full compliance was not given by some of the women with GDM in this clinic despite advice provided. Therefore, regular and more frequent dietary counseling are needed to improve on compliance.

B04 Dietary nutrient intake of three groups of renal replacement therapy (RRT) patients in Hospital Kuala Lumpur

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The objective of this cross-sectional study was to evaluate the dietary food intake of Haemodialysis (HD, n=53), Continuous Ambulatory Peritoneal Dialysis (CAPD, n=50) and Renal Transplant (TX, n=54) patients attending the Renal Unit of Hospital Kuala Lumpur according to medical nutrition therapy (MNT) guidelines. 24-hr dietary recall for 3 days [3D24H] per patient were collected for the purpose of the study. Assessment of mean daily nutrient intakes was on the basis of total daily consumption as well as per kg ideal body weight (kg BW). Mean body weight for HD, CD and TX were 58.23 ± 20.31 kg, 59.95 ± 13.8kg and 63.12 ± 11.7kg respectively. Study results indicated total daily energy intake was significantly greater for TX patients compared to HD patients (1777.1 ±460 kcal; 1518.6± 334.6 kcal, $p<0.05$) but not with CAPD patients (1688.7 ± 200 kcal). This was attributed to gains from peritoneal glucose by CAPD patients. Comparisons of energy intake/kg BW indicated no significant differences between TX, CAPD and HD (30.3 ± 9.7kcal/kg; 29.5 ± 5kcal/kg; 27.5 ± 6.8 kcal/kg, $p>0.05$) groups. TX patients consumed significantly greater total daily amounts of protein compared to HD and CAPD patients (66.9 ± 18.5g; 55.8± 18g; 52.3 ± 10.8g, $p<0.05$) but per kg BW basis, intake was significantly greater for TX than CAPD patients (1.14g ±0.35/kg; 0.91± 0.19g/kg, $p<0.05$) but not compared to HD (1.02 ± 0.36g/kg) patients. Comparisons for energy intake per MNT recommendations indicated that 66.7% of TX patients achieved the recommendation (25kcal/kg BW) in comparison to 24.4% for CAPD and 25% of HD patients (35 kcal/ kg BW). In addition, 83.3% TX patients achieved the protein recommendation (0.8g/ kg BW) whereas only 35.8% of HD (1.2g/ kg BW] and 16.0% of CAPD patients [1.2g/ kg BW) achieved requirements. Total daily carbohydrate intake comparisons for the 3 groups indicated that intake by TX patients was significantly greater than either HD or CAPD patients (258.44 ± 80g; 226.17 ± 48.9g; 204.3 ± 36.3, $p<0.05$). This trend was also reflected for total daily fat consumption which tested significantly greater for TX but not between HD and CAPD (51.2 ± 15.8g; 42.8 ± 14.32g; 41.5 ± 9.0g $p<0.05$) patients (42.8 ± 14.32g; 41.5 ± 9.0g, $p>0.05$). In conclusion, RRT modality influenced achievement of dietary food intake per kg BW basis as indicated by greater food consumption by TX patients but unsatisfactory food intake in CAPD and HD patients. Therefore, efforts to increase protein and energy intakes per kg BW basis in CAPD and HD patients of Hospital Kuala Lumpur should be the focus of guided nutritional intervention.

B05 Comparison of body image and energy balance between overweight male and female adolescents in Kuantan, Pahang

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A cross sectional study was conducted to compare the differences in body image, and energy balance between overweight male and female adolescents in Kuantan, Pahang. By a multi-stage sampling, a total of 1403 students (611 males and 792 females) aged 13 and 14 years, attending four selected secondary schools in Kuantan district, were screened for their weight status. Of these, 301 (21.4%) adolescents (10.7% males, 10.7% females) were overweight and obese. From the 301 adolescents, 100 overweight and obese male, and 100 overweight and obese female adolescents were randomly selected for the present study. The respondents comprised 63.5% Malays, 27.5% Chinese, and 9.0% Indians with a mean age of 13.6 ± 0.5 years. No significant associations were found between socio-demographic factors and sex of the overweight respondents. Although a majority of the respondents (males: 55%; females: 67%) reported correct perception of their weight status, 39% male and 29% female respondents were *underestimators*, while 6% male and 4% female respondents were *overestimators*. Results showed the female respondents had a greater body size discrepancy ($t=7.523$, $p<0.000$), desired a smaller ideal body size and all (100%) wished to reduce their body weight compared to 87% of male respondents. More female respondents were dissatisfied with their body weight, hands, waist, hips, and legs than male respondents. Conversely, more male respondents were found to be dissatisfied with their chest than female respondents. As a whole, males were found to have a greater overall body parts satisfaction score than females ($t=4.061$, $p<0.000$). With respect to energy expenditure, male respondents expended more energy than female respondents ($t=3.232$, $p<0.001$). There was a significant association between energy balance and sex of the respondents ($c^2=4.442$, $p<0.01$) whereby more female respondents (85%) were in negative energy balance compared to the male respondents (67%). Based on EAT-26 scores, more male respondents were prone to eating disorders (36.0%) compared to female adolescents (28.0%). However, there was no significant association between categorisation of EAT-26 scores and sex of the respondents ($c^2=1.471$, $p=0.289$), indicating that male and female respondents of this study were equally at risk of eating disorders. Interestingly, there was a significant difference in bulimia and food preoccupation sub-scores of EAT-26 between the two groups ($t=2.876$, $p<0.01$). Although these subjects claimed that they had received information on weight management, a majority (males: 65%; females: 58%) had a low level of weight management knowledge. Future prevention intervention programmes for overweight and obese adolescents should focus on promoting positive body image, healthy dietary practices and active lifestyle.

B06 Alcohol consumption among university students

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This cross-sectional study was carried out to assess alcohol intake among private and public university students. A total of 226 university students [137 from National University of Malaysia Kuala Lumpur campus (UKMKKL) and 89 students from Sunway University College Bandar Sunway] comprising of 46.9% males and 53.1% females, participated in this study. Students' alcohol intake pattern was determined using a validated questionnaire from Indiana University (1975). In general, the prevalence of alcohol consumption among students was 52.2% while the prevalence in Sunway College (62.9%) was higher and significantly different from UKMKKL (45.3%). From the 62.9% students in Sunway College who consumed alcohol, 44.6% of them reported consuming it less than once a month, 33.9% of them consumed more than once a month and others only occasionally. As for the 45.3% students from UKMKL who consumed alcohol, 8% reported taking it 1-3 times per month, 59.7% of them consumed less than once a month, and the other 30.6% only occasionally. Only one student from UKMKKL reported drinking alcohol 3 to 5 times a week. As for the volume of alcohol consumed by the students, the mean intake was 2.7 ± 3.1 standard units per drinking session. The type of alcoholic drinks most frequently consumed by the students were beer (67.8%), wine (36.4%), vodka (12.7%), liquor (8.5%), whisky (6.8%), alcoholic tonic (5.1%) and brandy (3.4%). The mean age at which the students started drinking alcohol was 15.7 ± 3.1 years old. As for the expenses spent on alcoholic drinks per month, 51.7% of the students reported to spend less than RM 20 on alcohol; 31.4% of them to have spent not a single cent on it as it was paid by their drinking companion; 8.5% students spent RM20 – RM50 on alcohol; while 8.4% of the students spent more than RM50 on alcohol per month. In conclusion, this study showed that university students in Malaysia do not consume alcohol very often and it is not a major public helath problem.

B07 Relationship between dietary calcium intake, nutrition knowledge and physical activity with bone health status among Chinese female undergraduates aged 19 to 24 years at Universiti Putra Malaysia

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The objective of this cross-sectional study was to determine the relationship between dietary calcium intake, nutrition knowledge and physical activity with bone health status among a sample of Chinese female undergraduates aged 19 to 24 years at Universiti Putra Malaysia. Information on socio-demographic background, family history of osteoporosis, nutrition knowledge related to osteoporosis, pattern of milk intake and use of calcium

supplements were obtained through a self-administered questionnaire. Dietary calcium intake (assessed using a semi-quantitative food frequency questionnaire) and physical activity levels (for the past 7 days) were obtained through a face-to-face interview. Their weight, height and bone health status were measured using a weighing scale (TANITA), body meter (SECA), and an ultrasound machine (QUS-2), respectively. A total of 71 subjects volunteered to participate in this study. The mean age of the subjects was 21.79 ± 1.07 years. A majority (95.8%) of them reported that they did not have any history of osteoporosis. A total of 40.8% indicated they were drinking milk regularly. The mean weight and height of the respondents was 49.9 ± 6.7 kg and 157.6 ± 6.2 cm respectively with a mean body mass index (BMI) of 20.1 ± 2.6 kg/m^2. About 25.4% of them were classified as underweight and 4.2% were overweight. The mean knowledge score was 68.38 ± 11.55%. A majority (60.6%) of them were categorised as having a satisfactory level of knowledge. The mean dietary calcium intake was 432.31 ± 192.30 mg per day. About 70% and 96% of them had inadequate intake of calcium (<2/3RDA) based on the Malaysian RDA (450mg) and RNI (800mg), respectively. The mean of the total MET-min per week was 1924.35 ± 1321.41 with a majority (76.1%) of them classified as minimally active. The mean Broadband Ultrasound Attenuation (BUA) was 90.4 ± 15.3 dB/MHz and the mean T-score was 0.11 ± 1.23. About 20% were classified as osteopaenic. The results revealed no significant relationship between dietary calcium intake, knowledge scores and physical activity with BUA and T-score. In conclusion, no significant relationship was found between the variables studied with bone health. However, there was a high prevalence of underweight, which may put the young women at increased risk for osteoporosis. Therefore, appropriate educational and intervention programmes on osteoporosis and its associated risk factors should be developed for young adults to promote optimal bone health.

B08 Food intake and physical activity patterns for obese and normal weight children in Kuala Lumpur

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The purpose of this cross-sectional study was to determine the food intake and physical activity patterns among obese and normal weight children in Sekolah Rendah Jenis Kebangsaan (Cina) Chin Woo, Kuala Lumpur. A total of 110 respondents aged between 10 and 12 years had been selected for this study by using the Purposive Sampling Method. A total of 55 respondents were obese according to WHO classification of BMI-for-age more than 95th percentile (33 boys, 22 girls). As the control group, another 55 normal weight respondents matched for age and sex with the obese respondents were selected. Body weights and heights of the respondents were measured by using TANITA weighing scale and SECA microtoise tape. A set of questionnaires was used to obtain respondents' demographic, socioeconomic, food intake and physical activity patterns. Statistical Package for Social Sciences (SPSS) version 12.0 and Diet-4 were used to analyse the collected data. Pearson's Coefficient Correlation Test and Independent t-test were used to determine the correlation between variables and compare means between obese

and normal weight respondents. The mean age of respondents was 11.02±0.83 years. Mean BMI-for-age for obese and normal weight respondents were 28.54±3.22kgm^{-2} and 17.76±1.53kgm^{-2} respectively. The household size for the obese group was medium (6-10 people); while for the normal weight group was ≤5 people. The parents' educational levels of both obese and normal weight groups were similar (Form-3 secondary school level), which is between 7 and 9 years of education. The mean total household income per month for obese group (RM2253.29±2491.43) is lower than normal weight group (RM2816.56±2292.94). There was a negative significant correlation between socioeconomic status (father's years of education and mother's years of education) and BMI-for-age of respondents. The food intake for obese respondents was high in fat (35.14±8.89%) compared with normal weight respondents (33.60±7.11%). The mean energy balance for the obese group was negative (-324.28±276.56kcal); while for the normal weight group was positive (78.95±53.88kcal). There was a negative significant correlation between energy balance and BMI-for-age (r=-0.586, p=0.000). Besides, there was a significant difference in mean energy balance between the obese group and normal weight group (t=-6.956, p=0.000); by which, normal weight group had a higher mean energy balance than the obese group. In conclusion, the difference in energy balance between the obese group and normal weight group is due to the differences in energy intake and energy expenditure. Besides that, there were other factors like psychosocial and genetic factors that will affect the BMI-for-age of respondents. To reduce BMI-for-age of the obese respondents, they were recommended to reduce their fat intake by reducing the fried foods intake to reach the RNI (2005) recommendation of 20%-30% of total calories intake. They also can change their type of co-curricular and leisure time activities from low energy to high energy density in order to increase their energy expenditure.

B09 Knowledge, attitude and nutritional practices among Diabetes Mellitus type 2 patients at Hospital Kuala Lumpur

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This cross-sectional study was conducted to identify the knowledge, attitude and nutritional practices among the Diabetes Mellitus type 2 patients at Hospital Kuala Lumpur. About 90 diabetic patients (51 males, 39 females) who had received outpatient treatment at Hospital Kuala Lumpur for more than one year, aged between 40 and 75 years, were chosen through Purposive Sampling Method to be the respondents in this study. Data were collected by personal interview using a questionnaire and a 24-Hour Dietary Recall Form. Anthropometric measurements were taken by using TANITA digital weighing scale and SECA microtoice tape. Data on blood glucose level was obtained from patients' health records. Data were then analysed by using *Statistical Package for Social Science for Windows* (SPSS for Windows) version 12.0 and dietary data were analysed using the book "Nutrient Composition of Malaysian Foods", 4th edition. Results of the study showed that the mean age of respondents was 53.68 ± 7.56 years old, mean total monthly household income was RM1855.00 ± 1381.59, mean years of getting treatment was 8.08 ± 7.43 years, mean random blood glucose level was 10.02 ± 3.67

mmol/L and mean energy intake was 1161.12 ± 474.43 Kcal per day. More than 70 % of the respondents were overweight (45.6 %) and obese (27.7 %) with the mean Body Mass Index of 28.12 ± 6.47 Kg/m^2. Majority of the respondents (36.7 %) were educated till the level of Upper Secondary School (Form 6) and worked in the service, production or clerical sector (41.1 %). Majority of the respondents (54.4 %) in this study had high blood pressure. Family history of Diabetes Mellitus was common among the fathers (33.3 %), mothers (42.2 %) and siblings (42.2 %) of the respondents. About 60.0 % of respondents were in the high tertile scores for knowledge and about 66.7 % respondents were in the high tertile scores for attitude. The most common nutritional practice among the majority (96.7 %) of the respondents was drinking a lot of water every day. From Pearson's Coefficient Correlations test, a significant but weak relationship was found between knowledge and attitude ($p = 0.01$, $r = 0.354$), as well as between knowledge and total number of years of education ($p = 0.003$, $r = 0.311$). However, no significant relationship was found between knowledge and BMI, knowledge and total monthly household income, knowledge and age, attitude and BMI, and also knowledge and random blood glucose level. From the Independent Samples t-test, no significant difference was found in the level of knowledge between male and female respondents. In conclusion, although a majority of the respondents had been receiving treatment for more than 8 years, but in terms of disease management, it was still unsatisfactory. Therefore, a more comprehensive disease management programme should be planned to increase the knowledge, instil positive attitude and encourage good nutritional practices among the Diabetes Mellitus type 2 patients, in order to improve their quality of life.

B10 Nutritional status and antioxidant intake of children with Down Syndrome

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This study was carried out to assess the nutritional status and antioxidant intake of children with Down Syndrome in Klang Valley. 80 children aged 3 to 7 were recruited from Kiwanis Down Syndrome Foundation Centre in Petaling Jaya and Klang. Questionnaires on the subject and family's background along with the health status of subject were completed by parents. Nutritional status was determined via anthropometry and dietary assessment. Measurement of anthropometry variables included weight, height and mid-upper-arm circumference. 24-hour diet recall and two days diet record were used to obtain dietary data. Weight and height measurements were compared to the special growth charts for Down Syndrome children (Cronk et al. 1988). Mid-upper-arm circumference measurements were compared to Frisancho (1981). Nutritional status of the subjects was also classified by using the body mass index-for-age percentiles (NCHS 2000). Mean age of mothers when they delivered the subjects was 35.41±5.84 years. Majority of subjects (58.75%) were diagnosed with chronic diseases. The mean weight of subjects was 14.72±3.01kg. Majority of the subjects' weight (42.5%) were between 25th - 50th percentiles. Only one (1.25%) subject was classified as underweight (<5th percentile).

Mean height of the subjects was 97.29±9.86cm and most of the subjects (81.25%) had height >50th percentile using the Down Syndrome growth chart. Mean BMI for subjects was 15.59±1.75kg/m^2 and the BMI of the subjects were in the range of 11.6-20.7kg/m^2. However, 13.8% of the subjects (n=11) were categorised as underweight while 23.8% of the subjects (n=19) were classified as overweight according to BMI cutoff point (NCHS 2000). Mean energy intake of the subjects was 1681±408kcal. Multivitamins and minerals were the primary supplements consumed daily by 50% of subjects. Vitamin C intake of the subjects was 121±73mg and this value exceeded the Malaysian RNI recommendation (2005) for vitamin C. Mean vitamin E intake of subjects was 4.6±2.2mg. Vitamin E intake of male subjects was 86.0% of the RNI recommendation while female subjects met 100% of the RNI recommendation. Mean beta-carotene intake of subjects was 2.2±2.3mg. Vitamin A intake of subjects was 50±71µg and both genders did not meet the RNI recommendation. Majority of subjects (98.8%) showed low intake of vitamin A compared to normal children (7.2%) in Malaysia as reported by WHO (1995). This study showed that prevalence of underweight among Down Syndrome children (13.8%) was higher compared to normal children (11.3%) in Malaysia (WHO 2002). Prevalence of overweight among Down Syndrome children (23.8%) in this study was higher than the prevalence of overweight among normal children in Malaysia (7.3%) (Foong et al., 2004). However, the prevalence of overweight among Down Syndrome children in this study was less compared to the prevalence of overweight (>30%) among Down syndrome children in United Kingdom and Republic of Ireland (Styles et al., 2002), as well as Sweden (Myrelid et al., 2002). Among all the antioxidants, vitamin A appeared to be the most likely deficient nutrient among Down Syndrome children. In conclusion, malnutrition among Down Syndrome children (obesity and underweight) appeared to be a major public health problem in Malaysia.

B11 Parental control in child feeding practices and its relation to nutritional status of preschoolers in Taman Puchong Utama, Selangor

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This study was conducted to determine the association between parental control in child feeding practices and preschoolers' nutritional status. A total of 70 preschoolers (38 boys and 32 girls) aged between 2 and 6 years old and their mothers participated in this study. A set of structured questionnaires was used to obtain information on socioeconomic, demographic characteristics, parental control, dietary intake and anthropometric measurements of the preschoolers. Parental control in child feeding practices was assessed in three different aspects i.e. restriction, pressure to eat and monitoring by using Child Feeding Questionnaire. Dietary intake of preschoolers was assessed using 24-hour recall and analysed according to Recommended Nutrient Intake of Malaysia (RNI) and Food Guide Pyramid for Children. Anthropometric measurements such as weight and height were measured using TANITA weighing scale and SECA body meter, respectively. The anthropometric measurements were then compared with the National Center for Health Statistics (NCHS) reference. The anthropometric assessments indicated that 10.0%

(n=7) of the preschoolers were overweight, 4.3% (n=3) underweight, 11.4% (n=8) stunted and 2.9% (n=2) wasted when compared with the NCHS reference. Dietary intake data indicated that mean intake of calories, protein, iron, vitamin A, thiamine, riboflavin, niacin and vitamin C were exceeding the RNI, while calcium was found to be below the RNI. However, the preschoolers did not achieve the recommended number of servings for all groups. Independent T-test showed no significant differences in parental control (restriction, $t = 0.300$, $p > 0.05$; pressure to eat, $t = 0.418$, $p > 0.05$; and monitoring, $t = 0.559$, $p > 0.05$) between both sexes. This indicated that mothers were not practising different parental controls in feeding the boys and girls. Based on Pearson correlation test, monitoring was significantly associated with pressure to eat ($r = -0.361$, $p < 0.01$). It was found that intake of riboflavin was significantly associated with restriction($r = -0.251$, $p < 0.05$) and monitoring ($r = 0.352$, $p < 0.01$). Monitoring was also significantly associated with calcium intake of the preschoolers ($r = 0.249$, $p < 0.05$). Intake of milk and dairy products was significantly associated with pressure to eat ($r = -0.297$, $p < 0.05$) and monitoring ($r = 0.308$, $p < 0.01$), while intake of fish, lean meat, poultry, eggs, beans and bean products were only significantly associated with monitoring ($r = -0.252$, $p < 0.05$). Although association exists between dietary intake and parental control, parental control was not associated with nutritional status of preschoolers. Parental control should not be overlooked as one of the factors that may influence child nutritional status.

B12 Relationship of dietary intake, health characteristics, knowledge of supplements and use of supplements among the elderly

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This study was conducted to determine the relationship between dietary intake, health characteristics, and knowledge of supplements with use of supplements among a sample of elderly in Taman Rasah Jaya, Negeri Sembilan. A total of 74 (male = 50%, female = 50%) respondents were interviewed using a set of structured questionnaires consisting of five sections (socio-economic background, self-reported health related characteristics, dietary intake, intake of supplements and knowledge on supplements). The age of the respondents ranged from 60 to 85 years old and a majority of them (75.7%) were in the 60-69 age group. Presence of acute health problems and chronic diseases was reported by 54.1% and 68.9% of the respondents, respectively. Majority of the respondents fulfilled more than two-thirds of the Recommended Nutrient Intakes (RNI) for most of the nutrients except for folate. A total of 50% of the respondents were currently taking supplements (males = 54.1%, females = 45.9)%. Most common sources of information on supplements were from friends (44.6%) and family members (41.9%). The most common types of supplements taken were herbal products (27.0%) calcium (8.1%) and spirulina (8.1%). For assessment of knowledge on supplements, only 18.9% of the respondents scored 60.0% or more. Chi-square tests showed no significant association between supplements use with age, sex, household size, education level, acute health problems, chronic diseases and knowledge level on supplements. There were significant differences in average intakes for fat ($t=-4.065$, $p < 0.001$), riboflavin ($t= 2.100$, $p< 0.05$), calcium

(t =-3.07, p<0.05), iron (t=-2.535, p <0.05) and zinc (t=-2.831, p=0.01) between supplements users and non-supplements users. In conclusion, there was no significant relationship between socio-demographic characteristics, health related characteristics and knowledge on supplements with use of supplements. On the other hand, dietary intakes of certain nutrients were higher among supplements users. However, a more in-depth study with larger sample size is needed to further determine the trend of supplements use and the relationships between related factors with supplements use.

B13 Knowledge, attitude and practice of breastfeeding: a study among Chinese mothers who attended maternal and child health clinic in Dewan Bandaraya Kuala Lumpur

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Mother's milk is the best milk for children. Despite concerted efforts to promote breastfeeding, prevalence is still low especially among Chinese mothers. This study was designed to determine the knowledge, attitude and practice of breastfeeding among Chinese mothers who attend the Maternal and Child Health Clinic of the "Dewan Bandaraya Kuala Lumpur" and also to identify those socioeconomic factors associated with it. A cross-sectional study was carried out in four clinics located in Cheras, Jalan Ismail, Segambut and Metro Kepong. Through convenient sampling, a total of 95 mothers with at least 1 child below 5 years old were interviewed personally by using a pretested questionnaire. Results showed that the majority of the mothers were between 26 and 35 years old with the average of 30.07±4.98 years. Almost all (94%) have achieved at least primary education and the average monthly household income was RM3,656 ± 2,426.5, ranging from RM1,000 to RM12,700. Most respondents had small families with an average of 2.33 children. About half of the women (53.7%) were housewives. Majority of the respondents were knowledgeable about breast feeding, scoring a mean of 23.98 correct answers out of 30. Most of them also had favourable attitudes towards breastfeeding with an average scoring of 23.98±4.19 out of 30. Most of the mothers knew the benefits of breast milk but only about 70% of the mothers were aware of the benefits of colostrum. Half were of the opinion that they were too shy to breastfeed in public and all mothers did not agree that breastfeeding would be in conflict with their image as a modern mother. At the time of the study, nine out of 95 mothers were still breastfeeding despite the fact that the average ages of their babies were 8.2 months, ranging from one to 36 months. Although almost all (99.0%) breastfed their babies at birth, duration was very short (54.15±81.79 days) and duration of exclusive breastfeeding was only 22.27±33.76 days. None or lack of breast milk (38.1%) was the main reason contributed to the early cessation of breastfeeding. Other reasons included health problems in the mother (21.6%), having to start working (13.4%) and refusal on the part of the baby to breastfeed (10.3%). Analysis also indicated that there was a positive correlation between knowledge and attitude (r=0.439; p=0.000) and also attitude and length of breastfeeding (r=0.222; p=0.041). Older mothers (r=0.259; p=0.011), those who had more years of formal education (r=0.285; p=0.005), those who were of higher parity (r=0.223; p=0.03) as well as

those with larger family size (r=0.205; p=0.047) had significantly better knowledge of breastfeeding. On the other hand, only mothers who had more children (r=0.34; p=0.001) and mothers who had more years of education (r=0.249; p=0.015) had more favourable attitudes towards breastfeeding. Beside this, mothers with higher parity (r=0.267; p=0.013) and older mothers (r= 0.249; p=0.022) also tended to breastfeed their babies longer. In conclusion, although Chinese mothers were knowledgeable about breastfeeding and despite generally favourable attitudes towards it, length of breastfeeding was dismally low. This is despite the fact that 99.0% of the babies were indeed introduced to breast milk first, in line with the principles of baby friendly hospitals. These Chinese mothers will need follow-up visits on the part of the community nurses in order to continuously support them in their effort to breastfeed.

B14 Knowledge, attitude and applications towards "Recommended Nutrient Intakes For Malaysia 2005" among professionals in the field of nutrition and dietetics

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The purpose of this study was to assess the levels of knowledge, attitude and applications with regard to the "Recommended Nutrient Intakes For Malaysia 2005" among professionals in nutrition and dietetics in Selangor and Kuala Lumpur. A list of 87 private hospitals and clinics as well as 12 government hospitals in Selangor was obtained from the Ministry of Health. Besides that, a list of 24 government agencies with nutrition activities was obtained. A list of 35 food and health supplements companies was also obtained based on convenient sampling. Out of a total of 158 organisations from the public and private sectors contacted, only 55 (34.8%) agreed to participate in the study. They consisted of 28 (50.9%) food and health supplements companies, 14 (25.5%) private hospitals and clinics, 7 (12.7%) government hospitals and 6 (10.9%) government agencies. Most of the clinics did not participate as they have no nutritionist or dietitian. Interview was conducted using pre-tested questionnaire with the officer who is responsible for nutrition or dietetics in the organisation. Data were analysed using the Statistical Package for the Social Sciences (SPSS) version 12.0 for Windows. Majority of the organisations were located in Kuala Lumpur (23.6%) and Petaling Jaya (18.2%). Almost half (49.1%) of the respondents graduated with Bachelor of Science (Nutrition and Community Health) from Universiti Putra Malaysia, more than one-third (36.4%) of the respondents hold the post of Nutritionist. The respondents have more than one main responsibility and 24.7% of them are responsible for sales or marketing as well. Almost all the respondents achieved the 56.4% second tertile and 41.8% third tertile for knowledge on the Malaysian RNI. 61.8% of the respondents achieved the second tertile score for attitude regarding the RNI. Majority (58.2%) of the respondents obtained the second tertile score for applications of the RNI. The Pearson correlation test showed no significant relationship between the application scores with knowledge and attitude scores. A high level of knowledge may not necessarily lead to a highly positive attitude or use of the RNI. The independent samples t-test showed no significant differences in the mean knowledge scores between

hospitals/nutrition related agencies and food companies. This may indicate that food companies also keep up with development in knowledge on the RNI. There are significant differences (p=0.004) in the mean attitude scores and (p=0.001) in mean scores for applications between hospitals/nutrition related agencies and food companies. This may indicate that hospitals/nutrition related agencies are focused on managerial and programme planning such as education and seminars based on RNI Malaysia 2005, while food companies only focus on their products or services. Therefore, various programmes such as education and seminars should be held to improve the attitude of professionals so that they can play their role more effectively.

B15 The relationship between oral hygiene, dietary fluoride, calcium and sugary food with caries experience among UKM students residing in Kuala Lumpur campus

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Based on the Ministry of health report (2000), caries experience increases with age. This cross sectional study was carried out to describe the relationship between oral hygiene, dietary fluoride, calcium and sugary food with caries experience among UKM students residing in Kuala Lumpur campus. A total of 93 subjects aged 19-24 years participated in the study that was carried out at UKM Kuala Lumpur campus. A 24-hour diet recall for 3 days was used to assess fluoride ingestion from diet. Fluoride Ion Selective Electrode was used to analyse fluoride content in foods and beverages consumed. Food frequency questionnaires were used to assess the frequency of sugary foods intake and calcium ingestion. Oral health questionnaire was used to assess the oral hygiene status. Caries risk was assessed by a professional dentist. DMFT (Decayed, Missing, Filled teeth) index was used to describe the rate and accumulation of caries in permanent teeth. In this study, the mean DMFT score was 3.80±3.87. The mean score for filled component was the highest (1.88±2.42), followed by decayed component (1.64±2.37) and missing component (0.27±0.75). The mean fluoride and calcium ingestion per day were 2.10±0.96mg and 454.79±208.9mg respectively. Mean frequency of consuming sugary foods was 2.08±1.26. The fluoride content in foods and beverages ranged from 0.04 to 25.64ppm and 0.03 to 0.80ppm, respectively. The relationship between fluoride and calcium ingestion from foods and sugary foods intake was not correlated with caries experience. However, the relationship between oral hygiene practices and caries experience was statistically significant ($p<0.005$), especially the frequency of dental visits. The effects of fluoride and calcium ingestion on caries in this study were minimal. The high exposure of fluoride-containing products reduces the effect of consuming sugary foods on caries experience. Good oral hygiene practices appear to be the most important factor in caries progression.

B16 Knowledge, attitude, and practices regarding nutrition labelling among women (aged 24 to 55 years) in Taman Permai II, Seremban

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This study investigated the relationships between socioeconomic factors and the levels of knowledge, attitude and practices regarding nutrition labelling among women living in Taman Permai II, Seremban. A sample size of 100 houses was conveniently set and selected from a total of 845 houses in Taman Permai II based on systematic sampling. The inclusion criteria were married women aged 24 to 55 years old, with at least one child. A total of 75 women who fulfilled these criteria agreed to participate in this study. Data was collected by interviewing the respondents with a pre-tested questionnaire. The mean age of the respondents was 41.1 ± 9.7 years. They have children in the range of 1 to 5 and the mean age of children was 17.0 ± 9.2 years. The mean number of respondents' years of schooling was 10.7 ± 2.9 years. Their monthly household income ranged from RM200 to RM 6000 and they spent a mean of RM823 ± RM599 monthly on food for the family. The television, radio and magazines were the main sources of information on nutrition and health. Results from the SPSS programme showed that 42.1% of the respondents obtained the second tertile score for nutrition labelling knowledge, while 85.5% and 71.1% respondents obtained the third tertile score for nutrition labelling attitude and practices respectively. These results indicated that the respondents have a moderate level of knowledge on nutrition labelling, but their attitude and uses were high. The Pearson correlation test showed significant correlation between the scores for attitude and practices related to nutrition labelling ($r = 0.320$, $p = 0.005$). The positive attitude towards nutrition labelling may lead to an increase in the use of nutrition labelling. The scores for knowledge ($r = 0.279$, $p = 0.015$) and attitude ($r = 0.348$, $p = 0.002$) towards nutrition labelling were significantly correlated with the number of years of schooling, but not with the number of children. The chi-square test showed that the scores for nutrition labelling knowledge, attitude and practices were not dependent on the age of children. Nutrition labelling knowledge was also found to be dependent on monthly household income ($c^2 = 7.527$, $df = 1$, $p = 0.006$). This indicates that increase of monthly household income leads to higher level of nutrition labelling knowledge because respondents with higher monthly household income normally have higher education levels. Understanding of nutrition labelling among the consumers is important for consumers to make appropriate and healthy food choices.

B17 Calcium intake, physical activity and bone health status among Indian female undergraduate students of Universiti Putra Malaysia

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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 Indian female students of Universiti Putra Malaysia. Information on socio-demography was obtained through a self-administered questionnaire. Dietary calcium intake was assessed using a quantitative food frequency questionnaire. Physical activity pattern was assessed using a 2-day physical activity record with one weekday and one weekend. Body weight, height and bone health status were assessed using a weighing scale (TANITA), body meter (SECA) and ultrasound machine (QUS-2) respectively. Data were analysed using the Statistical Package for Social Sciences (SPSS), version 12.0. A total of 77 subjects were recruited in this study. Mean age of respondents was 21.4 ± 1.4 years. The mean weight, height and Body Mass Index (BMI) were 51.9 ± 8.3 kg, 1.58 ± 5.9 m and 20.9 ± 3.4 kg/m^2, respectively. Majority of the respondents (71.4%) were normal weight according to BMI classification. A total of 18.2% were underweight, 7.8% overweight and 2.6% obese. Meanwhile, mean for percentage of body fat was 27.1 ± 6.3%. Mean calcium intake was high, with 746.3 ± 247.1 mg/day. Results showed that milk drinking was common among respondents. There were 67.5% regular milk drinkers. There were 39.0% of the respondents who consumed more than the Malaysian RNI for calcium intake. Approximately 50% respondents consumed more than 2/3 Malaysian RNI for calcium intake and 15.6% consumed lower than 2/3 Malaysian RNI for calcium intake. The mean for Broadband Ultrasound Attenuation (BUA) was 86.5 ± 17.1 dB/MHz and the mean for T-score was -1.13 ± 1.4. According to WHO (1994) classification, 67.5% were classified as normal and 32.5% as osteopaenic. The mean for Total Energy Expenditure (TEE) was 1811 ± 304 kcal/day. Based on FAO/WHO/UNU (2004), 50.6% of the respondents were classified as sedentary, 39.0% as moderate active and 10.4% as very active. Pearson correlation test indicated there was no significant correlation between BUA and calcium intake. However, BMI ($r = 0.44$, $p = 0.000$) and physical activity ($r = 0.40$, $p = 0.000$) showed moderate positive correlation with BUA. Therefore, increase of body weight and physical activity seems to predict better bone health. Although the results of this study showed no significant relationship between calcium intake with bone health status, it is an important risk factor of osteoporosis. Since dietary calcium and physical activity contribute significantly towards prevention of osteoporosis, it is recommended that adequate calcium intake and sufficient level of physical activity should be started early in life especially during childhood and adolescence, as rapid development of peak bone mass occurs during this period.

B18 A study on knowledge, attitude and practice (KAP) among type 2 diabetes mellitus patients in Hospital Universiti Kebangsaan Malaysia (HUKM)

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This cross sectional study was done to determine the knowledge, attitude and practice (KAP) among type 2 diabetes mellitus patients attending the Endocrinology Clinic of Hospital Universiti Kebangsaan Malaysia from December 2005 until February 2006. The study subjects consisted of 33 type 2 diabetic outpatients (17 men and 16 women) aged between 22 and 66 years old (52 ± 9 years old). Demographic, socio-economic background, health history and other information regarding the diabetic patients were gathered using validated questionnaires through one-on-one interviews with the subjects. Anthropometric data such as weight and height were measured and Body Mass Index (BMI) was computed to asses the extent of obesity. This study found that about 6% of the subjects were normal weight (BMI ≥ 18.5 kg/m^2), 58% were over-weight (BMI ≥ 25 kg/m^2) and 36% were obese (BMI ≥ 30 kg/m^2). The mean BMI of males and females were 29.6 ± 4.9 kg/m^2 and 29.6 ± 4.1 kg/m^2 respectively. The fasting blood sugar (FBS) level and glycated haemoglobin (HbA1c) level of the subjects were taken from their medical report. The mean of the FBS level and HbA1c level were 9.1 ± 2.9 mmol/l and 9.1 ± 2.6% respectively. Food intake was recorded by using a combination of diet history and food frequency questionnaire. From the questionnaire, the mean score of knowledge was 57.5 ± 10.4%, while their mean score of attitude was 76.8 ± 24.8% and mean score of the subjects' practice was 58.4 ± 15.4%. The majority of them (79%) scored moderately in the knowledge part and only 3% of the subjects managed to get a good score. Meanwhile about 18% of the subjects were categorised in the weak category. Score of knowledge had a negative correlation with level of FBS ($r= -0.023$, $p<0.01$) but had a positive correlation ($r= 0.130$, $p<0.01$) with level of HbA1c. Education level of the subjects was significantly positively correlated with attitude score ($r= 0.449$, $p<0.01$) but not significantly positively correlated with score of knowledge ($r=0.227$, $p<0.05$). Meanwhile, the attitude score had a negative correlation with the knowledge score ($r= 0.416$, $p<0.05$) but was significantly positively correlated with practice score ($r=0.436$, $p<0.05$). As a conclusion, a better structured nutrition education programme on diabetes management should be conducted for diabetic patients in order to improve their knowledge and attitude towards diabetes.

B19 Energy intake and expenditure of lactating mothers

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The objective of this study was to determine the energy intake and energy expenditure of lactating mothers in Batu Gajah, Perak. 50 mothers with babies aged 0-6 months

who were breastfed exclusively, and fulltime housewives were included in this study. Questionnaires were used to determine socio-demographic and socio-economic background of the subjects. The energy intake of the subjects was examined using 24-hour dietary recall while the energy expenditure of the subjects was measured using 24-hour physical activity recall, calculation of basal metabolic rate (BMR), thermic effect of food and energy of milk production. Total volume of milk produced was determined using test weighing method. Mean age of the subjects was (30.62 ± 5.966) years and the mean Body Mass Index (BMI) was (25.42 ± 4.248) kg/m^2. Mean total years of studying among the subjects was (11.12 ± 1.256) years and the mean household income was RM (1106.60 ± 351.362) per month. In addition, the mean age for their babies was (13.6 ± 4.468) weeks. The mean total energy intake of the subjects was (2145.54 ± 251.88) kcal, whereby the % total calories from carbohydrate, protein and fat were 55.99 ± 5.86%, 14.98 ± 2.67% and 29.02 ± 5.07% respectively. These intakes are low as they are only 85.82% and 80.06% of the Recommended Nutrient Intake (RNI) for subjects aged 19 to 29 years and subjects aged 30 and above respectively. For the energy expenditure, the mean was (2158.89 ± 152.62) kcal and the overall mean energy balance was (–13.35 ± 259.42) kcal. Meanwhile, the mean total milk volume produced by the subjects was (566.12 ± 110.46) ml and ranged between 404.44ml to 780ml. Pearson correlation test shows that there was no significant correlation between energy intake and milk volume produced by the subjects (r=-0.041, p=0.779). However, energy expenditure of the subjects showed a significant and moderate correlation with milk volume produced (r=0.482, p=0.000). Furthermore, there was no significant correlation between total nutrient intake such as carbohydrate, protein, fat, vitamin A, vitamin C, calcium, iron, thiamine and riboflavin with the volume of milk produced. In conclusion, even though energy intake of the subjects was lower than the amount recommended, it did not have any impact on the milk volume produced. This may be due to extra energy stored in their bodies during pregnancy. In contrast, the subjects who produced higher volume of milk expended more energy because the process of producing milk also needs energy.

B20 Nutrition knowledge, attitude and practice of Malaysian elderly

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This paper reports the nutrition knowledge, attitude and practice (KAP) of Malaysian elderly, as part of a nationwide study to evaluate the status of knowledge, attitude and practice on food and nutrition among various communities and food vendors in Malaysia. A total of 1040 elderly representing all states in Malaysia participated in this survey, which was carried out between September 1997 and March 1998. An interview administered questionnaire was used to assess the nutrition KAP and collect demographic data of the elderly. Majority of the subjects were in the 60-65 years (43.3%) and more than 65 years (41.3%) age category. There were 39.4% Malays, 26.9% Chinese and 4.8% Indians. 65% of the elderly were married, 30% widowed and the remaining 5% were either single or divorced. More than 50% of the elderly had never attended school,

35% completed primary schooling and only 9% finished their secondary education. In terms of nutrition knowledge, majority (61.1%) of the elderly did not know about balanced diet. Thus it was expected that most of the elderly did not know about foods to be consumed most (88%), foods with the highest energy (51.8%), foods to be eaten least (87.6%) or foods which are good sources of protein, vitamins and minerals, carbohydrate, fibre or fat (50.2% to 87.6%). 64% of the elderly had knowledge on foods high in salt. With regard to practice, 45% of the elderly were able to answer that eating a variety of foods is good food practice, however, almost a similar percentage (43.5%) had no knowledge of this. Majority of the elderly responded correctly to knowledge questions on food preparation that will increase fat, on diseases that are caused by obesity and diseases associated with sugar consumption. Overall, the nutrition knowledge scores revealed that almost 60% of the elderly could be categorised as having poor nutrition knowledge. It is quite disheartening to show that less than 10% of our elderly had sound nutrition knowledge. This survey showed that more nutrition education interventions need to be implemented to improve the shortcomings of nutrition KAP among the Malaysian elderly.

B21 Knowledge, attitude and practices (KAP) regarding Diabetes Mellitus (Type 2) among diabetic patients attending Klinik Kesihatan Gunong, Bachok, Kelantan

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This study was carried out at Klinik Kesihatan Gunong, Bachok over four weeks from 27th November until 22nd December 2005 using a structured pre-tested questionnaire as a tool to get information from diabetic patients attending the clinic for their treatment or follow-up. The purpose of this study was to study the knowledge, attitude and practices in preventing diabetes complications. Systematic sampling was used to select the respondents. A total of 107 patients (30 men and 77 women) were included. The results showed that the mean knowledge scores was 62.03 ± 16.817 based on 16 questions, while the mean attitude score was 83.22 ± 9.3199 (based on 15 attitude statements). It revealed that, most of the patients had moderate knowledge scores and had favourable attitudes towards lifestyle modification and self-care. Pearson Correlation test showed that there was a significant positive correlation between knowledge and attitude ($r = 0.343$, $p < 0.05$). Meanwhile, the younger the respondent ($r = -0.421$, $p = 0.000$) and the longer their years of formal education($r = 0.413$, $p = 0.000$) among them, the higher their mean knowledge scores. More than half of the respondents exercised regularly (51.4%), 11.2% did not drink sweet drinks and only 8.4% of them did not take sweet foods. The percentage of respondents who monitored their blood glucose and body weight regularly was 97.2% and 93.5% respectively, and 92.5% of the respondents took care of their feet everyday. Independent t-test revealed that, those who exercised ($t = 3.317$, $p < 0.01$) as well as those who no longer drink sweet drinks ($t = 2.708$, $p < 0.01$) had significant mean knowledge scores. At the same time, respondents who monitored their blood sugar levels ($t = 2.632$, $p < 0.05$), those who weighed themselves ($t = 3.659$, $p < 0.01$) as well as those who took care of their feet everyday ($t = 2.763$, $p < 0.01$) had significantly more

favourable mean attitude scores. The younger the patients ($t = -5.033$, $p < 0.01$), the higher the education ($t = 4.787$, $p < 0.01$) and the higher the household incomes ($t = 5.120$, $p < 0.01$), the more apt they were to exercise. Education and counseling regarding all aspects of diabetes especially reduction of sugar intake as a prevention of diabetes complication should be enhanced so that diabetic patients can have more years of quality living.

B22 Nutrition knowledge and use of supplements among Royal Malaysian Navy personnel

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Studies on nutrition knowledge in various population groups have often been reported; however, such studies among Armed Forces personnel are scarce. The purpose of the study was to assess the nutrition knowledge and the use of supplements among the Royal Malaysian Navy (RMN) personnel. A total of 909 RMN personnel based in Lumut, Kuantan and Johore were involved in this study carried out between August 2003 and January 2004. A modified questionnaire (NCCFN, MOH) was designed to obtain the relationship between selected demographic/background variables, nutrition knowledge and supplement use from the subjects. The questionnaire on nutrition knowledge largely focused on calories/diet, food pyramid, fats, protein, carbohydrate, vitamins/minerals, cholesterol, BMI and energy balance/obesity. Several questions concerning the use of supplements and sources of nutrition information acquired were also included in the questionnaires. The overall mean nutrition knowledge score for RMN subjects was 62.5% corresponding to a moderate category (51-74%). Results showed that nutrition knowledge score was higher among personnel at Lumut base, those older and more educated, the officers and the overweight personnel. The lowest mean nutrition knowledge score for any demographics subgroup was among personnel aged 18-24 years. Nutrition knowledge demonstrated moderate correlations with age ($r=0.214$, $p<0.01$), BMI ($r=0.137$, $p<0.01$), duration of service ($r=0.202$, $p<0.01$) and income ($r=0.240$, $p< 0.01$). Of the 36% personnel that reported using one or more supplements, 5.8% used them daily. Supplement users had greater nutrition knowledge than non-users, although not significantly different ($p>0.05$). The most common mode of nutrition information channel for RMN personnel were TV/radio (27.3%), courses/seminars (24.9%) and doctor/nurse (21.6%). In conclusion, although some 74% of the subjects indicated receiving nutrition information through either TV or radio, while attending seminars/courses and through their doctor or nurse, the overall nutrition knowledge of the personnel was moderate. Consumption of supplements to improve their health status was not common among the subjects studied. This baseline study provides useful information to the Armed Forces. There is a need to incorporate nutrition education in their training programme to ensure the health status of their personnel is not compromised.

B23 Women and development: The nutritional practice and health of women in the interiors of Sabah

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The objective of this research was to determine the dietary intake, food habits, and dietary knowledge among women in the interiors of Sabah. Their health and breastfeeding practice were also studied. The research covered the districts of Sandakan, Beluran and Kinabatangan. Research was also carried out in the districts of Lahad Datu and Semporna. A total of 973 women were chosen at random as respondents but only 764 of the questionnaires could be analysed. They were between the ages of 20 and 51, and were sexually active. They represented the ethnics residing in these areas in Sabah. A survey was done where the respondents had to answer questionnaires on their demography, dietary intakes and habits, medical histories, contraceptives and breastfeeding practices. The results showed that the majority of the respondents, about 243 (31.8%), were between the age of 31 and 40, 189 (24.7%) were between the age of 21 and 30, 168 (22%) of them were between the age of 41 and 50, and 146 (19.1 %) were 51 and above, while only 21 (2.7%) were under 20 years old. Majority of them 456 (59.7%) were educated either in primary school, secondary or college, while about 308 (403%) of the respondents received no education. About 625 (81.8%) of the women claimed that they had no income of their own, only 33 (4.3%) claimed that their income was above RM685.00, 15 (20%) put their income between RM342.00 and RM685.00, whereas 91 (11.9%) of the respondents' income was below RM342.00. As for dependents, about 63 (8.2%) had no dependents to support and 392 (36.5%) of the respondents supported a medium size family consisting of 1-4 persons in a family, while 279 (36.5%) of the respondents supported a family of 5-10 persons, 26 (3.4%) supported a large family of 11-15 persons, and about 4 (0.5%) of the respondents supported a large family of 16 and above. The respondents claimed that they practised good dietary habits whereby the majority of them 758 (99.2%) ate local vegetables with their meals, 711 (93.1%) took all kinds of seafood daily, 678 (87.7%) of them ate fruits and cereals in their daily diet and 569 (74.50%) of the respondents claimed that they took meat, chicken and eggs daily. About 435 (56.9%) of the respondents breast fed their children, 257 (33.6%) practised a mixture of breast and infant formula feeding, and only 32 (4.2%) of them practised formula feeding. Their demographic profile showed that the majority of the respondents were living below the poverty levels and had a large number of dependents to support, leading to having less purchasing power. But they are self supporting in growing fruits, vegetables, hill rice, and tubers, rearing domestic animals and doing their own fishing in ponds and rivers.

B24 Assessment of level of knowledge and attitude towards osteoporosis, calcium intake and physical activity among Malay women aged 35-60 years old in Felda Kemahang 01, Tanah Merah, Kelantan

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The purpose of this study was to determine the level of knowledge and attitude towards osteoporosis, calcium intake and physical activity among a sample of Malay women aged 35-60 years old in FELDA Kemahang 01, Tanah Merah, Kelantan. A total of 100 respondents was selected by simple random sampling. The interview sessions were conducted at their home using a set of questionnaires. Information on background data, milk consumption pattern, menopausal status, family history of osteoporosis and sources of information about osteoporosis were obtained. Calcium intake was determined using the semi-quantitative Food Frequency Questionnaire (SFFQ) while physical activity was assessed using the International Physical Activity Questionnaire (IPAQ). The mean age of the respondents was 46.54 ± 4.31 years old. The mean number of children and household size was reported as 6.95 ± 2.18 and 6.41 ± 1.74 persons, respectively. The mean monthly income was RM1,024 ± 339.86. Only 26% of the respondents had attained menopause for a duration of between one and seven years. About 4% of them had experienced a family history of osteoporosis and bone fracture. A majority (84%) of them had heard about osteoporosis and most of them (76%) received information about osteoporosis through the mass media. The mean scores for knowledge and attitude towards osteoporosis were 77.08 ± 6.68% and 83.32 ± 7.21%, respectively. A majority of the respondents (92%) were categorised in the upper tertile (>66%) of the knowledge scores. The mean intake for calcium was 578.07 ± 91.13mg and the main sources of calcium were vegetables (27.9%), milk and its products (15.5%) and fruits (14.1%). A majority (91%) of the respondents had intake of calcium above the Malaysia RDA (450mg). On the other hand, a total of 86% and 39% of the respondents were considered to have inadequate intake of calcium (<2/3RDA), based on the recommendation by FAO/WHO (2002), and the Malaysian RNI, respectively. About 63% of the respondents were classified as moderately active. Pearson correlation test showed no significant relationship between scores of knowledge and attitude towards osteoporosis with calcium intake and level of physical activities. In conclusion, the level of knowledge related to osteoporosis among the respondents was relatively high and they had a positive attitude towards osteoporosis. However, these findings were not reflected in their dietary calcium intake and level of physical activity. Therefore, relevant information and appropriate health education programmes on osteoporosis and its associated risk factors should be provided to those at risk, especially in the rural areas.

B25 Development of food frequency questionnaire (FFQ) for the adult populations in Sarawak

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This study aims to develop an FFQ for adult populations of Sibu in Sarawak. 196 subjects of 71 Chinese, 37 Malays, 26 Melanaus and 62 Ibans (93 men and 103 women) aged between 18 and 62 participated in this study. Anthropometric measurements such as body weight, height, waist and hip circumference and body fat percentage were taken. One-day 24-hour diet recall method by interview was used to determine the food items to be included in the FFQ and a questionnaire was used to evaluate meal pattern of the subjects. The mean weight, height, body mass index, waist-hip ratio and body fat percentage for men were 70.54±11.45kg, 1.68±0.09m, 25.00±3.84kgm^{-2}, 0.97±0.07 and 22.85±5.80% respectively and for women were 57.86±11.13kg, 1.56±0.06m, 23.74± 3.98kgm^{-2}, 0.83±0.07 and 30.64±5.48% respectively. Food items that contributed to 90% or more of the energy and macronutrients in the diet of the populations were included in the FFQ. Major contributors of energy and carbohydrate were white rice, various types of noodles (mee kampua, mee and mee hoon) and various types of rice (fried rice, chicken rice and coconut milk rice). Main contributors of protein were fish, sea food and fish-based products, chicken and chicken-based products and white rice. Half of the fat in the diet were contributed by chicken and chicken products, various types of noodles and fish, sea food and fish-based products. There were subtle differences in the meal patterns among the ethnic groups. Common breakfast items consumed by subjects were various types of noodles, cakes, bread and porridge together with hot beverages such as milo, tea added with condensed milk and/or sugar or coffee. Main meal dishes for lunch and dinner were similar with white rice, vegetables (stir fried with pieces of chicken/meat), fish (mostly fried) or meat (fried or cooked with soy sauce) and soup (flavour of chicken/duck/vegetables/egg). An FFQ specific for adult populations of Sibu in Sarawak comprising 71 food items in 10 food groups was developed. This FFQ needs to be calibrated before it is used to assess the food and nutrient intake of selected population in different districts in Sarawak.

B26 Fast food consumption and its effect on diet quality of adolescents in Kuala Lumpur

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Fast food is seen to be gaining popularity due to the mushrooming of fast food outlets especially in Kuala Lumpur. This study was carried out to assess fast food consumption patterns and its effect on diet quality amongst secondary schoolchildren in Kuala Lumpur. A total of 402 adolescent boys and girls aged 12-15 years participated in

this study. Anthropometric measurements, including body weight and height, and body composition, were assessed using bioimpedance (Maltron 916). Diet record was carried out on two separate days to compare nutrient intakes on a day with fast food consumption (FF) and another day without (nFF). All subjects completed a questionnaire on food habits. Mean body mass index (BMI) was 20.4 ± 4.6 kg/m^2 and 20.3 ± 4.3 kg/m^2, respectively for boys and girls; while mean body fat percentage was 25.3 ± 5.8% and 27.9 ± 4.5%, respectively. More than half the adolescents (63.7%) liked to eat fast foods. The most popular fast foods were burger (30.8%), fried chicken (16.4%) and pizza (12.9%), with the top three fast food restaurants in similar order: McDonalds (52.7%), Kentucky Fried Chicken (30.2%), and Pizza Hut (9.8%). Portion sizes most often consumed were regular (62.2%), small (23.3%) and large (14.5%). The most preferred beverages at fast food restaurants was carbonated soft drinks (76.0%). Most adolescents like to consume fast foods for the following reasons: taste (56.8%), convenience (20.0%), and easily accessible location (11.6%). Frequency of fast food consumption was every day (2.2%), once a week (19.3%), 2-3 times a month (29.3%), once a month or less (48.8%), and never (0.5%). Mean intakes on fast food days (FF) were significantly higher ($p<0.05$) than those on non-fast food days (nFF) for energy (FF 2067 ± 404 kcal/d, nFF 1595 ± 396 kcal/d), protein (FF 77.7 ± 29.6 g/d, nFF 53.0 ± 19.8 g/d), fat (FF 91.3 ± 25.3 g/d, nFF 60.7 ± 21.8 g/d), niacin (FF 14.5 ± 9.9 mg/d, nFF 10.0 ± 4.7 mg/d), and sodium (FF 2804 ± 1037 mg/d, nFF 1415 ± 1080 mg/d). It is good to note that 69.7% of the adolescents knew the effects of over-consumption of fast foods, and that the majority of them (59.0%) would choose more healthful foods if available. It may be concluded that most adolescents in Kuala Lumpur consume fast foods, and they ate more total energy and had poorer diet quality on days with fast food compared to days without fast food.

B27 Dietary habits and weight loss behavior among female college students

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The objective of this study was to assess the students' body weight, eating habits and weight loss behaviour. Weight gain during college years has been described as a problem, particularly for female students. Questionnaires were distributed to students aged between 18 and 24 years old. Anthropometric measurements, 24-hour food recall, food frequency form, weight loss behaviour, exercising habits and students' knowledge, attitudes and behaviours towards a healthy lifestyle, were collected through questionnaires. Body mass index was vital in this study. Results showed that 25% were underweight, 61.2% were of normal weight, and 13.8% were overweight. 63.8% desired to lose weight, 52.5% were undergoing dieting and 8.75% smoked to control their weight. To aid in losing weight, 12.5% binged, 33.8% fasted, 6.25% vomited and 60% exercised. Daily energy intakes were less than the recommended RDA of 2000Kcal while daily fat intakes were less than 30% of daily energy intake. These findings suggest that the students are health conscious and consume foods which are not high in calorie and fat.

B28 Diet and lifestyle for cancer prevention: knowledge, attitude, and practices among male students in Universiti Putra Malaysia, Serdang

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A cross-sectional study was conducted to assess knowledge, attitude, and practices (KAP) on diet and lifestyle behaviours for cancer prevention among 100 male students (50% Malay and 50% Chinese) in Universiti Putra Malaysia. Height and weight were measured using the SECA Bodymeter and the TANITA weighing scale respectively, for computation of body mass index (BMI). A self-administered questionnaire was used to obtain information on socio-demographic background and KAP on nutrition, body weight management, and lifestyle behaviour. Dietary intake was determined using a Semi-quantitative Food Frequency Questionnaire (SFFQ). Data analysis was carried out using SPSS ver.12. The mean age of respondents was 21.48±1.70 years. The majority of respondents were in the normal Body Mass Index (BMI) category (69%) while almost equal proportions were overweight (15%) and underweight respectively (14%). Results show that 30% of respondents had high nutritional knowledge scores, followed by 38% who obtained medium scores and 32% of respondents obtained low scores. Majority of respondents obtained the nutrition and cancer information from TV/radio (24%), journals/magazines (32%), internet (14%), family (15%), friends (12%), and others (3%). For attitude scores, 69% of respondents reflected an overall positive attitude while 31% showed a negative attitude. For dietary practices, the World Cancer Research Fund guidelines (WCRF, 1997), were used. Only 12.9% of respondents consumed fat less than 30% from total energy intake/day, 79.6% of respondents consumed red meat less than 80g/day, while 60.8% of them consumed fruits and vegetables more than 400g/day. For lifestyle practices, 7% of respondents smoked, and only 14.1% of respondents did any form of exercise for at least 30 minutes/day. Knowledge scores were significantly related with attitude scores ($r=0.378$, $p<0.01$). This shows the higher the knowledge, the better the attitude of respondent towards healthy eating and lifestyle behaviour. However, dietary practices were not significantly associated with knowledge and attitude. In conclusion, this study shows that a majority of male students have a moderate level of knowledge and show a positive attitude towards healthy eating and lifestyle but this was not reflected in their practices particularly in fat, fruit and vegetables intake and exercise. Therefore, cancer preventive education on diet and lifestyle practices is recommended for this group in order to improve their practices that may help in reducing their risk of cancer in the future.

B29 Ethnic comparison on basic sensory taste between Malay and Chinese students and Malay adults

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Dietary habits can determine the context, frequency and intensity with which food-related flavours are experienced and come to be preferred. Several studies have documented ethnic differences on taste acceptances. Therefore, the aim of this study was to compare the acceptance of four basic tastes; sweet, salty, sour and bitter, and a novel taste known as umami, between the Malays and Chinese. The solutions were prepared with different molarity. The taste solutions for sweet are sucrose (1%, 2%, 3%), salty (NaCI 0.1%, 0.2%, 0.4%), sour (citric acid 0.035%, 0.07%, 0.14%), bitter (1 tablet Aspirin/360 ml, 1 tablet Aspirin/240 ml, 1 tablet Aspirin/120 ml) and umami (monosodium glutamate 0.01%, 0.03%, 0.05%). A hedonic scale with 5 points beginning with "no taste at all" to "extremely strong taste" was used to assess the intensity of these solutions. The subjects were the Malay (n=54) and Chinese (n=104) students and staff of Universiti Kebangsaan Malaysia (n=28). The results of this study showed that there was a significant difference in the taste of sweet and salty at low molarity solution between Chinese students and Malay students, and also between Chinese students and Malay adults. This showed that the Malay students and the Malay adults could recognise the sweet and salty taste, indicating that the subjects are accustomed to sugary and salty foods. For the middle molarity solution, a significant difference was observed between Malay adults and Malay students, and also between Malay adults and Chinese students for sweet taste. The Chinese students had significantly lower mean intensity rating for salty taste. It shows that both of the Malay and Chinese students preferred sweet and salty foods more than the Malay adults. The mean intensity rating of umami taste among the Chinese students was significantly greater than the Malay adults and the Malay students in the high molarity solution. It seems that the Chinese students tend to have higher habitual intake of foods with monosodium glutamate added. As a conclusion, acceptance of basic taste differs between ethnic and age and this is due to the individuals' habitual food intake and culture.

B30 Body composition among healthy individuals supplemented with antioxidants

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The capability of free radicals to induce lipid oxidation in human bodies has been related to the pathological process of various diseases, such as cardiovascular diseases, cancer, diabetes and aging. The research on biological antioxidants, therefore, has attracted great attention from both scientists and the public. Antioxidants are known to reduce free radical attacks and also the risk of many other diseases. However, little is known about the relationship between antioxidant, peroxidation and body composition. Therefore, the objective of this study was to evaluate the effectiveness of antioxidant namely lipoic acid (ALA) and tocotrienol on body composition among physically active males. A total of 63 subjects were selected and divided into five groups i.e control (Group A), placebo (Group B), supplemented with ALA (Group C), supplemented with tocotrienol (Group D) and supplemented with the combination of ALA and tocotrienol (Group E). The body composition was measured using body impedance technique (BIA), Maltron Bioscan 916 analyser at baseline, and 90 days. The supplemented group received 50 mg/day of ALA and/or 200 mg/day of tocotrienol for 90 days. After 90 days of supplementation, a desirable increase was found for 'reactance', a proxy indicator of Red Blood Cell (RBC) membrane integrity, in ALA (8.9%) and VE (4.1%) supplemented groups. A similar trend was noted for 'phase angle', indicator for general health, in all groups (range of increase 5.3% to 13.9%). There were no significant changes in BMI, percentage of body fat, percentage of fat free mass and total body water in all groups after 90 days supplementation. In conclusion, there is an improvement in general health in all subjects, possibly due to the physical training. It seems that 'reactance' as measured using BIA technique reacts positively to supplementation of antioxidants. The value of this parameter as a biomarker for antioxidants needs further investigation.

B31 Assessment of knowledge related to osteoporosis, physical activity and calcium intake among Malay female students at Universiti Putra Malaysia

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The objective of this study was to determine the level of knowledge related to osteoporosis, physical activity and calcium intake among Malay female students at UPM, Serdang. The sample consisted of 79 students between 20 and 25 years old. Information

on socio-demographic background, milk consumption pattern, knowledge related to osteoporosis, calcium intake and physical activity pattern was collected using a self-administered questionnaire. Weight and height measurements were self-reported. Data were analysed using the Statistical Package for the Social Sciences (SPSS 12.0). The mean age of the respondents was 21.5 ± 0.16 years and the mean monthly expenses for food was RM214.36 ± 13.264. Majority of respondents (96.2%) had information related to osteoporosis and the most common source of information cited by a majority of them was television (90.8%). Most respondents indicated that they consume milk (86.1%) and dairy products (94.9%). More than half (54.5%) of the respondents who did not consume milk indicated "They were not interested to drink milk" as a main reason. The mean body weight and height of the respondents were 51.49 ± 0.96 kg and 1.57 ± 0.07m, respectively, while the mean BMI was 20.9 ± 0.37 kg/m^2. According to BMI categories, about 20% of the respondents were underweight (BMI<18.5 kg/m^2) and 10.7% were overweight or obese (BMI>25 kg/m^2). The mean knowledge scores was 40.89 ± 1.6 and most of them were classified in the second tertile. The mean calcium intake was 356.64 ± 182.89mg/day. Majority (40.3%) of them did not fulfill two-thirds of the calcium requirement based on the RDA (450 mg) and most of them (81.8%) had inadequate intake of calcium based on the Malaysian RNI. The main sources of calcium were vegetables (25.5%) and dairy products (20.7%). The mean MET-min/week was 1191.8 ± 1108.45. Most respondents were categorised as inactive (44.3%) and minimally active (43.0%). Pearson Correlation test showed no significant relationship between knowledge scores and physical activity. However, there was a significant correlation between knowledge scores and calcium intake ($r = 0.28$, $p<0.05$). Chi-squared test also showed significant relationship between level of knowledge and level of physical activity ($c^2=4.86$, $p<0.05$). In conclusion, the level of knowledge related to osteoporosis was at a moderate level, while a majority of the respondents were categorised as inactive and minimally active. Therefore, campaigns and educational programmes to create awareness about osteoporosis and associated risk factors are needed among young female adults. Such preventive measures are important to promote optimal bone health and reduce the risk of osteoporosis in later years

B32 Differences in nutritional practices amongst mothers with low and normal birth weight infants

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A child's future health begins with the mother's nutritional status during pregnancy. Maternal malnutrition is one of the main determinants of low birth weight infants. The aim of this study is to determine the differences in nutritional practices amongst mothers with low and normal birth weight infants. In this cross-sectional convenience sampling study, 36 mothers with low birth weight infants and 36 mothers with normal birth weight infants within 6 months of age delivered at General Hospital, Tengku Ampuan Rahimah, Klang, Selangor participated in this study. Information on socioeconomic conditions, health status and reproductive history, nutritional practices and dietary intake during pregnancy of the subjects were obtained using questionnaires and face to face interviews.

Data on intake of nutritional supplements, food restriction or avoidance and foods that were seldom eaten were also identified. Mothers with twin pregnancies or multiple pregnancies were excluded and only Malaysian mothers were included in this study. Data was analysed using SPSS version 13.0 and DIET 4 software version 3.70. Differences in mean maternal age, mean years of education, mean household income and mean score of nutritional practices of mothers with low and normal birth weight infants were tested using independent t-test. Majority of the respondents in this study were Malay. The mean maternal age for mothers with low birth weight infants was 29.61 ± 7.08 years old while mothers with normal birth weight infants was 30.56 ± 5.22 years old. Mothers with low birth weight infants achieved 11.66 ± 5.74 kg weight gain during pregnancy while mothers with normal birth weight infants gained 12.46 ± 5.38 kg during pregnancy. About 55% of the subjects in this study had a normal pre-pregnancy body mass index. Iron and folate were the supplements taken by the majority of the respondents during pregnancy while fruits and vegetables were the food groups most restricted by the respondents. No significant differences were found between mean maternal ages, mean years of education, mean household income and mean score of nutritional practices between mothers with low and normal birth weight infants. The overall nutritional practices among mothers with normal birth weight infants were better than mothers with low birth weight infants.

B33 Stages of change on fruit and vegetable intake and nutritional status among adults (age 25 – 50)

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Stages of change, which consist of precontemplation, contemplation, preparation, action and maintenance, explain the stages experienced by most people when changing towards a healthier behaviour. This study describes whether demographic and socio-economic factors, nutritional status and dietary intake differ among stages of change related to fruit and vegetable intake. An analytical cross-sectional survey was carried out in a housing estate with data collected through interviews with subjects from the randomly selected houses. A total of 123 subjects (males = 67, females = 56) aged 25 to 50 years (mean = 35.45 ± 8.90) were categorised into five stages using the algorithm stages of change. Subjects' nutritional status was determined through Body Mass Index (BMI) and waist circumference. Dietary intakes were measured by using 24-hour dietary recall. Data were analysed descriptively and compared (ANOVA) among the stages of change. About 41.5% of the subjects were in the maintenance stage, followed by preparation (23%), precontemplation (16.3%), contemplation (11.4%) and action (8.9%). There was a significant association between stages of change and monthly income (X^2 = 35.065; $p<0.001$). Almost half of the subjects (47.2%) had normal weight, 37.4% were overweight and 15.4 % were underweight. More males (46.3%) were overweight compared to females (26.8%). About 13.8 % of the subjects had at-risk waist circumference. There were no significant differences observed among the stages in relation to BMI and waist circumference. The energy and nutrient intakes of subjects were adequate except for calcium (65%). There were significant mean differences in the percent kcal from carbohydrate (F = 3.196;

p<0.05) between preparation/action and maintenance. The intake of riboflavin were significantly different (F = 3.241; p<0.05) between precontemplation/contemplation and preparation/action. The serving numbers of fruit and vegetable intake showed significant differences (F = 3.862; p<0.05) between precontemplation/contemplation and maintenance with intake increasing with progress to later stages of change (maintenance = 3.26 ± 2.13; preparation/action = 3.11 ± 3.14; precontemplation/ contemplation = 1.82 ± 2.08). Specific intervention is needed for different stages of change in order to promote intake of fruits and vegetables.

B34 Dietary intake and physical activity among University Putra Malaysia (UPM) students

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The purpose of this study is to assess the dietary intake and physical activity of University Putra Malaysia (UPM) students. 126 students aged 19 to 28 years (59 male and 67 female) participated in this study. Weight and height were measured and compared to BMI classifications by World Health Organization (WHO). Dietary intake and physical activity were assessed by 3-day food record and International Physical Activity Questionnaire (IPAQ) respectively. Socioeconomic factors that can affect nutritional status of the students were also evaluated. The results indicated that the prevalence of underweight and normal weight were 26.2% and 61.1% respectively, while the prevalence of overweight and obesity were 10.3% and 2.4% respectively. Dietary intake data showed that while the average intakes of protein, fat, vitamin A, niacin and riboflavin exceeded the recommended nutrient intakes, the average intake of energy, carbohydrate, calcium, iron, thiamine and vitamin C were below the recommendations. Majority of the students were moderately active (77%), while 8.7% and 14.3% were vigorously active and inactive respectively. There was no significant association between socioeconomic factors, energy and nutrient intakes with Body Mass Index (BMI). Similarly, no significant association was found between physical activity level and BMI. A significant association was found between carbohydrate intake and physical activity level (p<0.05, r=0.203). Meanwhile, for energy and other macronutrients, no significant association was found. In general, the nutritional status and physical activity levels of these students was satisfactory.

Group C: Nutrients and Other Components in Food

C01 Effects of different cooking methods (raw, fried, boiled and steamed) on total lipid, fatty acids composition and peroxide value contents in Indian mackerel (*Rastrelliger kanagurta*) and red tilapia (*Oreochromis mossambicusx*)

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Fatty acid compositions of raw fish have been widely studied; however, the number of reports concerning the effects of cooking on the stability of those fatty acids is limited. Oxidation process is one of the major causes of food deterioration (rancidity); resulting in changes in flavour and odour. The objective of this research was to estimate and compare the content of total lipids, fatty acids composition and peroxide value in raw, boiled, fried and steamed Indian mackerel (*Rastelliger kanagurta*) and red tilapia (*Oreochromis mossambicusx*). Indian mackerel and red tilapia were collected from a wholesale market in Seri Kembangan (Selangor, Malaysia) using the random sampling method. Total lipid content was estimated using the Bligh and Dyer (1959) method. Peroxide value content was estimated using Ainie *et al.* (2004) method and fatty acids composition was determined using a gas chromatography (GC). Total lipid content of raw, fried, boiled and steamed Indian mackerel were 35.02% ± 0.01, 36.61% ± 0.01, 31.31% ± 0.01, and 33.65% ± 0.17 respectively. In red tilapia, the total lipid content were 19.13% ± 0.03, 31.34% ± 0.01, 16.76% ± 0.01 and 16.83% ± 0.02 respectively. It was found that there was a significant difference ($p < 0.05$) in the lipid content of the raw fish compared to the heat-treated ones for all fish. The amount of ω-3 and ω-6 polyunsaturated fatty acid (PUFA) was shown higher in Indian mackerel compared to that in red tilapia. Composition of fatty acids in raw fish exhibited high amounts of PUFA, followed by saturated fatty acids, and finally monounsaturated fatty acids. Cooking, however, reduced the w-3, w-6 PUFA and oleic acid but increased the percentage of stearic acid (saturated fatty acid). Peroxide value content in Indian mackerel showed that fried was the highest (124.0 ± 4.24 mEq 0_2/kg oil) followed by boiled (36.0 ±1.41 mEq 0_2/kg oil), raw (27.0 ± 4.24 mEq 0_2/kg oil) and steamed (25.0 ± 4.24 mEq 0_2/kg oil). Peroxide value content in red tilapia showed that fried (69.0 ± 4.24 mEq 0_2/kg oil) was the highest followed by boiled (38.5 ± 4.95 mEq 0_2/kg oil), steamed (21.0 ± 2.83 mEq 0_2/kg oil) and raw (13.5 ± 2.12 mEq 0_2/kg oil). This data also showed that the peroxide value content of Indian mackerel is higher than red tilapia. This might be due to higher content of total lipids in Indian mackerel than red tilapia. Peroxide value (lipid oxidation) was also shown to be increased when the temperature of cooking method was increased. In conclusion, this study showed that cooking methods do affect the total lipid, fatty acids composition and peroxide value contents in fish studied.

C02 A comparison of the bioactivity of selected local herbs with some common western herbs

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Malaysia is rich with plants and herbs with the potential to act as natural medicine. However, there is still a lack of information on the bioactivity of these plants including their antioxidant and anti-cancer activities. The objective of this research was to measure the antioxidant and anti-proliferative activities of several local herbs against cancer cells and to compare them with some of the common western herbs. Six local herbs were analysed for their total phenolic content, antioxidative activities and anti-proliferative capacities. FRAP assay and DPPH assay were employed for the measurement of antioxidant activities. The breast cancer cell-line, MCF-7 was employed for the analysis of anti-proliferative capacities. The percentage inhibition of the free radical, DPPH by the methanolic and water extracts of the local plants was in the range of 10-71%. With the western herbs, the range was 14-35%. The methanolic extract of Leucaena was the most active with a percentage inhibition of 71 ± 2 %. On the contrary, the most active western herb was the methanolic extract of marjoram which exhibited only a 34 ± 1 % inhibition at a concentration of 100 µg/ml of the extract. The reducing properties of the local herbs were comparable with the western herbs when measured using FRAP assay. The methanolic extract of Leucaena had the highest FRAP value (498 ± 23 µmole/L) compared to the western herbs which was the methanolic extract of thyme (436 ± 19 µmole/L). In the anti-proliferative study using MCF-7 cells in culture, five of the six local herbs showed anti-proliferative activities. The local herb Mollucan spinach did not show any inhibitory effect. The water extract of Leucaena exhibited the highest inhibition at 66 ± 6 % whereas with the western herbs, the highest inhibitory activity was demonstrated in the methanolic extract of sage, at 81 ± 1 %. In general, we observed that both the methanol and water extracts of the local herbs contained considerable antioxidant activities, both as reducing agents and radical scavengers as well as anti-proliferative activities. It can be concluded that local herbs are as active as the western herbs in terms of their antioxidant activities as well as their ability to inhibit cancer cell proliferation. More studies are being conducted to further analyse the active compounds present in these plants including their mode of action.

C03 Total antioxidant activity of white, brown and germinated brown rice (GBR)

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Brown rice grains contain more nutritional components than the milled rice or white rice. The white rice (W-A and W-B) and brown rice (B-C and B-D) were each subjected to

four experimental conditions to induce germination and no germination: unsoaked (non-germination) and soaking for 3, 9, and 27 hours (germination). The objective of the study was to determine the total antioxidant activity between unsoaked and soaked white rice (W-A and W-B) as well as for the brown rice (B-C and B-D) samples. No germination was observed for the soaked white rice (W-A and W-B) whereas germination occured when brown rice (B-C and B-D) was soaked in water at ambient temperature. These samples were then dried at 40°C to remove the additional moisture for storage as well as to stop germination. The unsoaked and soaked samples were then extracted with n-hexane, and the extracts were evaluated for total antioxidant activities, tocopherol, tocotrienol and oryzanol content. Total antioxidant activities were measured using ferric thiocyanate (FTC), thiobarbituric acid (TBA) and electron spin resonance (ESR) methods, while the amount of tocopherol, tocotrienol and oryzanol in each sample was determined using high-performance liquid chromatography (HPLC). Germinated brown rice C soaked for 3, 9 and 27 hours showed a significant increase in total antioxidant activities, tocotrienol and oryzanol content compared to other samples of white rice (W-A and W-B) and brown rice (B-D). This indicates that germination of brown rice by soaking is a good treatment to increase the nutritional values in rice which has been a staple food for most of the world's population.

C04 Total antioxidant activity and phenolic content of selected vegetables under condition of *in vitro* digestion

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Common fruits and vegetables are good sources of antioxidants and polyphenols. These compounds have been shown to have a wide range of potential health benefits, and understanding the bioavailability of polyphenols from foods is becoming increasingly important. The objective of this study is to assess the stability of phenols from carrot, cabbage and spinach using an in vitro digestion procedure that simulates the physio-chemical changes that occur in the upper gastrointestinal tract (GIT). Three vegetables namely carrot, cabbage and spinach were subjected to an in vitro gastrointestinal digestion. The IN sample, which represents the serum-available material, and the OUT sample, which represents the materials that remains in the GIT and passes through the colon, were measured for total phenolic content using Folin-Ciocalteau assay and total antioxidant activity using FRAP assay. All the total phenol content of the carrot, cabbage and spinach survived gastric digestion. Under simulated pancreatic digestion, a significant decrease in percentage recovery of phenols in carrot, cabbage and spinach was observed both in the IN and OUT fraction. The recovery of phenols in the IN fraction is significantly lower than the recovery of phenols in the OUT fraction for all the vegetables. Spinach showed lower recovery of phenols compared to cabbage and carrot in the OUT fraction. In the IN and OUT fraction with regard to the initial fraction, carrot, cabbage and spinach showed significant decrease in total antioxidant activity. There is a significantly strong relationship between total antioxidant activity and phenolics contents for all the vegetables in the postgastric fraction. However, no significant relationship was found in the IN and OUT

fraction. Overall this study showed that phenolics content was significantly affected by pancreatic digestion but not pepsin digestion.

C05 The anti-proliferation effects of tea tree and patchouli's essential oils in breast cancer cell lines

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Plants from tropical regions are considered to be potential sources for the screening of anti-proliferative agents. Two essential oils are extracted from local medicinal plants, tea tree *Melaleuca alternifolia* and patchouli *Pogostemon cablin* for this research. Tea tree *Melaleuca alternifolia* has been shown to have impressive anti-viral, anti-bacterial, anti-microbal, anti-septic, and anti-fungal properties while patchouli *Pogostemon cablin* is used to treat anxiety and dry mature skins. It was hypothesised that both essential oils have anti-proliferative effects towards human breast (MCF-7 and MDA-MB-231) cancer cell lines. This study was conducted with the aims to evaluate the effects of two essential oils towards MCF-7 and MDA-MB-231 cancer cell lines. Both cell lines were treated with different concentration range of two essential oils, 0, 20, 40, 60, 80 and 100 µg/ml. Cell growth inhibition was determined using MTT assay. Viable cells converted yellow tetrazolium salt to blue formazan product, which were measured by ELISA reader. This assay was performed to obtain dose-response relationship between the concentrations of the essential oils and the percentage cell viability of cancer cells. The IC_{50} value obtained for tea tree and patchouli essential oils on MCF-7 cells are 81.333±11.015 and 63.667±2.082 µg/ml respectively. On the other hand, the IC_{50} of tea tree and patchouli essential oils on MDA-MB-231 are 84.667±4.163 and 70.333±5.508 µg/ml. From the study, the IC_{50} of patchouli essential oils is higher than tea tree essential oils on both cancer cells, thus it is more effective in killing breast cancer cells. Therefore, this study has proved that the two essential oils have anti-proliferation effects on breast cancer cells with different IC_{50}.

C06 Antioxidant activities of *Strobilanthes crispus* and *Centella asiatica* juices pasteurised at various times and temperatures

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The objective of this study was to determine the antioxidant activities of *Strobilanthes crispus* and *Centella asiatica* juices during pasteurisation. Juices were prepared by homogenising *Strobilanthes crispus* and *Centella asiatica* purees singly with honey and natural food stabiliser. These products were then subjected to various times (8 to 30 min)

and temperatures (60 to 80°C) of processing. Their antioxidant activities were determined via 1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging assay with L-ascorbic acid and BHT as positive controls. *Strobilanthes crispus* juices showed higher antioxidant activities than *Centella asiatica* juices at various times and temperatures studied. *Strobilanthes crispus* juices also showed comparable antioxidant activities to L-ascorbic acid and BHT. As time and temperatures increase from 8 to 30 min and 60 to 80°C respectively, the antioxidant activities of both juices exhibited minimal changes. Thus, *Strobilanthes crispus* and *Centella asiatica* juices pasteurised up to 80°C can still retain high antioxidant activity.

C07 Cytotoxic effect of different partitions of *Nigella sativa* L. oil extracted

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Nigella sativa L., commonly known as black cumin seed, belongs to the botanical family of Ranunculaceae. It has been used in many Middle Eastern countries as a natural remedy for 2000 years. Among the promising medicinal plants, *N. sativa* is an amazing herb with a rich historical and religious background. The effects of 72 h incubation with different concentrations (10–100 µg/ml) of the different partition of *Nigella sativa* oil extracted using methanol, hexane and ethyl acetate were tested on the human hepatoma (HepG2) cell line by 3-(4,5 dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. The powder seeds were extracted with 90% methanol at room temperature and then half of the methanol concentrated extract was partitioned with n-hexane and half of the hexane concentrated extract was partitioned with ethyl-acetate. All the above partitions were tested in HepG2 cell lines. Results from MTT assay demonstrated that the greatest inhibitory effects of the different partitions were observed with the ethyl acetate partition where the IC_{50} values of ethyl acetate extraction of *N. sativa* oil was 25 µg/ml, whereas for hexane 67.5 µg/ml and for methanol was 75.2 µg/ml. Further experiments are worthwhile to determine the anticancer potential of this plant decoction and its components.

C08 Total phenolic content and antioxidant activity of selected spices

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Phenolic substances have been shown to be responsible for the antioxidant activity of plant materials. So, the aim of this study was to determine the total phenolic content and antioxidant activity of selected spices (nutmeg, cinnamon, coriander, fenugreek and

anise). The total phenolic content was determined by Folin-Ciocalteau method and total antioxidant activity was investigated with four different methods: radical scavenging activity using α-α-diphenyl-β-picrylhydrazyl (DPPH), β-carotene bleaching (BSB) test, ferric thiocyanate (FTC) and thiobarbituric acid (TBA) method. Samples were extracted with organic solvent (80% ethanol). The highest phenolic content was obtained from cinnamon (9670±127.28 mg of GAE/100 g extract) followed by nutmeg (2034±35.36 mg of GAE/100 g extract), anise seed (1674±30.41 mg of GAE/100 g extract), fenugreek (338±9.90 mg of GAE/100 g extract) and coriander (292±4.95 mg of GAE/100 g extract). One-way ANOVA test showed there are significant differences in phenolic content for each of the samples ($p < 0.05$). In the β-carotene bleaching (BSB) test, anise seed showed the highest antioxidant activity followed by nutmeg, fenugreek, cinnamon, and coriander. Anise seed also showed highest antioxidant activity followed by fenugreek, coriander, nutmeg, and cinnamon in the Ferric thiocyanate (FTC) and thiobarbituric acid (TBA) methods, whereas in free radical scavenging activity, cinnamon showed the highest antioxidant activity followed by nutmeg, anise seed, fenugreek, and coriander. The one-way ANOVA test indicated that there are significant differences ($p<0.05$) between the total antioxidant activity in four different methods that were used to determine antioxidant activity with each of spices. In this study, results showed good correlation between antioxidant activity and total phenolic content in DPPH method. In conclusion, different methods give different antioxidant power for each of samples.

C09 Fatty acid composition of six selected fishes: *Channa striatus*, *Clarias batrachus*, *Pangasius pangasius*, *Parastromateus niger*, *Megalaspis cordyla* and *Lates calcarifer*

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Fish are a major dietary source of very-long-chain n-3 polyunsaturated fatty acids. The consumption of fish and fish-derived products, which has considerably increased over recent decades, is recommended as a means of preventing cardiovascular diseases. The study was carried out to determine the types of fatty acids present and its composition in six selected fishes namely *Channa striatus* (haruan), *Clarias batrachus* (keli), *Pangasius pangasius* (patin), *Parastromateus niger* (bawal hitam), *Megalaspis cordyla* (cencaru) and *Lates calcarifer* (siakap putih). The fish samples were purchased during the month of September to December from two different markets in Kuala Lumpur and they were purchased at different time periods. Proximate analysis was conducted to determine fat, moisture, protein and ash content in the samples. Fatty acid methyl ester (FAME) was prepared by a modified direct transesterification method and the fatty acids were analysed by gas chromatography. The results showed that most of the fish contained less than 1% lipids by weight. The highest level of crude fat was found in *Pangasius pangasius* that is about 9.8%, followed by 7.4% *Clarias batrachus*, 0.5% *Channa striatus*, 0.4% *Lates calcarifer*, 0.2% *Megalaspis cordyla* and 0.1% *Parastromateus niger*. Palmitic acid (C16:0) was the predominant saturated fatty acid present in all the fishes, accounting for about 60-74%

of total saturated fatty acids. Oleic acid (C18:1) was the most abundant monounsaturated fatty acid. Linoleic acid (C18:2n6) and linolenic acid (C18:3n3) were the predominant polyunsaturated fatty acids. The *Megalaspis cordyla* has the highest content of palmitic acid that is about 31.2%, while *Lates calcarifer* has the highest linolenic acid that is 1.9%. Among the fishes, *Clarias batrachus* has the highest oleic and linoleic acid content that is about 42.0% and 20.9% respectively. The percentage of docosahexaenoic acid (DHA) exceeded that of eicosapentaenoic acid (EPA) in *Pangasius pangasius*, *Parastromateus niger*, *Megalaspis cordyla* and *Lates calcarifer* fish analysed. The ratio of n-3/n-6 was higher in *Parastromateus niger*, *Megalaspis cordyla* and *Lates calcarifer* fish. In conclusion, *Parastromateus niger*, *Megalaspis cordyla* and *Lates calcarifer* contained more than 10.5% ω-3 fatty acids. This information will enrich the current Malaysian Food Composition Table.

C10 Determination of total phenolic content and total antioxidant activities of *Strobilanthes crispus* and *Pandanus odorus* herbal drink

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The antioxidant activity and total phenolic content of herbal drinks which were prepared by two types of local herbs (*Strobilanthes crispus* [SC] and *Pandanus odorus* [PO]) were investigated. SC or locally know as 'pecah beling' has been used as traditional antidiabetic, laxative, antilytic and diuretic medicine. PO is a fragrance leaf with a pleasant aroma that is widely used in cooking especially in Southeast Asia. PO root extract has been shown to have hypoglycaemic effect in some studies. Few studies have been done on SC herbal tea to study its chemical compound, anticancer and antidiabetic properties. This research emphasised herbal drinks of SC, PO as well as mixture of SC and PO. The effects of of the preparation method (cut and blend) on antioxidant activity and phenolic content of the herbal drinks were also studied. Six types of herbal drinks, which were blended SC, blended PO, cut SC, cut PO, mixture of cut SC and cut PO as well as mixture of blended SC and blended PO were prepared. Radical-scavenging activity was also evaluated using DPPH test, where antioxidant activity was measure by β-carotene assay. SC showed higher scavenging activity and antioxidant activity than PO and mixture. Means of radical-scavenging activity were significantly different between blended and cut herbal drink for SC, PO and mixture herbal drinks. Only PO showed significantly different antioxidant activity between cut and blended herbal drinks. Phenolic content of herbal drinks were measured by Folin-Ciocalteu method. SC contained the highest phenolic content, followed by PO and mixture. In conclusion, cut herbal drinks showed higher antioxidant activity and phenolic content than blended herbal drinks in all tests. Preparation methods affected the antioxidant activity and total phenolic content in herbal drinks.

C11 Comparison of antioxidant activity and phenolic content in white tea with black tea, green tea and oolong tea

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All teas are made from the *Camellia sinensis* plant, but different processing methods produce different types of tea. Tea that contains antioxidants is found to have effects on cardiovascular disease, cancer, oral health, bone health, thermogenesis, cognitive function, iron status, and kidney stones. Unfermented teas (green tea and white tea) are rich in catechins, whereas fermented teas (black tea and oolong tea) are rich in theaflavins and thearubigins. The flavonol content of tea is less affected by processing, and flavonols are present in comparable quantities in fermented and unfermented teas. The objective of the study is to determine and compare the antioxidant activity and phenolic content in White Tea, Black Tea, Green Tea, and Oolong Tea. Four antioxidant assays were done namely ferric thiocyanate (FTC) method, thiobarbituric acid (TBA) method, α,α-diphenyl-β-picrylhydrazyl (DPPH) radical scavenging activity, and ferric reducing antioxidant power assay (FRAP). Folin-Ciocalteu method was used to determine the phenolic content of tea extracts. All tea extracts exhibited markedly antioxidant activity and phenolic content, especially green tea. The percentage of antioxidant activity found in tea extracts (1 mg/ml) using FTC method ranged from 19.58% to 58.56% in the decreasing order of green tea > white tea > black tea > oolong tea. The percentage of antioxidant activity found in tea extracts using TBA method ranged from 33.43% to 60.62% in the decreasing order of green tea > white tea > oolong tea > black tea. All tea extracts had 66.66 – 93.97% scavenging activity at a dose of 5 mg/ml. The radical scavenging effects of four tea extracts on the DPPH radicals decreased in the order of green tea > white tea > oolong tea > black tea. All four teas had ferric reducing ability, in the decreasing sequence of green tea > white tea > oolong tea > black tea, at 5 mg/ml. All tea extracts (1 mg/ml) had 368.80 – 543.30 GAE of phenolic content, in the sequence of green tea > white tea > oolong tea/black tea. All antioxidant activity, DPPH radical scavenging activity, FRAP assays in tea extracts had positive linear correlation with the phenolic content of the tea extracts. In general, green tea posseses the highest antioxidant activity and phenolic content as compared to white tea, black tea and oolong tea.

C12 The anti-proliferation effects of sitosterol in breast, cervical and ovarian cancer cell lines

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Many recent epidemiology studies point to the large part that diet may play in the development of human cancer. Sitosterol, the main dietary phytosterol found in plants,

may have the potential for prevention and therapy for human cancer. The extraction of sitosterol was done on *Strobilanthes crispus*, commonly known as "pecah beling" or "jin batu" in Malaysia. The present study examines the anti-proliferation effects, by using MTT cell proliferation colorimetric assay Kits in selected cancer cells. Sitosterol in increasing concentrations were then added to each well and incubated for 72 hours. For the next step, 10 µl of MTT labeling reagent were added to each well and incubated for 4 hours, followed by the solubilisation buffer being added to each well and incubated overnight. The plates were then read using ELISA reader at 550 nm wavelength. Treatment of sitosterol in increasing concentration gradient (0, 20, 40, 60, 80,100 µM) resulted in a dose-dependent growth inhibition in various cancer cells, MDA-MB-231 breast cancer cells, MCF breast cancer cell, HELA cervical cancer cell and CAOV3 ovarian cancer cell. Therefore, from the MTT cell anti-proliferation assay, the IC_{50} value was determined for all the cancer cell lines. The non-estrogen-responsive MDA-MB-231 cancer cell was given the lowest IC_{50} value 30.50 ± 7.47 µM in treatment of sitosterol, which is the most sensitive cancer cell, among other cancer cells. The estrogen-responsive MCF-7 cancer cell was given IC_{50} value 87.00 ± 9.64 µM in treatment of sitosterol. The CAVO3 ovarian cancer cell was given IC_{50} value 69.00 ± 6.25 mM in treatment of sitosterol. The HELA cervical cancer cell wasn't given IC_{50} value within the concentration range above, and proved to be the most resistant cancer cell among other cancer cells.

C13 Determination of macronutrients and energy content in selected bakery products and pastries served at the athletes' cafeteria, National Sports Institute of Malaysia

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Sports nutrition is the application of eating strategies to promote good health, adaptation to training and optimal performance during competition. It is therefore important to pay close attention to the dietary and nutrient intakes of the athletes to enhance performance and exercise capacity. Thus, this study was carried out to determine macronutrients and energy in selected bakery products and pastries served at the athletes' cafeteria of National Sports Institute. Moisture, ash, crude protein and fat were determined using proximate analysis whereas carbohydrates were calculated by difference. Energy content was determined by multiplying the protein, fat and carbohydrates by factors of 4kcal/g, 9kcal/g and 4kcal/g respectively. Ten types of selected bakery products and pastries were chosen by the chef according to their popularity and uniqueness among 38 types of bakery products and pastries from the 4 weeks menu cycles. The selected bakery products and pastries were divided into three groups comprising of breads (ciabatta, French loaf and soft roll), cakes (banana cake, blueberry cake and pandan layer) and pastries (apple strudel, chocolate eclair, custard danish and linzer tart). Each sample was collected 2 times from 2 different cycles in duplicates (n=2). At the end of the sampling, 4 replicates were collected for each sample. French loaf had the highest amount of carbohydrates (59.1 ± 2.2%) whereas pandan layer had the lowest (26.7 ±

2.41%). The protein content of soft roll was the highest (9.62 ± 0.1%) while the pandan layer had the lowest (1.48 ± 0.1%). Average fat content of breads (5.1 ± 4.2%) were the lowest among all groups and in fact French loaf (1.0 ± 0.1%) contained essentially low fat. The linzer tart contained the highest ash (1.8 ± 0.0%) whereas the pandan layer had the lowest (0.35 ± 0.0%). Results showed that there was a wide range of moisture among the samples. The moisture content ranged from 8.3 ± 0.2% in linzer tart to 67.1 ± 2.3% in pandan layer. Pastries contained the highest amount of fat (15.2 ± 10.6%) among the 3 groups. Linzer tart contained the highest fat (30.2 ± 2.2%) and also the highest energy (511 ± 11.6 kcal/100g) while pandan layer contained the lowest energy (152 ± 8.9kcal/100g). Breads were rich in complex carbohydrates, contained moderate levels of protein and little fat, making it relatively low in calories compared to other groups. Athletes are encouraged to consume breads as pre-game or post-game meal to get adequate amounts of carbohydrates to maximise muscle glycogen stores. It can also become a healthy snack before training. Pastries contain significant amounts of fat and it should be avoided before competition to prevent gastrointestinal distress. Findings from this study can be used as a helpful guide for athletes in choosing snacks according to their training or competition nutrition needs.

C14 Antioxidant activity of *Strobilanthes crispus* juice and its anti-proliferation effect on various cancer cell lines

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The objective of this study was to determine the antioxidant activity of *Strobilanthes crispus* (*Sc*) juice and its anti-proliferation effect on various cancer cell lines (MDA-MB-231, MCF-7, Caov3 and HeLa). It was hypothesised that *Sc* juice would have antioxidant activity and anti-proliferation effect towards the various cancer cell lines. The antioxidant activity of *S.c* juice at different concentrations (0.001%, 0.01%, 0.1%, 1%, 10%) was determined via 1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging assay with L-ascorbic acid as positive control. EC_{50} value was determined from the percentage of antioxidant activity versus concentration curve. Meanwhile, the anti-proliferative effect of *Sc* juice after 72 hours incubation at the same concentration range was determined using the MTT (3-[4,5-dimethylthiazol-2-yl]-2,5-diphenyl tetrazolium bromide) assay. The viable cells converted the yellow tetrazolium salt to blue formazan product, which were measured by ELISA reader and the IC_{50} value was determined from the percentage of the cells viability versus concentration curve. The EC_{50} value of *Sc* juice was 3.36±0.35% compared to 0.09±0.04% for positive control. The IC_{50} value for MDA-MB-231, MCF-7, Caov3 and HeLa cell lines were 2.34±0.61%, 2.81±1.05%, 4.18±1.28% and 5.53±0.48% respectively. The IC_{50} was found to be highest in HeLa cells whereas MDA-MB-231 cells exhibited the lowest IC_{50} value. The study showed that *Sc* juice has antioxidant capacity and anti-proliferative activity on all of the four cancer cell lines.

C15 Antiproliferation effect of phytic acid from rice bran on breast cancer cell lines

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Phytic acid (myo-inositol hexaphosphate) is an active ingredient of high fibre diet that has anti-cancer activity in both *in vitro* and *in vivo* models. To test the hypothesis that phytic acid mediates its function via inhibition of cell proliferation irrespective of hormonal dependence, its effect on growth inhibition and differentiation were studied in two human mammary carcinoma cell lines with different estrogen receptor status. Phytic acid was extracted by dissolving rice bran in HCI. Neutralisation had to be performed before it could be applied for cancer cell treatment. The human mammary carcinoma cell lines (MCF-7 and MDA-MB-231) were treated with 0.25-8.0mM of phytic acid and incubated for 48 hours at 37°C and 5% CO_2. Cell growth inhibition was quantitatively evaluated using the 3-(4, 5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. All the experiments were performed in triplicate. Much lower concentrations of phytic acid were required after 24 hours of treatment to inhibit the growth of MDA-MB-231 cells than MCF-7 cells; the IC_{50} for MDA-MB-231 cells was 2.933±0.153mM compared to 5.867±0.306mM for MCF-7 cells. Our data not only confirmed that the phytic acid inhibits the growth of breast cancer cells, the results also showed that the phytic acid affected both estrogen receptor independent and estrogen receptor dependent human mammary carcinoma cell lines. However, it inhibits the estrogen receptor independent cell line (MDA-MB-231) more than the estrogen receptor dependent cell line (MCF-7).

C16 Antioxidant and anti-proliferation activity of roselle juice on Caov-3, MCF-7, MDA-MB-231 and HeLa cancer cell lines

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Roselle (*Hibiscus sabdariffa Linn*) extract has been scientifically proven to possess high antioxidant activity, anti-proliferation and anti-carcinogenic properties. This study was conducted to evaluate the antioxidative capacity of commercialised roselle juice (RJ) at three storage periods and its anti-proliferative effect on breast (MCF-7 and MDA-MB-231), ovarian (Caov-3) and cervical (HeLa) cancer cell lines. The antioxidant activity of 1 week (WRJ), 1 month (MRJ) and 1 year (YRJ) juice samples each at 0.001-10% concentration range were determined via 1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging assay with L-ascorbic acid as positive control. EC_{50} values of 3.733±0.247% (WRJ), 3.717±0.637% (MRJ), and 3.383±0.711% (YRJ) were obtained, compared to 0.217±0.616%

for positive control. The difference in antioxidant activity between different storage periods of RJ was not significant ($p>0.05$) but all samples exhibited increasing activity with increasing concentrations. RJ at the same concentrations were tested using the MTT (3-[4,5-dimethylthiazol-2-yl]-2,5-diphenyl tetrazolium bromide) assay on the four cell lines to obtain the percentage viability of the cells. The cells were incubated for 72 hours after inoculation with RJ and the control group was without treatment. The IC_{50} was found to be highest for Caov-3 cells (2.267±1.193%) whereas MCF-7 cells exhibited the lowest (0.432±0.278%) IC_{50} value after treatment with MRJ. Increasing concentrations of each sample corresponded to lower percentage viability of cells for all samples; however, the interaction within and between cell type and storage period was not significant ($p>0.05$). The study showed that commercialised roselle juice has strong antioxidant capacity and anti-proliferative activity on the four cancer cell lines despite different storage periods. However, further study should be conducted to establish its anti-cancer mechanisms.

C17 Antioxidant capacity and total phenolic, flavonoids and hesperidin contents in selected citrus species in Malaysia

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This study aims to determine antioxidant capacity, total phenolic, flavonoids and hesperidin contents in citrus species. The selected citrus species are wild lime (Citrus hystrix), common lime (Citrus aurantifolia), musk lime (Citrus micocarpa) and oranges (Citrus sinensis). Antioxidant capacity (FRAP and DPPH assays), phenolic and flavonoids contents were determined based on spectrophotometry. Hesperidin content, a major flavonoid in citrus species was determined using a High Liquid Performance Chromatography (HPLC). Results showed wild lime had the highest phenolic content, followed by common lime, oranges and musk lime. Wild lime had showed the highest flavonoids content, followed by common lime, musk lime and oranges. Common lime had the highest hesperidin content, followed by wild lime and oranges, but it was not detected in musk lime. Wild lime showed the highest ferric reducing power, followed by common lime, oranges and musk lime. Wild lime showed the highest free radical scavenging activity (35 mg/ml) expressed as EC_{50} value among four citrus species. A very strong, positive correlation ($r = 0.909$; $p < 0.01$) was found between total phenolic and ferric reducing power. A similar result was also observed between total flavonoids and ferric reducing power. A significant correlation ($r = - 0.947$; $p < 0.01$) was found between total phenolic and free radical scavenging activity. There was a negative correlation ($r = - 0.958$; $p < 0.01$) between total flavonoids and free radical scavenging activity. Moderate correlation was found between hesperidin content and antioxidant capacity. The study indicated that wild lime (commonly known as 'limau purut') exhibited the highest antioxidant capacity and phenolic content compared to other citrus species studied. The high antioxidant capacity, especially the ferric reducing power of 'limau purut' might be due to its flavonoid compounds. Besides hesperidin, other flavonoids could also contribute to antioxidant capacity of citrus species.

C18 Potential of antioxidative compound, phytic acid (IP-6), as anti-proliferation agent on human colon cancer cell line, HT29

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Colon cancer is a serious health problem in most developed countries and according to MOH (2002), colon cancer is the third cause of death in Malaysia, contributing to 9.23% of total death cases. Progressive introduction of western dietary food in Malaysia, which is high in fat and low in fibre, has caused the incidence of colon cancer to increase. Phytic acid (IP6) is a simple ringed carbohydrate with six phosphate groups attached to each carbon (a bioactive sugar molecule). It is found in high concentrations especially in wheat bran, rice bran and wheat germ. Recent reports suggest it may possess various significant health benefits such as antioxidant and anticancer properties. Previous reports revealed that phytic acid is a potent inhibitor of iron mediated generation of the hydroxyl radical. It is proposed that inhibition of intracolonic hydroxyl radical generation may contribute to the suppression of colonic carcinogenesis. In this study, the effect of extracted phytic acid from rice bran is tested to colon cancer cell line (HT-29). The cytotoxic effect of rice bran phytic acid and corn (commercial) phytic acid were quantified using MTS [3-(4,5-dimethyiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-3(4-sultophenyl)-2H-tetrazolium] inner salt assay. IC_{50} value for the treated cancer cell line was obtained by plotting the cytotoxicity percentage against the concentration of both samples (mM). The cell was treated with the extract in different ranges of concentration (1×10^{-6} to 10mM). This is to screen the anti-proliferation effect of the sample containing phytic acid on cell growth in dose-dependent manner. In conclusion, phytic acid's ability to inhibit the growth of colon cancer cells renders it a possible chemotherapeutic compound for the treatment of colon cancer.

C19 Total phenolic content, antioxidant activity and antiproliferation effect of grape and raisin on human breast and cervical cancer cell lines

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Grapes (*Vitis vinifera*) are one of the most widely consumed fruits in the world and can be found in three basic colours, green, red and blue black. Raisins are dry grapes with only 15% of water compared to about 80% in grapes. One group of cancer preventive phytochemicals that is receiving increasing attention in recent years is polyphenolic antioxidants. Thus, two types of grapes, Red Globe (red grape) and Calmeria (green grape) and two types of raisins, Golden Raisin (yellow raisin) and Dark Raisin (black raisin) were used to investigate their beneficial effect on human health. All the extracts were defined as fresh weight of edible portion and ethanol is the main solvent used. Total

phenolic contents were determined with the Folin-Ciocalteu reagent using method of Velioglu (1998). DPPH (1, 1-diphenyl-picrylhydrazyl) free radical scavenging method according to Cervatto et al., (2000) was used to evaluate the antioxidant activity. The study on antiproliferation effect was determined using MTT (3-[4,5-dimethylthiazol-2-yl]-2, 5-diphenyltetrazoliumbromide) assay against women cancers such as breast (MDA-MB-231), and cervical (HeLa) cancer cell lines. The results showed that the mean total phenolic concentration, expressed as mg GAE (Gallic Acid Equivalent) per 100 g of fresh samples of red grape, green grape, golden raisin and dark raisin was 56.9 ± 0.014 mg, 78.7 ± 0.023 mg, 217.6 ± 0.124 mg and 169.0 ± 0.036 respectively. The results show that golden raisins contain the highest amount of phenolic concentration. There were no significant differences ($p>0.05$) in the total phenolic content between red grapes and green grapes, also between golden raisins and dark raisins, but there are significant differences ($p<0.05$) in mean total phenolic content between grapes group and raisins group. For the antioxidant activity, different concentrations ranging from 0.5 to 3.0 mg/ml organic and aqueous extract were used to determine the free radical scavenging activity. According to one way ANOVA analysis, there were no significant differences ($p>0.05$) in free radical scavenging activity of ethanol extracts for all samples. In aqueous (water) extract however, all fruits showed significant differences ($p<0.05$) in the free radical scavenging activity with golden raisins still exerting the highest free radical scavenging activity (EC_{50}= 0.04 ± 0.003 mg/ml). Pearson correlation test showed a very strong positive relationship ($R^2> 0.9$) ($p<0.05$) between total phenolic content and the antioxidant activity against the free radicals. The findings on antiproliferative effect against MDA-MB-321 (non-hormone dependent) breast cancer cell lines showed only golden raisins achieved the IC_{50} value at concentration of 3.0 ± 2.021 mg/ml while there were significant differences ($p<0.05$) in the antiproliferation effect against the cancer cell lines for all samples except for green grapes and dark raisins. All samples, except for red grapes, have the IC_{50} value against HeLa cervical cancer cell lines. The lowest IC_{50} value was obtained by green grapes (4.0 ± 0.379 mg/ml) followed by golden raisins (4.3 ± 0.1 mg/ml) and dark raisins (4.5 ± 0.451 mg/ml). There was also a strong negative association (R^2=-0.892) ($p<0.05$) between antioxidant activity and the antiproliferation effect of all fruits against all cancer cell lines. Although this study have shown some potential effects of grapes and raisins against cancer, further studies need to be conducted using dry basis or different solvents and the underlying mechanisms by which antioxidants can actually suppress cancer also have to be clearly stated.

C20 Determination of total phenolic contents, antioxidant activity and antiproliferation effect on breast cancer and cervical cancer cell lines in red pitaya *hylocereus polyrhizus*, red pitaya *hylocereus undatus* and strawberry fruit

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The aim of this study was to compare total phenolic content, antioxidant activity and antiproliferation effect on non-hormone dependent breast cancer (MDA-MB-231) and

cervical cancer (HeLa) cell lines in red pitaya *h.polyrhizus*, red pitaya *h.undatus* and strawberry fruit. The total phenolic content was determined according to the Folin-Ciocalteu method, while antioxidant activity of two types of extract was evaluated by α,α-diphenyl-ß-picrylhydrazyl (DPPH) radical scavenging assay and antiproliferation effect on cancer cell lines was determined by 'Micro-culture Tetrazolium salt' (MTT (3-[4,5-dimetylthiazol-2-yl]-2-5-dyphenyltetrazoliumbromide)) method. In this study, all the fruits were used in fresh form and were not freeze-dried. From the results, obviously, strawberry showed the highest total phenolic content and antioxidant activity compared to other samples. The obtained result for phenolic content was 93.716 ± 2.867 mg GAE/ 100g fresh weight for strawberry, 8.281 ± 0.967 mg GAE/100g fresh weight for red pitaya *h.polyrhizus* and 6.278 ± 0.317 mg GAE/ 100g fresh weight for red pitaya *h.undatus*. The total phenolic content of each sample was determined by comparison between the sample extracts with the standard-phenolic. The one-way ANOVA test showed that overall, the total phenolic content had significant differences with value of $F= 2423.244$; $p= 0.000$ ($p<0.05$). In DPPH method, two types of extraction were used. EC_{50} value was used as criteria to determine whether the extract might have antioxidant potential. EC_{50} value was determined from the graph of percentage of DPPH radical scavenging activity against concentration of sample extract (mg/ml). EC_{50} for strawberry and red pitaya *h.polyrhizus* for ethanol extract was 3.333 ± 0.289 mg/ml and 88.667 ± 1.155 mg/ml respectively, while, water extract was 16.333 ± 0.577 mg/ml and 98.333 ± 0.577 mg/ml respectively. There is a very strong positive correlation between phenolic contents and antioxidant activity ($p<0.01$) with $r^2 = 0.980$. For the antiproliferation activity, non-hormone dependent breast cancer (MDA-MB-231) and cervical cancer (HeLa) cell lines with concentration 1×10^5 cell/ml were treated with ethanol 100% extract from red pitaya *h.polyrhizus*, red pitaya *h.undatus* and strawberry fruit at concentrations of 1, 2, 3, 4 and 5 mg/ml. Incubation period for this treatment was 72 hours at 36°C with use of 5% CO_2. IC_{50} value was used as criteria to determine whether the extract might have anticancer potential. IC_{50} value was determined from the graph of percentage of life cells (viability cell percentage) against concentration of ethanol extract of the samples (mg/ml). Results showed that the extract of strawberry had IC_{50} value for non-hormone dependent breast cancer (MDA-MB-231) and cervical cancer (HeLa) cell lines at 2.163 ± 0.125 mg/ml and 4.030 ± 0.017 mg/ml respectively. Meanwhile, IC_{50} for red pitaya *h.polyrhizus* for cervical cancer (HeLa) cell lines was 4.508 ± 0.080 mg/ml. In conclusion, red pitaya *h.polyrhizus* and strawberry extracts have anticancer potential on cervical cancer (HeLa) cell lines and only strawberry extracts have anticancer properties on non-hormone dependent breast cancer (MDA-MB-231) cell lines. Overall, strawberry showed high phenolic contents, high antioxidant activity and high effect in antiproliferation activity on breast and cancer lines compared to other samples studied.

C21 Determination of antioxidant capacity and phenolic content in teh Sarawak (*Phyla nodiflora*) and belimbing pasir (*Oxalis barreliefi*)

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The objective of the study was to determine the antioxidant capacity and total phenolic content of water and methanolic extracts in teh Sarawak (*Phyla nodiflora*) and belimbing pasir (*Oxalis barreliefi*). The antioxidant capacity was determined using TEAC and FRAP methods, and the values obtained were in the range of 374-130 μM TEAC/g sample and 593-250 μM Fe (II) equivalent/g sample respectively. Total phenolic content was determined using Folin-Ciocalteu method and the values obtained were in the range of 812-190 μM gallic acid equivalent/g sample. The results showed antioxidant capacity in water extract was higher than methanolic extract in both samples based on both methods. A similar result was also observed for total phenolic content. High ferric reducing power and scavenging activity was observed in teh Sarawak and belimbing pasir, respectively. Belimbing pasir had higher phenolic content compared to teh Sarawak. One-way ANOVA showed a significant difference ($p<0.05$) between antioxidant capacity and phenolic content for teh Sarawak and belimbing pasir. Positive significant correlations between ferric reducing power and phenolic content ($r^2=0.899$, $p<0.01$), and between scavenging activity and phenolic content ($r^2=0.988$, $p<0.01$), were found in both samples. Heat treatment at 95°C for different incubation times (0, 20, 40, and 60 min) indicated that highest antioxidant capacity of the samples was at 40 min. The study indicated that these herbs have high antioxidant capacity and phenolic content. Phenolic compounds are one of the antioxidants that can play an important role in scavenging radicals.

C22 Determination of carotenoids in fruit skin, leaf and juice of *Citrus grandis* (Pummelo) from Melo mas and Shatin Cultivars by high performance liquid chromatography technique

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This study was conducted to evaluate the quantitative distribution of carotenoids in different parts of *Citrus grandis* from melo mas and shatin cultivars. The individual carotenoids like xanthophyll, lycopene, α-carotene and β-carotene contents in fruit peel, leaf and juice of *Citrus grandis* melo mas and shatin cultivars were separately determined using high-performance liquid chromatography (HPLC) technique. The carotenoid compounds were successfully separated isocratically on a C_{18} Column using a ternary mixture of acetonitrile, methanol and dichloromethane within 30 min with flow-rate at 1.0 ml/min and detection at 450 nm. All the four carotenoid compounds used were detected in all parts of samples except lycopene in leaf of *C. grandis* and in peel and juice of *C. grandis* shatin cultivars. Among the five extracts that were used, a-carotene was found to

be of the highest level in leaf of *C. grandis* shatin cultivar which was 9928.467 μg/g tissue, followed by xanthophyll from fruit peel of *C. grandis* melo mas cultivar which was 8721.533 μg/g tissue and β-carotene from leaf of *C. grandis* which was 3799 μg/g tissue. Meanwhile lycopene was found to be of the highest level in juice of *C. grandis* melo mas, which was 336.067 μg/g tissues. The carotenoids are among the important natural pigments as bioactive compounds and present quite commonly at higher levels in both the citrus fruits, which possess remarkable antioxidant activities. There has been increasing interest in using natural antioxidants compared to synthetic antioxidants, since they can protect the human body from free radicals and may prevent or retard the progression of many chronic diseases.

C23 Effect of stigmasterol on p53 expression in MDA-MB-231 cancer cell line

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Strobilantes crispus (Acanthaceae), or locally known as pecah beling, has been used traditionally as an antidiabetic, a diuretic, and has been proven scientifically to possess high antioxidant activity, anti-proliferation and anti-cancer properties. This study was conducted with the aim of evaluating the effect of stigmasterol extracted from *S. crispus* leaves on p53 expression in non-hormone dependent breast cancer cell line (MDA-MB-231). This cell line was treated with different concentrations of stigmasterol; 0, 20, 40, 60, 80 and 100 μM. In this study, the tetrazolium assay (MTT) was used to measure cell proliferation rate. Viable cells converted yellow tetrazolium salt to blue formazan product, which was measured by ELISA reader. This assay was performed to obtain dose-response relationship between the concentrations of the extract and the percentage viability of MDA-MB-231 cells. The IC_{50} value obtained for stigmasterol was 50.3 ± 5.0 uM. Three concentrations; 40, 50 and 60 μM were then used to determine the different levels of p53 expression using immunocytochemistry approach. The supernatant of treated cells were added to p53-coated 96-well plates. The conjugated p53 were then labeled with biotin and streptavidin. TMB substrate was added to provide dark blue-coloured product, which was measured by ELISA reader. The stigmasterol concentrations of 40, 50 and 60 μM gave the value of p53 expression of 0.263±0.211, 0.018±0.054 and 0.011±0.053, respectively. The p53 expression was found to be inversely proportional with the stigmasterol concentration of 40 and 50 μM. Thus, this study proved that stigmasterol has an anti-proliferation effect on cancer cells by reducing the p53 gene expression.

C24 Determination and comparison of total phenolic content and antioxidant activities of Strobilanthes crispus and Centella asiatica juices

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Strobilanthes crispus (*S. crispus*) and *Centella asiatica* (*C. asiatica*) contain beneficial biological active compounds which include trace elements and some minerals. These herbs were processed into juices and treated with different processing temperatures and times. *S. crispus* and *C. asiatica* juices were analysed for total phenolic content using Folin-ciocalteau method and antioxidant activity using Beta-carotene bleaching method and Ferric reducing antioxidant power (FRAP). The objective of this study was to determine and compare the effect of processing parameters on total phenolic content and antioxidant activities of *S. crispus* and *C. asiatica* juices. Results showed that most samples of both herbs exhibited high total phenolic content and antioxidant activities. Among nine different processing parameters of *S. crispus* juice, *S. crispus* juice heated at 60°C for 30 minutes showed the highest total phenolic content and antioxidant activity. On the other hand, *C. asiatica* juice heated at 70°C for 30 minutes showed the highest total phenolic content and antioxidant activity among other processing parameters of *C. asiatica* juice. However, *C. asiatica* juice showed higher results than *S.crispus* juice. This indicated that processing parameters with different temperatures and times had an effect on the total phenolic content and antioxidant activities of both herbs. The relationship between total phenolic and antioxidant activities is significant in both herbs respectively ($p<0.05$). It means that phenolic compounds may be the major contributors to the antioxidant activities in both herbs respectively.

C25 Database development on total fat, saturated fats, monounsaturated fats, polyunsaturated fats and vitamin E content in Malaysian foods: a compilation based on food analysis, recipe based calculation and borrowed values from various food compositions

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Identifying the types of fatty acids present in the diets along with vitamin E is important in determining plasma lipid status of individuals with diabetes, hyperlipidaemia, heart diseases and certain cancers. However, without nutrient database, interpretation of food intakes is biased and inconsistent. Therefore, this study was carried out with the aim of developing a database on fatty acids and vitamin E for use in assessing dietary intakes of breast cancer survivors. The database was compiled from 3 sources

namely chemical analysis; recipe based calculations and borrowed values from various established food composition tables. The chemical analysis was carried out on common foods consumed for breakfast, lunch, dinner and snacks. Chemical analysis was also done on several raw foods and cooking oils. Results of the fat absorption studies in cooked foods also contributed to the development of this database. For cooked foods that were not available, recipes were calculated based on Yield Factor Method. Borrowed values of fatty acids and vitamin E were obtained from the Singapore and United Kingdom food composition tables. The Malaysian food composition table was used as the main reference. A total of 500 Malaysian foods and dishes were compiled in this database and presented in 13 categories according to the type of foods and dishes. The nutrients included in the database were energy, carbohydrates, protein, beta-carotene, vitamin C, dietary cholesterol, selenium and along with total fat, saturated fats, monounsaturated fats, polyunsaturated fats and vitamin E. This database was incorporated in a food frequency questionnaire (FFQ) and was pilot-tested on healthy Malaysians in determining their fatty acids and vitamin E status. The results obtained were similar to the studies conducted previously using duplicate diets among the same population. This research provides data to show that the methods used to create a nutrient database for an FFQ may offer another means of improving FFQs.

C26 Antioxidant activity and total phenolic content of psyllium husk extract

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Previous studies have shown that Psyllium husk, which is also known as *Plantago* seed husk, can significantly lower serum cholesterol levels. This hypocholesterolaemic effect of Psyllium husk may have been contributed by the antioxidant activity or the high content of fibre and phytate. Hence, the objective of this study is to determine the antioxidant activity, total phenolic content, total dietary fibre and phytate in Psyllium husk. In this study, Psyllium husk was extracted with distilled water or 80% (v/v) methanol. Antioxidant activity of the extracts was assessed by using Ferric Thiocyanate Method (FTC), Thiobarbituric Acid Method (TBA) and α,α-diphenyl-β-picrylhydrazyl (DPPH) Radical Scavenging Activity. Total phenolic content was estimated by using Folin-Ciocalteu assay and it was expressed as gallic acid equivalents (GAE). Total dietary fibre was determined by using combination of enzymatic and gravimetric method while phytate was determined by combination of colorimetric and HPLC method. According to One-way ANOVA, there was no significant difference in total antioxidant activity between water extract, methanolic extract and standard (BHT) ($p > 0.05$). Independent Sample T-test also showed that there was no significant difference ($p > 0.05$) in the mean of DPPH radical scavenging activities between the water extracts and methanolic extracts of Psyllium husk. The results of Independent Sample T-test however, showed that there was a significant difference ($p < 0.05$) in the mean total phenolic content between the water extract and methanolic extract of Psyllium husk. Methanolic extract exhibits higher antioxidant activity in FTC, TBA method and DPPH radical scavenging activity,

which was 81.18%, 71.30% and 138.92% respectively. Methanolic extract also has higher total phenolic content than water extract, which was 1.12 GAE/g. This suggested that methanol is a better solvent to extract antioxidant and phenolic compound from Psyllium husk. Besides that, this study also found that Psyllium husk has 67 g/100g total dietary fibre and 46.89 mg/g phytate. As a conclusion, results demonstrated that Psyllium husk has the potential to be used as a daily food supplement due to its high antioxidants, high phenolic content, and also high fibre and phytate.

C27 Development of probiotic dadih using carrageenan and inoculum from asam gelugur (*Garcinia atroviridis*)

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Dadih is a traditional Malay dessert that is unique since it is a milk-based product made by fermenting milk in asam gelugur (*Garcinia atroviridis*), and adding the whey produced (which acts as an inoculum) to sweetened fresh cow's milk, which is then steamed. The traditional method makes use of heat to aid in the curd formation, thus destroying the beneficial probiotics present in the inoculum. Probiotics, bacteria and yeast have been defined as live microorganisms which, when consumed in adequate amounts, can have a beneficial effect on the host by improving the intestinal microbial balance. In this study, carrageenan is used as a stabiliser to form a curd, so that the product does not have to be steamed. Microbiology test showed that the inoculum acts as starter culture with 1.4×10^7 CFU/g *Lactobacillus* count and 4.3×10^5 CFU/g yeast. The inoculum used contributes probiotics while mango fruit juice will increase the nutritional value of the product. Five treatments, namely dadih without inoculum and mango which acts as control (C), dadih without inoculum but added mango (M), dadih with 5% inoculum and added mango (MI5), dadih with 10% inoculum and added mango (MI10), and traditional method of dadih preparation with 10% inoculum and added mango with heat treatment (MT) were studied. Bacteriological examination proved that samples with at least 5% inoculum are needed in order to produce probiotic dadih; the *Lactobacillus* count was 6.8×10^5 CFU/g. The effect of inoculum and mango on the pH of dadih was tested by analysing pH during storage for 14 days. There was a significant change in pH ($p<0.05$) between formulation and storage days. Addition of mango juice resulted in a more rapid decrease in the pH value. There was a significant difference ($p<0.05$) between mango-flavoured dadih and plain dadih (C) for texture and colour analysis. Results from proximate analysis showed that sample MI10 has higher moisture, fat and ash compared to the 4 other samples. Sensory evaluation conducted using a 9 point hedonic scale showed a preference for mango-flavoured dadih with inoculum in terms of aroma, taste and overall acceptability.

C28 The bioavailability of iron, zinc, and calcium in selected infant cereals using in vitro method

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Minerals such as iron, zinc and calcium play a vital role in early life of the infant. However, as a result of the digestion process, interactions might happen that could modify the bioavailability of these nutrients initially designed for adequate nutrition in infant cereals. The objective of this study is to determine the iron, zinc and calcium availability of selected infant cereals (rice and brown rice) mixed with either breast milk, infant formula, or boiled water. An in vitro digestion method (pepsin, pH2 and pancreatin-bile extract, pH7) was applied to simulate human's gastric and intestinal digestion. Minerals were analysed by flame atomic absorption spectrometry. Overall, brown rice showed a higher mineral availability compared to rice, and the addition of milk, either breast milk or infant formula, to the infant cereal increased the availability of calcium, iron and zinc from rice and brown rice cereal. Calcium availability was higher in the cereal added with infant formula compared with breast milk but the result was not significant. Rice + breast milk showed a higher iron availability compared to rice + infant formula but a reversed trend was observed in the crown rice. However, these results were not significantly different. Addition of infant formula to the brown rice cereal showed a significantly higher zinc availability compared to other samples. This study showed that the addition of milk to infant cereal increased the availability of the mineral studied. It is recommended that milk be added to infant cereals to increase the mineral availability.

C29 Evaluation of antioxidant capacity and polyphenol content in hot water extract prepared from Belimbing Pasir *(Oxalis barrelieri)* leaves and Teh Sarawak (*Phyla nodiflora*) trees

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This study was carried out to evaluate the antioxidant capacity and polyphenol content of hot water extract prepared from Belimbing Pasir (*Oxalis barrelieri*) leaves and Teh Sarawak (*Phyla nodiflora*) trees. The determination of antioxidant capacity was based on Trolox Equivalent Antioxidant Capacity (TEAC) and β-carotene bleaching assays. Folin-Ciocalteau method was used to determine the free phenolic and bound phenolic contents. For total flavonoids, the colometric method was used. Mean antioxidant capacity of hot water extract in Teh Sarawak (352.3 uM TEAC / g dry sample) was higher than Belimbing Pasir (272.1 uM TEAC/g dry sample). Meanwhile, for mean antioxidant capacity based on β-carotene bleaching assay, Belimbing Pasir (69.6 %) was higher than that of Teh Sarawak (31.4 %). Polyphenol and total flavonoid contents were higher in Teh Sarawak than in Belimbing Pasir. T-test showed that there was a significant difference

($p < 0.05$) between antioxidant capacity for both samples. There was a significant difference ($p < 0.05$) for polyphenol contents. There was also a significant difference ($p < 0.05$) for total flavonoids. Pearson correlation showed that there were significantly strong and positive correlations between antioxidant capacity and polyphenol content for TEAC (between TEAC and free phenolic, $r^2=0.973$; $p<0.01$, TEAC and bound phenolic, $r^2=0.989$; $p<0.01$, TEAC and total flavonoid, $r^2= 0.896$; $p<0.01$). For β-carotene bleaching assay, there were significantly strong and negative correlations between antioxidant capacity and polyphenol content (β-carotene and free phenolic, $r^2=0.994$; $p<0.01$, β-carotene and bound phenolic, $r^2=0.994$; $p<0.01$, β-carotene and total flavonoid, $r^2=0.954$; $p<0.01$). The study indicated that hot water extract of these plants have high scavenging activity. This activity could be due to antioxidant polyphenols especially flavonoids.

C30 Determination of macronutrients and energy content in Western menus selected from the athletes' cafeteria at the National Sports Institute of Malaysia

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Good nutritional status plays an important role in an athlete's performance. However, many athletes do not care about their diet and yet, hope to perform well. Hence, this study was conducted to determine macronutrients and energy composition in selected Western menus prepared for the athletes served at the cafeteria in the National Sports Institute to help athletes make healthy and wise food choices. Ten types of Western menus have been selected from the carbohydrate (sautéed potato, pasta napolitana, fusilli arabiata and vegetable lasagna with béchamel sauce), protein (xian style lamb stew, baked fish with creamy lemon sauce and grilled black pepper chicken), vegetables and fruits (mediterranean roasted vegetables and waldorf salad) and soup (minestrone soup) groups by the chef based on the popularity of the foods from a 4-week menu cycle. These samples were analysed using the AOAC (1995) method except for the determination of carbohydrate and energy. Carbohydrates were calculated 'by difference' while energy was calculated by multiplying the carbohydrate, protein and fat content with 4 kcal/g, 4 kcal/g and 9 kcal/g respectively. Results showed that pasta napolitana contained the highest carbohydrate and energy content of 28.6 ± 0.4 g/100g and 133 ± 1.9 kcal/100g respectively. Xian style lamb stew contained the highest protein value (18.4 ± 0.7 g/100g) while fusilli arabiata had the lowest fat content of 0.6 ± 0.1 g/100g. Minestrone soup contained the highest water content (90.9 ± 0.3 g/100g) and vegetable lasagna with béchamel sauce contained the highest ash content (1.9 ± 0.0 g/100g). Mediterranean roasted vegetables had the highest fat content of 6.1 ± 0.6 g/100g. Overall, sautéed potato, pasta napolitana, fusilli arabiata, vegetable lasagna with béchamel sauce and minestrone soup are high in carbohydrates, ranging from 63-86% of total energy per serving. Baked fish with creamy lemon sauce, xian style lamb stew and grilled black pepper chicken are rich in protein with 52-63% energy per serving. All these menus have low fat content within the range of 4-26% energy per serving except for grilled black pepper chicken, waldorf salad and mediterranean roasted vegetables (contain more than

30% energy of fat per serving). Results obtained from this study are very beneficial in helping athletes to choose menus according to their nutritional contents in order to achieve a balanced diet that will eventually help them maximise sports performances.

Group D: Clinical Nutrition

D01 The development and evaluation of booklet on index glycaemic for type 2 diabetes mellitus patients

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This study was conducted to develop and to evaluate reader acceptance towards the media in nutrition education for type 2 diabetes. A booklet on 'G.I. dan Diabetes Jenis 2' was developed specifically for this study. The contents of the booklet consist of diabetes management emphasising on healthy eating, Glycaemic Index (G.I.) and guidelines on low G.I. choices. This study was divided into three phases, the first phase was surveying and planning the information, the second phase was development and implementation, and the third phase was evaluation of the booklet. The evaluation conducted was to determine the readability of the booklet, evaluate subjects' acceptance and evaluate whether the booklet was effective in increasing subjects' knowledge. The study subjects (n=30) consisted of diabetic patients (n=6), undergraduate students with nutrition background (n=18) and without nutrition background (n=6). The content validity of the booklet was judged by the experts in the field of nutrition during the development phase. A set of questionnaires to evaluate the subjects' acceptance towards the booklet was given together with the booklet. The questionnaire for assessment of knowledge after implementation was given before and after giving the booklet. Subjects were given about one week to understand and evaluate the booklet. The readability of the booklet was calculated by using readability formula from Khadijahs' study (1987): *Formula Kebolehbacaan: Satu Cara Objektif Untuk Menentukan Tahap Kebolehbacaan Bahan-bahan Bacaan.* From the formula, the readability level of this booklet was determined to be at sixth grade level, which is suitable for 12-year-old readers. Subjects rated the content, graphics and layout of the booklet from satisfactory to good. This study found that the knowledge of the subjects was increased after receiving the booklet. The results demonstrated that the booklet can be used in future nutrition education programmes to educate patients on glycaemic index.

D02 Diet diversity and diet quality among cancer patients at Hospital Kuala Lumpur

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A cross-sectional study was carried out to examine dietary diversity and diet quality among cancer survivors. Seventy-four subjects (54 females and 20 males) aged 20 to 75 years who attended the follow-up clinic at the Institute of Oncology, Hospital Kuala Lumpur volunteered for this study. They consisted of 66.2%, 13.5% and 20.3% Malays, Chinese and Indians, respectively. Patients were interviewed using a structured questionnaire to obtain information on socio-economic background and health status while height, weight, waist and hip circumferences were measured directly. Dietary intake was assessed using a 2-day 24-hour diet recall and a food frequency questionnaire. Dietary diversity and diet quality were determined using the Food Variety Score (FVS) and the Healthy Eating Index (HEI) respectively. Majority of the respondents had been diagnosed with breast cancer (36.5%), followed by colon cancer (18.9%), lung cancer (10.8%) and cancers of other sites (eg: cancer of the ovary (33.8%). About 42% of respondents had normal body mass index, 33.24% were overweight, 13.61% obese and 11.2% were underweight. Abdominal obesity was seen in 73% of respondents. Based on the total food diversity score, only 2.7% of respondents ate more than 30 different foods per week. Majority of respondents (56.8%) ate between 10 and 19 different foods per week, 39.2% ate about 20 to 29 different foods per week and 1.4% ate less than 10 different foods per week. Less than 3% of respondents had a very good food variety score, 12.2% and 27% had good and fair food variety scores respectively while the majority (58.2%) of respondents had a poor food variety score. The average HEI score indicated that only 6.8% of respondents had a good quality diet (score > 80), 14.9% had a poor diet (score <50) and majority (78.4%) had a diet that needs improvement (score 51-79. Cholesterol was the component of HEI that had the highest percentage (79.7%) of respondents with a maximum score of 10 whereas the lowest percentage (4.1%) was obtained for vegetables. Overall, 42.57% of respondents met the recommendation (score per component=10) of the Food Guide Pyramid. In conclusion, cancer survivors in this study were found to have diets that need improvement in terms of quality and diversity. This study provided no evidence of correlation between HEI and FVS score with nutritional status. This may be because the sample size is small and a variety of cancer types were involved. Much remains to be learned about the role of diet diversity and diet quality in survival after the diagnosis of cancer.

D03 Supplementation of palm vitamin E during early pregnancy decreased the ICAM-1 expression in development of pregnancy-induced hypertension and preeclampsia (REPP Study)

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The occurence of oxidative stress during pregnancy that leads to endothelial dysfunction in the event of pregnancy-induced hypertension (PIH) and preeclampsia plays a major role in the pathophysiological mechanism of the disease. However, the precise biochemical pathways involved in the disease remains unclear. In this study, we investigated the effect of palm vitamin E (tocotrienols) supplementation on the expression of intercellular adhesion molecule-1 (ICAM-1) in pregnant women (n = 299 subjects) selected from a randomised, double-blinded, placebo controlled clinical trial in the antenatal clinic of HUKM. Palm vitamin E (100mg/daily) was prescribed to healthy normotensive, non-proteinuric primigravidae from early second trimester before 16 weeks gestation until delivery. From 299 subjects, 49 subjects were selected in the normal group for the adhesion molecules expression study for both vitamin E arm (n = 27 subjects) and placebo arm (n = 22 subjects). Out of 299 subjects from the trial, only 15 subjects had developed PIH and preeclampsia as the case group. From those 15 subjects, only 9 subjects were selected for the ICAM-1 expression analyses. Total RNA was extracted from peripheral blood mononuclear cells (PBMN) collected at gestation week 28, 32, 36, 40 and at delivery. Cord blood and mother's blood were also taken during delivery. The total RNA was reverse transcribed to complementary DNA (cDNA). PCR amplification was carried out using specific primers for ICAM-1 in different serial dilution of initial cDNA concentration (1000ng). The sense and antisense were designed as 5' TAA AAC ACT AGG CCA CGC ATC TG 3' and 5' TAA GGC CTC ACT GGG TAA TCT CTG 3'. The PCR product (~614bp) was run on 2% agarose gel. Intensity of the targeted band (ICAM-1) on the gel electrophoresis was observed by using imaging system. The result showed that in the normal group, there was lower ICAM-1 expression in the palm vitamin E arm compared to placebo throughout the interval. We also found that at the lower dilution of cDNA concentration, ICAM-1 expression significantly ($P<0.05$) decreased in the mother and cord blood during delivery. On the other hand, in the case group, ICAM-1 expression in palm vitamin E arm (n = 3 subjects) was lower compared to placebo (n = 6 subjects) only at week 28 in all dilutions, and significantly ($P<0.05$) decreased in higher dilution at 32 weeks gestation. In contradiction; there was higher ICAM-1 expression in palm vitamin E arm compared to placebo arm towards delivery, starting at 36 weeks gestation, although it was not significant in all dilution concentrations. Therefore, there was potential reduction on ICAM-1 expression by giving palm vitamin E at early pregnancy, found in the normal group. Nevertheless, there was also a reduction of ICAM-1 expression in the case group, only at early third trimester (28 and 32 week gestation) in palm vitamin E arm, which increased towards delivery, although not significantly.

D04 The relationship between selenium and breast cancer: a case control study

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The relationship between selenium status and risk of cancer such as prostate, intestinal, lung and liver has been documented in western countries. However, there is controversy over its association with breast cancer. Dietary factors such as fibre and fat have been found to be associated with risk of breast cancer among Malaysian women. Therefore, the purpose of this case-control study is to find out the relationship between selenium status and risk of breast cancer among Malaysian women. The study subjects comprised 64 cases and 127 controls aged 30 to 65 years, matched for age and ethnic group, with 80% study power. The inclusion criteria for cases was newly diagnosed with breast cancer (stage I to III), not on any therapy for cancer yet with no other chronic diseases and had good cognitive function. Controls were women who were healthy, not diagnosed with cancer and other chronic diseases, not pregnant and lactating and had no family history of cancer. The subjects were interviewed to obtain information on their habitual dietary intakes, lifestyle including family history of cancer, reproductive history and also medical information. Selenium status was determined from analysis of toenail and hair using inductively coupled plasma-mass Spectrometry (ICP-MS) and intake was determined using the diet history questionnaire. The frequency of taking high selenium food among cases and control was determined using semiquantitative food frequency questionnaire. Family history of breast cancer, age of first pregnancy, lactation and alcohol consumption were found to be significant risk factors for breast cancer ($p<0.05$). The mean intake of total energy and protein was higher among controls as compared to their cases ($p<0.05$) while the mean selenium intake among cases (78.47 ± 25.34 µg/d) was apparently lower than the controls (89.34 ± 36.85 µg/d) ($p<0.05$). The relative risks of increasing quartiles of selenium intake were 1.393, 1.385 and 1.813. Dietary selenium is associated with breast cancer. Thus, promoting of healthy eating with emphasis on selenium is essential to prevent the disease from becoming widespread.

D05 Body composition trends in haemodialysis, continuous ambulatory peritoneal dialysis and renal transplant patients using bioelectrical impedance analysis

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The National Renal Registry of Malaysia identified a higher body mass index (BMI) as an important index of nutritional status that correlates to better survival outcome in the renal

population. The objective of this cross-sectional study, therefore, was to understand the body composition of haemodialysis [HD, n=53], continuous ambulatory peritoneal dialysis (CAPD, n=54) and renal transplant [Tx, n=55] patients using bioelectrical impedance analysis [BIA]. Body composition and bioelectrical impedance data were obtained using the Maltron Bioscan 916 V_3 analyser for HD patients post-dialysis and in CAPD patients after outflow and drainage of dialysate. Mean BMI was significantly greater in Tx compared to HD patients (24.4 ± 4.4kg/m^2; 21.9 ± 4.2kg/m^2, $p<0.05$). There was no significant difference in mean BMI between the HD patients and CAPD patients [23.1±4.4kg/m^2] ($p>0.05$), and between CAPD and Tx ($p>0.05$) patients. Mean percentage of fat free mass (%FFM) was significantly greater in CAPD than Tx patients (79.13±9.6%; 73.9±10.52%, $p<0.05$) but not significantly ($p>0.05$) different between HD and CAPD patients or between HD and Tx patients. Mean percentage of fat mass was significantly higher in Tx than in CAPD patients (26.1±10.52%; 20.9±9.6%, $p<0.05$) but was not significantly ($p>0.05$) different between HD and CAPD patients or between HD and Tx patients. CAPD patients had a mean percentage of total body water (TBW) that was significantly greater than either HD or Tx patients (60.41±6.8%; 56.13±5.19%; 55.25±5.33% respectively, $p<0.05$). There was no significant difference ($p>0.05$) in mean percentage of TBW between HD and Tx patients. In addition, mean percentage of extracellular water (% ECW) was significantly higher in CAPD compared to HD or Tx patients (52.37±8.18%; 46.12±4.47%; 46.26±4.41% respectively, $p<0.05$), but not significantly different ($p>0.05$) between HD and Tx patients. Mean body cell mass (BCM), as a measure of susceptibility to infection and additional physiologic impairment, was greater in Tx patients compared to HD patients (25.33±4.17kg; 23.22±5.14kg, $p<0.05$) but was not significantly different ($p>0.05$), between either HD and CAPD patients or between CAPD and Tx patients. Mean muscle mass was not significantly different between the 3 groups ($p<0.05$). CAPD patients had significantly lower mean phase angle than either HD or Tx patients (4.61±1.15°; 5.58±1.05°; 5.54±0.82° respectively, $p<0.05$) but no significant difference ($p>0.05$) was noted between HD and Tx patients. Mean reactance as a measure of cell breakdown or decline in cell permeability was significantly different between the 3 groups ($p<0.05$) with HD patients having a higher value of reactance (64.6±15.6Ω) compared to either CAPD (40.8±13.3Ω) or Tx patients (54.6±10.7Ω). Mean impedance was significantly different within the 3 groups with HD patients having significantly higher impedance compared to CAPD or Tx patients (661±137Ω; 511±10.7Ω; 568±87Ω respectively, $p<0.05$). The lower percentage of fat mass, higher %TBW and % ECW combined with lower phase angle and reactance of the CAPD patients suggests a poorer nutritional status linked to poor survival outcome compared to the HD and Tx patients.

D06 Modification of lifestyle factors related to breast cancer risk among female schoolteachers in Selangor: preliminary baseline data on anthropometry

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According to the 2003 National Cancer Registry Report, Malaysian women have a 1 in 19 chance of getting breast cancer in their lifetime. Epidemiological studies have shown that diet and lifestyle practices contribute to about 30% of risk towards breast cancer incidence. This paper will present some preliminary baseline data on the anthropometric status of 195 women out of a total sample of 300 teachers who will be participating in an intervention study which aims to modify diet and lifestyle knowledge, attitudes and practices related to breast cancer risk. Height, weight, waist and hip circumferences were measured using appropriate equipment and procedures. Body mass index and waist hip ratio were then computed. Malay women teachers comprised the majority while Chinese, Indians and others together constituted only about 8% of the sample. Their mean age was 37.34 years. BMI classification showed that 28.8% of teachers were overweight while 9.7% were obese. About 14% of teachers had waist circumferences > 88 cm. Relative obesity as indicated by waist-hip ratios of above 0.8 was found in 40.5% of women. General obesity and abdominal obesity are prevalent in this sample of women teachers reflecting a high risk of co morbidities. Weight control in overweight and obese women may be an effective measure, not only for breast cancer prevention, but other chronic diseases.

**Partly funded by the Ministry of Higher Education, Kingdom of Saudi Arabia.*

D07 Development and evaluation of nutrition education material for cancer prevention

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The objective of this study was to develop and to evaluate acceptance of multimedia nutrition education materials in the community. A CD-ROM on "Diet and Healthy Lifestyle for the Prevention of Cancer" was developed specifically for this study using Microsoft Power Point. This study consisted of three phases. The first phase was surveying and planning of information, the second phase was development of the CD and the third phase was evaluation of the prepared material. Thirty six (n=36) subjects with and without formal nutrition education background were chosen randomly for this study. The CD-ROM was distributed to all subjects and they were given about 1 week to understand and evaluate the prepared material. Two sets of questionnaires were given to the subjects. One set of questionnaires, which consisted of demographic, socio-economic

background, cancer history and 20 questions about nutrition knowledge was given before receiving the CD-ROM. Meanwhile, another set was given together with the CD-ROM for nutrition knowledge test and satisfactory evaluation on contents, illustrations and graphics of the CD-ROM. Subjects' knowledge score increased significantly ($p<0.05$) after receiving the CD-ROM (84 ± 7%) compared to the baseline (63 ± 20%). Education level of the subjects was significantly positively correlated with score of knowledge ($r = 0.546$, $p<0.05$). Overall, subjects were satisfied with the contents, illustrations and graphics of the CD-ROM. In conclusion, a good CD-ROM on nutrition has been developed in this study and perhaps can be used in future nutrition education programmes for cancer prevention.

D08 Association of obesity with coronary heart disease risk factors among Malay adolescents

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A relationship between anthropometric measurements and Coronary Heart Disease (CHD) is well depicted. This study was carried out to assess the relationship between anthropometry measurements and CHD risk factors, to study the association between obesity and CHD risk factors, and the relationship between lipid profiles with dietary intake and lifestyles among Malay adolescents (18 – 26) in Shah Alam. Questionnaires were formulated and distributed to adolescent Malays in Shah Alam. The questionnaire was divided into 3 parts; SQFF (Semi Quantitative Food Frequency) analysis, KAP (Knowledge, Attitude and Practice) analysis and Health related questions. Weight, height and waist circumference were taken during interview sessions using standard procedures. 3 ml of blood samples were taken for lipid blood profile analysis and were analysed at Hospital Kluang Johor. Results showed that levels of obesity have contributed towards CHD risk factor. Based on SQFF analyses, dietary factors (food high in fats) were not the only factor for obesity. The compensatory factors in this research were sedentary lifestyles (100%), exercise (66.7% and less than 2 - 3 times a day), genetic factor ("obese person" (60.0%) and "cardiovascular disease and diabetes" (50%)) among nearest family members). A study conducted by Willet, 2002, gave similar results. KAP analysis showed unsatisfactory scores which depicted poor knowledge, attitude and practice towards healthy food intake. The total percentages for "very high" and "high" CHD risk based on hypertension were low (24%). Lipid serum analysis ratio between LDL/HDL values showed all serum samples were in a very low CHD risk. Dietary factor was not the main etiology for subjects having obesity, instead compensatory factors such as lack of exercise and sedentary lifestyles explained for their obesity levels. Thus, anthropometry measurements were the only identified CHD risk factors among subjects contributed by these compensatory factors.

D09 The agreement in estimation of body composition using two bioelectrical impedance analysis methods among rural elderly Malays

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This cross sectional study was conducted to determine an agreement in estimation of body composition using two bioelectrical impedance analysis methods i.e. Maltron 906 and Maltron 916 among 186 elderly Malays in rural area of Sabak Bernam, Selangor. The subjects comprised of 93 men and 93 women, with age ranging from 60-75 years. All measurements using both equipments were done for each subject immediately after completion of either one method. Percentage of body fat (% fat) and fat free mass (FFM) was highest in overweight subjects [Maltron 906; 35.49 ± 7.54 (% fat), 45.11 ± 9.81 kg (FFM) and Maltron 916 (37.00 ± 8.55 (% fat); 43.93 ± 9.34 kg (FFM)], followed by normal subjects [Maltron 906; 30.40 ± 7.54 (% fat), 37.19 ± 6.78 kg (FFM) and Maltron 916 (26.55 ± 7.13 (% fat); 38.92 ± 6.73 kg (FFM)] and underweight subjects [Maltron 906; 24.72 ± 6.52 (% fat), 30.85 ± 6.82 kg (FFM) and Maltron 916 (16.91 ± 3.95 (% fat); 33.90 ± 6.24 kg (FFM)]. A significant correlation between Maltron 906 and Maltron 916 was observed in percentage of body fat (r=0.813, p=0.0001), body fat mass (r=0.929, p=0.001), fat free mass (r=0.941, p=0.0001), total body water (r=0.933, p=0.0001) and percentage of total body water (r=0.728, p=0.0001). Fat free mass showed the highest significant correlation between Maltron 906 and Maltron 916 in underweight subjects (r=0.964, p=0.0001), followed by overweight subjects (r=0.961, p=0.0001) and normal subjects (r=0.899, p=0.0001). Meanwhile, percentage of body fat showed the highest significant correlation in overweight subjects (r=0.902, p=0.0001), followed by underweight subjects (r=0.663, p=0.0001) and normal subjects (r=0.658, p=0.0001). Similar trends were also observed for body fat mass and percentage of fat free mass. In conclusion, the body composition parameters measured using both Maltron 906 and Maltron 916 seem to be highly correlated especially in overweight subjects.

D10 Dietary supplementation and alternative medicine practices among cancer survivors at Hospital Kuala Lumpur

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This study was conducted to determine the prevalence of use of dietary supplements and alternative medicine among cancer survivors at Hospital Kuala Lumpur. Ninety patients comprising 18 males (20.0%) and 72 females (80.0%) who fulfilled the selection criteria were interviewed using a pre-tested structured questionnaire. The questionnaire elicited information on personal characteristics, cancer history, use of

dietary supplements, and use of alternative medicine. Most of the respondents were between 51 and 60 years old (52.2%). Subjects' height, weight and waist circumference were measured using appropriate techniques. Body fat percentage was determined with the OMRON Body Fat Analyser. Statistical analysis was carried out using SPSS ver 12. Subjects comprised Malays (48.9%), Chinese (42.2%) and Indians (8.9%) and most of them were married (75.6%). One-third of the patients had received primary school education while slightly more had secondary and tertiary education. Breast cancer was the single most common cancer seen in these patients (45.6%). About 49% of the respondents had mean survival duration of > 3 years while 31% were between 1.00-2.99 years. Two-thirds of the subjects had been diagnosed at stage 1 and 75.6% have had surgery. About 49% were overweight and obese, 66.7% had high body fat percentage (>30%) and 43.3% showed abdominal obesity. Dietary supplements were used by 68.9% of the respondents and the mean duration of use was 3.28 years. Multivitamins were the most common type used (56.5%) followed by vitamin C (32%). About half of the supplement users obtained their information from health care providers including doctors, nutritionists and pharmacists while 34% bought supplements on the advice of their friends, relatives and direct selling agents. Alternative medicine is practised by 60.0% of the respondents and the mean duration of usage is 3.56 years. Religious pursuit was the most common alternative medicine practised by respondents (53.7%). Among the socio-demographic factors, ethnicity was the only factor associated with use of alternative medicine (c^2 =10.702, p=0.001) but not with dietary supplement use. In conclusion, this study shows that dietary supplementation and alternative medicine practices are common in cancer survivors. The use of a larger sample of subjects may have resulted in significant socio-demographic and anthropometric differentials.

D11 The effect of red pitaya fruit (*Hylocereus sp.*) consumption on the total antioxidant status and malondialdehyde level among diabetics, hypertensive and hypercholesterolaemic subjects in Universiti Putra Malaysia

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The objective of this sequential experimental study was to determine the effect of red pitaya fruit (Hylocereus sp.) on the total antioxidant status (TAS) and malondialdehyde status level (MDA) among diabetics, hypertensive and hypercholesterolaemic subjects in Universiti Putra Malaysia. The study consisted of 54 subjects and were divided into 4 groups, which were normal (group 1), hypercholesterolaemia (group 2), diabetic (group 3) and hypertensive (group 4). Each group was given 2 treatments of 400g and 600g of red pitaya fruit every day for 4 weeks. Each subject was required to have their blood taken at 0th (w1), 3rd (w2), 5th (w3) and 7th (w4) week during the study and about 10ml of fasting blood was taken by trained personnel. Blood samples were centrifuged before the samples were stored at 80°C. Chemical analysis was carried out to determine TAS value using Ferric Reducing Ability of Plasma (FRAP) and MDA level using

Thiobarbituric Acid-Reactive Substances (TBARs). There was no significant relationship between MDA of diabetic group and hypercholesterolemic group (r= -0.079, p= 0.084). Besides, there was no significant relationship between MDA of diabetic group and hypertensive group (r= -0.366, p= 0.333). However, hypercholesterolaemic group had a positive correlation with hypertensive group (r= 0.71, p = 0.855). According to the result on TAS, diabetic group was negatively correlated (r= -0.173) with hypercholesterolaemic group but positively correlated (r= 0.517) with hypertensive group. Hypercholesterolaemic group was positively correlated with hypertensive group (r= 0.154). For 400g diabetic group, TAS value increased 6.36% from w1 to w3, whereas the TAS value of the 600g group had increased 9.05% from w1 to w3. The MDA level of the 400g group had decreased 64.95% from w1 to w4, whereas the MDA level of the 600g group had decreased 59.01% from w1 to w3. For 400g hypertensive group, TAS value decreased 49.08% from w1 to w3, whereas the TAS value of the 600g group decreased 38.33% from w1 to w3. The MDA level of the 400g group had increased 74.49% from w1 to w3, whereas the MDA level of the 600g group had decreased 73.75% from w1 to w3. For 400g hypercholesterolaemic group, TAS value decreased 20.46% from w1 to w3, whereas the TAS value of the 600g group decreased 38.37% from w1 to w3. The MDA level of the 400g group had increased 69.66% from w1 to w3, whereas the MDA level of the 600g group had decreased 40.97% from w1 to w3. As a conclusion, consumption of 600g red pitaya should be recommended to reduce MDA level in the body. To get more accurate results, diet of the respondents should be controlled since dietary intake could affect the value of TAS and MDA in the body.

D12 Effect of red pitaya fruit (*Hylocereus sp.*) on blood lipid profiles in mild hypercholesterolaemia and hypercholesterolaemia subjects

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This 6 weeks study was conducted to determine the effect of red pitaya fruit (*Hylocereus sp.)* on lipid profile in mild hypercholesterolaemia and hypercholesterolaemia subjects with total cholesterol level >5.2 mmol/l. Thirty six subjects aged 21-56 years old (15 males and 21 females) were recruited among staff and students of Universiti Putra Malaysia. The subjects were divided into 4 groups. Two treatment groups consumed 400g or 600g of pitaya fruit, each dose over a period of 4 weeks. This was followed by a 2-week washout period. Two control groups, which consisted of positive control (hypercholesterolaemia subjects) and negative control (normal subjects), were not given any pitaya fruit throughout the study. Mean age of all subjects was 44 years old ±10.6 and all subjects selected did not smoke, were not pregnant and were not drinkers. Lipids profile was analysed at baseline, 3, 5 and 7 weeks. Weight, BMI, total body fat and blood pressure were analysed also. All respondent were asked to keep a 3-day food record and food frequency questionnaire (FFQ). Mean nutrient intake per day for calories was 1838.05 kcal ± 621.11, which is 87.9% of Recommended Nutrient Intakes for Malaysia. The mean intake of protein was 106.42 ± 55.34 g, fat 71.30 ± 31.5 g, cholesterol 291.897 ± 24.59 mg, vitamin C 77.178 ± 40.89 mg, niacin 23.77 ± 3.77 mg and dietary fibre 31.195 ± 15.32 g. Mean weight

for the group that consumed 600g pitaya fruit (group 1) was 65.28 kg ± 0.27, group that consumed 400g pitaya fruit (group 2) 74.86 ± 0.33 kg, positive control group (group 3) 72.14 ± 0.35 kg and negative control group (group 4) 55.74 ± 0.26 kg. Mean BMI for group 1 was 26.02 ± 3.82, group 2 was 29.08 ± 5.29, group 3 was 29.21 ± 0.4 and group 4 was 22.93 ± 0.12. Mean total body fat for group 1 was 31.88 ± 0.17%, group 2 was 31.85 ± 0.22%, group 3 was 33.09 ± 0.82% and group 4 was 28.68 ± 0.09%. Mean blood pressure for group 1 was 125/79mm/Hg, group 2 was 126/79mm/Hg, group 3 was 127/83mm/Hg and group 4 was 101/68mm/Hg. No significant differences were seen in weight, BMI and total body fat in all groups from weeks 1-5. Consumption of 600g pitaya fruit significantly ($p<0.05$) reduced total blood cholesterol concentration from baseline to the end of the treatment (5th week) by 13.3% (from 5.67 ± 2.07 mmol/l to 4.91 ± 0.83 mmol/l). There was a reduction (from 5.40mmol/l ± 2.07 to 4.52 mmol/l ± 0.83) in total blood cholesterol concentration by 16.4% in group 2 but it was not significant ($p=0.067$). No significant differences were seen in total blood cholesterol concentration in both control groups from weeks 1-5. Consumption of 600g pitaya fruit significantly ($p<0.05$) reduced LDL cholesterol concentration from weeks 1-5 by 24.7% (from 3.88 ± 1.62 mmol/l to 2.92 ± 0.60 mmol/l). There was a reduction (from 3.79 ± 0.83 mmol/l to 2.61 ± 0.36 mmol/l) in LDL cholesterol concentration by 30% in group 2 but it was not significant ($p=0.055$). No significant differences were seen in total LDL-cholesterol concentration in both control groups from weeks 1-5. No significant differences were seen in HDL-cholesterol from weeks 1-5 in all groups. As a conclusion, consumption of 600g red pitaya fruit significantly reduced total blood cholesterol concentration and LDL-cholesterol concentration, conforming recommendations to consume ≥5-10 servings of fruit and vegetable daily.

D13 Effects of red pitaya fruit (*Hylocereus sp.*) consumption on blood glucose level in type 2 diabetic subjects

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The aim of this study was to determine the effects of red pitaya fruit consumption on blood glucose level, lipid profiles, blood pressure, body weight and total body fat in subjects with type 2 diabetes mellitus. A total of 28 staff of Universiti Putra Malaysia, Serdang (14 males and 14 females), 21 of whom had type 2 diabetes mellitus, aged between 40 and 55 years old, took oral antidiabetic medications instead of insulin injection, were not pregnant and were non-drinkers, were included in the study. The diabetic subjects were recruited based on fasting blood glucose level ≥ 6.1 mmol/L. Subjects were divided into four groups; Group 1 was given 400g of red pitaya fruit per day, Group 2 was given 600g of red pitaya fruit per day, Group 3 was a negative control group and Group 4 was a positive control group, with seven subjects for each group. Subjects were assigned to seven weeks of study which consisted of three phases: phase 1 (one week), phase 2 (4 weeks of treatment) and phase 3 (2 week wash-out period). Fasting blood samples were taken four times throughout the study, twice during phase 2 and once during both phase 1 and phase 3. The blood samples were analysed using *chemical auto-analyser* (Rocher/Hitachi, Germany) machine. For diet assessment, 24-hour dietary record

was carried out for 3 days in a week and once for Food Frequency Questionnaire (FFQ). Results of the study showed the mean systolic blood pressure was 132.27±27.07 mmHg, diastolic blood pressure (85.11±13.58 mmHg), body mass index (27.30±5.27 kg/m^2), waist-hip ratio (0.89±0.07) and total body fat (30.61±5.71%). Mean nutrient intake per day for calories, carbohydrate, protein, fat, cholesterol, vitamin A, vitamin C, calcium, iron and dietary fibre were 2072.3±638.79 kcal, 280.12±91.79 g, 88.08±27.91 g, 66.48±24.18 g, 206.78±142.78 mg, 7838.72±3208.15 IU, 124.25±71.80 mg, 595.61±164.95 mg, 23.69±11.22 mg and 29.89±8.62 g respectively. Among the four groups, Group 1 (400g of red pitaya) showed significant differences in certain study parameters. After four weeks of treatment, there was a significant increase in HDL-cholesterol level from 0.78±0.08 mmol/L to 0.99±0.13 mmol/L (14.1%), and a significant decrease in blood glucose level from 6.41±0.94 mmol/L to 4.87±0.91 mmol/L (19.94%), LDL-cholesterol level from 2.64±0.57 mmol/L to 1.61±0.39 mmol/L (5.94%) and triglycerides level from 1.54±0.49 mmol/L to 0.97±0.43 mmol/L (23.52%). There was a significant increase in total cholesterol level from 3.96±0.68 mmol/L on the fifth week to 5.09±0.78 mmol/L on the seventh week of the study (24.08%). Even though there was no significant difference in Group 2 (600g of red pitaya), there was still an increasing trend in HDL-cholesterol level and decreasing trend in blood glucose, total cholesterol, triglycerides and LDL-cholesterol levels throughout the study period. No significant differences were seen for systolic and diastolic blood pressure, body weight and total body fat in all groups. In conclusion, the findings indicate that red pitaya fruit consumption has great potential and may be beneficial in controlling the blood glucose level and lipid profiles in type 2 diabetic subjects.

D14 A modified direct transesterification method for determination of plasma fatty acids profile

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Analysis of fatty acid composition in human plasma for the purposes of monitoring dietary fat intake is becoming increasingly common in epidemiological studies. In this study, a modified direct transesterification method was used to determine plasma fatty acids profile of twenty healthy individuals. Direct transesterification is a one step reaction of fatty acid methyl aster (FAME) synthesis that involves FAME derivatisation directly from the sample matrixes without a previous extraction step to isolate the lipids. The separate lipid extraction step was omitted and fatty acids were simultaneously extracted and transesterified in this method. The modification was in terms of solvents and reagents usage. Two hundred µl of plasma sample added with methanolic sulphuric reagent and toluene was refluxed for 90 min at 90°C. On cooling the mixture to room temperature, the non-FAME containing phase was separated from the FAME containing phase using n-hexane and distilled water by centrifugation. The lipid containing phase was retained and sodium sulphate anhydrous was used to remove excess water before injecting into the gas chromatography system. The results of the study showed that the mean

percentage of the predominant fatty acids in the subjects plasma was 33.7% for palmitic acid (C16:0), 23.9% for linoleic acid (C18:2n6), 14.9% for oleic acid (C18:1n9), 10.9% for stearic acid (C18:0), 6.8% for arachidonic acid (C20:4n6), 4.7% for docosahexaenoic acid (DHA, C22:6n3), 1.6% for eicosatrienoic acid (C20:3n6), 1.2% for palmitoleic acid (C16:1) and 0.3% for eicosapentaenoic acid (EPA, C20:5n3). The mean percentage for total saturated fatty acids was 45.5%, monounsaturated fatty acids was 16.6% and polyunsaturated fatty acids was 37.6%. Interestingly, about 60% of the healthy volunteers, as estimated from their plasma fatty acids profile, had 7 - 8.4% of energy intake for linoleic acid and 1.2 – 2.6% of energy intake for omega-3 fatty acids, which are EPA and DHA from their diet. To conclude, this modified direct transesterification method has the ability to preserve all the fatty acids, specifically polyunsaturated fatty acids, which is vulnerable to oxidation. This method is also simple and saves time.

D15 The impact of dietary habits on colorectal cancer

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A study to determine the Impact of Dietary Habits on Colorectal Cancer was carried out. This study was conducted in Penang General Hospital at the Oncology ward. The samples selected for this study were the patients with colorectal cancer who were willing to cooperate and participate in the study. About 29 patients were selected during the duration of this study. Structured questionnaires and Food Frequency Questionnaires (FFQ) were framed to elicit information from the patients. From the study it was observed that higher (55% of males and 72% of females) incidence of colorectal cancer was found among the Chinese population. Majority (27%) of the patients were in the age group of 65-70 years. Around 34% of the patients were observed to be smokers. Eleven patients were identified to have consumed high levels of red meat and low-fibre food daily before being diagnosed with colorectal cancer. They were noticed to have 92% fibre deficiency and 98% of cholesterol intake in their diets. Hence, there is a need to educate the public to adhere to a wholesome diet, particularly to increase the consumption of high-fibre and low-fat diets for the prevention of colorectal cancer.

D16 Assessment of nutritional status and quality of life in haemodialysis patients of SJAM – KPS haemodialysis center, Klang

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Although it is acknowledged that chronic dialysis therapy will reduce mortality rate of renal failure patients, on the other hand, it is well documented that dialysis therapy itself has a negative impact on patients' nutritional status and quality of life. The objective of this study was to determine the nutritional status and quality of life of haemodialysis patients. A total of 67 subjects (39 male, 28 female) participated in this cross-sectional study. Questionnaires were used to collect subjects' socio-demographic data and score of Quality of Life (adapted from KDQOL-SF^{TM}). Dietary intake of subjects was assessed using 2-day food record (one on haemodialysis day and another on non-haemodialysis day). Biochemical and medical histories were retrospectively obtained from subjects' medical record as secondary data. Anthropometric measurements such as dry weight, height, triceps skinfold thickness, mid-upper arm circumference and percentage body fat were obtained immediately after haemodialysis section using appropriate techniques. Dietary intake was analysed using Nutritionist Pro, while other data were analysed using SPSS version 12.0. The mean height, dry weight, and BMI of the subjects were 160.7 ± 6.8 cm, 63.1 ± 13.2 kg, and 24.5 ± 5.3 kgm^{-2} respectively. There were 41.8% subjects who were overweight with 58.2% normal weight. A total of 58.2% subjects had abnormal lipid profile. The mean serum albumin level and uric acid level was 41.3 ± 2.8 g/dl and 0.45 ± 0.07 mmol/l respectively, while 16.4% had low albumin level and 65.7% had elevated uric acid level. All subjects had elevated creatinine level and low Total Iron Binding Capacity with a mean of 919.8 ± 267.6 µmol/l and 35.5 ± 5.2 mmol/l respectively. As for medical history, 80.6% were hypertensive, 61.2% were diabetics while 16.4% had cardiovascular diseases. Mean energy and protein intake was 2414 ± 633 kcal/day and 111.3 ± 36.0 g/day respectively. There were 59.7% and 76.1% of subjects achieving dietary recommendation for energy and protein intake respectively. There was a significant difference between dialysis and non-dialysis day for energy intake (p=0.000) and protein (p=0.02) intake. Mean dietary intake for sodium, potassium, phosphorus, calcium, and iron intake was 3785.4 mg, 1860.9 mg, 1764. 9mg, 296.2 mg, and 37.0 mg respectively. Subjects' Quality of Life score was not satisfactory. Total score for each section was 100, while the mean score was 64.96 ± 11.31 (symptom/problem list), 55.88 ± 9.29 (effect of kidney disease), 44.59 ± 17.61 (burden on kidney disease), 37.10 ± 7.14 (physical composite), and 40.07 ± 6.19 (mental composite). There was a significant relationship between BMI and effect of kidney disease (r = 0.302, p = 0.013), but not with symptom/problem list (r = -0.128, p = 0.301), burden on kidney disease (r = -0.128, p = 0.303), physical composite (r = 0.056, p = 0.653), and mental composite (-0.042, p = 0.735). Similarly, Pearson coefficient test showed a significant relationship between albumin level with effect of kidney disease (r = -0.390, p = 0.001) and burden on kidney disease (r = 0.267, p = 0.029), but not with symptom/problem list (r = 0.008, p = 0.949), physical composite (r = -0.142, p = 0.252), and mental composite (r = -0.165, p = 0.183). Subjects showed a moderate level of nutritional status but unsatisfactory score for Quality of Life. Appropriate counseling and interventions are needed to improve nutritional status and quality of life in haemodialysis patients.

D17 Validation of skinfold thickness and bioimpedance technique against dual energy X-ray absorptiometry (DEXA) measurement in determination of body composition among young healthy adult men

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The purpose of this study was to validate the body composition profile measured using skinfold thickness and bioimpedance technique against dual energy x-ray absorption-metry (DEXA) measurement among young healthy adult men. Total of 60 healthy subjects (44 Malays, 13 Chinese and 3 Indians) aged 20 to 37 years volunteered for this study. The body composition was determined using DEXA, skinfold thickness (SFT), Maltron 906 and Omron 302. All measurements were carried out on the same day for each subject. Fat percentage and fat free mass (FFM) was highest in Indian subjects (DEXA; 28.2 ± 4.4 (% fat), 51.7 ± 6.8 (FFM), SFT; 25.2 ± 4.5 (% fat), 58.4 ± 7.5 (FFM), Maltron 906 ; 30.3 ± 3.6 (% fat), 54.4 ± 8.5 (FFM), Omron 302; 29.3 ± 5.1 (% fat), 55.0 ± 6.0 (FFM)) followed by Malay subjects (DEXA; 20.9 ± 8.1 (% fat), 50.7 ± 10.9 (FFM), SFT; 19.7 ± 6.6 (% fat), 55.6 ± 10.3 (FFM), Maltron 906; 24.5 ± 5.2 (% fat), 52.7 ± 10.6(FFM), Omron 302; 23.0 ± 7.4 (% fat), 53.0 ± 8.9 (FFM)) and lastly in Chinese subjects (DEXA; 17.1 ± 6.1 (% fat), 48.1 ± 6.1 (FFM), SFT; 15.7 ± 4.8 (% fat), 52.8 ± 7.1 (FFM), Maltron 906; 20.9 ± 4.3 (% fat), 49.7 ± 8.2 (FFM), Omron 302; 19.7 ± 5.1 (% fat), 50.3 ± 6.8 (FFM)) in all methods. Significant correlation was found between DEXA and SFT in fat percentage (r=0.920, p=0.0001) and FFM (r=0.741, p=0.0001), DEXA and Maltron 906 in fat percentage (r=0.781, p=0.0001) and FFM (r=0.725, p=0.0001), between DEXA and Omron 302 in fat percentage ((r=0.890, p=0.0001) and FFM (r=0.744, p=0.0001), and also between Maltron 906 and Omron 302 in fat percentage (r=0.812, p=0.0001) and FFM (r=0.954, p=0.0001). Good agreement between all methods was observed when Bland-Altman graft was plotted. However, compared to DEXA, Maltron 906 and Omron 302 devices tended to overestimate fat percentage and FFM.

D18 Nutritional assessment of gastrointestinal cancer patient undergoing elective surgery

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This cross-sectional study was conducted in the Surgical Ward at Hospital University Kebangsaan Malaysia (HUKM) and Surgical Ward of University Putra Malaysia at Kuala Lumpur Hospital (HKL) to determine nutritional status of the cancer patients undergoing elective surgery. Nutritional status was assessed by anthropometric

measurements, daily food intake, biochemistry profile and patient-generated subjective global assessment (PG-SGA). Anthropometric measurements were assessed by weight and height for body mass index (BMI) calculation, mid-upper arm circumference (MUAC) and triceps skinfold. Daily food intake was assessed by 3-day food record and 24-hour diet recall. Biochemistry profile (serum ferritin and serum albumin) was taken from patients' bed head ticket. PG-SGA was assessed using PG-SGA assessment form by Ottery (2001). A total of 73 gastrointestinal cancer patients aged between 35 and 77 years were divided into case (n = 38) and control group (n = 35). The case group was classified according to the body mass index (BMI) < 18.5kg/m^2 and the control group BMI ³ 18.5kg/m^2. Results revealed that the mean age of the case group was 62 ± 10 years meanwhile the control group was 62 ± 10 years ($p<0.005$). The mean BMI of the case group was 18 ± 3kg/m^2 and the control group was 25 ± 5kg/m^2. Approximately 29 (40%) subjects in the case group and 5 (7%) in the control group had muscle wasting based on measurement of mid upper arm circumference (MUAC). Mean serum ferritin level of the case group was lower (11 ± 2ng/ml) as compared to the control group (12 ± 2ng/ml). Mean serum albumin level of the case and control groups was 33 ± 11g/l and 38 ± 7g/l respectively. Mean energy intake for men and women subjects in the case group were 1193 ± 436kcal/day and 1262 ± 597kcal/day respectively. Meanwhile, energy intake for men and women in the control group was 1338 ± 395kcal/day and 1342 ± 288kcal/day respectively. The percentage of carbohydrate, protein and fat consumed by case group was 54 ± 10%, 21 ± 16% and 27 ± 9% respectively. The percentage of carbohydrate (53 ± 11%) and protein (19 ± 4%) consumed by control group was lower as compared to the case group. However, percentage of fat intake of the control group was 29 ± 9%. Assessment of PG-SGA showed that 26% (n=10) of the case group were severely malnourished as compared to 3% (n=1) of the control group.

D19 Comparison study of energy intake and energy expenditure between normal and overweight children

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The purpose of this study was to compare the energy intake and energy expenditure between normal and overweight children. A total of 69 primary school children in Batu Pahat, Johor aged 12 years old were selected after anthropometric measurements were done. A total of 34 (49.3%) respondents selected were overweight (OW) according to BMI-for-age above the 85th percentile (NCHS, 2000). Another 35 (50.7%) children were selected as controls, matching for age and gender. Interview sessions were done two times a week for each respondent using a questionnaire. Each set of questionnaire contained socio-demographic questions, 24-hour Dietary Recall and 24-hour activity physical recall. The data were then analysed using computer software of *Statistical Packcage for Social Science* (SPSS) 12th version and Diet 4. Pearson's Coefficient Correlation Test for determining the correlation between variables. Independent t – test was used to determine the differences. Mean members of siblings for (NW) were 4.00±1.41 while, for (OW) was 4.00±1.20. Majority of the mothers (51.4%) and fathers (42.9%) of the (NW) respondents

worked in service, production and clerical sector, while majority of the mothers (41.2%) of the (OW) subjects were fulltime housewives and fathers (55.9%) worked in service, production and clerical sector. Most of the respondents came from a middle-income family with a mean income of (RM3022.94±2469.78) for (OW) children and (RM3169.88 ±1865.30) for (NW) children respectively. Mean BMI for (NW) was 18.28±1.25 kg/m^2 and (OW) was 27.04±3.56 kg/m^2. The energy intake for (NW) children was higher than (OW) children with mean energy intake of 1621.49±456.88 kcal and 1587.71±562.22 kcal respectively. Mean energy expenditure for (NW) children (1454.64±108.30 kcal) and (OW) (1763.52±230.67 kcal) were different from their energy intakes, which showed that (NW) respondents use less energy compared to (OW) children. Mean energy expenditure for both (NW) and (OW) children were (166.84±432.44kcal) and (-175.81±550.93 kcal) respectively. The Pearson Coefficient Correlation Test showed that there was no significant correlation between socio-demographic factors and the occurrence of (OW) among the respondents. Body Mass Index and energy balance was also not significantly correlated. This showed that maybe there are other factors that contribute to the positive or negative energy balances. There were no significant differences in energy intake between (NW) and (OW). However, energy expenditure ($t = -7.086$, $P < 0.001$) and energy balance (2.878, $P < 0.05$) was significantly different between (NW) and (OW) children. This showed that the differences in energy expenditure for both respondents may have influenced the differences in their energy balances. As a result, it is importance to achieve healthy nutrition and adequate physical activity to avoid the occurrence of energy imbalance which can contribute to overweight and obesity. Furthermore, parents should take care and give more attention to their children in consuming healthy diets suitable for their growth.

D20 Association between dietary antioxidants and cancer: a case-control study

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It has been hypothesised that dietary antioxidants influence the risk of cancer. The relationship between intake of dietary antioxidants and cancer incidence was examined in this case-control study. A total of 50 female patients with cancer disease (breast cancer n=29, cervix cancer n=21) from Institute Radiotherapy and Oncology in General Hospital Kuala Lumpur were selected as cases, while 50 female adults (without cancer and chronic diseases) matched for age and ethnicity were randomly selected from Klang Valley as controls. Data were obtained through interview by questionnaire, which contained demographic information, anthropometric measurement, food frequency questionnaire and supplement intake. The mean intake of vitamin A, β-carotene, vitamin C, vitamin E and Selenium was 1118±938 μg RE, 1559±1869 μg, 110±78 mg, 14±5 mg dan 132±67 μg for cases and 2196±1372 μg RE, 4098±2816 μg, 218±132 mg, 15±5 mg dan 119±55 μg for controls. It was found that the mean intake of vitamin A, β-carotene and vitamin C was significantly higher among controls as compared with cases ($p<0.05$). This result indirectly supports the difference in fruits and vegetables intake between cases and controls which was statistically different at $p=0.029$. Women with vitamin A intake lower than

RNI had a 1.77 times higher risk of getting cancer, women with lower β-carotene intake (<3500 μg) had a 3.14 times greater risk to develop cancer and women with vitamin C intake lower than RNI had a 1.83 higher risk of getting cancer. For breast cancer, there is a significant difference between cases and controls for vitamin A (p=0.007), β-carotene (p=0.001) and vitamin C (p=0.001). Cervix cancer shows similar results with significant difference between cases and controls for vitamin A (p=0.001), β-carotene (p=0.000) and vitamin C (p=0.001). For fruit and vegetables intake, significant difference occurs between cases and controls. For breast cancer, there is no difference in fruit and vegetables intake between cases and controls but there is a significant difference for vegetables intake only at p=0.000. For cervix cancer, there is significant difference in fruit and vegetables intake at p=0.001. As a conclusion, vitamin A, β-carotene and vitamin C lower the risk of cancer incidence. Fruits and vegetables also partially lower the risk of cancer incidence. However, more conclusive studies should be conducted.

D21 Gustatory evaluation and activity of daily living among stroke survivors at the PERKIM rehabilitation center, Bandar Baru Sentul, Kuala Lumpur

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Tastes are very unique in nature and each taste gives different sensations from another. The importance of the taste sense is to determine the good quality of food for health. Increasing the taste and modifying the texture of diet will improve the quality of life. This cross-sectional study was to evaluate the gustatory evaluation and activity of daily living (ADL) among stroke survivors at the PERKIM rehabilitation center, Bandar Baru Sentul, Kuala Lumpur. Four basic tastes; sweet, sour, salty and bitter, were tested using several dilutions. The solutions were sampled not according to sequence. Sucrose (1%, 2%, 3%) was used for the sweet solution, citric acid (0.035%, 0.07%, 0.14%) for the sour taste, salt (NaCI 0.1%, 0.2%, 0.4%) for the salty taste and aspirin for the bitter (1 tablet Aspirin/360ml, 1 tablet Aspirin/240ml, 1 tablet Aspirin/120ml) taste while monosodium glutamate (0.01%, 0.03%, 0.05%) for the umami taste. The gustatory evaluation was based on a 5-point hedonic scale while functional status was assessed using a Modified Barthel Index. Anthropometric measurements and 3-day food intake were also collected. Eleven stroke survivors; 9 Malays and 5 Chinese, participated in the study. The results showed that the stroke survivors were more sensitive to sweet, salty, bitter and umami tastes at the lowest concentration, indicating that the taste threshold for those tastes are low. The score for the Modified Barthel Index showed that the stroke survivors were independent and able to do their daily activities.

D22 Nutritional status among paediatric oncology through anthropometric, biochemical and hematological parameters

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Malnutrition is common among paediatric oncology patients. Many factors contribute to malnutrition such as physiological abnormalities, response to the tumours and the side effects of the treatment. A cross sectional study was carried out to determine the nutritional status of paediatric oncology patients aged 4 to 12 years old in Hospital Universiti Kebangsaan Malaysia. A total of 17 children (7 boys and 10 girls) were recruited within a period of 6 months and divided to three age groups. Group A: 4 to 6 years old, group B: 7 to 9 years old and group C: 10 to 12 years old. The nutritional status was assessed through anthropometric measurements including weight, height, triceps skin fold and mid upper arm circumference. By using Frisancho's standards (1990), malnutrition was observed in 70.6% of the children and they were below 50th percentile of weight for age table. Indicator for height-for-age showed that 76.5% of the children were below 50th percentile, which indicates stunting. Signs of muscle wasting were seen in 58.8% of the children via MUAC measurement. Low hemoglobin was found in 70.6% of the children (<11.0 g/dL) and 29.4% of the children had low serum albumin (<35.0 g/dL). This study showed that early recognition of malnutrition in paediatric oncology patients is possible through routine assessment of their nutritional status and early nutritional intervention is needed to enhance better quality of life.

Group E: Food Science and Technology

E01 Knowledge, attitude and practices on nutrition labelling among small and medium sized industry (SMI) food manufacturers in Selangor: a case study

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The purpose of this study was to assess the knowledge, attitude and practices on nutrition labelling among small and medium sized industry (SMI) food manufacturers in Selangor. This study was carried out as a case study and purposive sampling was used. According to the SMI Association of Malaysia and Small and Medium Industries Development Corporation (SMIDEC) there are a total of 270 SMI food manufacturers in Selangor and Kuala Lumpur. Letters were sent to all the food manufacturers. However, only 21 (7.8%) companies agreed to participate despite repeated phone calls. There were 16 (76.2%) small size companies and 5 (23.8%) medium size companies. Majority of the companies did not agree to participate giving reasons that they were too busy and were not interested to participate. Interviews were conducted with the companies' officers who

were responsible for nutrition labelling. The data was analysed using SPSS version 12.0 for Windows. Most of the companies were located in Klang (33.3%) and Shah Alam (19.1%). Majority of the respondents held posts as Quality Control Executives (28.6%), General Managers (19.1%), Food Technologists (9.5%) and Production Managers (9.5%). Respondents were predominantly female (66.7%). The mean total number of years of operation for the food manufacturing companies was 16.3±21.1 whereas the mean number of full time employees was 35.6±27.1. The main products manufactured were sauces (23.8%) such as chilli sauce, tomato sauce and oyster sauce, flour products (23.8%) such as biscuits and cakes, fruit juices (9.5%), snacks (9.5%) and spices (9.5%). More than half of the manufacturers export to Singapore and Australia. All manufacturers obtained nutrition labelling information from the Ministry of Health. Scores for knowledge and attitude on nutrition labelling were divided into 3 tertiles (low, medium and high). The mean score for knowledge was 48.2±11.4, whereby the highest score was 72.0 and lowest was 36.0. Almost half of the respondents (47.6%) were in the lowest tertile for knowledge; all of whom were from the small industry. This showed that small food manufacturers do not fully understand the requirements for nutrition labelling. The mean score for attitude was 81.0±5.2 with the highest score 90.0 and lowest score 66.0. There were 71.4% respondents who showed moderately positive attitude towards nutrition labelling. All the respondents claimed to comply with the labelling requirements for all the 4 major nutrients (energy, carbohydrate, protein and fat). Those who exported their products to overseas did comply with the importing country's requirements for nutrition labelling. Most of the manufacturers (76.2%) faced problems in terms of cost of printing new labels. This is more prevalent in small industries. Moreover, cost of analysing nutrients (71.4%) and a lack of nutrition professionals to prepare nutrition labelling (47.6%) also posed problems, especially among small manufacturers. In conclusion, the government should organise more programmes regarding nutrition labelling for the food manufacturers. These should target more small-sized manufacturers to increase their awareness and knowledge on nutrition labelling.

E02 Sago flour substitution in bread making: physical & chemical status

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Sago flour was partially substituted in the formation of dough for bread making process. The dough was developed using the straight dough method. Substitution of 40% sago flour was found to be the maximum level to meet the standard criterion. Measurements and analyses were carried out on the freshly baked buns. It was observed that the physical quality of the sago buns decreased compared to the control sample, which was prepared from 100% wheat flour. The texture of sago buns tended to be harder compared to the control buns and this complied to the results given by the sensory panels. Sensory evaluations showed that there was a significant difference between aroma, texture and overall acceptability of the products. Scanning results from

the electron microscope indicated the presence of uniform cone shapes and deeper holes for sago buns compared to bowl shapes and shallow holes for the control bun. Chemical analysis conducted showed that there was no significant difference for crude fibre and ash content in both samples but there was a significant difference for moisture content.

E03 Effect of oil degradation on the sensory acceptability and oil colour after deep-fat frying of *keropok lekor* and *pisang goreng*

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Fat used for frying becomes part of the food consumed. Therefore, oil quality is of paramount importance because it affects the quality of the fried foods and its acceptability by consumers. The objective of this study was to determine the effects of palm olein, corn and blended oil degradation on sensory acceptability and colour after frying with *keropok lekor* and *pisang goreng* for 10 frying days. *Keropok lekor* and bananas coated in batter were deep fried in cooking oil at a temperature of 180±3°C for 5 and 3 minutes respectively. Oil was collected after every frying for colour test using colourmeter. Sixty Chinese students of the Universiti Kebangsaan Malaysia, Kuala Lumpur campus were recruited as taste panelists. These taste panelists sampled the *keropok lekor* and *pisang goreng* after every frying until the 10th frying days. Oil was also collected after every frying to test for colour intensity. The results of the study showed a significant ($p<0.05$) increase in colour, flavour, texture and overall acceptability of *keropok lekor* and *pisang goreng* at the beginning and decreased significantly ($p<0.05$) at the end of the study period. The *keropok lekor* and *pisang goreng* fried in palm olein was the best followed by corn oil and blended oil respectively. The luminance (L) of the three oils decreased while the redness (a) increased throughout the deep-frying period. The yellowness (b) of the corn and blended oil were increased at the beginning and decreased steadily while palm olein showed a downward trend from the beginning of the frying period. In conclusion, oil degradation will affect acceptability of taste and oil colour. *Keropok lekor* and *pisang goreng* fried in palm olein was the most favoured by the Chinese taste panelists.

E04 Sensory acceptance of different types of pitaya fruit juices

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The objective of this study was to determine the sensory acceptance of different types of pitaya fruit juices. 32 students of Faculty of Medicine and Health Sciences, pre-screened for pitaya and fruit juice liking, participated in this study. This study was conducted in the food research laboratory of Department of Nutrition and Dietetics.

Subjects were asked to evaluate their intensity of acceptability for the sensory attributes: colour, texture and mouthfeel, sweetness, aftertaste and overall liking by using 9-point hedonic scale (1= dislike extremely and 9= like extremely). In addition, subjects also rated their consumer reactions (frequency of willingness to consume and purchase intent) by using food action rating scale (1= less than once a week and 5= more than once a day; 1= definitely would not buy and 5= definitely would buy). For overall liking, the hedonic values given to the juices ranged from "neither like nor dislike" to "like slightly". Subjects liked the white pitaya fruit juice with no sugar added significantly less than other types of pitaya fruit juices ($p<0.05$). Meanwhile, there was no significant difference for the colour, texture, mouthfeel and aftertaste liking among different types of pitaya fruit juices ($p>0.05$). Subjects indicated that they "liked slightly" these sensory attributes. Whereas, the mean scores of sweetness acceptability ranged from "dislike slightly" to "like moderately". Red and white pitaya fruit juice with no sugar added were significantly less preferred than pitaya fruit juices with honey and brown sugar in terms of sweetness acceptability ($p<0.05$). The sweetness of the pitaya fruit juices was revealed as a strong promoter of overall pleasantness than other sensory attributes liking ($r= 0.932$, $p<0.01$). Furthermore, subjects expected that they would consume the juices from the range of "once a week" to "2-3 times a week". They demonstrated that they "may be not or may be buy" for all the juices. Besides, the overall acceptability was significantly correlated to the frequency of willingness to consume and purchase intent of the pitaya fruit juices ($r= 0.327$, $r= 0.254$, $p<0.01$). As conclusion, there was a significant difference for the overall and sweetness acceptability among the different types of pitaya fruit juices whereas no preferences were found for the colour, texture, mouthfeel and aftertaste liking for either juice. Future research may be carried out for different segments of consumers.

E05 Development of a valid and reliable questionnaire on perception of halal and haram foods

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The objective of this study was to develop a valid and reliable questionnaire on perception of halal and haram foods. The initial steps involved the development of a conceptual framework by collecting information and identification of halal haram concept. After being assessed by an expert panel including a dietician and a panel from Faculty of Islamic Studies, 70 items were chosen and constructed into the questionnaire. The edited preliminary questionnaire (70 items) was administered to expert and non-expert groups, that was Muslim (n=15) and non Muslim (n=15) referred to as sample 1, for the purposes of performing item analysis and assessing construct validity of the questionnaire. The analysis of 70 items showed cronbach-α value of 0.957 and eight items were deleted because their values were higher than cronbach-α value. Another sixty-two items of the questionnaire were assessed and given to nutrition and dietetic students as subjects with nutrition background (n=80) and Biomedical Science students (n=80) as

subjects without nutrition background. These groups were referred to as sample 2. After the reliability analysis, 62 questionnaire items showed cronbach-α value of 0.934 and three items were deleted because their values were higher than cronbach-a value. The final questionnaire had 59 items and its construct, content and internal consistency reliability were reassessed. Cronbach-a value for the final 59 items of the questionnaire was 0.954 for nutrition and dietetic students, 0.957 for biomedical science students and the overall value of 0.954 for both groups. The differences between subjects with and without nutrition background were examined for validity. It was hypothesised that subjects with nutrition background would have higher scores than without nutrition background. It was however found that there were no significant differences (76.86 ±16.75, 76.5 ± 18.61, $p>0.05$) in the mean scores between these groups. However, there were significant differences (91.13 ± 4.184, 60.71± 12.49, $p<0.05$) in the mean scores of Muslim and non Muslim groups. In conclusion, the questionnaire on perception of halal and haram food with construct, face and content validity and internal consistency was developed in this study.

E06 Nutritional evaluation of sweet potato flour and sweet potato-based cake

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Sweet potato (*Ipomea batatas*) is the most important of the local tuber crops for fresh consumption in Malaysia, and is very tasty and nutritious. Sweet potato can also be processed into flour and further utilised in the production of cakes. The sweet potato tubers variety '*merah manis*' were washed to removed dirt, sliced, soaked in sodium metabisulphite solution, tossed and dried until brittle. Grind process was used to produce sweet potato flour. Nutritional evaluation of the flour carried out showed that sweet potato '*merah manis*' had high vitamin A content as β-carotene (7485.80 μg), vitamin C (18 mg) and dietary fibre (9.50 g) per 100 g sample. It is also high in carbohydrate content, which is a good energy source, but very low in fat content. From the formulation studies, sweet potato flour can substitute wheat flour 100% in cake formulation. The advantage of using sweet potato flour in cakes is the high vitamin A (1631.29 μg) and dietary fibre content (5.08 g) after baking. The sweet potato cake is also moist compared to the cake from wheat flour. These indicated that sweet potato flour seemed more nutritious than wheat flour and food manufacturers have the choice of using sweet potato flour as a raw material instead of always relying on imported wheat flour.

E07 Studies on probiotic mango-flavoured dadih

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Probiotic products are marketed widely throughout the world today. Probiotic foods contain live, beneficial bacteria. Foods such as yogurt, dahi, or kefir are the most recognised foods providing 'good' bacteria for human gastrointestinal (GI) system. In this study, the traditional local-made dadih was prepared by adding sugar, salt and carageenan to the milk and heated for 10 minutes at 80-90°C, cooled to 40°C and inoculated with different percentages of the traditional Indian yogurt called Tairu which contained probiotic cultures. Mango puree was then added with the aim of nutrient fortification and promoting the growth of probiotic bacteria. The objective of this study was to investigate the viability of probiotic cultures in the dadih. It has been suggested that probiotic products should contain at least 10^7 CFU per ml or g (Ishibashi & Shimamura, 1993). Results in the study showed that the anaerobic bacteria count is in the range of 10^7 cfu/g. A control was prepared and the results showed that the number of LAB populations was substantially higher in the fruit-based dadih. Proximate analysis of the probiotic dadih was determined and compared with other fermented dairy products. Results of the proximate analysis is as follows: Moisture (81.9%), fat (5.4%), protein (4.6%), ash (1%) and carbohydrate (7.1%). Sensory evaluation was conducted to determine the acceptability level of the probiotic fruit-flavoured dadih.

E08 Effect of germinated conditions on γ-aminobutyric acid and ferulic acid in MR 219 and MR 220 germinated brown rice

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Germination is a complex metabolic process that causes lipids, carbohydrates, and storage proteins within the seed to be broken down in order to obtain the energy and amino acids which are necessary for the plant's growth. γ-aminobutyric acid and ferulic acid are the two most important active components which are affected by germination. The objective of this study was to study γ-aminobutyric acid and ferulic acid content in Malaysia brown rice, MR 219 and MR 220 which germinated in varied periods and condition. Both species of white, brown and germinated brown rice were studied. Rice sample was germinated in three conditions, which were distilled water, 0.5 g/ L gibberellic acid and 10 % yeast. γ-aminobutyric acid and ferulic acid components were studied at 0, 6, 24 and 48 hours of germination. Results showed that, γ-aminobutyric acid and ferulic acid in MR 219 and MR 220 was significantly different at 24 hours of germination ($p< 0.05$). Beside, γ-aminobutyric acid content in rice sample, MR 219 and MR 220 germinated with gibberellic acid at 24 hours of germination showed the highest γ-aminobutyric compared with other germinated conditions, while ferulic acid content

germinated with gibberellic acid at 24 hours only showed the highest ferulic acid in MR 219 rice but not in MR 220. This showed that rice samples germinated with gibberellic acid have the effect of increasing γ-aminobutyric acid in germinated brown rice at 24 hours of germination.

Group F: Experimental Nutrition

F01 The effect of *Tinospora crispa* during rats hepatocarcinogenesis

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The effect of Tinospora crispa (akar patawali) aqueous extract on the activities of three tumour marker enzymes; glutathione (GSH), glutathione-s-transferase (GST) and gamma-glutamyl transpeptidase (GGT) during rat hepatocarcinogenesis was studied. 20 male rats (Sprague dawley) were divided into four groups; group A (negative control), B (normal + T. crispa), C (positive control) and D (cancer + T.crispa). The rats were treated with 200mg/kg diethylnitrosamine (DEN) as a cancer inducer and 0.02% of 2-acetylaminofluorene (AAF) as a promoter of liver cancer without partial hepatectomy. 10% (w/v) of Tinospora crispa aqueous extract was supplemented in normal treatment and cancer treatment groups. The rats were sacrificed after 12 weeks of the experiment period and their livers were excised. Results produced in this study were significantly different ($p<0.05$) for body weight increment when compared between cancer control and normal treatment groups. The liver weight of cancer control group produced was significantly higher ($p<0.05$) when compared to normal control group. The cancer treatment group also produced a significantly higher liver weight ($p<0.05$) when compared to normal control and normal treatment groups. The ratio of liver to body weight also produced a significant difference ($p<0.05$) between cancer control and normal control groups. Rats treated with DEN/AAF (cancer control) had significantly higher tumour marker enzymes ($p<0.05$) for all GSH, GST and GGT. T. crispa extract supplementation significantly ($p<0.05$) decreased the tumour marker enzyme activities in cancer treatment group compared to cancer control group for GSH but was not significantly different to GST and GGT.

F02 Effect of *Strobilanthes crispus* juice on wound healing in hyperglycaemic induced rats

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The aim of this study was to determine the effect of *Strobilanthes crispus* juice on wound healing in normal and diabetic rats induced with streptozotocin. Wounds were created by making a 2 cm full-thickness incision on the back of each male *Sprague-Dawley* (130-290g) and the rate of healing was measured daily for seven days. 40 rats were divided into two categories, which are normal and diabetics. Each category consisted of 4 groups (n= 5); control normal, treated with 0.5 ml/kg b.w, treated with 0.75 ml/kg b.w and treated 1.0 ml/kg b.w *Strobilanthes crispus* juice. All rats were treated by force-feeding besides giving basal diet and water *ad libitum*. Blood samples were taken on day 0 and 7 after wound creation for the determination of glucose and lipid profile (total cholesterol, triglyceride, HDL and LDL) by using Chemical Autoanalyser machine. The results showed that there was a significant difference ($p< 0.05$) in increasing the percentage of wound healing in normal rats treated with 1.0 ml/kg b.w *Strobilanthes crispus* juice compared to the other normal groups. This shows that 1.0 ml/kg b.w is the favourable treatment dose in increasing percentage of wound healing (65%) compared to normal group treated with 0.5 ml/kg b.w (46%), normal group treated with 0.75 ml/kg b.w (41%) and control normal group (31%). The results showed that all diabetic group sreceiving *Strobilanthes crispus* juice treatment had significant difference ($p< 0.005$) in increasing the percentage of wound healing. Groups that were treat with 1.0 ml/kg b.w showed the highest rate of healing (43%) compared to groups treated with 0.75 ml/kg b.w (36%) and 0.5 ml/kg b.w (29%). However, there is no significant difference between treatment with *Srobilanthes crispus* juice and glibenclamide in decreasing the blood glucose level and lipid profile of the rats. From this study, we may conclude that treatment of *Strobilanthes crispus* juice will increase the percentage of wound healing in rats. However, it does not show effect in changing the blood glucose level and lipid profile.

F03 The effect of *Strobilanthes cripus* juice on the blood glucose and lipid profile of diabetic-induced rats

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Strobilanthes cripus (*S. cripus*) can be found in Malaysia and Indonesia where it has been used as a medicinal plant traditionally. This study was conducted to investigate the effect of *S. cripus* on blood glucose and lipid profile of diabetic-induced rats. A total number of 54 male *Sprague dawley* rats were used for 3 weeks of investigation. Rats were divided into 9 groups, which were diabetic control (group 1), normal control (group 6),

diabetic and normal with *S. cripus* juice treatment (group 3, 4, 5, 7, 8 and 9 – 0.50, 0.75 and 1.00ml/kgBW) and diabetic with glibenclamide (group 2). Throughout 3 weeks of the study, normal and diabetic control groups were only provided with basal diet, diabetic and normal treatment groups were additionally force-fed with 0.50, 0.75 and 1.00ml/kgBW/day of *S. cripus* juice, and diabetic with glibenclamide also force-fed 10mg/kgBW of glibenclamide. After 3 weeks of supplementation with *S. cripus* juice, the blood glucose level increased 145.96% (0.50 ml/kgBW), 2.49% (1.00 ml/kg/BW) except for group 0.75 ml/kgBW that reduced 19.35% as compared with baseline. However, these results were not statistically significantly different ($p>0.05$). Total cholesterol increased significantly about 200% (0.50 ml/kgBW), 157.53% (0.75 ml/kgBW) and 94.55% (1.00 ml/kgBW) when compared with baseline level. The TG level also increased significantly by about 100% (0.50 ml/kgBW), 48.94% (0.75%). The HDL-C for 6 treated groups (diabetic and normal) was significantly increased ($p<0.05$). For diabetic groups, 206.90% (0.50 ml/kgBW), 171.43% (0.75 ml/kgBW) and 118.19% (1.00 ml/kgBW); normal groups were 58.06% (0.50 ml/kgBW), 66.10% (0.75 ml/kgBW) and 87.71% (1.00 ml/kgBW). Moreover, LDL-C also increased statistically significantly ($p<0.05$). LDL-C level for diabetic-induced groups increased 533.33% (0.50 ml/kgBW), 400% (0.75 ml/kgBW) and 329.41% (1.00 ml/kgBW) whereas for normal rats the LDL-C level increased 220.83% (0.50 ml/kgBW), 174.07% (0.75 ml/kgBW) and 246.15% (1.00 ml/kgBW) as compared to the baseline readings. This study shows that *S. cripus* juice could not help to reduce blood glucose, TC, TG and LDL-C but it could help to increase HDL-C level tremendously.

F04 The influence of phytic acid extracted from rice bran on aberrant crypt foci in rat colon

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Phytic acid (myoinositol hexa-phosphoric acid, IP6) has been extensively studied for its potential chemopreventive activity against colon carcinogenesis. A striking anticancer effect of phytic acid was demonstrated in different experimental models. Phytic acid is a major form of phosphorylated inositol present in foods, constituting 1-5% by weight of most cereals, nuts, oilseed, legumes and grains. One of the sources of phytic acid is rice bran, which occurs at 9.5%-14.5% by weight. Rice bran that is normally discarded as a by-product of rice production, will increase in value due to phytic acid potential as neutraceutical in the prevention of colon cancer. Therefore, the purpose of this study was to determine whether phytic acid extracted from rice bran has any effect on the aberrant crypt foci (ACF) characteristic, an early biomarker of colon cancer risk. 36 four week-old Sprague Dawley rats were divided into four groups of six rats each. Rats received two intraperitoneal injections of colon-specific carcinogen, azoxymethane (AOM), at 15 mg/kg body weight at five and six weeks of age. The phytic acid was administrated at 0.2% and 0.5% in the drinking water during post-initiation phase (beginning 1 week after carcinogen treatment) of carcinogenesis. All rats were killed after eight weeks of treatment, and the colons were examined for the preneoplastic lesion. Administration of 0.2% and 0.5% extracted phytic acid in the drinking water, significantly inhibited the aberrant crypt

formation in rats treated with azoxymethane (AOM), compared with rats treated with azoxymethane (AOM) alone (26.00±4.55 and 40.5±10.15 vs 59.5±3.87, repectively). It is concluded that phytic acid in rice bran can reduce early biomarkers of colon cancer risk.

F05 Anti-obesity effect of Jin Batu (Strobilanthes crispus) leafy extract on diet-induced obese rats

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The objective of this study was to determine the anti-obesity effect of *S. crispus* leaves extract on diet-induced obese rats. Sprague-Dawley rats were given high-fat diets for 14 weeks to induce obesity and were treated for another 14 weeks with 2% (w/w) water extract of *S. crispus* leaves. After 14 weeks of diet treatment, rats in the High-Fat Diet group became obese with mean weight gain of 134.97 ± 21.41 g compared to the mean weight gain of Control rats (97.50 ± 12.12 g). Some rats were found to be obese-resistant because of their lower weight gain compared to Control rats. Adipose tissue weight of Obese group was significantly higher than the Control group. Plasma lipid profile analysis showed no significant difference between Control and Obese groups' mean Low-Density Lipoprotein (LDL) and High-Density Lipoprotein (HDL). However, mean plasma leptin of Obese group was found to be significantly higher than Control group. Further *S. crispus* extract treatment study showed that mean body weight increased in the order of Control (C) group (491.33 ± 10.91 g), Obese + Treatment (OT) group (511.93 ± 31.75 g) and Obese (O) group (551.88 ± 37.52 g). However, the mean weight gain was lowest in the OT group (–7.15 ± 14.04 g) compared to of C group (28.17 ± 12.04 g) and O group (10.28 ± 35.296 g). Adipose tissue weight was found to be highest in the O group, followed by C group and OT group. Analysis of plasma lipid profile showed that there were no significant differencec in mean LDL and HDL of the three groups. However, highest leptin level was found in O group while results in C group and OT group were about the same. In conclusion, this study indicates that *S. crispus* extract has some anti-obesity effect. More studies should be conducted to confirm the results.

F06 The effect of *Strobilanthes crispus* extracts on atherogenesis and tissue morphology in hypercholesterolaemic rabbits

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Strobilanthes crispus plant has frequently been used as a herbal remedy locally and in Indonesia as anti-diabetic, diuretic and cholesterol-lowering agents. This study was designed to determine the hypocholesterolaemic role of *Strobilanthes crispus* extracts on an animal model induced with atherosclerosis. Twenty-four adult female New Zealand white rabbits (body weight: 1.8-2.5 kg) were used. After two weeks of adaptation period, the rabbits were randomly assigned into four groups (n=6/group); the negative control, positive control, *Strobilanthes crispus* and simvastatin groups. The rabbits were fed with an unmodified non-purified diet, 0.25% high cholesterol diet, 0.25% high cholesterol diet supplemented with *Strobilanthes crispus* extract (0.2% of diet) and 0.25% high cholesterol diet supplemented with simvastatin (20 mg/kg body weight), respectively for 12 weeks. At the end of the experimental period, the rabbits were sacrificed. Ascending aorta, liver, kidney and heart tissue specimens were excised immediately and prepared for the microscopic and histopathological studies by fixing in formalin and paraffin blocks. Sections were prepared and stained with haematoxylin and eosin. The intima to media thickness ratio for the aorta of the positive control group was slightly higher than the *Strobilanthes crispus* and simvastatin groups. Although the difference was insignificant, massive macrophages and foam cells were detected in the intima lesion resulting in thickening of the positive control group aorta. In contrast, the aortas from the group treated with *Strobilanthes crispus* extract and simvastatin showed lesser thickening than the positive control group. Both treatment groups still had some protruded intima, unlike the negative control group, as they were also induced with artherosclerosis. Meanwhile, in the liver tissue, slight fatty changes, moderate to severe and mild lymphocyte infiltration were observed in the positive control and simvastatin groups, respectively. Ballooning degeneration of hepatocytes in both groups was also detected. Interestingly, no such changes were visible in the *Strobilanthes crispus* group. These results support the previous study that *Strobilanthes crispus* plant may possess the hypocholesterolaemic properties that can slow down the development of atherosclerosis.

F07 Degradation of palm olein, corn oil and blended oil during batch frying of *keropok lekor* and *pisang goreng*

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Lipid oxidation that occurs during deep-fat frying is the cause of deteriorative changes in chemical, sensory and nutritional food properties. This study was conducted to determine the oxidation level in oils and food when the oils were repeatedly used for ten frying days. *Keropok lekor* and *pisang goreng* were fried in palm oil, corn oil and blended oil at 180°C for 5 minutes and 3 minutes respectively during ten consecutive days. Oils and food samples were taken for analysis at the end of each frying days. Peroxide value (PV) and thiobarbituric acid (TBA) value was used to evaluate the primary and secondary oxidation products in fried food. Iodine value (IV) and free fatty acid (FFA) was measured to determine the oxidation level of frying oils. The fatty acid compositions of oils before and after frying were also determined. The results of the study showed that PV increased significantly from the first frying day to the seventh frying day. Peroxide value of *keropok lekor* fried in palm oil, corn oil and blended oil increased by 121%, 137% and 96%. Peroxide value of *pisang goreng* fried in the same oil increased by 92%, 129% and 77%. Thiobarbituric acid value also increased significantly, where *keropok lekor* fried in palm oil, corn oil and blended oil increased by 7.88 mol/kg, 12.08 mol/kg dan 8.42 mol/kg while *pisang goreng* increased by 3.83 mol/kg, 5.09 mol/kg and 4.37 mol/kg. The foods fried in corn oil showed the most increment in PV and TBA value. Iodine value for all the three oils decreased significantly but corn oil underwent saturation at a faster rate. Free fatty acid increased significantly in the three oils throughout the ten frying days. Fatty acid compositions of oil samples showed that the relative proportion of palmitic acid (C16:0) increased while the relative proportion of linoleic acid (C18:2) decreased for the three oils throughout the ten frying days. As a conclusion, palm olein, corn oil and blended oil are still acceptable after ten frying days.

F08 Ileal endogenous amino acid output of broiler chickens under high ambient temperature

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A study was conducted on the effect of high ambient temperature (35°C versus 21°C) during the 5th and 6th wk of age on endogenous amino acid excretion in the ileum of broiler chickens. A total of 90 birds reared under standard commercial condition, were divided into three equal groups. Birds in group 1 were challenged to heat stress (placed in a chamber set at 35°C for 180-min daily) during the 6th week of age, Group 2 was subjected to similar treatments but for both the 5th and 6th weeks of age, and Group 3

was the control group and kept at 21°C throughout the growing period. Relative weight gain, feed intake and FCR were measured. At the end of 6th week the birds were starved for 24 h before being fed a N-free diet for 4 h. The birds were then killed and the ileum contents sampled and analysed for endogenous amino acids (AA). The results showed that glutamic acid, aspartic acid, serine, threonine, leucine and arginine were predominant in the endogenous AAs flow. In addition, the lowest ileal endogenous losses were for tryptophan, methionine and cystine. Although there were some differences among individual endogenous AA composition during heat stress (Group 1) and after acclimation during the 5th week (Group 2), the overall endogenous AA composition remained unchanged ($p>0.05$). The changes in endogenous AA excretion, suggested that bile excretion into the endogenous AA flow remained unchanged during the heat stress and heat acclimation because glycine proportion subsided during the high ambient temperature. Saliva secretion into the endogenous AA flow increased during heat stress and increased again during acclimation. Mucin and peptidase secretion decreased by heat stress and continued to decrease during the acclimation period and lastly the proportion of desquamated intestinal epithelial cells was markedly increased under heat stress and also heat acclimation in broiler chickens.

F09 The effect of *Phoenix plum* juice on blood glucose level of rats

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Phoenix plum or dates are reported to have a high content of glucose but have no effect on the blood glucose level. An experiment was conducted to study the effects of *Phoenix plum* juice on the blood glucose level of rats. Twenty rats were divided into four groups i.e., Group 1 (control), Group 2 (10% glucose concentration), Group 3 (30% glucose concentration) and Group 4 (*Phoenix plum* juice or approximately 30% gluccose). Rats were force-fed accordingly and then blood was taken from the tail vein at 0 min, 30 mins, 60 mins and 90 mins later. Blood glucose was measured using Surestep® Blood Glucose strip and the reading was made using a Surestrip® Blood Glucometer. The experiment was repeated for three days. The data obtained were analysed statistically. The results showed that there is a significant ($p<0.05$) increase in blood glucose level in all treatment groups 30 minutes after feeding as compared to control. The blood glucose level also decreases significantly ($p<0.05$) to normal blood glucose levels between 30 and 60 minutes for Groups 1 and 4 but takes significantly ($p<0.05$) longer than 60 minutes for group 3. The results indicate that *Phoenix plum* juice has the ability to raise blood glucose levels as early as 30 minutes after consumption, however this increase is only temporary as levels return to normal by 60 minutes. The results suggest that *Phoenix plum* juice is a safe and suitable immediate energy provider with no retention time in the blood, as it is rapidly removed from the body system.

F10 The effect of palm kernel cake diets on the ovulation rate and embryo quality in rabbits

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Palm Kernel Cake (PKC) is one of the by-products of the Palm oil industry. It is commonly used for animal feed although it contains a high copper (Cu) content (MPOB, 2002). This high Cu content can cause toxicity in sheep; however the addition of molydenum sulphate can overcome this problem (Hair-Bejo and Alimon, 1995). A deficient or excessive level of Cu in diet can cause infertility problems in both male and female animals (Underwood, 1977; Weiner and Sales, 1976, Skandhan, 1992, Puls, 1994; Yaakub *et al.,* 2005). The objective of the study was to determine the effects of PKC on the reproductive parameters (ovulation rate and embryo quality) in rabbits. Twelve seven month old female New Zealand White rabbits were randomly assigned to three dietary treatment groups; Control, PKC and PKC supplemented with Molybdenum Sulphate in a completely randomised design (CRD). Rabbits were kept in an individual wire cage, and had access to water and feed *ad-libitum* for eight weeks prior to mating. Rabbits were slaughtered 48 hours post-successful mating and both oviducts were flushed with PBS supplemented with 10% inactivated fetal calf serum. Embryos were recovered from collected flushed media under the stereo microscope. The recovered embryos were fixed, stained with Hoechst 33342 and examined under Fluorescent microscope for quality evaluation. Data for the number of corpora lutea, number of ova/ embryos recovered were analysed using GLM, while data for embryo quality were analysed using Chi – square. Number of corpora lutea, ova/embryos recovered and recovery rate were not affected ($p>0.05$) for Control (10.0 ± 1.08; 5.0 ± 0.82; 50.6 ± 2.42%), 50% PKC (7.2 ± 1.80; 3.8 ± 0.85; 47.0 ± 4.36%) and PKC+SM diets (10.8 ± 2.22; 5.2 ± 3.20; 51.7 ± 9.68%), respectively. There was a significant difference ($P<0.05$) in the percentage of embryos at the early morula stage in rabbits under 50% PKC diet (27.8%; 5/12) as compared to Control (40%; 8/17) and PKC+SM diets (47.8%; 11/21). Overall, the results show that a higher percentage of unfertilised ova and a lower percentage of 8 – 16 cells embryos were recovered from rabbits fed 50% PKC (33.3%; 16.7%) as compared to Control (15%; 30%) and PKC+SM (8.7%; 30.4%), respectively. The results suggest that PKC may not support cleavage and may be detrimental to embryogenesis.

F11 The effects of *Strobilanthes crispus* tea on plasma gamma-glutamyltranspeptidase activity in hepato-carcinogenesis rat

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Many recent studies indicate that among most plants, tea extracts have the most potent anti-carcinogenic agents. Tea is the most widely consumed beverage in the world. This research was conducted to investigate the effects of herbal *Strobilanthes crispus* (SC) tea during rat hepatocarcinogenesis. Tumour marker enzyme activity of γ-glutamyl-transpeptidase (GGT) in plasma was determined in this *in vivo* study as a parameter. GGT is a sensitive, but nonspecific, indicator of liver disease with increased activity found in both cholestasis and hepatocellular damage. Three different doses of SC tea (0.5%, 0.75% and 1.0%) and glycyrrhizin as comparison were administered to the rats along the experiment to determine the effectiveness of SC tea as anti-carcinogenic matter. 64 male rats (*Sprague dawley*, 120-150 g, 7-8 weeks old) were used and housed individually for 14 weeks. They were divided into 9 groups. Four groups comprised the normal and supplemented-control groups. Hepatocarcinogen was induced in the other five groups. The first four groups comprised group of normal control (N), normal + 0.5% SC tea (NT0.5), normal + 0.75% SC tea and normal + 1.0% SC tea (NT1.0). The second five groups comprised group of cancer induced control (C), cancer induced + 0.5% SC tea (CT0.5), cancer induced + 0.75% SC tea (CT0.75), cancer induced + 1.0% SC tea (CT1.0) and cancer induced + glycyrrhizin (CG). The rats were treated with 200mg/kg diethylnitrosamine (DEN) as an initiator and 0.02 % of 2-acetylaminofluorene (AAF) as a promoter of hepatocarcinogenesis without partial hepatectomy. The rats were sacrificed after 14 weeks and their livers were taken and labeled individually. A significant increase ($p < 0.05$) in plasma GGT activity was observed in the cancer-treated group (C, CT0.5 and CT1.0) compared to N group. 0.75% SC tea supplementation significantly ($p < 0.05$) decreased the tumour marker enzyme activity of plasma GGT in CT0.75 group compared to the C group. While for 0.5% and 1.0% of SC tea, an insignificant decrease was produced in reducing the enzyme activities in cancer-induced liver. For normal control rats given SC tea (NT0.5, NT0.75 and NT1.0), the activity of plasma GGT showed insignificant increase when compared to N group. As a conclusion, this study showed SC was found to be a potential medicinal plant to prevent liver cancer. However, although this study showed SC tea successfully decreased the activity of GGT in plasma, further study needs to be done to prove its effectiveness.