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Adolescent health: problems, policies and programmes in Malaysia

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In Malaysia, about one-fifth of the population are adolescents and this is expected to increase rapidly. Adolescents face a broad range of health concerns including obesity, sexual and reproductive health; mental health and mental disorders; and high-risk behaviours such as smoking, substance abuse and alcohol consumption. The nutritional status of adolescents is often compromised by erratic dietary patterns, flawed body image perceptions and micronutrient deficiencies. The thematic Healthy Lifestyle Campaign has played a pivotal role in educating and influencing the public's health behaviour since 1991. In 2003, the campaign was focused on adolescents in schools in an effort to inculcate healthier lifestyle practices amongst them in addition to the comprehensive school health services rendered since 1967. In tandem with the objectives of the Ninth and Tenth Malaysia Plans, the National Plan of Action for Nutrition of Malaysia (NPANM) was formulated as a guide in the implementation of nutrition programmes and activities in the country. The National Adolescent Health Plan of Action (NAHPOA) was specifically initiated to gain intersectoral collaboration in providing services in adolescent health.

Symposium 1: Adolescent Nutrition (I)

Food habits and dietary intake among adolescents in Malaysia: A review

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This is a review of the food habits and dietary intake of adolescents in Malaysia between 2001 and 2006. A total of 6977 adolescents between the ages of 10 and 17 years (younger adolescents 10-12 years n=6000; older adolescents 13-17 years, n= 977) were involved in three cross-sectional studies. Food habits were determined using questionnaires while dietary intake was estimated using 3-day food records. Food habits of younger adolescents in Peninsular Malaysia showed that between 60 and 65% consumed breakfast every day while 28 to 36% skipped breakfast. Main reasons for skipping breakfast were time constraints and lack of appetite. Most commonly consumed breakfast foods were bread, nasi lemak and fried rice. Similar foods were also reported as the preferred breakfast foods especially nasi lemak and fried rice, although breakfast cereals was among the top three preferred foods. The prevalence of snacking was high (91%) in the 10-year olds, decreasing to 88% among the 12-year olds. Favourite snacks were a mix of healthy and unhealthy foods such as ice cream, fruits and French fries. Among the older adolescents, only 58% consumed breakfast every day while 19% skipped breakfast. However, only 48 to 74% took snacks. Unlike the younger group, the older adolescents were inclined to snack on foods such as keropok, cookies and sweets.

With regard to fast food consumption among the older adolescents, the most popular fast foods were burgers (31%), fried chicken (16%) and pizza (13%), corresponding to the top three fast food restaurants visited namely Mc Donalds (53%), Kentucky Fried Chicken (30%) and Pizza Hut (10%). The most preferred beverage when frequenting the fast food restaurants was carbonated soft drinks (76%). 49% consume fast food once a month or less, with another 29% frequenting 2-3 times a month and 19% once a week. Only 2% ate fast food every day while 2% had never eaten fast food. The reasons for going to these fast food joints were the tastiness (55%) of the foods served, its convenience (21%) and accessibility (12%). Majority of the adolescents consumed regular (62%) serving sizes, while the remaining ate either small (23%) or large (15%) meals.

The dietary intake of the older adolescents showed that both boys and girls did not meet the energy recommendation, fulfilling between 88% and 94% of the RNI. Protein and vitamin C intake were adequate, achieving between 115% and 143% for both sexes, while only the iron intake of the boys fulfilled the requirement. Nutrients which have been of concern among adolescents since the last decade are calcium and iron. Calcium and iron intake, especially among the girls, was inadequate, with calcium intake fulfilling only between 45% and 61% RNI for both sexes, while iron intake met only 44% to 46% of RNI among the girls.

This review attempts to highlight some of the key issues affecting adolescents such as their meal patterns, snacking habits, fast food consumption and nutrients of concern. While the habits of skipping breakfast and snacking can be improved, fast food consumption does not appear to be a major problem. It is clear that energy, calcium and iron intake remain problems which need to be addressed. School is the key setting for public health intervention programmes to prevent and reduce problems related to nutrition in adolescents. Thus it is imperative that relevant authorities work closely and more importantly get their act together in revisiting current programmes to make them more appropriate, doable, fun and interactive. This will hopefully improve eating habits and dietary intake and at the same time inculcate a healthy lifestyle among adolescents.

Micronutrient Deficiency in Adolescents: Knowledge Gaps and Investment Opportunities

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There are 1.2 billion adolescents ages 10-19 years in developing countries, contributing one-fifth to one-quarter of their country's population. Nutritionally, adolescents have long been considered as a low risk group when compared to young children, pregnant mothers and the elderly. However, adolescents do face the risk of micronutrient deficiency given that they are going through a period of rapid growth with high nutrient requirements, second only to infancy. The risk of micronutrient deficiency is also evident in adolescents who indulge in dubious eating and lifestyle practices. Yet, intervention programmes for adolescents are typically concentrated on girls with focus on improving pre-conception nutrition. Could the lack of attention on nutrition including micro-nutrients of adolescents be due to a lack of information, especially in developing countries? Against this backdrop, a review of publications on micronutrient deficiency in Malaysian

adolescents over the past decade was undertaken. The finding of a vast information gap is discussed in relation to investment opportunities for stakeholders. Several issues of concern for research and intervention including nutrition promotion and micronutrient fortification are presented. In this context, recognition is accorded to investment in food-based approaches for alleviation of micronutrient deficiency, not only for adolescents but for the population in general. Adolescence is a timely period to shape healthy eating and lifestyle behaviours to prevent the onset of nutrition-related chronic diseases in adulthood.

Bone health in Malaysian adolescents: some knowns but many unknowns!

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Adolescent years represent a window of opportunity to insure lifelong bone health. Peak bone mass (PBM) is likely achieved by late adolescence, with the critical window for accumulation occurring much earlier. Bone mineral content must be maximised during puberty to prevent osteoporosis in later life. Nutrition and physical activity are recognised cornerstones for achieving the genetic potential for maximum PBM. Nevertheless, paucity of data on these factors and skeletal health in Malaysia is a nemesis which hinders our understanding of PBM modulation in adolescence. Calcium needs are greater during puberty and adolescence than in any other population age group. Several cross-sectional studies, mostly unpublished, report low calcium intakes amongst Malaysian adolescents (300-600 mg/day) in comparison with the current RNI of 1000 mg /day. A small survey amongst urban adolescents showed that milk, milk products and milk-based beverages contributed to 40% of the total daily calcium intake. Several studies noted subtle differences between ethnic groups i.e. Indians having a higher intake of calcium and consumption of dairy products. Documentation of occurrence of lactose intolerance, protein intake and vitamin D status are little studied in relation to bone health. Physical activity and its impact on bone status are also unknown. Assessment of bone status is limited to the use of ultrasound devices but meaningful interpretation of data is hindered by lack of reference data for comparisons and lack of longitudinal studies for monitoring skeletal maturation. In view that our adolescents are the future "elderly" population, much needs to be done for the prevention of osteoporosis.

Symposium 2: Adolescent Nutrition (I)

Obesity: a rising problem among adolescents

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Obesity is a public health problem that is escalating in Malaysia, affecting many demographic groups, including adolescents. During childhood and adolescence, obesity increases the risk for medical problems, including pre-diabetes and diabetes, cardiovascular, gastrointestinal diseases, and psychological problems. It is also a risk factor for adult obesity and its associated morbidity and mortality. As such, it is imperative that the problem of overweight and obesity among adolescents in Malaysia be analysed and reviewed. This paper reviews several studies related to adolescent obesity in Malaysia. In a nationwide study on 5,294 secondary schoolchildren, Poh et al. (2004) reported an overweight and obesity prevalence of 19.0% based on Cole et al. (2000), with a higher prevalence among boys (20.3%) than girls (17.7%), and urban (21.0%) compared with rural (16.3%) adolescents. Another study among adolescents in Kuala Lumpur by Moy et al. (2004) found that overweight (based on WHO 1995 ≥ 95 th percentile) was more prevalent among young adolescents (10.1% in 11 year olds) as compared to older adolescents (5.7% in 16 year olds). In a study reporting trends, Ismail & Vickneswary (1998) found that prevalence of obesity among male adolescents in four secondary schools in urban Selangor increased eightfold in seven years: from 0.7% in 1990 to 5.7% in 1997. Another study in suburban Selangor by Poh & Pan (2003), reported a threefold increase over eleven years among 10 and 11 year old boys (1991 2.7%; 2002 9.0%) and 1.5 times increase among girls (1991 4.2%; 2002 6.0%). Zalilah et al. (2006) found that both energy intake and energy expenditure was higher among overweight adolescents, and concluded that it may be associated with a combination of low energy expenditure adjusted for body weight and high dietary fat intake. Guldan et al. (2003) in a study involving young adolescents in four Asian cities, including Kuala Lumpur, reported that weekend screen time (television viewing and computer) was higher amongst the overweight and obese. Since 2006, a Paediatric Obesity Clinic was initiated in HUKM to provide comprehensive weight management to overweight and obese children. A preliminary evaluation of this clinic reported that the children's BMI improved after 3 months follow-up at the clinic (Nurul Huda, 2006). As reported by Tee (2002) in his review on obesity in Asia, there is a lack of comprehensive data in this region. In Malaysia, the NHMS and MANS surveys, have provided some data on adults. However, there has been no national survey on the adolescent age group. Methodological issues, including appropriate growth reference and cut-off values, further complicate the situation. Future research should include improved measures of adiposity, etiological factors associated with obesity, effects of adiposity, as well as developing and evaluating effective intervention approaches at various levels of the community.

Concerns on body image and eating disorders among Malaysian adolescents

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Studies of body image and its related eating behaviours among adolescents, particularly females, are well documented in western countries. In light of sudden and rapid physical and psychological changes, adolescents are the most vulnerable to the development of negative body image. Hence, the current paper reviews local studies on body image and eating disorder problems in Malaysian adolescents from 1998 to 2007, in order to discuss concerns on body image, perception of body weight status and size, body size satisfaction, as well as proneness to eating disorders. Most of these studies on negative body image and eating problems among adolescents focused on females (n=11) while three focused on males and another three studied both males and females. For all of these local studies, data on body image and eating attitude and behaviour among adolescents were collected using self-administered questionnaires. Body weight and height were also reported and Body Mass Index (BMI) was calculated and classified based on WHO (1995) classification. Findings showed that more than 80% of Malaysian adolescents expressed concerns about their body shapes and sizes (Norimah et al., 2005). The prevalence of incorrect perception of weight status, particularly among female adolescents, ranged from 22.8% (Koay, 1998) to 66.3% (Sharina, 2004). Specifically, there were higher proportions of over-estimators than under-estimators among those who have incorrect perception of weight status (Fong, 2003; Dan, 2005; Chin, 2007). In spite of the fact that the majority of Malaysian adolescents are in the normal weight category, most tended to perceive their body weight as heavier than their actual weight status. Besides, there were high proportions of adolescents, particularly females, who were dissatisfied with their current body size and desired a slimmer ideal body size (Edwina, 2002; Fong, 2003; Chin, 2007). Female adolescents were dissatisfied with their waist, hips, stomach, thighs, legs, and height, while male adolescents were dissatisfied with their height, shoulders, arms, waist and chest (Koay, 1998; Dan, 2005; Siti, 2005). By using the Eating Attitude Test-26 (EAT-26), almost one-third of the adolescents were categorised as being prone to eating disorders. Further, Siew (2003) and Chin (2007) found that more than 90% of the female adolescents admitted that they were practicing some forms of weight-reducing methods in the past year. Although these studies showed that negative body image and risk of eating disorders are already widespread among Malaysian adolescents, their focus is only on a particular dimension of body image. It is therefore imperative to develop and validate the multidimensional construct of body image in the Malaysian context. As some of these studies also showed that Malaysian adolescents are struggling with their body image, there is a need to identify potential factors, like biological, psychological and sociocultural factors that may contribute to negative body image and its related eating problems before developing effective prevention intervention programs for adolescents.

Symposium 3: Young Investigators Symposium

Assessment of nutrient intake and mild cognitive impairment among elderly people

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The objective of this study was to examine the nutrient intake and mild cognitive impairment among elderly people in Klang Valley. A total of 126 subjects (45.2% men and 54.8% women) recruited from health clinics participated in the study. The subjects were asked about their sociodemographic and health status and their food intake was assessed using diet history questionnaire and a semiquantitative food frequency questionnaire. Cognitive capacity was measured using the Montreal Cognitive Assessment (MoCA) test. Only 28.1% of men and 33.3% of women met the daily energy requirement. From 104 subsamples who had completed the MoCA test, only three men and three women obtained normal scores. The prevalence of mild cognitive impairment was 94.2% among the respondents. The mean of MoCA score for men (18.69 ± 4.9) was higher than women (16.11 ± 6.9). 59 (56.7%) out of 62 respondents with primary education scored less than 26 points. This shows that MoCA scores are significantly correlated with education level ($p < 0.001$). There are significant relationships between MoCA score and age ($p < 0.05$), working status ($p < 0.05$), education level ($p < 0.05$) and ethnic groups ($p < 0.001$). Cognitive impairment was also related to personal problem, anxiety and Global Depression Scale's score ($p < 0.05$). Supplement intake among the subjects had a desirable association with cognitive function ($p < 0.001$). MoCA score is positively correlated with nutrient intake ($r = 0.207$, $p < 0.05$). In conclusion, mild cognitive impairment was prevalent among the subjects studied, and it was related to nutrient intake, socioeconomic status and depression level.

Body image perception, dietary behaviour and physical activity among young boys from a selected primary school in the Klang Valley

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A cross-sectional study was conducted to determine body image perceptions, dietary behaviours and physical activity levels of young boys at a primary school in the Klang Valley. The study also assessed the relationships among the three variables. Data were collected from 110 male students comprising 71.2% Malays, 10.6% Chinese, and 18.2% Indians, aged 10 to 12 years, with a mean age of 11.09 ± 0.74 years, in Sekolah Kebangsaan St. Johns (1), Kuala Lumpur. Weight and height were obtained and BMI was calculated using BMI for age and sex. Self-administered questionnaires were distributed to obtain respondents' pubertal development, perceived body image, dietary behaviours,

physical activity as well as body change strategies. The pubertal development of the respondents was assessed using the Pubertal Development Rating Scale and the Schematic Figures (Child/Adolescent Version) was used to measure respondents' perception of current and ideal body sizes. Other aspects of body image (body weight perception and body parts satisfaction) were determined using the Multidimensional Body Self Relation Questionnaire. Eating attitudes and dietary behaviour of the respondents were assessed using Children Eating Attitudes Test (ChEAT) and the Dietary Behaviour Questionnaire respectively. Physical activity level of the respondents was measured by the Physical Activity Questionnaire for Children (PAQ-C) while body change strategies were measured using the Body Change Inventory. Out of 104 respondents, 60.6% were still prepubescent while 39.4% had already reached puberty. The mean Body Mass Index of the respondents was $19.86 \pm 4.88 \text{ kg/m}^2$ with 6.7% underweight, 54.8% normal, 15.4% overweight and 23.1% obese. Fifty respondents (48.1%) perceived their weight correctly while fifty-four respondents (51.9%) perceived their weight incorrectly but a large percentage of the respondents (85.6%) desired to change their body weight. Using the Schematic Figures, the mean ideal body size chosen by the respondents was smaller (3.74 ± 0.62) than their mean current body size (4.12 ± 0.94). With regard to body area satisfaction, the respondents were mostly dissatisfied with the middle body area (52%), weight (49%) and height (30%). Nonetheless, almost one third of the respondents (32.6%) were at risk of developing symptoms of eating disorders and 23.1% were categorised as only moderately low in their involvement in physical activity. The study also revealed significant relationships between body weight perception and body weight status ($\geq 2=28.002$, $p=0.00$) and between body size discrepancy score and BMI ($r=0.457$, $p=0.000$). In contrast, body area satisfaction decreases with increases in BMI ($r=-0.266$, $p=0.006$) whereas ChEAT scores indicated a significant relationship with discrepancy scores ($r=0.198$, $p=0.044$). Conversely, body area satisfaction scores decreased with increased ChEAT scores ($r=-0.300$, $p=0.002$). Contrary to popular belief, there were no associations between body image perception and the pubertal stages as well as with physical activity level. There was also no significant interaction between ChEAT categories and body weight perception. The findings from this study imply that body image was already a concern among primary school boys. Further intervention and health promotion programs on body image should also address boys focusing on correcting their body image perception, promoting healthy eating practices as well as adopting an active lifestyle.

A continual study on the formulation of nutritional cards based on nutrient analysis for selected western menus served at athlete's cafeteria, National Sports Institute of Malaysia

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Sports Nutrition is the term normally applied to the interaction of nutrition and physical activity. There is no doubt that proper nutrition can influence the outcome of sports competitions. Athletes are more interested in nutrition to fuel peak performance

but they often get the wrong nutritional message and seek information from unqualified practitioners. Therefore all menu items that are served in athlete's cafeterias should have an accompanying nutritional card highlighting ingredients in the dish, and nutrient content per serve obtained from chemical analysis. Thus, this study was carried out to determine the macronutrients and energy levels in selected western menus served at the athlete's cafeteria of National Sports Institute. This was followed by the formulation of nutritional cards based on chemical analysis. This study used a colour-coded system to classify between dishes that are high in carbohydrates (green), protein (blue) and fat (red). Sixteen types of western menus have been selected by chefs according to their popularity in food wastage and are divided into four groups, namely entree (anna potatoes, chicken lasagna, farfalle napoli, penne marinara, potato rosti with mornay sauce and thai style pasta), protein group (baked fish with ginger butter sauce, beef balls in gravy, beef patty, chicken shawarma, fish burger, lamb stew with garlic pods and roast lamb with rosemary), vegetables and fruits such as fruit salad, as well as soup (mushroom soup). Each sample was collected twice from 2 different cycles and analysed using the AOAC method (1995). However, carbohydrate and energy levels were calculated by 'difference' and multiplying with Atwater factor respectively. Results showed that Thai style pasta contained the highest carbohydrate level of $27.0 + 0.02$ g/100g although beef balls in gravy contained the highest energy value ($132 + 12.7$ kcal/100g) but lowest moisture content ($62.0 + 0.5$ g/100g). The mushroom soup showed the highest moisture content ($90.5 + 0.6$ g/100g) but the lowest in energy ($33.2 + 2.1$ g/100g) and fat content ($0.1 + 0.00$ g/100g). Chicken shawarma had both highest ash and protein content of $2.5 + 0.5$ g/100g and $27.7 + 3.4$ g/100g respectively. Chicken patty showed the highest fat value of $4.5 + 0.1$ g/100g. Menu items which were labeled in green included six items from the entrée group, the fruit salad and the mushroom soup while others were classified as high protein meals which were labeled in blue. All selected items were low in fat content. Findings from this study showed that sixteen selected western menus are high in carbohydrate, high in protein and low in fat content, which were suitable to meet the dietary goals of athletes to optimise sports performance.

Metabolic Syndrome in a sample of the Punjabi Community in Kuala Lumpur

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Metabolic syndrome (Mets) has been noted to be an emerging epidemic among the South Asian population of which Punjabis are a part. A cross sectional study was carried out to identify metabolic syndrome in a sample of the Punjabi community in Kuala Lumpur and to determine the relationship between socioeconomic status and dietary intake with Mets. One hundred Punjabi adults were recruited at the Gurdwara of the Sikhs in Kuala Lumpur by convenience sampling. Respondents were between 19 and 85 years old and the mean age was 50 years. Males comprised 26% of the study sample while 74% of them were females. The National Cholesterol Education Program (NCEP-ATP III) criteria were used to identify Mets in the study group. Waist circumference and blood pressure measurements of subjects were taken. Thirty μ l of overnight fasting blood was

drawn to determine glucose level, triglycerides (TG) and High Lipoprotein-Cholesterol (HDL-C) using the Reflotron, a multiphasic biochemical analyser. Metabolic syndrome was found in 41% of the subjects, representing 13% of males and 28% of females. Majority of the respondents had secondary and tertiary education (57%) and household income ranged between RM1000 and RM2000 per month (55%). From the waist circumference measurements, 30.8% of males and 48.6% of females were found to have abdominal obesity. About 89% of males and 97.3% of females had low levels of HDL-C. High triglyceride level (≥ 1.7 mmol/L) was found in 40% of respondents. The distribution of raised systolic and diastolic pressure ($\geq 130/85$ mmHg) and high blood glucose (≥ 6.1 mmol/L) were 35% and 18% respectively. The mean energy intake among those with Mets was 1822 ± 187 Kcal and 1726 ± 227 Kcal for those without Mets. The mean percentage of calories from macronutrients was found to be; fats (32.82%), carbohydrate (52.23%) and protein (13.98%). No significant difference ($p < 0.05$) was found in the prevalence of Mets between men and women. Significant relationships ($p < 0.05$) were found between education level ($\chi^2=14.808$) and age ($\chi^2=20.585$) with Mets. Carbohydrate and energy were significantly different ($p < 0.05$) between those with and without Mets. In conclusion, prevalence of Mets was found to be high in this study group. Therefore, an appropriate intervention program should be planned to increase awareness for prevention of diabetes and cardiovascular diseases in this community.

Nutritional Status and Food Insecurity among Preschool Children of KEMAS Kindergartens in Kuala Lumpur

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Malnutrition among young children associated with social deprivation has been correlated with the adoption of poor quality diets and improper feeding patterns. A cross-sectional study was carried out to assess nutritional status, feeding patterns and levels of food insecurity among preschool children aged 4 – 6 years in Bandar Tun Razak, Cheras. A total of 192 children comprising 90 boys and 102 girls from six KEMAS kindergartens were measured for their weight, height, mid-upper arm circumference (MUAC), triceps skinfold (TSF) and body composition using Maltron bioimpedance analysis. Questionnaires were administered to parents of all participants for information on socio-demography, food security and types of food eaten, while dietary assessment was done on a sub-sample of 85 subjects. Mean weight and height were 19.0 ± 4.0 kg and 1.12 ± 0.06 m, respectively. Mean BMI was 15.1 ± 2.2 kg/m² while mean body fat percentage was $16.0 \pm 4.0\%$. Mean MUAC and TSF were 17.3 ± 2.2 cm and 9.5 ± 3.7 mm, respectively. Prevalence of underweight, stunting, wasting and overweight was 9.7%, 9.7%, 4.9% and 4.9%, respectively. According to the Radimer/Cornell Food Insecurity Instrument, 34.9% of the households were food secured, while 65.1% experienced some kind of food insecurity, (28.6% households were food insecure, 15.1% individuals were food insecure and 21.4% fell into the child hunger category). Mean total energy intake was 1296 ± 126 kcal; with carbohydrate, protein, and fats contributing 57.2%, 14.8% and 28.1%, respectively to total energy intake. Mean calcium intake was 508 ± 196 mg. Subjects with some forms of food insecurity consumed less milk, fruits, seafood, meat, fried snacks and fast foods.

Low household income ($r=-0.564$, $p<0.01$), household size ($r=-0.195$, $p<0.05$), mother's education ($r=-0.23$, $p<0.01$) and father's education ($r=-0.21$, $p<0.05$) were found to be significant risk factors for food insecurity. Although there is a significant correlation between total energy intake and food insecurity ($r=0.183$, $p<0.05$), no significant correlation was found between food insecurity and nutritional status. Subjects that are food insecure consume less variety of foods which may lead to malnutrition. Further studies are needed to look into different populations to assess the effect of feeding patterns on the nutritional status of young children as the outcome of food insecurity.

Acculturation, dietary diversity and nutritional status among Che Wong's men and women

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Acculturation is defined as a process in which a minority group adopts the behaviours and beliefs of the majority members. Various studies have shown the association between acculturation with socio economic and demographic factors, dietary diversity and nutritional status. The objective of the study was to determine the association between acculturation of Che Wong men and women in Wildlife Krau Reserve (WKR) with socio economic factor, dietary diversity as well as health and nutritional status. Acculturation was measured as language usage in daily activities. A structured questionnaire was used to obtain information on demographic and socio economic status. Dietary diversity was measured using food frequency questionnaire (FFQ). Both men and women were also measured for height, weight, blood pressure and waist circumference. Acculturation score for both men and women were 14.28 ± 2.08 and 15.29 ± 2.99 , respectively. Dietary diversity score showed that women (9.6 ± 4.63) and men (9.4 ± 3.70) had similar food patterns. None of the men and women had waist circumference more than 102 (men) and 88 cm (women). About 13.8% of the men were underweight, 10.3% overweight and 3.4% obese. For women, 25% were underweight and 28.6% overweight. Other than that, 3.6% of men and 6.9% of women had blood pressure more than 140/90 mmHg. Socio economic and demographic factors were not significantly correlated with the level of acculturation except for the years of living outside WKR for women ($r=-0.422$, $p=0.025$). Level of acculturation for both men and women were not significantly correlated with dietary diversity, blood pressure, waist circumference and Body Mass Index (BMI). Similarly, dietary diversity was not significantly correlated with health and nutritional status in both men and women. In conclusion, even though the findings did not support the objective of the study, further research should be conducted because there is increasing evidence to support the adverse association between acculturation and health status in indigenous peoples.

Symposium 4: Food Innovations and Renovations

Scientific substantiation on Synergy-1, an oligofructose-enriched inulin that enhances bone mineral accretion in adolescents

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Deficiencies of the mineral calcium are world health problems. Low calcium intake poses a problem in both developed and developing countries. There are no short term consequences, but a diet deficient in calcium can reduce bone density and impact bone health later in life. Even with enough available calcium, being overweight and not getting enough exercise results in low peak bone mass. New research by Prof. Abrams sponsored by the US Government at the Children's Nutrition Research Center confirmed that peak bone mass increases by intake of the oligofructose-enriched-inulin.

The study assesses the effects of short and long-term supplementation with a specific inulin-type fructan on calcium absorption and bone mineral accretion. Pubertal adolescents were randomised to receive 8 g/d of Synergy-1 or a control for one year. Bone mineral content and bone mineral density were determined prior to randomisation and after one year. Calcium absorption was measured at baseline, 6 weeks, and one year after randomisation. Results: Synergy-1 subjects had significantly greater calcium absorption than control at 6 weeks and one year. Synergy-1 had a greater average daily skeletal calcium accretion and bone mineral density change than control. Conclusion: Daily consumption of Synergy-1 significantly increases short and long-term calcium absorption and enhances bone mineralisation during pubertal growth.

Early brain development may benefit from adequate availability of tryptophan for sleep and tyrosine for alertness

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The newborn brain volume amounts to about 400 mL at birth and grows to about 1,100 mL within the first 2 years of postnatal life. This remarkable growth with concomitant development requires adequate intakes of macro and micronutrients, such as iodine and long chain polyunsaturated fatty acids, but also of amino acids. Tryptophan and tyrosine are two of the important amino acids that are involved in brain development by their precursorships of serotonin and melatonin (from tryptophan) and the catecholamines dopamine and noradrenaline (from tyrosine). These are neurotransmitters (serotonin, catecholamines) and mediators involved in circadian rhythms (melatonin). The intra-uterine and early neonatal percentage "active sleep" (i.e. the counterpart of REM sleep in adults) parallels the period of rapid brain development (i.e. last trimester and first 3 post-natal months). At birth the newborn spends 16-18 hours asleep per day. Half of this is REM sleep, which is believed to promote brain development in a period when environ-

mental experiences are limited ('endogenous, or activity-independent, stimulation'). Sleep deprivation may impact neurosensory development, learning and memory, and brain plasticity. Sleep is intimately related to brain tryptophan availability. Human milk total tryptophan reaches highest levels at 03:00 and lowest levels at 15:00. Feeding experiments with low and high tryptophan contents in infant formulae, administered during the day and night, respectively, improved various indices of nocturnal sleep. Alertness is rather related to brain tyrosine availability. Adequate tyrosine availability seems crucial during wakefulness. Wakefulness stimulates 'exogenous'-, also named 'activity-dependent'-, brain development. It is concluded that adequate tryptophan and tyrosine availability is important to promote favourable patterns of sleep and wakefulness at the appropriate times of the day, and is therefore likely to be of importance for optimal development of the newborn brain.

Symposium 5: Issues of Fats & Oils in Human Nutrition

Position of fatty acid in fats and oils and its implication on health and nutrition

Dato' Dr Neoh Soon Bin

Managing Director, Soon Soon Oil Mill Sdn. Bhd

The positional distributions of fatty acids in the triglyceride have shown to affect their metabolism. Fatty Acids in sn-1 and sn-3 position are absorbed as free fatty acids and metabolised in the lumen. Fatty acids in the sn-2 are absorbed intact as monoglyceride and enter blood circulation and will determine the blood lipid profile. Palmitic acid in the sn-2 position has shown to enhance fat absorption in infants while at the same time increasing atherosclerosis in rabbits.

Native vegetable oils and fats favors the polyunsaturates or monounsaturates in the sn-2 position whilst the saturated fatty acids are in the sn-1 or sn-3 position. Chemical interesterification, which is increasingly used as a substitution for partially hydrogenated fat rich in trans fatty acids, can alter the distribution with higher saturated fats in the sn-2 position. Studies have shown that interesterified fat containing more palmitic acids in the sn-2 position can be just as bad as the trans fatty acids. In short, the concept of saturation and unsaturation may not be the only consideration in determining the nutritional effects. The sn-2 hypothesis which influences the fat digestion and absorption in humans could present a new perspective in understanding its effect in blood lipids, lipoprotein and their role in modulating coronary heart disease.

Modulating fat in the diet: Applying new knowledge to practice

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For over 2 decades, advocacy through the American Heart Association focused on dietary fat and cholesterol in the nutritional management of hypercholesterolaemia. The approach to dietary modulation was not just a decrease in fat calories and the amount of cholesterol, but to manipulate an increase in polyunsaturated (PUFA) over saturated (SFA) fat content (P/S ratio) in the diet. This fat composition model, the basis of the Step 1 and Step 2 diets, has been universally adopted. In practice, such diets, despite achieving a net reduction in TC and LDL-C, increase risk of hypertriacylglycerolaemia as well as reduce HDL-C. Global risk management for cardiovascular disease (CVD) today recognises that low plasma HDL-C and elevated triacylglycerol (TAG) add risks where there is a constellation of risk factors for 'low metabolic capacity'. The new ATP III/ NCEP guidelines advocate the Step 2 Diet with net increases in MUFA and reduction of trans fats. In practice, the postprandial generation of TAG-rich lipoproteins after a meal is potentially atherogenic and this should be the criterion of advocating dietary fat modulation. Trans is the new bad fat on the block as there is a positive linear trend with lipoprotein levels. In practice, trans in food is a major issue today because it is associated with the use of partially hydrogenated vegetable oils which became widespread replacements for saturated fat in commercial food preparations. The fatty acid composition of the diet, their predominance in various oils and fats, the position occupied by individual fatty acids on the TAG molecule and the type and percentage of SFA in the diet are all important variables modulating lipoprotein metabolism. This presentation discusses the application of new research about the nature of fat and the exogenous fat metabolism to the nutritional management of cardiovascular risk factors.

Trans fats issues: current concerns and cardiovascular disease

Dato' Dr Khoo Kah Lin

Heart Foundation of Malaysia

Trans fats are unsaturated fatty acids with at least one double bond in the trans configuration. Naturally occurring trans fats are found in small amounts in meats, dairy products from cows, sheep and other ruminants. They are produced by the action of bacteria in the ruminant stomach.

The majority of trans fats are formed during the partial hydrogenation of vegetable oils, a process that converts vegetable oils into semisolid fats for use in margarines, commercial cooking, and manufacturing processes. From the perspective of the food industry, partially hydrogenated vegetable oils are attractive because of their long shelf life, their stability during deep frying and their semisolidity, which can be customised to enhance the palatability of baked goods and sweets.

Consumption of trans fatty acids raise LDL-C, triglycerides, Lp (a). It lowers HDL-C and reduces the size of LDL particles. These effects are detrimental to cardiovascular

health. Trans fatty acids promote inflammation by increased activity of the tumour necrosis factor (TNF) and levels of interleukin 6 and c-reactive protein. It causes endothelial dysfunction by increasing intercellular adhesion molecule and E-selectin and reduces brachial artery flow-mediated vasodilatation. Trans fatty acids also impair the post prandial activity of tissue plasminogen activity.

In a meta-analysis of four prospective studies, a 2% increase in energy intake was associated with a 23% increase of incidence of CHD. Higher trans – 18:2 levels were associated with a tripling of the risk of sudden death from cardiac causes. There is controversy in the relationship between the intake of trans fatty acids and the incidence of diabetes.

From the nutritional standpoint, the consumption of trans fatty acids results in considerable potential harm but no apparent benefit. In addition, adverse effects are seen even at low levels of intake; 1-3% of total energy intake or approximately 20 – 60 calories (2-7G) for a person consuming 2000 calories a day. Thus a complete or near-complete avoidance of industrially produced trans fats – consumption of less than 0.5% of the total energy intake may be necessary to avoid adverse effects and would be prudent to minimise health risks. The AHA 2006 Diet and Lifestyle Recommendations advise the consumption of trans fat to less than 1% of energy.

The consumption of trans fatty acids may be reduced at 3 levels: (a) consumer's choice by public education and food labelling of trans fat; (b) Industry alternatives to use partially hydrogenated vegetable oil; and (c) Restaurants and food outlets sale of trans fat-free food.

It is estimated a reduction of 3-6% of CHD events may be averted based on the predicted changes in total and HDL-Cholesterol. Based on reported relationship between trans fat intake and CHD events in prospective studies, a reduction of 10 – 19% CHD events may be averted by reducing trans fat intake in the US. If trans fats is replaced with unhydrogenated (Cis) unsaturated fats, an additional reduction of 12 – 22% CHD events may be averted.

In conclusion, total avoidance of trans fatty acid and replacing with cis unsaturated fatty acid can reduce CHD events by 22 – 41%.

Symposium 6: Nutrition Potpourri

Sesame oil exhibits additive effect on nifedipine and modulates oxidative stress and electrolytes in hypertensive patients

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The objective of the study was to investigate the effect of sesame oil, as sole edible oil, on hypertensive patients who were on medication with nifedipine, a calcium channel blocker. A sample of 396 hypertensive patients (aged 58±3.8 years; 215 men and 181 women) participated in this study. Forty patients were treated only with nifedipine while three hundred and fifty six patients were treated with nifedipine and instructed to use

sesame oil in place of other edible oils for 60 days. The consumption of sesame oil remarkably reduced the blood pressure (systolic and diastolic blood pressure from 166 ± 4.2 and 101 ± 3.1 to 134.2 ± 3.4 and 84.6 ± 3.0 respectively). The dosage of the drug also reduced, as there was a fall in blood pressure during sesame oil consumption. Plasma levels of sodium decreased while potassium and chloride increased significantly. Lipid peroxidation (thiobarbituric acid reactive substances) level significantly decreased while activities of enzymic (superoxide dismutase, glutathione peroxidase and catalase) and concentrations of non-enzymic antioxidants (vitamin C, vitamin E, β -carotene and reduced glutathione) increased in nifedipine-sesame oil group. Nifedipine group showed a significant reduction in blood pressure, lipid peroxidation and improvement in reduced glutathione; however, the values are significantly lower than nifedipine-sesame oil group. These results suggest that dietary substitution of sesame oil, in nifedipine-taking hypertensive patients, has an additive effect in the reduction of blood pressure and plays an important role in the modulation of electrolytes and in the reduction of lipid peroxidation and elevation of antioxidants.

Diabetic control and pregnancy outcomes among pregnant women with gestational diabetes (GDM) in Hospital Universiti Kebangsaan Malaysia (HUKM)

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Gestational Diabetes Mellitus (GDM) is defined as impaired glucose tolerance during pregnancy. It is estimated that 4% of pregnancies experience this abnormality. The morbidity of GDM is presented with increased pre eclampsia, polyhydramnios, and caesarian sections. The objective of the study is to determine the diabetic control and factors related to it and pregnancy outcomes. A questionnaire on sociodemographic information of respondents, physical activity levels, knowledge and practice on diabetic control was used. A 24-Hour Dietary recall, and Food Frequency Questionnaire (FFQ) were used to determine food intake and dietary habits. All pregnant mothers in their last trimester attending the Obstetrics and Gynaecology (O&G) outpatient department and delivering their babies at HUKM were screened. Based on the estimated prevalence of GDM, which is 4.15%, a total of 56 mothers were recruited in the study for a period of five months. About 30 (53.6%) of the diabetic mothers were on diet control only and the remainder 26 (46.4%) were on insulin and diet. A majority of the mothers (73.2%) had risk factors such as family history, pre-pregnancy status of being overweight (BMI 24-29.9) and obese (BMI < 30). Their knowledge and practice on diabetic control was average. Their mean energy intake was 1370 ± 428 Kcal (60% of RNI), carbohydrate was 216 ± 90 gm (60% of RNI), protein was 55 ± 15 gm (88% of RNI) and fat 32.5 ± 10 gm (21.3% of RNI). About 25% of respondents consumed refined CHO namely fruit juice, chocolate based drinks, simple CHO (27.8 ± 29.2 gm). Only 33 respondents exercised, however there was no correlation between exercise and glucose control. There were 27 babies delivered by caesarian

sections, 3 babies with macrosomia (<4.0 kg). Poor DM control mothers (HbA1C <6.4) presented with complications like macrosomias, preterm, polyhydramnios and NICU. In conclusion, even though knowledge of the mothers on DM control was average, their daily practice was still poor resulting in poor control and unwanted pregnancy outcomes and complications.

Under-reporting of energy intake from various dietary assessment methods: a preliminary study of Malaysian dietary data

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The study is a preliminary investigation into the accuracy of reported energy intake (REI) using 7-day weighed records (7d-wr), food frequency questionnaires (FFQ), and 24-hour recalls (24h-rec). Secondary analyses on collated data from randomly selected undergraduates and employees of Universiti Malaysia Sabah (7d-wr and FFQ: n = 30, 18 - 25 y; 24h-rec: n = 169, 19 - 62 y). Basal metabolic rate (BMR) was estimated using equations (Ismail et al., 1998). Without physical activity measurements, energy expenditure (EEE) was estimated for sedentary lifestyles as 1.55 X BMR. Under-reporters of REI were determined by comparing REI with EEE, assuming that REI = EEE in energy balance. 83.3% of subjects under-reported their REI measured using 7d-wr, 40% using FFQ, and 73.4% using 24h-rec with mean REIs from under-reporters at 5.7 MJ/d, 5.7 MJ/d, and 5.2 MJ/d respectively; all lower than the estimated energy requirement for Malaysians (men: 10.21MJ/d (19 - 29y), 10.29 MJ/d (30 - 59y); women: 8.37MJ/d (19 - 29 y), 9.12MJ/d (30 - 59 y). Findings for men in all three methods were inconclusive. For women measured using 7d-wr and 24h-rec, correlation between REI and BMI improved after excluding under-reporters (7d-wr: r = 0.184, p = 0.379 for everybody, and r = 0.977, p = 0.023 for good-reporters) (24h-rec: r = -0.081, p = 0.482 for everybody; r = 0.476, p = 0.012 for good-reporters). For FFQ, inverse relationship was observed between REI and BMI, which was retained after under-reporters were excluded (r = -0.327, p = 0.110 for everybody; r = -0.422, p = 0.103 for good-reporters). Under-reporting of REI suggests inaccuracies in nutrient intakes measured using all three methods. Further secondary analyses on datasets from previous studies representative of the Malaysian free-living population are required to establish prevalence of under-reporting, accuracy of dietary data and validity of conclusions inferred from them.

Iron absorption, the generation of non-transferrin bound iron and oxidative stress following oral iron supplementation in subjects with inflammatory bowel disease

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Iron supplementation is widely used to correct iron status and also to prevent iron deficiency anaemia. However, there might be an adverse effect such as oxidative stress caused by non-transferrin bound iron (NTBI) in the circulation due to rapid iron absorption. The aims of this study were to investigate the generation of NTBI following a single dose of ferrous sulphate and to measure its effect on plasma antioxidants. A total of 29 inflammatory bowel disease patients were recruited. All subjects received a single capsule of ferrous sulphate (65 mg iron) with water and blood samples were drawn over four hours and analysed for total serum iron levels, transferrin saturation, NTBI, total antioxidant capacity (TAC), plasma ascorbate and urate. Ethical approval was obtained from the St Thomas' Hospital ethics committee. Using the iron absorption curve, subjects were divided into absorbers (n=21) and non-absorbers (n=8) group. Serum NTBI and transferrin saturation rose significantly in the absorbers group but remained unchanged in the non-absorbers group. Serum iron concentration reached highest concentration at 4 hours after ingestion with mean±SE of 38.81±4.32 µmol/l (P<0.001). NTBI concentrations peaked at 3 hours after iron ingestion with mean±SE of 1.70±0.23 µmol/l (P<0.001) and were closely correlated to transferrin saturation (r=0.9, P<0.001). However, there was no significant reduction in the plasma TAC, ascorbate and urate concentrations from baseline. This study did not show the presence of oxidative stress due to low iron absorption in the studied population and this probably related to the presence of inflammation in the patients. However, the presence of NTBI in the circulation is a worrying sign and warrants further investigation on its activity in the body and also among other study populations. The effects of unabsorbed iron on gastrointestinal lumen should also be investigated.

Synergistic influence of habitual dietary calcium and physical activity on bone mass in Chinese adolescent girls

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Although it is well established that an increased calcium intake (Ca) and increased physical activity (PA) during growth, independently have beneficial effects on bone mass,

none of the studies have been done in children of Chinese-origin to determine whether these factors have a synergistic action on bone development when both are increased. The aim of the present study was to determine an interaction between dietary Ca and PA levels on bone mineral content (BMC) and bone area (BA) in 504 Chinese adolescent girls aged 15 years in Beijing, China. Muscle strength, pubertal stage, PA and dietary intakes were assessed using standard validated protocols, whereas bone masses of the total body and forearm skeletal sites were assessed by dual x-ray absorptiometry. Four different combinations of dietary Ca and PA level were used, namely 1) combination of low Ca (<9hours/week) and low PA (<440mg/d)-[LCaPA], 2) high Ca and low PA-[HCaLPA], 3) low Ca and high PA-[LCaHPA], and 4) high Ca (≥ 440 mg/day) and high PA (≥ 9 hours/week)-[HCaPA] to investigate whether there was any interaction between the influence of both dietary calcium and PA on bone mass, after adjusting for body size and other potential confounders. Mean age (\pm SD) of the subjects was 15.0 (± 0.9) years, with most of them (96%) at the post-pubertal stage. Mean daily intakes of calcium was 460 (± 199) mg/day, while the estimated PA level was 10.2 (± 7.0) hours/week. Analysis of covariance model (ANCOVA) showed a significantly greater BMC for the total body in the group with HCaPA than in the group of LCaPA, after adjusting for BA, body weight, height and pubertal stage. In addition, it was also found that subjects in HCaPA had significantly higher BA of the proximal forearm compared with those in the LCaPA group. In contrast, no significant differences were found in BMC of the total forearm sites, and BA of the total body in subjects with HCaPA compared with subjects of LCaPA, suggesting that the influence of dietary calcium intakes and physical activity may vary according to skeletal sites. There were no significant differences in 1) BMC for the total body or 2) BA for the proximal forearm between any of the other groups, suggesting that high PA alone or high dietary calcium alone have less pronounced benefits on bone mass compared to the combination of high PA and high Ca intake. In conclusion, it was found that those who had higher levels of PA (≥ 9 hours/week) and greater dietary calcium intakes (≥ 440 mg/day), after adjusting for known confounding factors, had a greater total body BMC and proximal forearm BA compared to those with less exercise and lower dietary calcium intakes, indicating that when both factors are present together, they exert synergistic effect on bone mass. Therefore, adequate intake of calcium and continuous participation in physical activity are important in maximising bone mass accretion in adolescents.

Poster Presentations

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

A01 The development of food source booklet as the nutrition education tool for athletes

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The purpose of this study is to develop a nutrition education tool in the form of a booklet of food sources based on foods served by the National Sports Institute (ISN) cafeteria. This booklet contains the nutrient contents of 202 foods and 16 beverages that are served in ISN cafeteria. Firstly, all pictures of the foods and beverages were taken according to the serving size. The Nutrient Composition of Malaysian Foods was used to calculate the standard recipes that are given by ISN. The calorie and macronutrient content of carbohydrate, protein, fat and fiber and certain micronutrient content such as calcium, iron, and vitamin C were included in this booklet. All foods were categorised as follows: starchy foods including rice, porridge, pasta, noodle, nasi impit, breakfast choice (Asian), bakery products, pastries, cakes, and grain products; protein foods including chicken, egg, fish and shellfish, meat, processed meat, milk and dairy product, and soybean products; vegetables and fruits including legumes, starchy vegetables, cooked vegetables, vegetable fruits, salad, and tropical fruits; desserts including bubur, custard and mousse, pudding and jelly; and miscellaneous foods including soup, honey and spreads, and salad dressings. Meanwhile, the beverages were categorised as fruit juice, coffee, tea and chocolate drinks. The functions of important nutrients for athletes and nutrition tips were included as part of the contents of this booklet. The glycaemic index (GI) for athletes were also included in this booklet. The GI of foods were also included in this booklet according to the colour that ISN used: green for low GI foods, yellow for intermediate GI foods, and red for high GI foods. This booklet is very important for athletes to know the nutrient contents in the food that they eat so that they can make wise choices.

A02 The Malaysian Games Anthropometry Project 2006 (MGAP06): Anthropometric profile of young squash athletes

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The purpose of this study was to describe the anthropometric profile of young squash athletes. 63 squash athletes (36 males, 27 females) from 9 states competing at the Malaysian Games (SUKMA Kedah 2006) voluntarily participated in this study. Each

athlete completed a battery of anthropometric tests (7 skinfolds, 2 girths and 2 breadths) undertaken by trained anthropometrists using standard protocols (ISAK). The athletes were assigned to two groups based on performance (medalists and non-medalists). Analysis of variance was undertaken using the sum of 7 sites skinfold measurement, girths and breadths as variables. All statistical analyses were performed using SPSS 12.0. On average, male squash athletes were 16.2 ± 1.5 years, weight 59.1 ± 11.5 kg, height 167.0 ± 8.2 cm, sum of skinfolds 76.4 ± 38.6 mm, arm girth 28.9 ± 3.8 cm, calf girth 35.0 ± 3.0 cm, humerus breadth 6.7 ± 0.5 cm, femur breadth 9.5 ± 0.6 cm; female athletes were 15.0 ± 1.7 years, weight 50.4 ± 6.6 kg, height 156.3 ± 6.4 cm, sum of skinfolds 96.9 ± 24.3 mm, arm girth 26.5 ± 4.2 cm, calf girth 33.3 ± 3.0 cm, humerus breadth 5.7 ± 0.4 cm, femur breadth 8.7 ± 0.5 cm. Significant differences were found in height ($p < 0.05$) and femur breadth ($p < 0.05$) between male medalists and non-medalists. Between female groups, the medalists were significantly heavier ($p < 0.05$). These results provide the first anthropometric profile of young Malaysian squash athletes. Medalists differ from non-medalists in weight, height and bone breadth but not in sum of skinfolds.

A03 Relationship between obesity and body image perception among Chinese females aged 30-60 years old in Simpang Lima, Sitiawan, Perak

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A cross-sectional study was conducted to determine the relationship between obesity and body image perception among Chinese females aged 30-60 years old in Simpang Lima, Sitiawan, Perak. The respondents were selected through simple random sampling. A total of 80 respondents who fulfilled the inclusion criteria were recruited. Data were collected using a questionnaire-guided face-to-face interview. Anthropometric measurements were taken using digital weighing scale (TANITA) and SECA body meter. Body fat percentage (%BF) and waist circumference (WC) were measured using OMRON and body meter, respectively. Physical activity for seven days was analysed using International Physical Activity Questionnaire (IPAQ) and one-day dietary recall was analysed using the Diet-4. The mean weight and height of the respondents were 60.7 ± 10.4 kg and 157.7 ± 4.5 cm, respectively. The mean of body mass index (BMI), WC and %BF of the respondents were 24.44 ± 4.21 kg/m², 82.8 ± 9.88 cm and 30.09 ± 6.36 %. Results showed that 20% of the respondents were overweight and 16.3% were obese. About 43% of the respondents were satisfied with their health status. A majority (81.3%) of the respondents were categorised as having no eating disorder. 43.8% of the respondents were classified with moderate level of knowledge on weight management. About half (49%) of the respondents correctly perceived their body weight status and most of the respondents (61.3%) were dissatisfied with their current body weight status. A majority of the respondents (61.3%) desired to reduce their body weight. Based on the figure rating scale, about 25.0% of the respondents indicated figure drawing 6 to represent their current body size and 38.8% indicated figure drawing 4 to represent their ideal body size. With regard to body parts satisfaction, the respondents indicated that the body parts they disliked most were weight (68.8%), height (66.3%), hip (67.5%), waist (56.3%), and arm (52.6%). The mean value for total energy intake was 2298 ± 582 kcal per day. Majority of the respon-

dents (52.5%) were minimally active. This study revealed significant relationship between body weight status and body weight perception ($\chi^2= 3.76$, $p=0.001$); with perception of body size ($\chi^2 = 8.92$, $p<0.05$) and with body parts satisfaction ($\chi^2=12.34$, $p=0.000$). Body mass index was significantly correlated with dietary energy intake ($r =0.286$, $p<0.05$). There was no significant relationship between BMI and physical activity ($r =-0.030$, $p>0.05$). In conclusion, there was a high prevalence of overweight and obesity among the middle-age Chinese women. A majority of the women were dissatisfied with their current weight status and indicated intention to reduce their body weight. Women who were overweight or obese were more likely to under-estimate their body weight status, to be slimmer and to be less satisfied with their body parts. Future intervention programs need to address distorted body image perception and promote healthy weight loss behaviours.

A04 Physical activity levels of 13-year-old adolescents in Kuantan, Pahang Darul Makmur

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A cross-sectional study was conducted to determine the physical activity patterns of four hundred 13-year old adolescents in Kuantan, Pahang. Physical Activity Questionnaire for Older Children (PAQ-C) was used to assess physical activity levels among the participants. Results indicated that about one-third of the respondents were in the low physical activity level category, most (61.5%) were in the moderate category and only 3.0% were in the high physical activity level category. Males were more physically active than females ($\chi^2=23.667$, $p=0.0001$). Nonetheless, only 4.8% of the male and 1.7% of the female adolescents were in the high physical activity level category. Female adolescents (45.1%) were twice as likely as male respondents (22.1%) to fall in the low physical activity level category. There was a significant interaction effect of sex and ethnicity in mean physical activity score ($F(1, 389)=8.343$, $p=0.004$) whereby Malay males have a higher mean physical activity score as compared to Chinese males while Chinese females have a higher mean physical activity score compared to Malay females. Conversely, no significant association was found between physical activity level and weight status ($\chi^2=0.040$, $p=0.998$). However, a majority of the underweight respondents (65.5%) were in moderate and high physical activity level categories, while normal weight respondents were mostly in the low physical activity level category (35.9%). This study suggests that intervention to promote regular physical activity is needed since high percentages of the adolescents fall within the low physical activity level category.

A05 Nutritional status of national silat athletes at National Sports Council (MSN) Bukit Jalil, Kuala Lumpur

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The purpose of this study was to evaluate the body composition, dietary intake, energy intake, energy expenditure and energy balance of 20 National Silat Athletes during centralised training at National Sports Council (MSN), Bukit Jalil. Data from the athletes were obtained through a 3-day food record, physical activity record and anthropometric measurements. A total of 20 subjects, comprising 14 male and 6 female silat athletes were selected. The mean age of all respondents was 24.40 ± 4.06 years, ranging from 19 to 33 years. The main income was RM 1002.77 \pm RM 730.05 per month, ranging from RM 400 to RM 3200 per month. Majority of the athletes were army officers (6), full time athletes (3) and business people (2). One subject was unemployed and a majority of them (95%) completed secondary school. Results showed that mean height of the athletes was 1.67 ± 0.097 m and mean weight was 67.70 ± 14.85 kg. Mean BMI was $23.79 \text{ kg/m}^2 \pm 3.25 \text{ kg/m}^2$ and this was categorised as 'normal'. Measurement of '4 sites skin fold' had shown the overall mean of body fat percentage was $22.70 \% \pm 9.41 \%$ with majority of the male respondents categorised as normal and a majority of the female athletes as too fat. The mean energy intake was 2839.84 ± 966.37 kcal/day with contribution from carbohydrate (58.80%), protein (16.10%) and fat (25.10%). The mean energy expenditure was 3962.70 ± 1178.92 kcal/day. The energy balance was 1122.86 kcal/day. In conclusion, the food status of respondents was good based on BMI and body fat. The negative energy balance shows that the energy expenditure of respondents was greater than the energy intake. The results suggest the importance of nutritional education to promote a balanced intake, provide all nutrients in optimal amounts, inhibit unnecessary ingestion of nutritional supplements, maintain ideal performance, and improve the silat athletes' health status.

A06 Relationship between physical activity with stages of change and self-efficacy towards physical activity among university students

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This study was carried out to determine the relationship between the level of physical activity with stages of change and self-efficacy towards physical activity among university students. A total of 80 respondents from a residential college at Universiti Putra Malaysia were recruited using multi-stage random sampling. The sample consisted of 40 male and 40 female students whose age ranged from 18 to 23 years old. Data on demographic information, stages of change, self-efficacy and barriers to being active were

collected using a self-administered questionnaire. Weight and height were measured using standard procedures and appropriate equipments. Physical activity level was determined by calculating the total energy expenditure (TEE) based on the three-day physical activity record and total steps count using the pedometer. The data was analysed using SPSS 13.0. About 8% and 1.3% of the respondents were overweight and obese, respectively. Based on the stages of change, about 50% of the respondents were at stage 1 (Pre-contemplation and Contemplation), 26.3% at stage 2 (Preparation) and 23.8% at stage 3 (Action and Maintenance). Total mean scores for self-efficacy were 15.6 ± 3.40 and 14.4 ± 4.87 among male and female respondents, respectively. About 45.0% of the respondents were categorised, as having high self-efficacy and 57.5% had moderate barriers to being active. The mean total steps count was $10,5178 \pm 3763.1$. Based on the step counts, 50% of the respondents were categorised as active ($> 10,000$ steps per day). The mean TEE was 2374.1 ± 460.1 kcal and it was significantly higher among the males compared to the females ($p < 0.001$). Based on the FAO/WHO/UNU (2004) classification of TEE, 61.3% of the respondents were categorised as active. No significant relationship was found between physical activity level determined by TEE and total steps count ($\chi^2 = 1.875$, $p = 0.171$). The physical activity level was also not significantly related to stages of change and self-efficacy ($p > 0.05$). However, scores for total barrier to being active and TEE were significantly correlated ($r = -0.285$, $p = 0.01$) indicating that those with less barriers had higher physical activity level. In conclusion, a majority of the respondents were at the stage of pre-contemplation and contemplation, had high level of efficacy and moderate level of barriers to being active and were considered to be active based on step counts and total energy expenditure.

A07 The association between physical activity levels with anthropometric and body composition measurements among elderly Malays

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This cross sectional study was carried out to assess the relationship between physical activity with anthropometric and body composition measurements among elderly Malays in a rural area of Sabak Bernam district, Selangor. A total of 267 subjects, comprising 137 men and 130 women with ages ranging from 60-75 years old, participated in this study. Physical activity level was assessed using the International Physical Activity Questionnaire (IPAQ). The level of physical activity was classified as low, moderate and high according to the standard guidelines. Anthropometric measurements, including body weight, height, mid upper arm circumference (MUAC), waist circumference (WC) and calf circumference (CC) were all measured using standard procedures and appropriate instruments. Body composition was measured using a bioelectrical impedance analysis (BIA) method i.e. Maltron BF-906 Body Fat Analyser. The results showed that the men were significantly heavier (60.8 ± 13.2 kg) and taller (160.2 ± 6.1 cm) than the women (54.1 ± 11.8 kg) and (149.2 ± 6.9 cm) ($p < 0.0001$) respectively. Calf circumference was greater in

men (33.9 ± 3.9 cm) as compared to women (32.3 ± 3.6 cm) ($p < 0.01$). The prevalence of muscle wasting, as assessed using MUAC, increased with age in both sexes ($p < 0.01$) and ($p < 0.05$). In men, the CC were reduced with increasing age ($p < 0.05$), while in women, weight and height indicated a significant reduction with increasing age ($p < 0.05$). Findings revealed that all parameters of body composition showed significant difference between the sexes ($p < 0.0001$). The total body water (liters) was lower in the older age groups in both sexes. A similar trend was noted for lean body mass (kg) in women. The majority of subjects were classified into the low level of physical activity category followed by moderate and high level activity. There was no significant association between physical activity levels and anthropometric measurements but all parameters of body composition, except for body fat mass (kg), associated with physical activity levels ($p < 0.05$). In men, the percentage of body fat, lean body mass and total body water showed significant difference with physical activity levels ($p < 0.05$). In conclusion, the findings indicate that there is a relationship between physical activity levels and parameters of body composition.

A08 Health survey of Kluang, Malaysia

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There are various health problems occurring in Malaysia because of the rapid economic development today. Hence, we conducted a health survey in order to gain basic data on health education and nutrition among the civilians of Kluang city, Malaysia. Participants comprised 81 people of Malay descent, and 147 people of Chinese descent. The survey was carried out in January 2007. The body measurements that we conducted for the study are as follows: body height measurement, body weight measurement, chest measurement, blood pressure and bone density measurement. We used type MK8000, S/N4H0058 bone density measuring instrument to measure the bone density. We conducted questionnaire surveys on the food habits of the civilians of Kluang city. There were 20 questionnaire items which related to food habits and environmental matters. According to the bone density measurements, the bone density levels were higher among the aged than the young in both the Malay and Chinese participants. BMI among the youngest people distributed in the normal range. On the other hand, BMI levels tended to increase after hitting the 30 year mark and as the age increased. According to the dietary survey that was conducted among the Malay and the Chinese, 82% of Malays drink skimmed milk whereas 69% of Malaysian Chinese drink skimmed milk. Also, 77% of Malays consume bean products whereas 93% of Chinese consume bean products. The inhabitants of Kluang city who are elderly and have high levels of BMI will tend to fall prey to life-related diseases such as hyperglycemia, diabetes and hypertension in the future. Therefore, it will be necessary for them to prevent life-related disease. Doctors should execute health surveys with citizens and advise them to practice healthy lifestyles.

A09 Skeletal muscle mass and its relationship with functional status and physical activity among elderly Chinese aged 60 years and above in Sekinchan, Selangor

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The objective of this study is to determine the skeletal muscle mass and its relationship with functional status and physical activity among Chinese elderly aged 60 years and above in Sekinchan, Selangor. Information on personal background and health-related characteristics were collected using a questionnaire. ADL, IADL and physical activities were observed and recorded using appropriate instruments. Weight, height, waist, hip, calf and thigh circumferences, body fat mass, body fat percentage and handgrip were measured using appropriate instruments. A total of 100 Chinese elderly participated in this study, 73% were females and 27% were males whose age ranged from 60 to 89 years old. For males, the height (165.69 ± 4.13 cm) and the skeletal muscle mass (22.98 ± 3.20 kg) were significantly higher than females (151.70 ± 6.17 cm, 14.24 ± 3.79 kg). The younger subjects (60 to 74 years) had significantly higher weight ($p < 0.01$), height ($p < 0.05$), BMI ($p < 0.05$), waist circumference ($p < 0.05$), calf circumference ($p < 0.001$), thigh circumference ($p < 0.001$) and skeletal muscle mass ($p < 0.001$) compared to the older subjects (≥ 75 years). There were significant differences between the male and female subjects in their ADL score, IADL score, skeletal muscle mass and handgrip strength ($p < 0.01$). ADL score, IADL score, total MET-min per week, skeletal muscle mass and handgrip strength were found to be significantly different according to the age groups ($p < 0.001$). Skeletal muscle mass was positively correlated to ADL score ($r = 0.362$, $p < 0.001$), IADL score ($r = 0.341$, $p < 0.01$), total MET-min per week ($r = 0.197$, $p < 0.05$), handgrip strength ($r = 0.702$, $p < 0.001$). Age was negatively correlated with ADL score ($r = -0.558$, $p < 0.001$), IADL score ($r = -0.624$, $p < 0.001$), total MET-min per week ($r = -0.381$, $p < 0.001$), skeletal muscle mass ($r = -0.497$, $p < 0.001$) and handgrip strength ($r = -0.557$, $p < 0.001$). Calf circumference was significantly and positively correlated with skeletal muscle mass ($r = 0.610$, $p < 0.001$) and handgrip strength ($r = 0.401$, $p < 0.001$). In conclusion, females and the older age group were found to have lower skeletal muscle mass, functional status, physical activity level, handgrip strength and some of the anthropometric measurements. With increasing age, there may be further decline in body composition including skeletal muscle mass and some functional ability which may affect the physical ability and health status of the elderly. Therefore, elderly people who are at increased risk need to be identified and provided with appropriate intervention programs or activities.

A10 Comparisons of nutrient & energy consumption among women of urban & rural areas in Malaysia

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The nutritional status of women of childbearing age affects not only their health but also contributes to the newborn's health, with a potential transgenerational impact. Dietary studies are very important in understanding the role of nutrition in preventing certain diseases. Changes in food patterns and intake in a country which is experiencing an epidemiological transition, must be carefully analysed. Previous studies in other countries showed a significant difference in energy and nutrient intake between urban and rural areas. This study has been undertaken to assess the health of the women who play a central role in the household food source allocation and to investigate nutrient and energy consumption in women in urban and rural areas. The target group for this questionnaire is women between 20 and 55 years of age. This group has been considered a priority due to their fertility status, central role in the household food resource allocation and family health care. A 24-hour dietary recall and a set of questionnaires were used to obtain nutrient intake in a sample of 100 women from 20 to 55 years of age. Nutrient adequacies were estimated using the Diet 4.1 software and stratified according to area (urban or rural), physiological status and educational status. The median national energy intake was 1764 kcal. Carbohydrates and fat intake were higher in urban than in rural areas. In conclusion, energy and nutrient intake were almost the same in both urban and rural as the level of health awareness in rural areas are increasing.

A11 Malaysian Games Anthropometry Project 2006 (MGAP06): An overview

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MGAP06 is the largest survey of young Malaysian athletes undertaken by the Sports Science Division, National Sports Institute (ISN). The objectives of the project included: to develop anthropometric profiles for local young athletes and to provide physical characteristics suited for sports to be used as selection criteria in talent identification programs. The project was planned with three phases: (1) Preliminary preparation, (2) Data collection and (3) Data analyses and dissemination. The anthropometric variables measured included weight, height, seven skinfolds, two girths and two bone breadths. All measurements were performed by trained anthropometrists using a standard protocol (ISAK). A total of 1028 athletes (males 689; females 339) from fourteen contingents and 23 sports volunteered to be measured. The biggest group of subjects was from football (n=143), followed by track and field (n=110), hockey (n=96), lawn bowls (n=82), karate (n=76) and squash (n=63). The average age of the athletes was 17.7±2.3 years with a range from 10 to 21 years. Malay (n=655) was the largest ethnic group, followed by Chinese

(n=191), Indian (n=64), indigenous group (n=94) and others (n=24). The largest number of athletes came from Kedah (n=132) followed by Sabah (n=111), Melaka (n=93) and Sarawak (n=92). The anthropometric data collected provide comprehensive information about young Malaysian athletes.

A12 Basal metabolic rate and energy expenditure among national male athletes undergoing high intensity training

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This cross-sectional study was carried out to assess the basal metabolic rate (BMR), physical activity pattern and energy expenditure among national male athletes undergoing high intensity training. A total of 37 subjects from National Sports Council (NSC) Bukit Jalil participated in this study. Subjects were involved in four types of sports, namely badminton (n=16), squash (n=9), boxing (n=5) and weight lifting (n=7). Anthropometric measurements included body weight and height, while body composition was assessed using Bodystat® 1500-MDD. BMR was measured by indirect calorimetry using Deltatrec Metabolic Monitor MBM-100 (Datex-Ohmeda, Finland). Total energy expenditure was measured using an activity diary (AD). Subjects had mean age of 22.7 ± 2.3 years, height 1.70 ± 5.8 m, weight 70.6 ± 13.2 kg, body fat 15.9 ± 4.8 %, fat free mass 54.8 ± 5.9 kg, and body mass index 24.8 ± 3.5 kg/m². TEE averaged 10.5 ± 2.2 MJ/day, while mean physical activity level (PAL) was 2.27 ± 0.36. Mean measured BMR was 1882 ± 382 kcal/day, while mean BMR calculated from predictive equations of FAO/WHO/UNU (1985) was 1755 ± 270 kcal/day, Henry & Rees (1991) 1611 ± 237 kcal/day, Ismail et al. (1998) 1517 ± 233 kcal/day and Poh et al. (2006) 1720 ± 199 kcal/day. Spearman correlation showed that BMR measurement was significantly correlated with fat free mass (r = 0.891, p<0.001) and body weight (r = 0.922, p<0.001). Comparison of measured BMR with predicted BMR showed that predictive equation FAO/WHO/UNU (1985), Henry & Rees (1991), Ismail et al. (1998) and Poh et al. (2006) underestimated actual BMR by 6.7%, 14.4%, 19.4% and 8.6% respectively. Regression equation for the prediction of BMR among athletes was derived, that is BMR = 0.082(W) + 2.014 MJ/day. In conclusion, it is suggested this predicted equation can be used to calculate the BMR for male athletes undergoing high intensity training.

A13 Assessment of household food security and nutritional status among residents of the PPR Cochrane flats in Cheras, Kuala Lumpur

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Household food security is defined as having access to sufficient food for a healthy life for all its members. The purpose of this cross-sectional study was to determine the status of household food security among urban flat residents in the "Projek Perumahan Rakyat" (PPR) Cochrane in Cheras, Kuala Lumpur. A sample of Malay women (n=75) aged 20 - 50 years with children aged 1 - 6 years was included in the study based on purposive sampling. Socio-demographic background and household-related information were obtained from the parents. The nutritional status of the children (38 male and 37 female) was assessed and compared to the NCHS/WHO (1983) reference value. Children between -1SD and +2SD of reference median were classified as normal. The mean z-score for height for age, weight for age and weight for height of the children were -0.75 ± 1.22 , -0.41 ± 1.56 , and 0.09 ± 1.49 respectively. There were 18.5% underweight children, 72.3% normal weight and 9.2% overweight. Dietary intake of the children was estimated using 24-hour recall for 2 days. The mean intake of energy, protein and vitamin C of the children attained the recommended nutrient intake (RNI) for Malaysia, (2005) that is, 919 ± 328.29 kcal, 51.8 ± 44.7 g and 30.78 ± 36.31 mg respectively. Nevertheless, for vitamin A, calcium and iron, average intake for the children was 84%, 98.7% and 56% respectively, which did not meet the RNI levels. For the assessment of household food security status, the Radimer/Cornell Food Security instrument was used, which categorised food security status from less chronic to most chronic condition of food insecurity namely household food secure, household food insecure, individual food insecure and child hunger. The result showed that 13.4% of the households were food secure and 86.6% food insecure. Out of the household food insecure, 10.8% showed individual food insecurity and 15.4% experienced child hunger. This indicates that there were households having chronic food insecurity problem. There were significant correlations between income, nutritional status (weight for age) and dietary intake (vitamin A) of the household with food security status. Households with higher income showed significant correlation with food secure status ($\chi^2=14.595$, $p=0.002$). Children with higher z-score for weight for age and higher intake of vitamin A, correlated with food security status ($p=0.03$). In conclusion, this study showed there was a high prevalence of household food insecurity among a sample of households in the PPR Cochrane flats in Cheras. Further investigation on management of household food security in urban areas should be undertaken to improve the nutritional status among poor flat dwellers in cities.

A14 Decision-making power and nutritional status of orang asli (Che Wong) women and children at Krau Wildlife Reserve in Pahang

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This study was conducted to determine the decision-making power and nutritional status of Orang Asli (Che Wong) women and children. Through non-probability purposive sampling, 26 women and 20 children were selected from 26 households at Krau Wildlife Reserve in Pahang. Demographic and socio-economic information of the households, decision-making and dietary diversity of women were obtained using questionnaires. Women and children were also measured for their weight, height and waist circumference (women only). A majority (30.8%) of the women were between 20 and 29 years old and the mean age was 32.12 ± 14.76 years. All of the women were not employed and only 15.3% completed 3 years of schooling at primary school. The mean for household income was $RM277.12 \pm 264.05$ and the mean for household income per capita was $RM52.50 \pm 49.29$. Based on household income per capita, 50.0% of subjects were hard core poor category, 30.8% poor category and 19.2% above the poverty line income. For decision-making, the mean total score for freedom to move, food, purchase and work and reproductive and health were 6.96 ± 2.32 , 12.88 ± 3.25 and 8.77 ± 2.14 , respectively. This showed that Che Wong women have greater decision-making power in food, purchase and work. More than half of the women (57.7%) were obese, 26.9% overweight and 15.4% normal with mean Body Mass Index (BMI) of 31.94 ± 6.25 . The mean for waist circumference was 74.26 ± 6.86 with 23.1% having increased risk (80cm-87cm) and none at high risk (≥ 88 cm). Seven food groups (cereal and cereal products, meat and meat products, fish, fruits, vegetables, milk and dairy products and drinks) were used to determine the women's dietary diversity score and the mean total score was 9.65 ± 4.68 with minimum score of 0 and maximum score of 37. The prevalence of underweight, stunting and wasting of the children was 45%, 35% and 30% respectively. Findings showed that there were significant associations between decision-making power with demographic and socio-economic characteristics (years of education) ($r = 0.450$, $p < 0.05$) and between demographic and socio-economic characteristics (household income) with health and nutrition (waist circumference) of women ($r = 0.486$, $p < 0.05$). No significant associations were found between demographic and socio-economic characteristics with health and nutrition of children and between decision-making power with health and nutrition of both women and children. Although no association exists between decision-making power with women and children's health and nutrition, decision-making power does play a part in determining women and children's health status. Thus, interventions should emphasise improving decision-making power among Orang Asli women to enhance their health status as well as their children's well-being.

A15 Body image distortion among young Malay adolescent girls in Kuala Lumpur

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This study was carried out to evaluate the body image perception among young adolescent girls in Kuala Lumpur. A total of 277 Malay girls aged between 10 and 12 years old participated in this study. Anthropometric measurements such as weight and height were taken and subsequently the body mass index (BMI) was calculated. Body image perception was determined using a modified questionnaire for adolescents (Choo et al, 2000). Food intake was evaluated using 24-hour dietary recall on a subsample of 138 subjects. The results indicated that majority (64%) of the girls had normal weight while 11% were underweight and the remaining 25% were at risk of being overweight. 79% of the girls were concerned with their body shape. When classified into BMI, distorted body image was found in one in three underweight girls (32%), one in three normal girls (32%) and two in five overweight girls (44%). Most subjects were concerned with their body image since they were either 9 (32%) or 10 years old (29%), however there were girls as young as 5 (5%) or 6 years old (5%) who were affected. Although 43% girls reported that nobody in particular influenced them about their body shape, 34% of them were influenced by their mothers. Health factors (83%) appeared to be the main reason adolescent girls were concerned about their body image, while beauty (8%) and boosting self confidence (8%) seemed less important. Food intake data showed that mean energy intake was 1517 ± 333 kcal per day, achieving 76% energy of the Recommended Nutrient Intake (RNI, 2005). Mean iron (14.69 ± 6.41 mg/day) intake fulfilled 100% of iron intake among the girls who were non-menstruating while only 45% among those who have already started menstruating. Mean calcium intake (340.60 mg/day) was poor, meeting only 34% of RNI. This study showed that distortion of body image was present in at least a third of the girls. Although the concern on body image was mainly influenced by health, food intake data showed that nutrients of concern such as energy, calcium and iron were inadequate among these girls.

A16 Preliminary survey on BMI profile among USM main campus students

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The objective of this survey was to measure the BMI profile among USM main campus students. The data was randomly collected from students around USM lecture theatres during lecture hours. A total of 624 students (male 264 and female 360) were involved in the survey. The result showed that the mean age, weight and height among the students were 21.42 ± 1.38 years, 55.65 ± 12.21 kg and 1.63 ± 0.09 m, respectively. The mean BMI of all the samples was 20.81 ± 3.61 kg/m², with male students showing

slightly higher BMI ($21.84 \pm 4.13 \text{ kg/m}^2$) compared to female students ($20.05 \pm 2.96 \text{ kg/m}^2$). Malay students showed the highest BMI, followed by Indian and Chinese students. The BMI for the Malay, Indian and Chinese students were $21.31 \pm 3.84 \text{ kg/m}^2$, $20.45 \pm 3.76 \text{ kg/m}^2$ and $20.23 \pm 3.09 \text{ kg/m}^2$, respectively. Based on the BMI results, about 61 % of all the samples were in the normal range, 27 % were underweight and about 12% were overweight or more. A higher percentage of the female students were in the underweight category (33%) compared to the male students (20%). Based on race, about 63% of the Malay students were normal weight, 24% were underweight and 13% in the overweight or more category. For the Chinese students, about 60% were normal weight, 31% were underweight and 9% were in the overweight or more category. For the Indian students, about 56% were normal weight, 31% were underweight and 13% were in the overweight or more category. This preliminary data showed that there is a high percentage of underweight individuals among USM students. Further assessments need to be carried out to survey if these underweight students show symptoms of clinical problems related to nutritional deficiencies.

A17 Comparison of selected cardiovascular disease risk factors between overweight and obese female adolescents with normal-weight female adolescents in Kajang, Selangor

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A cross-sectional comparative study was conducted to compare cardiovascular disease risk factors between overweight and obese female adolescents (OW) with normal-weight female adolescents (NW) aged 13, 14, and 16 years old. Through an anthropometric measurement screening of 382 female adolescents (Form 1, 2, and 4) from three selected secondary schools in Kajang, Selangor, the prevalence of overweight and obesity were 12.3% and 8.6%, respectively. Of 80 subjects that were overweight and obese, 65 were selected and matched for age, ethnicity, and pubertal status with 65 NW subjects to be included in this study. As a whole, the subjects comprised 92.3% Malays, 1.5% Chinese, and 6.2% Indians. The mean age for both groups was 14.74 ± 1.37 years. Results of the study showed that more than half of the subjects' mothers (OW: 56.9%; NW: 67.7%) were housewives and earned less than RM500 monthly (OW: 58.5%; NW: 70.8%), whereas, most of their fathers worked as executives (OW: 18.5%; NW: 30.8%) with monthly income of more than RM2000 for most of the OW group (35.4%) and in the range of RM1001 to RM2000 for most of the NW group (36.9%). Some 23.1% OW and 13.8% NW respondents claimed to have asthma. Family health history showed that many family members (mother, father, grandfathers and grandmothers) suffered from diabetes and hypertension while many other family members (cousins, sisters, and brothers) had asthma. Food Frequency Questionnaire (FFQ) showed that the most frequently consumed foods for both groups were white rice, *laksa*, pineapple, chicken, beef, sugar, and salt. In addition, the findings showed that there were significant differences in the mean body size discrepancy scores ($t=8.446$, $p=0.000$), mean systolic ($t=-3.60$, $p=0.001$) and mean diastolic blood pressures ($t=-4.30$, $p=0.000$) between OW and NW subjects. Consistently,

Chi-square test also showed that there were significant associations between BMI and systolic blood pressure ($\chi^2=11.58$, $p=0.001$) and diastolic blood pressure ($\chi^2=17.81$, $p=0.000$). Conversely, there were no significant differences in mean scores for nutrition knowledge ($t=1.73$, $p=0.086$), mean scores for physical activity ($t=0.56$, $p=0.123$), mean blood glucose levels ($t=0.00$, $p=1.000$), mean blood cholesterol levels ($t=-0.93$, $p=0.350$), and mean blood triglyceride levels ($t=-1.36$, $p=0.180$) between the two groups. It is suggested that future intervention and prevention programs focused on early adolescence should formulate strategies that are used to overcome overweight and obesity problems because obesity remains one of the risk factors that could lead to other cardiovascular disease risk factors.

A18 Cardiovascular risk factors among adults at Greentown Health Clinic, Ipoh, Perak

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A cross sectional study was conducted to determine the risk factors for cardiovascular disease (CVD) among 87 adults at Greentown Health Clinic, Ipoh, Perak. A sample of 41 men and 46 women were selected randomly, and personally interviewed using a structured questionnaire which included family history, anthropometry measurements, blood pressure, blood glucose level, lipid profiles, physical activity, smoking, and alcohol intake. All data were analysed using SPSS (Spearman correlation). Results of this study showed that the mean age of subjects was 47.49 ± 8.2 years old. About 78.1% had family history of CVD, with 6.9% having ≥ 3 diseases. Mean BMI was 28.12 ± 4.70 with the highest being overweight (37.9%), followed by obesity (32.2%), normal (28.7%), and underweight (1.1%). About 35.6% had systolic hypertension (≥ 140 mmHg) and 21.8% had diastolic hypertension (≥ 90 mmHg). High fasting blood glucose (≥ 7.0 mmol/L) was found in 60.4% subjects and 47.2% had high non-fasting blood glucose (≥ 11.1 mmol/L). About 43.5% had high LDL-C (>4.1 mmol/L), 26.1% had high Total Cholesterol (>6.2 mmol/L), 69.6% had borderline Triglyceride levels (2.26-4.52 mmol/L), and 4.35% had low HDL-C (<0.9 mmol/L). After assessment, 39.1% were not doing any regular physical activity daily. Cigarette smoking was observed among males; only 6.9% were currently smokers. Four smokers were categorised as moderate smokers (10-20 cigarettes/day) and another two were light smokers (<10 cigarettes/day). Only 1.1% were light drinkers (<21 unit/week). There was no significant relationship between BMI and socio-demography (age and number of children), socio-economic status (income, education, and occupation), systolic blood pressure, physical activity, fasting, and non-fasting blood glucose level. However, there was a positive, significant relationship between BMI and diastolic blood pressure ($r=0.248$, $p=0.02$). In conclusion, risk factors such as overweight and hypertension significantly contributed to CVD risk factors among adults. Different intervention programs should be carried out to increase awareness among urban people from different socio-economic backgrounds.

A19 Lifestyle related risk factors for breast cancer among women in Klang Valley, Malaysia

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Breast cancer is the most common cause of cancer-related deaths among women worldwide. A case-control study was done to identify the lifestyle risk factors for breast cancer among women in Klang Valley. This study was carried out among 75 newly diagnosed breast cancer patients and 137 controls, aged 29-65 years old in Klang Valley. The inclusion criteria for cases were: (i) newly diagnosed breast cancer (stage I to III); (ii) that had not undergone any therapy for cancer; (iii) no other chronic diseases such as hypertension and diabetes; (iv) in good cognitive function; (v) not pregnant and lactating; (vi) not in menstruation for those who are not menopausal yet. The control group comprised of women who were healthy, not diagnosed with cancer and other chronic diseases, not pregnant, lactating and not menstruating. Demographic data were obtained through standardised pre-tested questionnaires by trained interviewers. All of the variables asked were analysed using Statistical Package for Social Science (SPSS) software version 12.0. Factors contributing toward increased risk of breast cancer were waist circumference more than 80 cm [OR = 4.0 (95% CI = 2.173-7.456)] and WHR more than 0.85 [OR = 3.4 (95% CI = 1.86-6.229)]. Women who did not regularly do any strenuous and moderate physical activity from secondary school till present had a three times risk of getting breast cancer [OR=3.25, (95% CI = 1.74 to 6.09)]. Women who were not working were also three times at risk [OR = 3.2, (95% CI = 1.75 to 5.83)]. Chi-squared test did not show any significant differences between cases and control for factors like smoking, alcohol consumption, family history, age at menarche, usage of oral contraceptive pills and hormone-replacement therapy. Women who got pregnant at the age of more than 30 years old had a three time higher risk of getting breast cancer [OR = 3.1 (95% CI = 1.39-6.98)] ($p < 0.05$). Thus, certain lifestyles factors especially related to abdominal obesity and physical activity are associated with the risk of getting breast cancer. Efforts should be taken to increase awareness and understanding of the importance of healthy lifestyle in cancer prevention.

A20 Body image perceptions among students

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This study investigated body image perception among students. A self-administered body image questionnaire was utilised in a cross-sectional assessment of 570 (ages 19 to 29 years; 258 males, 312 females) students of Universiti Malaysia Sabah. Respondents expressed their perceptions of body image by selecting the body size perceived to be most appropriate to describe their current, ideal and most attractive body

image from a Nine Figure Silhouette. Height and weight were measured and body mass index was calculated. Perceived and actual weight classifications of respondents were compared. Respondents' self-esteem was also assessed and they were screened for eating disorders using The Eating Attitudes Test (EAT-26). Respondents were also questioned about factors that influence their perceptions of body image. Study findings revealed that a majority of respondents (73%) chose body image considered to be in the underweight category. Only 24% of respondents perceived themselves as having normal weight while the rest perceived themselves as being overweight (2%) and obese (1%). Majority of respondents (89%) desired body images classified as underweight and perceived this body image to be attractive. Statistical analysis showed significant association ($p < 0.05$) between BMI and perception of body image. Only 36% of respondents had correct body image perceptions which matched with their calculated BMI. Most respondents with normal BMI tend to incorrectly perceive themselves as being underweight while respondents who were actually overweight and obese tend to perceive themselves as having normal BMI. The self-esteem scale indicated that majority of the respondents had high self-esteem and that 14% of respondents, a majority of them females, obtained EAT-26 scores considered as symptomatic of eating disorders. Although many respondents were shown to have incorrect perceptions of body image in this study, most of them were assessed as having high self-esteem and not many of them suffered from eating disorders.

A21 Determination of calf circumference cut-off values for Malaysian elderly at risk of malnutrition

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Malnutrition is a growing problem but largely unrecognised in the elderly. Therefore, early identification of malnourished elderly must be performed in order to reduce the strain on the health care system. Since direct measurements of body composition are not possible in most patients, good anthropometric reference data are fundamental in assessing the nutritional state of elderly people. Calf circumference is recommended by the World Health Organization as a measurement of nutritional state in older individuals. The purpose of this study was to determine calf circumference cut-off points using calf circumference data from rural areas in Malaysia. This was a community-based cross sectional survey for establishing cut-off values for calf circumference in Malaysia. The total number of persons involved was 810 subjects to obtain nationally representative data for the Malaysian elderly which consisted of 429 men and 381 women. The mean age was 69.0 ± 6.2 years and range was 60 to 97 years. Data were collected from four different districts namely Sabak Bernam, Selangor ($n=286$), Kuala Pilah, Negeri Sembilan ($n=235$), Pasir Mas, Kelantan ($n=152$) and Kodiang, Kedah ($n=137$). A linear regression analysis with z-score procedure by gender was used to derive the calf circumference prediction equations. The final prediction equations for CC for men: $CC \text{ (cm)} = 3.69 \text{ (z score)} + 33.81$, $R^2 = 1$ and $CC \text{ (cm)} = 0.7103 \text{ (BMI)} + 18.54$, $R^2 = 1$; and for women: $CC \text{ (cm)} = 4.31 \text{ (z score)} + 31.63$, $R^2 = 1$ and $CC \text{ (cm)} = 0.6698 \text{ (BMI)} + 16.847$, $R^2 = 1$. Based on these equations,

using z score equal to negative 1; for men (BMI 16.30 kg/m²) and for women (BMI 15.64 kg/m²). The cut off points for men and women at risk of malnutrition were 30.1 cm and 27.3 cm respectively. In conclusion, these cut-off points can be used to screen elderly individuals who are at risk of malnutrition by health professionals.

A22 Effectiveness of the intervention program for promotion of healthy ageing and risk reduction of chronic diseases: Body weight, waist circumference and lipid profile changes

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Nutrition intervention programs for promotion of healthy ageing is essential to prevent malnutrition and nutrition related problems among elderly people. Thus, an intervention study was conducted to evaluate the effectiveness of the nutritional education packages which have been developed based on a needs assessment study among rural elderly Malays in Sabak Bernam, Selangor. The nutrition education program was implemented among the intervention group (n=26) from Sungai Panjang sub-district. A total of 30 elderly people, matched for age and sosio economic status, were recruited from Pasir Panjang sub-district. The nutrition education was delivered via group discussions and demonstrations using the healthy ageing packages which comprised of a flipchart, placemats and a booklet. The intervention sessions group received 7 lessons on healthy eating, healthy body weight, cholesterol, blood pressure maintainance, control of blood glucose, fibre and exercise. Body weight, waist circumference, fasting blood glucose, fasting serum lipid and C-reactive protein measurements were performed at baseline, 3 months and 6 months in both intervention and control groups. Results revealed a significant decrease (p<0.05) in body weight (after 3 and 6 months), waist circumference (after 6 months) and fasting blood glucose (after 3 and 6 month), as well as high-density lipoproteins (HDL-C) (after 3 and 6 months) for the intervention group, compared with no significant decreases in those parameters in the control group. In conclusion, the 6 months nutrition intervention program had successfully improved health related parameters (i.e. weight, waist circumference and fasting blood glucose) in older people.

A23 Body image perception, dietary behaviour and physical activity among young girls from a selected primary school in Melaka

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A cross-sectional study on body image perception, dietary behaviour and physical activity among young girls was conducted at Sekolah Kebangsaan Convent Infant Jesus 2 in Bandar Hilir, Melaka. A total of 128 female students were recruited as respondents in this study. They comprised 53.1% Chinese, 24.2% Malays, and 18.8% Indians with a mean age of 11.37 ± 0.8 years. The mean Body Mass Index (BMI) was 17.78 ± 3.4 kg/m². Additionally, 20 (15.6%) respondents were underweight, 84 (65.6%) were normal-weight, 21 (16.4%) overweight and another 3 (2.3%) respondents were obese. Almost half (46.9%) of the respondents had achieved menarche. With respect to body weight perception, 17.2% were under-estimators, 56.3% correct-estimators, and 26.6% over-estimators. More than half of the respondents (57%) had an intention to change their body weight. The mean score for body parts satisfaction was 35.19 ± 7.2 and 32% of the respondents were classified as generally dissatisfied with most of their body parts. Based on *Body Figure Rating Scale*, almost two thirds of the respondents (72.7%) chose figure 4 as their ideal body size. Consequently, 52.4% of the respondents desired a slimmer body figure, 36.7% wished to maintain their body figure, whereas only 11% of the respondents desired a slightly bigger body figure. The mean score for *Children Eating Attitude Test* (ChEAT) was 10.56 ± 8.0 , but 18 (14.1%) respondents were categorised as prone to eating disorders. Using the *Physical Activity Questionnaire for Children* (PAQ-C) the study revealed that most of the respondents were moderately active with a mean score of 2.57 ± 0.6 . With respect to *Weight Management Knowledge Inventory* (WMKI), more than half (59.4%) of the respondents were in the low level of weight management knowledge score while only 3.1% of the respondents managed to attain a high knowledge score. The current study revealed a significant association ($\chi^2=63.980$, $p<0.001$) between body weight perception and actual body weight status. There was a significant negative relationship ($r=-0.187$, $p<0.05$) between body parts satisfaction and BMI, indicating the higher the BMI, the lower the satisfaction level of the respondents towards their own body parts. Similarly, a significant negative correlation was also found between ChEAT scores and body parts satisfaction scores ($r=-0.230$, $p<0.001$). This indicated that the greater the dissatisfaction towards body parts, the greater the tendency to develop eating disorders. Furthermore, a positive significant relationship was found between body parts satisfaction and physical activity level ($r=0.280$, $p=0.001$). This implied the higher the physical activity levels of the respondents, the higher the satisfaction toward their body parts. Nevertheless, there was a significant positive correlation ($r=0.203$, $p<0.05$) between body shape discrepancy scores and BMI. This showed that the higher the body weight status, the larger the discrepancy between desired and current body shape. Lastly, a significant negative ($r=-0.219$, $p<0.05$) correlation between body shape discrepancy scores and WMKI scores was found. This signifies that the higher the weight management knowledge level, the lesser the discrepancy in desired and current body shape. In conclusion, health promotion intervention programs should be designed in order to enhance healthy body image among young girls.

A24 Comparison of nutritional status in vegetarians and non-vegetarians from Kinta Amitabha Buddhist Society, Perak

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The aim of this study was to compare the nutritional status of Chinese vegetarians and non-vegetarians aged 10 years and above. Demographic data, lifestyle practices, anthropometric measures and dietary intakes were compared in a convenience sample of 80 vegetarians (21 males, 59 females; mean age: 30.0 ± 11.7 year old) and 80 age-matched non-vegetarians (43 males, 37 females; mean age 33.4 ± 30.0 year old). Two day-dietary records were assessed using a computer dietary analysis software program, Nutritionist-pro. Smoking status, alcohol and supplement use differed for both vegetarians and non-vegetarians in which lower proportion of vegetarians smoked and drank alcohol while higher proportion of vegetarians used supplements. Physical activity level was comparable between two groups. Body mass index (BMI) did not differ by dietary pattern. Mean BMI was 21.8 ± 3.7 kg/m² and 21.7 ± 3.1 kg/m² for vegetarians and non-vegetarians, respectively. Majority of the respondents had normal BMI. However, vegetarians had higher proportion of underweight and overweight as compared to non-vegetarians. Vegetarians had significantly higher percentage of body fat than non-vegetarians ($p < 0.05$). Less than one-third (22.5% and 11.3%) of the vegetarian subjects achieved the recommended calorie and protein intake, respectively. A high proportion of vegetarian subjects failed to achieve recommended intakes for thiamin (70%), riboflavin (82.5%), niacin (86.3%), vitamin C (52.5%), vitamin D (100%), calcium (97.5%), iron (73.8%) and zinc (72.5%). All vegetarians and non-vegetarians achieved the recommendation intake for selenium. There were significant lower dietary intakes for calories, protein and fat ($p < 0.05$) in vegetarians as compared to non-vegetarians. A significantly higher intake for carbohydrate and fiber ($p < 0.05$) was found in vegetarians compared to their counterparts. For micronutrients, vegetarians had a significantly lower mean intake of thiamin, riboflavin, niacin, pyridoxine, cobalamin, vitamin D, calcium, phosphorus and iron ($p < 0.05$). No significant differences were observed in mean vitamin C, zinc and selenium intakes between vegetarians and non-vegetarians. In conclusion, the vegetarian diets in this sample of subjects were deficient in total calories, protein, fat, vitamins (B₂, B₃, B₁₂ and D) and minerals (calcium, iron and zinc) when compared to their non-vegetarian counterparts or RNI Malaysia. Further studies with larger sample size involving blood nutrient analysis to delineate the complete profile of nutritional status in vegetarians should be conducted.

A25 Demographic and anthropometric assessment among HIV patients

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This study was conducted to observe demographic data and assess nutritional status among HIV patients. Subjects consisted of 99 adult patients (with ages ranging between 20 and 59 years), 24 from Hospital Kuala Lumpur and 75 from Hospital Sungai Buloh. 83 subjects were men, 16 were women, consisting of 35 Malays, 53 Chinese, 9 Indians and 2 from other races. Demographic data and information of infection was gathered using questionnaires. Patients were divided into 4 stages according to immunological classification based on CD4 count. 17 subjects were categorised as Stage I, 19 Stage II, 28 Stage III and 32 Stage IV (AIDS). 56.6% of the subjects were infected by HIV through heterosexual contact, 12.1% homosexual contact, 2% bisexual contact, 23.2% intravenous drug use (IDU), 2% through blood transfusion and 4% unknown mode of transmission. 64.6% of the subjects had been infected less than 5 years, 24.2% within 5 to 10 years and 10.1% more than 10 years. Nutritional status was assessed using anthropometric data i.e. weight, height and Body Mass Index (BMI). Anthropometric measurements revealed that mean weight of subjects was 60.7 ± 11.3 kg, height 167.8 ± 7.6 cm and BMI 21.5 ± 3.6 kg/m². Mean weight was 66.4 ± 14.4 kg, 62.0 ± 12.5 kg, 60.8 ± 10.1 kg and 58.0 ± 8.6 kg for Stage I, II, III and IV accordingly. Results demonstrated that mean BMI in accordance to stage was 23.9 ± 5.0 kg/m², 22.1 ± 3.9 kg/m², 21.1 ± 3.2 kg/m² and 20.6 ± 2.4 kg/m² for stage I to IV. Mean BMI was in the normal range for both sexes, but lower in men (21.4 ± 3.1 kg/m²) compared to women (22.0 ± 5.7 kg/m²). In general, 20.2% of the subjects were underweight, 62.6% normal weight, 15.2% pre-obese, 1% obese class I and 1% obese class II. In conclusion, this study showed that majority of HIV patients were normal weight, while 20.2% of them were underweight.

A26 Self-efficacy, stages of change related to dietary fat reduction and nutritional status among Universiti Putra Malaysia non-academic staff

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Rapid economic development has brought changes to Malaysians' lifestyle and food habits. Diets high in fats/oils and refined carbohydrates contribute to significant changes in disease patterns with increasing prevalence of diet-related chronic diseases. The purpose of this cross-sectional study was to determine self-efficacy and stages of change related to dietary fat reduction and nutritional status among 202 UPM non-academic staff aged 18-56 years. Information on the demographic, socioeconomic, self-efficacy and stages of change related to dietary fat reduction were collected using a pre-tested interview-administered questionnaire. Weight, height and waist circumference of the subjects were also measured. Energy and dietary fat intake were obtained through two days of

24-hour dietary recall. The sample's mean for Body Mass Index (BMI) was 24.34 ± 13.21 kg/m² with 26.1% overweight and 13.1% obese. The mean waist circumference (WC) for males and females was 86.29 ± 11.95 cm and 77.78 ± 10.98 cm respectively. 16.6% of respondents had at risk WC (Males = 94 – 101cm; Females = 80 – 87cm) and 18.6% had increased risk WC (Males ≥ 102 cm; Females ≥ 88 cm). The mean energy intake was 1635 ± 580.14 kcal while the mean fat intake was 50.44 ± 21.14 g. The mean total calorie contributed from fat was 27.78 ± 6.44 % with 34.3% of subjects consuming more than 30% of total calories from fat. Using the Algorithm Stages of Change, 68.3% of subjects were in Stage II (Preparation stage), followed by Stage I (Contemplation/Pre-contemplation stage – 19.8%) and Stage III (Action/Maintenance stage – 11.8%). The total mean score of self-efficacy was 19.50 ± 4.06 with females having significantly higher ($F = 9.519$, $P < 0.001$) self-efficacy scores (20.03 ± 3.93) compared to males (18.10 ± 4.08). No significant difference was found in self-efficacy by socioeconomic status (years of education, individual and household income). Self-efficacy on fat reduction was significantly associated with the stages of change ($\chi^2 = 14.530$; $p < 0.05$). Subjects who are in the later stages of change (Action and Maintenance) had higher self-efficacy scores compared to the earlier stages (Per-contemplation/Contemplation). There was a significant difference in BMI by stages of change with subjects having improved BMI at the later stages ($F = 3.819$, $\chi^2 = 13.608$; $p < 0.05$). The mean WC did not differ by stages of change. No significant trends across stages were found for dietary fat intake (%). Total energy varied significantly by self-efficacy groups ($F = 4.726$, $p < 0.05$) but no significant differences were found among self-efficacy groups for fat intake, BMI and WC. In conclusion, self-efficacy is associated with stages of change in dietary fat reduction. Self-efficacy is useful for defining the stages of change and possibly in tracking behaviour change over time. Nutrition educators can use self-efficacy as predictors in health and nutrition-related behavioural programs in order to achieve the healthy diet goals.

A 27 The Malaysian Games Anthropometry Project 2006 (MGAP06): Somatotype of young track and field athletes

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The purpose of this study was to describe the somatotype of 108 young Malaysian track and field athletes. Sixty-eight males and 40 females competing at the 2006 Malaysian Games (SUKMA Kedah) participated in this study. Each athlete completed an anthropometric battery of tests (7 skinfolds, 2 girths and 2 breadths) undertaken by trained anthropometrists using standard protocols (ISAK). Somatotype was derived using the Heath-Carter somatotype scale. The athletes were assigned to one of four groups: throw, jump, power (sprint, hurdler, heptathlon, decathlon events), and distance (middle distance, long distance, race walking events) and univariate analysis of variance was undertaken using somatotype as a dependent variable. All statistical analyses were performed using SPSS 12.0. On average, male athletes were aged 18.2 ± 1.7 years, weight 64.1 ± 13.4 kg, height 170.5 ± 6.0 cm, with sum of skinfolds 60.3 ± 41.0 mm; female athletes were aged 17.0 ± 1.6 years, weight 54.7 ± 12.2 kg, height 160.1 ± 5.5 cm, with sum of skinfolds 92.8 ± 40.9 mm.

The somatotype of male athletes was classified as balanced mesomorph (2.6-5.1-2.9), while the female athletes were endomorph-mesomorph (3.9-4.3-2.8). Somatotypes for male throw (n=10), jump (n=7), power (n=38) and distance athletes (n=13) were 5.8-7.5-1.1, 2.2-4.5-3.3, 2.0-4.8-3.1, and 2.2-4.2-3.8 respectively. Significant differences in mean somatotype ($p < 0.001$) were found among groups, where male throw athletes were more endomorphic ($P < 0.001$) and mesomorphic ($p < 0.001$) and less ectomorphic ($p < 0.001$). For female athletes, mean somatotype for throw (n=9), jump (n=7), power (n=20) and distance athletes (n=4) were 6.6-7.2-0.6, 3.3-3.0-3.6, 3.1-3.7-3.3 and 2.7-2.9-4.4, respectively. Mean somatotype was different among female groups ($p < 0.05$). These results provide the first description of the somatotype of Malaysia track and field athletes. Although these were young athletes (age 14-21 years), their somatotype profiles were similar to published results of elite athletes.

A28 Assessment of nutritional status of Orang Asli children aged 0-12 years in Penempatan Orang Asli Batu 12 Gombak, Selangor

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This study was carried out to assess the nutritional status of Orang Asli children aged 0-12 years old in Gombak, Selangor. The total population of children aged 12 and below was included in the study. There were 85 children comprising 41 boys and 44 girls. Anthropometry measurements (height, weight and mid upper arm circumference) were taken. Nutritional status of the children was classified based on the NCHS reference (WHO, 1995). Dietary assessment was carried out on all children aged 2-6 years (n=33). Results showed that 25 children (29.4%) were stunted, 11 (12.9%) underweight, 16 (18.8%) wasted and 7 (8.2%) overweight. A total of 14 (46.7%) out of 30 children had mid upper arm circumference less than the 5th percentile which indicates protein-energy malnutrition based on the Frisancho Reference (1981). Intake of calories, protein and vitamin C exceeded the Recommended Nutrient Intake levels (RNI Malaysia, 2005), whereas intakes of iron, vitamin A and vitamin B2, vitamin B1 and calcium achieved 96.56%, 85.42%, 79.85%, 65.11% and 50.96% of the RNI respectively. As for infant feeding, breastfeeding was the main practice (86.7%) for the mothers. There were 6 mothers (46.1%) who practised exclusive breastfeeding up to 6 months (mean 5.54 ± 2.8 months). Mean age for initiation of solid foods namely fruits, vegetables, chicken, eggs, biscuits, porridge and bread were at 6.0, 4.5, 4.0, 3.4, 3.3, 3.0 and 2.1 months respectively. Pearson correlation test showed a negative significant correlation between father's age and height for age ($r = -0.236$, $p < 0.05$), weight for age ($r = -0.371$, $p < 0.01$) and weight for height ($r = -0.238$, $p < 0.05$). This indicates that the older the father, the poorer the nutritional status of the children. There was also a negative significant relationship between mother's age and height for age ($r = -0.214$, $p < 0.05$) and weight for age ($r = -0.340$, $p < 0.01$). Household size was negatively significant correlated with the nutritional status of the children (weight for age). This indicates that the bigger the household, the worse off the nutritional status of the children. The correlation results showed a positive significant correlation between nutritional status (weight for age) with the intake of calcium ($r = 0.378$, $p < 0.05$) and

vitamin A ($r = 0.436$, $p < 0.05$) and weight for height with the intake of protein ($r = 0.694$, $p < 0.01$), vitamin A ($r = 0.497$, $p < 0.01$), vitamin B1 ($r = 0.362$, $p < 0.05$), vitamin B2 ($r = 0.520$, $p < 0.01$) and vitamin C ($r = 0.671$, $p < 0.01$). This indicates that the nutritional status of the children is better with higher intake of protein and micronutrients. In conclusion, malnutrition problem still occurs among Orang Asli children who live in Gombak, a sub-urban area.

A29 A comparison of bone health status between Chinese female vegetarians and non-vegetarians in Ipoh, Perak

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The objective of this study was to compare the bone health status (BHS) and dietary nutrient intake between Chinese female vegetarians and non-vegetarians aged 20 years and above in Kuan Yen Ling Sep Association, Ipoh. Background information was obtained through a self-administered questionnaire. Dietary intakes were assessed through two-day dietary records. Weight, height, body fat and bone health status were assessed using electronic weighing balance (TANITA), body meter (SECA), Omron body fat meter and ultrasonometry (QUS-2) respectively. Data was analysed using Statistical Package for the Social Science for Window (SPSS) version 13.0 whereas dietary data was analysed using Nutritional Pro software. A total of 136 subjects with 70 vegetarians and 66 non-vegetarians were recruited into this study. Mean age of vegetarians and non-vegetarians was 44.9 ± 13.3 years and 47.9 ± 16.6 years, respectively. Age was not significantly different between the two groups ($p > 0.05$). Mean dietary calcium was low (424.1 ± 255.7 mg/day). There was significantly lower dietary intake of energy ($p < 0.05$), protein ($p < 0.001$), vitamin B₁₂ ($p < 0.001$) and vitamin D ($p < 0.001$), but a higher dietary intake of magnesium ($p < 0.001$) among vegetarian subjects compared to non-vegetarians. No significant difference was found in the dietary calcium and potassium intake between the two groups. When nutrients from supplementation were included, total calcium intake was significantly higher among vegetarians ($p < 0.05$). Mean Broadband Ultrasound Attenuation (BUA) and T-score was 85.0 ± 16.0 dB/MHz and -0.34 ± 1.27 , respectively. Approximately 70% of the vegetarians and 65% of the non-vegetarians had normal BHS, respectively. There were approximately 30% subjects with osteopenia (low bone mass). There was no significant difference in BHS between vegetarians and non-vegetarians ($p > 0.05$). There was a significantly positive relationship between BUA with total calcium intake (dietary and supplement) ($r = 0.347$, $p < 0.001$), dietary vitamin D intake only ($r = 0.171$, $p < 0.05$), total vitamin D intake ($r = 0.346$, $p < 0.001$) and total magnesium intake ($r = 0.209$, $p < 0.05$). A positive relationship was also found between height and BUA ($r = 0.243$, $p < 0.01$) as well as lean mass and BUA ($r = 0.188$, $p < 0.05$). Although vegetarian diets are not assumed to be a risk factor for bone health status, relevant programs and interventions related to risk factors, consequences and prevention of osteoporosis among women, especially vegetarians who have lower intake of selected nutrients, should be carried out to promote optimal BHS and to reduce the risk of osteoporosis.

A30 Accuracy of perceptions of dietary fat intake in relation to nutritional status and diet-related psychosocial factors among Universiti Putra Malaysia staff

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A cross-sectional study was conducted to determine the differences in nutritional status and diet-related psychosocial factors according to accuracy levels of dietary fat intake perceptions among UPM staff. A set of structured questionnaires was used to obtain information on socioeconomic, demographic and diet-related psychosocial factors. Body weight, height and waist circumference (WC) were assessed using a weighing scale (TANITA), body meter (SECA) and microtoise tape (SECA), respectively. Dietary fat intake was assessed using 2 days of 24-hour dietary recalls and analysed according to Recommended Nutrient Intake of Malaysia (RNI). Diet-related psychosocial factors were assessed in four different aspects i.e. perceived risk, intention to change, outcome expectancies and perceived barriers. A total of 202 subjects were involved in this study with 27.7% males and 72.3% females. The mean age of the subjects was 33.81 ± 10.34 years. Most of the subjects were Malays (95.5%). The mean body mass index (BMI) and WC were 24.34 kg/m^2 and 80.09 ± 11.85 cm, respectively. A total of 26.1% and 13.1% of the subjects were overweight and obese. Based on the WC as an indicator, majority of the subjects (84.4%) were considered at low risk for chronic diseases (males ≤ 102 cm, females ≤ 88 cm). The mean for energy and dietary fat intake were 1641 ± 582 kcal and 50.44 ± 21.14 g, respectively. More than half of the subjects (55.2%) had desirable fat energy intake of 20 – 30%, while 34.2% and 10.4% consumed more than 30% and less than 20% of calories from fat, respectively. For the diet-related psychosocial factors, mean scores for perceived risk, intention to change, outcome expectancies and perceived barriers toward dietary fat intake were 8.57 ± 2.34 , 3.92 ± 1.17 , 19.24 ± 3.93 and 15.50 ± 3.52 , respectively. In general, females perceived greater risk of cancer, had higher intention to change, placed greater values on expected outcomes and perceived lesser barriers toward dietary fat reduction than did males. By comparing the subjects' actual dietary fat intake to their perceived fat intake, approximately half of the subjects (49.5 %) were classified as accurate estimators, while 35.6% and 14.9% were underestimators and overestimators, respectively. A one-way analysis of variance (ANOVA) using the three categories for accuracy indicated that subjects who overestimated dietary fat intake had significantly greater BMI than did subjects who accurately estimated or underestimated dietary fat intake ($F = 3.372$, $p < 0.05$). Significant between-group differences were also found for dietary fat intake ($F = 18.027$, $p < 0.01$) and percentage of calories from fat ($F = 100.699$, $p < 0.01$). Further, chi square test showed significant association between BMI and accuracy groups ($\chi^2 = 21.394$, $p < 0.01$) and dietary fat intake and accuracy groups ($\chi^2 = 243.701$, $p < 0.01$). There were significant differences in perceived cancer risk by accuracy groups ($F = 3.256$, $p < 0.05$). However, there were no significant differences in WC, energy intake, intention to change, outcome expectancies and perceived barriers according to the accuracy groups ($p > 0.05$). These findings suggested that inaccurate perceptions of dietary fat intake should not be overlooked as one of the cognitive barriers to dietary change and factors that may influence nutritional status.

A31 Comparison of body image perceptions, weight status, dietary practices and physical activity between female nutrition and engineering students from Universiti Putra Malaysia (UPM)

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A cross-sectional comparative study was conducted to compare body image perceptions, weight status, dietary practices and physical activity of female Universiti Putra Malaysia students who are exposed to nutrition knowledge with those who are not. Sixty-five nutrition students were selected and matched for program year and age with sixty-five engineering students to be included in this study. The mean age for all respondents was 21.44 ± 0.996 years. The prevalence of overweight among engineering and nutrition students were 9.2% and 1.5% respectively; while the prevalence of underweight were 27.7% and 24.6% respectively. There was no significant association between actual body weight status and program of study ($\chi^2=4.240$, $p=0.120$). The findings showed that there were significant associations between perception of body weight status ($\chi^2=9.646$, $p=0.008$), weight management knowledge level ($\chi^2=18.842$, $p=0.000$), and physical activity level ($\chi^2=6.220$, $p=0.045$) with program of study. This showed that majority of the nutrition students (80.0%) were correct estimators compared to engineering students (55.4%). Besides, a greater number of nutrition students (32.30%) had a high level of weight management knowledge compared to engineering students (13.8%). It was also found that students who were exposed to nutrition knowledge had a higher level of weight management knowledge. Furthermore, nutrition students (53.8%) were more likely to be moderately active compared to their counterparts (32.3%). On the other hand, there were no significant associations between perception of body size ($\chi^2=3.191$, $p=0.203$), eating attitude ($\chi^2=0.000$, $p=1.000$), and energy balance ($\chi^2=2.566$, $p=0.109$) with program of study. Besides, there were no significant differences in the means of total energy intake ($t=0.392$, $p=0.696$) and means of total energy expenditure ($t=0.706$, $p=0.482$) between engineering and nutrition students. Majority of the students from both groups wished to be slimmer (engineering: 60.0%; nutrition: 67.7%) but only a small and equal percentage of students (4.6%) from both groups were identified as prone to eating disorders. Similarly, only a small percentage of students from both groups had positive energy balance (engineering: 16.9%; nutrition: 7.7%). In short, with exposure to nutrition knowledge, students were more likely to have correct perception of their body weight status as well to have a higher level of weight management knowledge. However, exposure to nutrition knowledge did not equate with good dietary practices. Most of these young adults, whether exposed to nutrition knowledge or otherwise, were both affected by the idealised slimmer bodies. Future intervention and prevention programs should focus not only on improving nutrition knowledge, but must also consider enhancing dietary skills and practices for a healthy life.

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

B01 A study on energy drink intake among KUTPM students

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Nowadays, energy drinks or stimulant drink products such as *RedBull* and *Livita* are so appealing to students. For this group of people, gulping down an energy drink is perceived as a quick way to consume extra energy to get through the day, compensate for a perceived deficiency in vitamins, minerals, herbs, or some other nutrient, boost endurance, expedite recovery from exercise or improve brain function. However, most of these energy drinks cannot deliver on such high expectations. Thus, this study was conducted in order to identify the level of knowledge, practice and awareness of KUTPM students about energy drinks, as well as to determine the percentage of students who regularly consume these energy drinks. This study was also done to reveal the desirable and undesirable effects of consuming energy drinks and relating them with the main ingredients of the beverages. As many as 100 questionnaire forms were distributed among KUTPM students. Data obtained were compared and analysed using SPSS version 14.0. The results showed that the level of knowledge towards energy drinks among KUTPM students is moderate for both genders. Additionally, the study also found that the prevalence of consuming energy drinks among respondents is high, as about 96% of the respondents stated they consumed energy drinks regularly. 61% of them agreed that consuming energy drinks could help boost their energy when they were tired, while 55% of them stated that energy drinks could help them maintain their wakefulness. However, some of the respondents claimed that they experienced several side effects such as insomnia (39%), stomach upset (33%), headache (32%) and frequent urination (22%) that are associated with the high level of caffeine in the drink. Overall, this study found that energy drinks are beneficial if consumed in a moderate amount. However, further study is needed to reveal the possible health effects that may be brought about by the high level of certain substances in these energy drinks.

B02 Calcium intake of young female national athletes

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Adequate calcium intake during training and competition as a youth is essential to bone health as well as for optimal athletic performance. The objective of this study was to determine the calcium intake of young female athletes who were national and interna-

tional level representatives. 48 well-trained female athletes aged between 14 and 19 years old from various sports participated in this study. Their calcium intake was estimated using a Food Frequency Questionnaire. The subjects had a mean BMI of 20.4 ± 3.1 Kg/m² and a mean body fat of $17.2 \pm 5.1\%$. Based on the BMI classification, 20.8% of them were underweight. The average calcium intake of the female athletes was 629.0 ± 434.6 mg/d (range: 52.9-2323.0 mg/d). When this value was compared with the Malaysian RNI for calcium which was 1000 mg/d, majority (89.6%) of them had a lower intake of calcium which indicated inadequate calcium intake in the female athletes. Analysis of the calcium intake of the female athletes showed that the highest contributor of calcium came from milk (32%), followed by meat (12%) and vegetables (10%) and the remainder of calcium intake came from the other food groups including fish, cereals and fruits. Calcium intake of athletes participating in different sports was also compared to ascertain if there were any differences among the various sports. Results showed that female athletes involved in athletics had the highest calcium intake with a mean value of 1200 ± 973.8 mg/d (range: 186.04-2323.0 mg/d) whereas athletes participating in wushu had the lowest calcium intake with a mean value of 416.9 ± 360.3 mg/d (range: 166.4-949.0 mg/d). Inadequate calcium intake especially in young female athletes may affect the development of peak bone mass, increasing the risk of training injuries and bone fracture, and future osteoporosis. Therefore it is recommended that young female athletes should increase their dietary intake which would increase micronutrient intake with particular attention to their intake of calcium.

B03 Knowledge and practices related to dietary fiber intake among UKM (KL) second year undergraduates

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A cross-sectional study was carried out to evaluate knowledge and practices related to dietary fiber intake amongst UKM (KL) second year undergraduates. Subjects' knowledge was evaluated using the NCCFN questionnaire and a separate questionnaire on dietary fiber knowledge. Subjects' dietary fiber intake was assessed using multiple 24-hour diet recalls and Food Frequency Questionnaire. Subjects' dietary intake was also scored according to Healthy Eating Index (HEI). A total of 151 students (38 male and 113 female) participated in this study. Majority of the subjects had normal BMI (76.2%) while 20.5% were underweight and 3.3% were pre-obese. Nutritional knowledge scores were high in most of the subjects (97.4%). Results revealed that despite the high overall nutritional knowledge scores, knowledge specific to dietary fiber was still poor. Dietary fiber intake was below current recommendation of 20-25g/day due to low consumption of fruits, vegetables and wholemeal products. The knowledge and consumption level of these young adults with regard to dietary fiber intake needs to be improved.

B04 Use of mass media and health and nutrition behaviour of young adults

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The mass media is an important tool for the transfer of information, concepts, and ideas about health and nutrition to young adults. This cross-sectional study was conducted to determine the relationship between the use of mass media and health and nutrition behaviour of young adults. A self-administered questionnaire was used to collect data on type and pattern of use of mass media, health behaviours (smoking habit, exercise habit, oral health care behaviour, stress control behaviour, and road safety behaviour), frequency and type of nutritional supplements consumed, and meal patterns. Thirty-five female and 55 male students were selected randomly from a residential college in University Putra Malaysia. The mean age of the sample subjects was 19.43 ± 0.67 years and all subjects were first year students. The sample comprised 46.7% Malays, 42.2% Chinese, 4.4% Indians, and 5.5% other races. The mean frequency of use of mass media in the past one month were 3.60 times, 1.28 times, 2.66 times, 3.32 times, and 3.83 times for newspaper, magazine, television, radio, and Internet, respectively. The mean duration (hours per week) spent on the various mass media were 4.03 hours, 1.17 hour, 6.60 hours, 12.67 hours, and 8.73 hours for newspaper, magazine, television, radio, and Internet, respectively. The results showed significant differences between gender for frequency and duration (hours per week) of use only for Internet. Health behaviours were categorised into three groups, which were poor, medium health, and healthy. About 98.0% of the students followed road safety practices, followed by 85.5% on smoking, 81.1% on stress control, 76.7% on exercise, and 42.2% on oral health care. A significant association was found between frequency of use of newspaper (Chi square=11.933, $p < 0.05$) and oral health care behaviour. A significant association was also found between duration (hours) spent on radio and stress control behaviour (Chi square=11.242, $p < 0.05$). The findings indicated that the mean frequency intake of breakfast, lunch, dinner, and nutrition supplements were 5.57 times, 6.37 times, 6.37 times, and 2.80 times per week. More female (62.9%) than male (45.5%) students consumed breakfast regularly. An inverse correlation was found between frequency of use of television with frequency of breakfast consumption ($r = -0.218$, $p < 0.05$) and between frequency ($r = -0.251$, $p < 0.05$) and duration ($r = -0.219$, $p < 0.05$) of use of magazine and frequency of supplement consumption. A significant relationship was found between frequency of use of newspaper ($r = 0.44$ and $r = 0.338$, $p < 0.05$) and magazine ($r = 0.332$, $p < 0.01$ and $r = 0.230$, $p < 0.05$) with mother's income and household income. Correlations were also found between duration (hours) spent on newspapers ($r = 0.337$, $p < 0.01$) and magazines ($r = 0.228$, $p < 0.05$) with mother's income. Association was found between household income and smoking behaviour (Chi square= 12.476, $p < 0.05$). Among the health behaviours, only smoking had a significant association with both father's (Chi square= 123.05, $p < 0.05$) and mother's (Chi square= 121.518, $p < 0.05$) education level. However, intake of meals and supplements were not associated with socioeconomic status of this sample. In conclusion, use of mass media and economic status were found to influence certain health and nutrition behaviours in this sample of university students.

B05 Negative body image and weight-reducing behaviours among female adolescents in Kuantan, Pahang

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A cross-sectional study was conducted to determine the concerns of body image, perception of body weight status, body size satisfaction and weight-reducing behaviours among female adolescents in Kuantan, Pahang. By using multi-stage sampling, a total of 319 female students aged between 13 and 16 years with a mean age of 14.28 ± 1.04 years were randomly selected from a secondary school in Kuantan district. The respondents comprised 166 (52.0%) Malays, 125 (39.2%) Chinese, and 27 (8.5%) Indians and one (0.3%) 'Other'. Based on WHO (1995) classification, 6.6% of the respondents were underweight, 77.7% normal-weight, 9.4% overweight and 6.3% were obese. Some 89.3% of the respondents expressed concerns about their body shapes, with health (37.9%) as their most common reason for the concerns. Although a majority of the respondents (62.7%) perceived their weight status correctly, 22.6% were over-estimators and 14.7% were under-estimators. Using the Contour Drawing Rating Scale (Thompson and Gray, 1994), which compared perception of current with ideal body size, it was found that 66.5% have negative discrepancy scores (range: -5 to -1). This indicated that they were dissatisfied with their body sizes and desired a smaller ideal body size. Further, respondents were found to be dissatisfied with their weight (51.7%), waist and abdomen (46.4%), height (43.3%) and hips, thighs, and legs (42.3%), and the mean total body parts satisfaction score was 27.76 ± 5.60 . Most of the respondents (94.4%) have been involved in at least one weight-reducing behaviour in the past year. The most common weight-reducing behaviours that were irregularly practiced by the respondents included exercise (55.8%), not eating between meals (45.8%), selecting low calorie foods (44.8%), drinking water before meals (39.2%), using own diet (38.9%), and keeping busy (38.6%). Female adolescents who were concerned about their body shapes were more likely to be dissatisfied with their body size and desired a smaller ideal body size ($\chi^2=15.546$, $p<0.0001$), and more frequently involved in weight-reducing behaviours ($t=2.088$, $p<0.05$). Indeed, those who were dissatisfied with their body size and desired a smaller ideal body size were also prone to be involved in more frequent weight-reducing behaviours ($F=13.650$, $p<0.0001$). However, there was no significant difference in mean scores of weight reducing behaviours among correct estimators, over-estimators, and under-estimators ($F=1.566$, $p=0.210$). In conclusion, a large percentage of female adolescents in this study were identified with negative body image and were trying various weight-reducing behaviours in order to achieve the thin ideal body image. Body image health promotion programs planned for female adolescents should take these factors into consideration.

B06 Awareness of smoking as a risk factor for cardiovascular disease among KUTPM students

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Cardiovascular disease is a global health problem and it has emerged as an epidemic in industrial and developing countries. Heart disease or cardiovascular disease is the disease that affects the heart's ability to function normally. Smoking has been identified as one of the major modifiable risk factors for cardiovascular disease in younger people or adolescents, especially college or university students who were exposed to the danger of smoking tobacco. These people tend to become addicted to this habit and could pose a danger to their health and other students. Perhaps they are unaware or less aware of the risk of smoking. The main purpose of this survey was to assess the awareness of smoking as a risk factor cardiovascular disease. This cross-sectional survey was carried out among KUTPM students from July 2006 until January 2007. This survey was conducted in places that the students frequented, such as restaurants nearby KUTPM, library, students' living places such as Apartment Perdana, lecturers' offices and in class. Evaluations of data were separated into five assessments, which are socio-demographic, smoking, health and smoking, physical activity and stress assessment. The data was analysed using Statistics Package of Social Sciences (SPSS version 14.0). Out of the 100 respondents who answered the questionnaire form, it was found that the prevalence of smoking was 29%. The male smokers comprised about 82.8% of the total and females 17.2%. Of the 71 students who did not smoke at all, male non-smokers comprised about 49.3 % and female nonsmokers 50.7%. 92.9% of students agreed that smoking could affect their health. Majority of respondents (54%) answered that heart diseases were the prominent effects of smoking. The smokers agreed that peer groups were a main factor that could influence a person to smoke (23%) but 34.5% respondents agreed that curiosity was the main reason for smoking initiation. The study shows that the students are well aware about the danger of smoking to health. This was proven when 93% of respondents agreed that this habit could affect the human health condition. Furthermore, the higher percentage of non-smokers made the point very clear that smoking habits were strongly associated with cardiovascular disease.

B07 Weight management knowledge and practices among members of selected fitness centers in Kuala Lumpur

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The objective of this study was to determine the relationship between weight management knowledge and nutritional status among members of three selected fitness centers. Knowledge on weight management were categorised into aspects of nutrition,

physical activity and psychosocial. Questionnaires consisting of 37 items covering the three aspects were distributed among members. A Food Frequency Questionnaire (FFQ) was also given to respondents to examine their food intake (FI). Assessment of weight, height, waist circumference (WC) and percentage of body fat (%BF) was done on each respondent. Percentage of body fat was measured using a hand-held bioelectrical impedance monitor. A total of 77 members, with 63.6% being male members and 36.4% females, completed the questionnaire and anthropometric assessments. Majority of the respondents had moderately acceptable knowledge on nutrition (61%) and physical activity (53.2%). While most respondents had normal BMI (54.5%), 15.6% were obese and 2.6% were underweight. About 74% respondents had WC within the normal range. Measurements of percentage of body fat showed that 54.5% respondents were moderate, 23.4% were normal, 14.3% were obese and 7.8% were lean. A total of 63.6% respondents reported that they were currently taking some sort of complementary medicine ranging from multivitamins to protein drinks to traditional slimming 'jamu'. Pearson analysis showed a significant correlation between nutrition knowledge with BMI and %BF ($p < 0.05$). Overall, anthropometric indices and questionnaires suggest normal nutritional status and acceptable level of weight management knowledge among majority of the respondents. However, as public health awareness increases, it is crucial to emphasise on consuming whole, conservative foods rather than complementary medicine. Thus, nutritionists and dietitians play a major role in educating the health-aware public based in fitness centers.

B08 Calcium intake, physical activity and bone health status among Chinese male young adults

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The objective of this cross-sectional study was to determine the relationship between calcium intake, physical activity and bone health status among Chinese male young adults. A self-administered questionnaire was used to obtain background and social demographic information, family history of osteoporosis, consumption pattern of milk and calcium supplement. While daily calcium intake was assessed using quantitative food frequency questionnaire (QFFQ), physical activity was assessed using global physical activity questionnaire (GPAQ). Height, weight, body fat and bone health status were assessed using body meter (SECA), weighing scale (TANITA), body fat analyser (HBF-302) and ultrasonometry (QUS-2), respectively. Data was analysed using the program Statistical Package for Social Sciences (SPSS) version 13.0. A total of 139 respondents aged between 18 and 25 years were recruited in this study. The mean age of respondents was 20.1 ± 1.0 years old. Mean daily calcium intake was low (520.2 ± 299.7 mg). Total physical activity in MET was 2975.71 ± 2921.22 min/ week. Mean weight, height and body mass index (BMI) was 63.2 ± 10.6 kg, 1.72 ± 0.06 m, 21.34 ± 3.36 kg/m², respectively. The mean percentage of body fat was $18.25 \pm 5.59\%$, with a mean lean body fat of $86.71 \pm 58.90\%$. Mean Broadband Ultrasound Attenuation (BUA) was 92.37 ± 18.75 dB/ MHz while mean for T-score was 0.26 ± 1.47 . 34.5% of respondents drank milk regularly. Based on BMI

classification, 72.7% of respondents were in normal category while 14.4%, 10.8% and 2.2% of respondents were classified as underweight, overweight and obese, respectively. According to diagnostic criteria for osteoporosis by WHO (1994), majority of respondents (80.6%) had normal bone mass (T-score > -1.0). Approximately 20% were osteopenic (-2.5 < T-score < -1.0) and none were osteoporotic (T-score > -2.5). Pearson correlation test showed there were no significant relationships between (i) calcium intake with BUA ($r = -0.116$, $p > 0.05$) (ii) total physical activity per week with BUA ($r = 0.038$, $p > 0.05$) (iii) height with BUA ($r = 0.087$, $p > 0.05$). There were significant relationships between (i) fat mass with BUA ($r = 0.285$, $p < 0.01$), (ii) weight with BUA ($r = 0.355$, $p < 0.01$). In conclusion, calcium intake and physical activity showed no significant association with bone health status. However fat mass and body weight showed significant relationship with bone health. It is recommended that prevention and management of low bone mass should be focused on factors recognised as determinants of bone health status among male young adults.

B09 Nutrition content analysis of television food advertising directed at adults

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Mass media plays an important role in influencing public's eating behaviour. Amongst all the mass media, television is an important influence on food choice. This study was carried out to evaluate food advertising targeting adults carried by six local television stations from June to August 2006. Six out of seven of the nation's TV channels agreed to participate in this study namely RTM1, RTM2, TV3, NTV7, 8TV and TV9. Prime time for each channel was determined based on the total number of commercials screened per hour of television show time. Advertisements during prime time were then analysed to determine trends, types of food advertised and their fitness (?? adherence) to the Malaysian Food Pyramid. Trends indicated that prime time differed between TV stations, but did not differ between weekdays and weekends for all stations ($p > 0.05$). TV3 had the longest prime time mean of 9.7 hours per day. It also screened the most numbers of food advertisements (4109), followed by RTM2 (2488), NTV7 (1956), TV9 (1160), 8TV (1142) and RTM1 (816). The total number of food advertisements shown by all stations remained consistent from June to August. ($p > 0.05$) Cereals and breads are the most advertised food products during prime time broadcasting (19.3%), followed by dairy products (17.2%), snacks (17.1%), sugar and candies (14.9%), biscuits (13.7%), beverages (7.7%), fats and oils (3.8%), miscellaneous (3.2%), fast foods (1.6%), processed foods (0.9%), while health supplements are the least advertised. When compared with the Food Pyramid, the analysis of advertising trends indicated that equal coverage is given to cereals and dairy products. However, a significant proportion ($p < 0.05$) of the Food Pyramid also accommodated snack foods and sweets.

B10 Milk drinking habits among lower primary school girls (7-9 years) in Kuala Lumpur

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A cross-sectional study was carried out to determine the milk drinking habits of primary school girls, aged 7-9 years in Kuala Lumpur. A total of 239 girls, comprising 60.3 % Malays, 31.4 % Chinese and 8.3 % Indians, were involved in this study. Milk intake habit was determined using a questionnaire. Food intake on a subsample of 61 girls was estimated by one day 24-hour diet recall. Anthropometric measurements such as weight, height and mid arm circumference were taken. Mean body weight, height, mid upper arm circumference of subjects were 26.0 ± 7.7 kg, 126.7 ± 10.3 cm, 17.9 ± 3.2 cm respectively. The results showed that 90% subjects consumed milk, with the Malay girls having the highest prevalence (91%) compared to Indians (90%) and Chinese (88%). 56.7% of milk-drinkers drank milk every day, with the Chinese reporting the highest percentage (66.7%) compared to Malays (52.7%) and Indians (50.0%). The mean serving of milk intake was 1.63 ± 0.82 glasses. Most of the subjects (54%) drank flavoured milk compared to fresh milk (38.6%), low fat milk (22.8%), full cream milk (20.0%), skim milk (14.9%), milk shake (10.7%) and condensed milk (9.3%). 63.7% of subjects consumed milk during breakfast and 44.7% of subjects drank milk with other beverages. Besides milk, 57.7% and 84.1% of subjects consumed cheese and yogurt respectively. The mean calcium intake was 699 ± 359 mg/day, meeting 99.8 % RNI. This intake was highest among Indians (763 ± 252 mg/day) compared to Malays (699 ± 406 mg/day) and Chinese (677 ± 284 mg/day), although not statistically different. In conclusion, the milk drinking habits of the lower primary school girls were satisfactory.

B11 Television advertising, children and nutritional relevance: some facts and figures

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The Malaysian government is considering banning fast food advertisements targeting children. This study is timely as we report on data covering six months of television advertising of foods targeting children. Six out of seven of the nation's TV channels agreed to participate in the study namely RTM1, RTM2, TV3, NTV7, 8TV and TV9 (response rate=85.7%). Prime time was determined based on the screening of children's programmes. Prime time differed between weekdays and weekends, reflecting time available to children for television viewing ($p < 0.05$). Prime time increased for all channels for weekend screening. Three channels (RTM1, RTM2, NTV7) increased prime time from September to November to cater for the school holiday season and Ramadhan. During weekdays, mean of the prime times for all channels was 1.7 hours in the evening while

one channel (TV3) ran an extra prime time screening for 3 hours in the morning. During weekends, separate prime times were designated for morning and evening periods reflecting a mean of 3.7 hours for all six channels. Over the six-month period, TV3 screened the most food advertisements (n=1104) compared to the other channels [RTM1 (n=59); RTM2 (n=327); NTV7 (n=643); 8TV (n=47); TV9 (n=407)]. Food advertising increased during September (n=3158) which recorded the highest number followed by July (n=2770), August (n=2431), October (n=2291), November (n=2245) and June (n=2211). In assessing the content of food advertisements for all six channels over six months, it was observed that advertisements for snacks were the highest (34.5%), followed by dairy products (20.3%), sugars and candies (13.4%), biscuits (11.2%), fast food (6.7%), breakfast cereal (6.4%), beverages (4.1%), supplements (0.9%), rice (0.6%), noodles (0.5%), bread (0.3%), miscellaneous and processed foods (0.2%). A major finding from this study related to the concern of the Health Ministry about banning fast foods. This study reports that the snack food advertising during children's prime time was screened 5 times more than fast foods. Most of these snack foods have high sodium content (mean 484.6mg per 100g).

B12 Development of a booklet on nutrition and healthy ageing for Chinese elderly

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In support of the National Elderly Policy which is peaceful, with self-respect and high social position, this study was conducted to develop a booklet on nutrition and healthy ageing for Chinese elderly. This study consisted of three phases. The first phase was assessment on nutrition knowledge and source of nutrition information among 100 Chinese elderly (40 men and 60 women) (mean age 68.3±5.8y) residing in Kuala Lumpur. Information about demographic data, nutrition knowledge and source of nutrition information were collected using an interview-based questionnaire. Results revealed that only 22.5% of men and 15% of women were categorised in the satisfactory level (75%-100%) of nutritional knowledge. In general, the mean of nutrition knowledge among subjects was unsatisfactory (52±23). A higher percentage of subjects were knowledgeable about vitamins, complications of taking too much sugar, the role of food in disease prevention and constipation. However, a substantial proportion of the subjects were lacking in knowledge related to the food pyramid and which food group to be consumed most. Most of the subjects relied on friends and family members as their source of nutrition information (82%). Food label was the least reported source of nutrition information (7%). In the second phase, the booklet was translated from Malay to Chinese, based on the booklet developed by IRPA research group 06-02-02-0041 EA203. In addition, the contents of the booklet were also modified based on the nutrition knowledge assessment and adjusted for Chinese population. During the third phase, a total of 50 Chinese elderly in Kuala Lumpur (29 men and 21 women) with mean age of 68.6±7.3years and with the ability to read in Mandarin were recruited. This phase aimed to evaluate the level of acceptance of the booklet. The questionnaire contained information on demographic data

and evaluation on understanding, content, graphic and format of the booklet. Findings from this phase indicated that the majority of the elderly (98%) understood the booklet's contents. They also reported that the photos helped them a lot in understanding the contents of the booklet (62%). Most of the subjects reported that the usage of pictures (94%), text size (86%) and colour (98%) was suitable. Generally, 96% of the subjects perceived the booklet's contents were useful as a healthy eating guide for Chinese elderly. In conclusion, the evaluation of nutrition knowledge and needs assessment prior to the development of printed nutrition education material is necessary to ensure its suitability, readability and acceptability among the studied Chinese elderly.

B13 Attributes of food preferences among breast cancer patients undergoing chemotherapy at HUKM Oncology Day Care

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Taste alterations are a significant problem among cancer patients and improving them is a challenge. It will be manifested by changes to food preferences among cancer patients during chemotherapy treatment. The aim of this study was to identify the attributes of food preferences in terms of taste, texture and aroma among breast cancer patients undergoing chemotherapy treatment. A questionnaire on therapy-related taste changes, symptoms & food preferences (TASTE-Q) was developed and pilot-tested. TASTE-Q has three sections namely; taste alteration, symptoms of therapy side effects and food preferences. It was interviewer-administered to the patients when they came for their chemotherapy cycle scheduled at HUKM Oncology Day Care. A total of 24 Malay breast cancer patients aged from 22 to 62, who had completed at least their first cycle of chemotherapy, were selected to participate in this study. The patients were from various cancer stages and were receiving either a standard chemotherapy regime or a single chemotherapeutic agent. The results of this study showed that during chemotherapy treatment patients preferred bread for lunch or dinner (71%), fish as the main entrée (71%), while green leafy vegetables was the preferred vegetable (75%). The preferred cooking method for the main entrée was cooking in soup (71%) while for vegetables was cooking in soup or *tom yam* (71%). Clear soup was preferred most by patients. Patients also preferred sweet fruits namely watermelon, papaya and red apples. Pudding was the favourite snack of 92% of the patients. As for beverages, 83% patients preferred sweet fresh fruit juices. These findings were coherent with preferences towards aroma and texture of food which was citrus (83%) and moist (71%) respectively. As a conclusion, breast cancer patients undergoing chemotherapy prefer their foods to be sweet and sour, moist in texture and with citrus aroma. This information will assist with recipe development for cancer patients during chemotherapy treatment.

B14 Relationship between osteoporosis health beliefs, dietary calcium intake and physical activity with bone health status among Chinese female students at UPM

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The objective of this study was to determine the relationship between osteoporosis health beliefs, dietary calcium intake and physical activity with bone health status among female students at Universiti Putra Malaysia. Socio-demographic information, family history of osteoporosis, osteoporosis health belief scores, milk consumption patterns and intake of calcium supplements were obtained through a questionnaire. Calcium intake was assessed using a semi-quantitative Food Frequency Questionnaire (SFFQ) while the level of physical activity was assessed using the International Physical Activity Questionnaire (IPAQ). Weight, height and bone health status were measured using a weighing scale (TANITA), body meter (SECA) and ultrasound machine (QUS-2TM), respectively. Data were analysed using the Statistical Package for Social Science (SPSS) version 13. A total of 170 respondents participated in this study. The mean age of the respondents was 19.15 ± 0.61 years. About 90.0% of them reported that they did not have any history of osteoporosis. The mean score for all subscales of osteoporosis health belief was 132.16 ± 9.38 . About 52.9% of the respondents consumed milk, particularly low fat milk (47.8%). The mean calcium intake was 757.52 ± 542.86 mg per day. Less than one-quarter of the respondents achieved the recommendation by FAO/WHO. However, 32.9% fulfilled the Malaysian Recommended Nutrient Intake (RNI). The main source of calcium in the diet was from vegetables (24.58%). More than half (51.2%) of the respondents were categorised as minimally active. The mean weight, height and body mass index (BMI) was 51.03 ± 8.13 kg, 157.09 ± 5.66 cm and 20.67 ± 3.05 kg/m², respectively. Based on the BMI classification, 22.9% of them were underweight and 9.4% were overweight and obese (BMI > 25 kg/m²). Mean Broadband Ultrasound Attenuation (BUA) was 88.13 ± 14.68 dB/MHz and T-score was -0.06 ± 1.16 . According to WHO classification, 22.4% were osteopenic. The results revealed no significant correlation between perceived seriousness towards osteoporosis, perceived benefits of taking calcium and perceived barriers to taking calcium with dietary calcium intake. However, there was a significant correlation between perceived susceptibility towards osteoporosis with dietary calcium intake. There was also no significant correlation between perceived benefits to exercise and perceived barriers to exercise with physical activity. The result also revealed no significant relationship between calcium intake and BUA and T-score, physical activity and BUA and T-score. In conclusion, about one-quarter of the respondents had poor bone health status, and their dietary calcium intake as well as physical activity level were considered to be low. Therefore, nutrition and health education and relevant intervention programs should be implemented to improve their calcium intake, increase physical activity level and to decrease the perception of barriers to calcium intake and physical activity. Such preventive programs are important to optimise peak bone mass and prevent the development of osteoporosis in the later years.

B15 Prevalence of hypertension among primary school children in Kelantan

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High blood pressure in childhood has been considered a risk factor for hypertension (HPT) in early adulthood. Therefore, this cross sectional study was carried out to determine the prevalence of HPT and to investigate the influence of body mass index (BMI) on blood pressure (BP) among children. A total of 593 healthy Malay primary school children aged 7 to 11 years old from six schools in Tumpat (rural) and Kota Bharu (urban), participated in this study. The birth weight data was taken from birth certificates or child health record books. Demographic questionnaires were completed by the parents. Current weight and height were measured and BMI were interpreted using the percentile of BMI-for-Age. Blood pressure was measured by the researcher in triplicate at one-minute intervals using Mercurial Sphygmomanometer (SPIRIT CK-101C) (children cuff size). The mean age of the subjects was 9.03 ± 1.4 years old while the mean BMI of the subjects was 16.56 ± 3.4 kg/m². Mean birth weight for all subjects was 3.10 ± 0.5 kg. About 13% of the subjects had low birth weight (<2.5 kg). According to BMI-for-Age, 13% subjects were underweight, 6.7% were at risk of overweight and 6.1% were overweight. Mean Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) were 103.97 ± 10.4 mmHg and 64.71 ± 8.5 mmHg respectively. SBP was higher in boys (104.39 ± 10.4 mmHg) than girls (103.55 ± 10.4 mmHg), although not significant. However, SBP was significantly higher in rural (105.53 ± 11.3 mmHg) children than urban (101.98 ± 8.8 mmHg) ($P < 0.001$). DBP was higher in boys (64.94 ± 8.6 mmHg) than girls (64.49 ± 8.4 mmHg), although not significant, while it was significantly higher in rural (65.44 ± 8.7 mmHg) children than urban (63.78 ± 8.2 mmHg) ($P < 0.05$). There were significant differences in SBP and DBP between age groups ($P < 0.0001$) using ANOVA test. The results revealed that 11.5% of the subjects were pre-HPT, 12.8% were HPT stage I, 3.5% were HPT stage II. Children with greater BMI-for-Age, tended to have higher SBP and DBP. Prevalence of HPT was higher in the rural (11.6%) than urban (4.7%) children. This study demonstrated the importance of early determination of BP in children and it is a good practice to carry out yearly measurements in order to curb hypertension among children, as recommended by the National High Blood Pressure Education Program (1996).

B16 Adequacy of selected nutrient intake among maintenance haemodialysis: a comparison between government and non-government dialysis centres in the Klang Valley

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This cross-sectional study was conducted to determine the adequacy of energy, protein, fluid, sodium, potassium and phosphate intake of haemodialysis patients in government and non-government dialysis centres. The study consisted of 90 subjects, in the age range from 20-78 years, recruited from Hospital Kuala Lumpur and dialysis centers under National Kidney Foundation. Dietary intake of subjects was examined for two days using 24- hour diet recall and food diary. The first day (non-dialysis day) required patients to recall their 24-hour food intake, while dialysis day required them to use a food diary to record their dietary intake. Nutrients intakes were analysed using Nutritionist Pro (2006 First Data Bank, Inc) program. Clinical history was obtained from subjects' medical reports. The 90 subjects consisted of Chinese: 69%, Malay: 19%, Indian: 7% and others: 2% from government (27.8%) and non-government (72.2%) dialysis centres. All subjects were dialysed three times per week with four hours dialysis for each session. The mean Kt/V was 1.7 ± 0.5 and 1.6 ± 0.3 for government and for non-government centres, respectively. Blood flow rate for government centres was 306.8 ± 43.2 ml/min and non-government was 293.4 ± 36.2 ml/min. The mean energy intake was 26.8 ± 7.0 kcal/kg BW with higher mean for subjects from government centres (28.5 ± 7.6 kcal/kg BW) than non-government (26.2 ± 6.7 kcal/kg BW) centres. There was approximately 7% (government) and 4% (non-government) subjects who failed to achieve the recommendation for energy intake. Mean protein intake was low, with a mean for 1.1 ± 0.4 g/day. Fluid intake for all subjects (government: 1142 ± 175 ml/day and non-government: 1100 ± 227 ml/day) was higher than the recommendation (750-1000ml/day). The mean for dietary sodium and phosphorus was 1.9 ± 1.0 g/day and 312 ± 735 mg/day, respectively. Majority (89%) of the subjects achieved the recommendations for calories. However, only a minority of the subjects (24.4%) achieved the recommendation for protein. There was no significant difference between maintenance haemodialysis patients from government or non-government centres for selected dietary intake in the study. Appropriate nutrition education should be provided to haemodialysis patients with the aim of improving nutritional status.

B17 Effect of anaemia in pregnant women on pregnancy outcomes in Gombak district, Selangor Darul Ehsan

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Anaemia or low hemoglobin (Hb) concentration (<11 g/dl) is common among pregnant women in Malaysia. A cross-sectional study was conducted to determine the factors that contribute to incidence of anaemia among pregnant women (38 anaemic, 38 non-anaemic) and its effects on birth outcomes. A total of 76 pregnant women in their third trimester who had antenatal care in Klinik Kesihatan Taman Ehsan, Klinik Kesihatan Selayang Baru and Klinik Desa Selayang Baru were chosen, according to their Hb levels. Data collection was conducted through interview sessions using a questionnaire. The questionnaire consisted of four sections, sociodemographic background, pregnancy history, respondent's health data, pregnancy outcome data and diet intake (Food Frequency Questionnaire and 24 Diet Recall). Pregnancy outcome data were collected after each subject had given birth. All data were analysed using SPSS version 12.0 and Diet 4 was used to analyse subject's nutrient intake. Results showed that mean age of respondents was 28.62 ± 4.3 . Majority of them had secondary education (60.53%) and in low parity of 1-2 (56.58%). Out of 38 anaemic respondents, 45.3% of them had 9-11 g/dl (10.05 ± 0.5) of Hb level and 5.3% had less than 9 g/dl (8.58 ± 0.3) of Hb level, while the Hb level of non-anaemic respondents was more than 11g/dl (11.78 ± 0.58). Majority of anaemic respondents had normal delivery (73.7%) with mean weight of baby 3.15 ± 0.6 . For non-anaemic respondents, majority had much higher percentage of normal delivery (92.1%) with mean weight 3.19 ± 0.4 . Both groups had a small percentage of low birth weight babies; 7.9% and 2.6% of anaemic and non-anaemic respondents respectively. In terms of iron supplement intake, only 57.9% of anaemic respondents complied with the recommendation while about 79% of non-anaemic respondents complied with the recommendation. In relation to nutrient intake for anaemic pregnant women, 13.2%, 65.8% and 44.7% of them achieved more than the Malaysian RNI for calorie, protein and vitamin C intake respectively. 36.8% and 7.9% of them had adequate intake of fat and calcium above the RNI. Compared to non-anaemic respondents, 7.9% and 57.9% of them achieved the RNI for calorie and protein intake respectively. For fat intake, 57.9% of non-anaemic pregnant women achieved more than the Malaysian RNI. 71.1% and 94.7% of them had inadequate vitamin C and calcium intake compared to RNI. The Chi square coefficient test showed that there was no association between Hb levels and socioeconomic factors (income level, education level, type of occupation) in both groups. There was also no significant difference between Hb level and birth weight. However, there was a significant difference between Hb level with baby health problems after birth ($\chi^2=0.039$, $P<0.05$). Majority of the anaemic babies (60.5%) suffered from jaundice. In conclusion, there was no significant relationship between socioeconomic factors and incidence of anaemia in semi urban pregnant women. However, there is a significant relationship between Hb levels with baby health problems after birth. Therefore, all pregnant women should have the knowledge and awareness to ensure that their health is in good condition throughout their nine month of pregnancy. An evaluation of the program should also be carried out to reduce anaemic problems among pregnant women.

B18 Knowledge and dieting practices on body weight control among female students in Kolej Tun Syed Nasir

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The objective of this study was to assess the nutrition knowledge and dieting practices on body weight control among 150 female students in Kolej Tun Syed Nasir, Universiti Kebangsaan Malaysia. Subjects consisted of 84% Malays, 13.3% Chinese, 2.6% Indians. Demographic data, nutrition knowledge and dieting practices on body weight control were gathered using validated questionnaires. Weight and height were measured and Body Mass Index (BMI) were calculated to determine obesity. Food intake data were collected using food records for 3 days. This study found 13% of the subjects were underweight (BMI < 18.5 kg/m²), 75% were normal (BMI 18.5-24.9 kg/m²), 9% were overweight (BMI 25.0-29.9 kg/m²), 2% were obese class I (BMI 30.0-34.9 kg/m²) and 1% were obese class II (BMI 35.0-39.9 kg/m²). Mean of weight, height and waist circumference among the subjects were 51.8 ± 9.9 kg, 154.9 ± 5.2 cm and 68.9 ± 7.9 cm respectively. Mean of BMI among the subjects was 21.51 ± 3.50 kg/m², whereas percentage of fat and fat mass were 27.5 ± 5.7 % and 14.8 ± 6.0 kg respectively. The study also found that the mean nutrition knowledge score was 90.3 ± 10.7 % while score for dieting practices was 23.2 ± 20.3 %. 94.7% of the subjects had good knowledge on nutrition and 5.3% had moderate knowledge. Most of the subjects had unhealthy dieting practices for controlling their weight. 32% of the subjects reduced the quantity of foods, 44.7% skipped meals, 30% stopped eating certain foods, 7.3% only ate fruits and vegetables, 40.7% stopped snacking between meals, 5.3% only drank water and 'diet' drinks, 2.7% fasted and 44.7% exercised. The results of this study showed bad dieting practices among female students even though they had good nutrition knowledge ($r = 0.2$, $p < 0.05$). Thus, this study suggests nutrition education to enhance healthy dieting practices for weight management among university students.

B19 Development of a booklet on portion size & meal planning as an educational tool for athletes

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This study was conducted to develop nutrition education tool in the form of a booklet entitled "Booklet on portion size and meal planning for athletes". This booklet consists of three chapters. First chapter was on the development of meal planning based on classification of calorie intake and body weight. The second chapter was on the development of food choices for athletes and the last one was on the development of ready-reckoner for 50g of carbohydrate. All menus were chosen from The National Sports Institutes (ISN) cafeteria. Meal planning was developed according to five meal times. Breakfast composed

of pre and post- training followed by lunch, afternoon tea and dinner. There were four classifications of calorie in this booklet, calculated according to the references body weight of 50kg, 60kg, 70kg and 80kg respectively. The second chapter of this booklet provided the food choices for athletes while the last chapter was on the Ready reckoner for exchanges of 50g of carbohydrate. The calorie and macronutrient of foods were determined using the Nutrient Composition of Malaysian Foods. The development of this booklet was to educate the athletes on how to choose their daily food intakes to meet their total daily energy intake as well as to enhance their performance.

B20 The impact of nutrition education on promoting healthy eating habits to primary school children

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This study was conducted to evaluate the practices of schoolchildren after receiving a nutrition promotion program. A total of 176 schoolchildren aged seven and ten years old from three schools in Kuala Lumpur participated in this study. A total of 90 children in the intervention group received the nutrition education program while 86 children in the control group did not receive any nutrition education program. The nutrition education program, which was conducted for two weeks, comprised of a comic reading session, drawing competition for food pyramid, 'Healthy Lifestyle' draughts game followed by exercise questions and a quiz that served as reinforcements for each session. A comic reading session was shown to the children for the first week while the 'Healthy Lifestyle' draughts game and drawing competition for food pyramid were conducted in the following week. Questionnaire forms were distributed before and after receiving the program to evaluate the attitudes and practices of the children. 61% of subjects had normal Body Mass Index (BMI). This study found that the nutrition attitude score for the intervention group increased from $75.78 \pm 13.38\%$ to $76.46 \pm 14.84\%$ after receiving the program. Meanwhile, there were no significant difference in attitude and practice scores in the control and intervention groups between seven years old and ten years old ($p > 0.05$). The frequency of fruit and vegetable intake increased in both intervention and control groups. Both groups also improved the frequency of breakfast and dinner. This study also observed reduction of fast food intake in both groups. In conclusion, nutrition education program should be held progressively to improve the eating habits among school children.

B21 The preliminary findings of Body Mass Index (BMI) and food intake among parents of obese children

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This cross sectional study was conducted to determine body mass index (BMI) and food intake among parents of obese children at Paediatric Obesity Clinic, HUKM. The study subjects consisted of 50 parents who visited the Paediatric Obesity Clinic together with their obese children. Data of food intake was collected using food diary, while anthropometric measurements were obtained to calculate the BMI. The results of this study indicated that the mean height of parents was 1.6 ± 0.08 m, while mean weight was 75.89 ± 13.63 kg and mean BMI was 29.58 ± 4.18 kgm^{-2} . The mean energy intake of the study subjects was 1970.94 ± 420.74 kcal, of which protein intake was 70.86 ± 20.02 g, fat intake was 65.38 ± 21.22 g, carbohydrate intake was 260.0 ± 66.1 g and fiber intake was 4.07 ± 2.7 g. This study also found that mean score of nutrition knowledge among the study subjects was 59.18 ± 11.64 %. The preliminary findings from this study showed that parents of obese children were also obese. Thus, nutrition education program on weight management and behaviour modification among the parents are important in treatment of childhood obesity.

B22 Calcium intake and bone health status of adolescent basketball athletes

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Physical activity and good calcium intake are beneficial to bone health. This study was carried out to determine the calcium intake and bone health status of 24 national basketball players (12 males and 12 females). The mean age of the subjects was 17.4 ± 1.3 years. The physical characteristics were assessed through anthropometric measurements. The dietary intake was estimated as a mean of 3-days record while physical activity level (PAL) was determined by time and motion study, which was carried out simultaneously. Habitual calcium intake was assessed using food frequency questionnaire for calcium. Bone status was determined using Quantitative Ultrasound (QUS) which measured the speed of sound (SOS, in units of meter per second, m/s) of distal radius. The results indicated that, the mean body weight for male and female subjects were 85.5 ± 15.0 kg and 63.1 ± 7.5 kg. For BMI, 4% were underweight, 21% overweight and the remaining (75%) were normal weight. The mean percentage body fat of male and female subjects were 14.3 ± 6.0 % and 20.4 ± 3.4 %. The mean calcium intake was 1113.5mg and fulfilled 114% RNI. 50% of male subjects drank milk 2-3 times a week while 83% of female subject drank milk more than 2 times a month. 38% of subjects were taking yoghurt and 75% were taking

dairy products. The mean bone SOS was 3968 ± 79 m/s. All female and 91% male subjects had good bone status. As for the physical activity level (PAL), 75% were categorised as having light PAL while 25% was moderate PAL. Results from the scatter plot indicated that the higher the calcium intake and PAL, the higher the bone SOS. This study showed that the bone health and calcium intake status of these basketball athletes were good and adequate.

B23 Assessment of dietary fiber and water intake among elderly in Klang Valley

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The objective of this study was to determine the level of dietary fiber and water intake among elderly people aged 60 years and above in Klang Valley, and its association with health status. A total of 57 elderly men (45.2%) and 69 women (54.8%) participated in the study. Intake of macronutrients, dietary fiber and water were assessed using Dietary History Questionnaire (DHQ) and a semi quantitative Food Frequency Questionnaire (FFQ). Health status, activity of daily living and depression status was assessed using a standard questionnaire. In this study, the mean intake of dietary fiber was 13.78 ± 8.58 g/d, yet it had not met the recommendation for fiber requirement of at least 20g/d. The mean intake of dietary fiber was higher among men (16.20 ± 10.39 g/d) compared to women (11.78 ± 6.12 g/d) ($p < 0.05$). The mean dietary fiber intake in the younger men (60-74y) of 16.54 ± 10.83 g/d was higher than the older age group (≥ 75 years), ie. 14.77 ± 8.63 g/d. A similar trend was also noted in women [12.19 ± 6.24 g/d (60-74 years) and 8.63 ± 4.20 g/d (≥ 75 years)]. Only 28.1% of elderly men and 33.3% of elderly women met the recommendation for energy requirement. A significant association was found between inadequate fiber intake and constipation ($p < 0.05$). It was also found that subjects with hypertension and diabetes had a lower dietary fiber intake. Those who took supplements also had a lower fiber intake ($p < 0.05$). There were 45 elderly men (35.7%) and 49 elderly women (38.9%) who had water intake of more than five glasses per day. Both men and women who had insufficient water intake (< 5 glasses/d) also had a lower intake of dietary fiber. In conclusion, the fiber and water intake of the subjects were inadequate and related with ageing and chronic disease and health behaviour.

B24 Awareness on halal and haram food among adults at KL Sentral

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This cross sectional study was done to find out about the perceptions of *halal* and *haram* concepts in food and beverages among adults in KL Sentral. This study involved 146 Muslim and 147 non-Muslim (100 Buddhists, 28 Hindus, 17 Christians and 2 others)

respondents with mean age 26.71 ± 10.02 . Interviews were carried out using 69 previously validated questionnaires on sociodemographic, knowledge, attitude and practices in *halal-haram*. Sociodemographic data showed that 1.7% respondents went to primary school, 24.6% secondary school and 73.7% higher level education. From this study, 69.39% non-Muslims knew about *halal* and *haram* foods in Islam compared to 96.58% Muslim subjects. 59.18% of non-Muslims said it was important for them to know about *halal* and *haram* foods and 29.25% non-Muslims had heard about it but did not know about it in detail. 71.23% Muslims knew about *halal* and *haram* from their parents; however, non-Muslims 36.00% knew mostly from their friends. The main sources of information about *halal* and *haram* food for Muslims and non-Muslims were schools and universities, with 45.89% and 27.21% respectively. Mean score awareness and knowledge for Muslims was 19.60 ± 1.80 and non-Muslims was 13.85 ± 4.17 . 83.56% Muslims are more conscientious in *halal* food labeling compared to 17.69% non-Muslims. 97.95% Muslims and 95.24% non-Muslims knew that *halal* label indicates that the food can be eaten by Muslims while 96.58% Muslims and 83.67% non-Muslims knew *halal* label played an important role in differentiating between *halal* and *haram* food. 97.26% Muslims and 76.19% non-Muslims agreed that *halal* and *haram* foods need to be separated so consumers can make a choice. 69.18% of Muslims stated that they always found out information about *halal* and *haram* food, while only 20.41% non-Muslims did so. Only 10.88% non-Muslims were aware about *halal* food issues compared to Muslims, 63.01%. The results also indicated there was a significant ($p < 0.05$) difference in percentage mean score knowledge between Muslims ($89.10\% \pm 8.16$) and non-Muslims ($62.95\% \pm 18.95$). In conclusion, even though Muslims are expected to be more aware and knowledgeable about *halal* and *haram* foods, some non-Muslims are becoming more aware and knowledgeable in certain parts concerning *halal* and *haram* foods in Islam.

B25 A preliminary finding of food intake among obese children in Paediatric Obesity Clinic, HUKM

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Obesity has become the most common paediatric chronic disease that requires effective intervention programs to overcome it. This report is a preliminary finding of the longitudinal study to assess the effectiveness of health promotion programs in the treatment of childhood obesity. The purpose of this cross-sectional survey was to assess food intake and physical activity patterns among 50 overweight and obese children and adolescents aged between 7 and 16 years old in a health promotion program at Paediatric Obesity Clinic, HUKM. Demographic data, anthropometric measures, KAP and physical activity data was collected during the clinic sessions while 7-day food diary data was collected from subjects a week after the session. During the clinic day, all subjects participated in the nutrition education program conducted by the dietitian, exercise instructed by the physiotherapist, session with psychologist and health examination by the paediatrician. Subjects were divided into 3 groups based on total number of visits to the clinic, which were 2 times (group A), 3 times (group B) and 4 times (group C). Weight was

decreased from 78 ± 26 kg to 77.9 ± 25.9 kg while height was increased from 151.7 ± 14.6 cm to 153.3 ± 14.5 cm, thus, making up decreases in BMI from 32.8 ± 6.3 kgm⁻² to 32.2 ± 6.2 kgm⁻² for group A ($p < 0.05$). However, calorie intake for this group increased from 2010 ± 468.7 kcal/day to 2102 ± 545.8 kcal/day. Weight and height in group B also increased from 78.4 ± 22.2 kg to 80.6 ± 22.4 kg and 148.7 ± 12.4 cm to 152.4 ± 12.3 kg respectively, thus, slightly decreased in BMI from 34.9 ± 7.2 kgm⁻² to 34.2 ± 6.8 kgm⁻². Their calorie intake decreased from 1963 ± 285.5 kcal/day to 1284.9 ± 439 kcal/day. This study also found subjects in group C had increased in both weight and height from 66.3 ± 24.1 kg to 69.3 ± 24.4 kg and 143.8 ± 16.2 cm to 147.1 ± 15.3 cm. However, their BMI increased from 31.1 ± 5.5 kgm⁻² to 31.2 ± 6.1 kgm⁻². Calorie intake of group C decreased from 1829 ± 323.3 kcal/day to 1118.4 ± 387.1 kcal/day. From these preliminary findings, it shows that the subjects need long-term support from their family, as well as from the health care team.

B26 Preliminary findings on food selection in school canteens among primary schoolchildren

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This study was conducted to assess the impact of nutrition knowledge, attitude and practice (KAP) on food selection among primary school children. 122 subjects participated in this study, comprising 65 7-year old children (53.3%) and 57 10-year old children (46.7%). The KAP was collected by questionnaires on food and nutrition, anthropometric measurements and 5-day food record observation at the school canteen. A total of 80 Malays (65.6%), 18 Indians (14.8%), 21 Chinese (17.2%) and 3 from other races (2.5%) participated in this study. This study showed that the school canteen produced *nasi lemak*, chicken rice, cooked rice, fish and vegetables, burger, nuggets, *roti canai*, wheat and fried rice noodles and soup, fried rice, fried fish crackers and traditional Malaysian *kuih* to be sold to the children. Most of the school children preferred consuming *roti canai* (25.4%), chicken rice (22.1%), rice, fish and vegetables (20.5%), burger (10.7%), *nasi lemak* (9.8%) and other foods (9.0%) from the school canteen. The factors influencing food selection of the 7-year old children were (26.2%) media such as television, newspapers and magazines, nutrition education programmes in school (24.6%), peers (20.0%), and food colours (20.0%). For 10-year old children, the influencing factors were nutrition education programmes in school (52.6%), (15.8%) media such as television, newspapers and magazines, and food colours respectively and peers (14.0%). This study also found significant differences ($p < 0.05$) between the weight and height of the subjects according to age. Mean intake of calcium from canteen food was 769.24 ± 597.10 mg for the 7-year old children and 628.43 ± 618.23 mg for the 10-year old children while mean intakes for dietary fiber were 2.33 ± 2.38 g for 7-year olds and 2.33 ± 2.82 g for 10-year olds. In conclusion, the results showed the need for nutrition promotion programmes to improve food selections in school canteens.

B27 Diet and lifestyle association with antioxidant level in male and female KUTPM and PTPL students

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Antioxidants serve as natural protection for organisms against the excessive free radical attack by the enzymatic and chemical detoxification system. The capacity of the antioxidant defense system is exceeded by free radical load that can cause damage to cells and tissues. These free radicals, caused by improper diet and unhealthy lifestyles, can lower the antioxidant status in our body. The aim of this study was to determine effect of diet and lifestyle with antioxidant level in male and female students. Biological tests were used to evaluate antioxidant status among the students. Antioxidant status was assessed in 61 male and 61 female KUTPM and PTPL students together with a questionnaire study. From this study, it was observed that there was a negative correlation for male respondents compared to female respondents in diet, lifestyle and antioxidant status. 1.3 to 2.0 mM was allocated as high antioxidant status while 0.5 to 1.3mM as low antioxidant status. Female students showed highest (70.5%) antioxidant status compared to males (11.5%) which was above 1.3 mM. Female students having low antioxidant status were less in number, 18 compared to the 54 male students. The factors that showed negative correlation in male respondents are associated with improper diet, smoking, alcohol consumption and no protection against sun exposure. Male students who consumed antioxidant vegetables regularly were far (39.3%) from the female students who did so (63.9%). In addition, 19.7% female students consumed fruit regularly compared to 14.7% of male students. This could be reason for the weak antioxidant status among female students. A significant ($p=0.00$) difference between male (26.2%) and female (1.6%) students was seen in their smoking habits. 14 smokers were males with low antioxidant status and 47 non-smokers were females with high antioxidant levels, showing the correlation between smoking and antioxidant level among the students. A significant ($p=0.01$) difference was found between males and females in terms of alcohol consumption. It can be concluded that there exists a strong correlation between antioxidant status of the male students and female students with their diet and lifestyle. In addition, male students displayed negative correlation while females displayed positive correlation with the antioxidant status. This study is important for it establishes the detrimental effect of diet and lifestyle on antioxidant status among students at KUTPM and PTPL.

B28 The feasibility and utility of analysing shopping receipts for dietary assessment

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This cross-sectional study, conducted for the first time in Malaysia, tests the usefulness of shopping receipts as a tool in dietary assessment methodology. Fifty-nine Chinese

households in a Kajang housing district were recruited through face-to-face meetings. A responsible person in each household was asked to collect shopping receipts and maintain records of food purchase without receipts for a month. Additionally 4-day diet records, anthropometry and a questionnaire on socioeconomic status, demography and lifestyle components were utilised to elicit more dietary information from the households. Receipts were analysed to determine the amount of money spent on various food items over a 30-day period. This data was then sorted into food groups based on the Malaysian Food Pyramid. Relationships between food purchase, BMI, diet record, household income, and lifestyle eating aspects were analysed statistically using Bland Altman test. 51% of households said shopping receipts represented their eating habits. According to food receipt analysis, 89.8% (n=53) of families shopped at wet markets compared to only 5% (n=3) sourcing foods from either hypermarket or supermarket. Mean food expenditure per household member determined through receipt analysis indicated 18.6% of families were spending around RM 301- 500 per person, 35.6% of families spent RM 501- RM 700 per person on food, 20.3% of families spent around RM 700- 900 per person and 20.3% of families spent >RM 900 per person. Income per household significantly influenced food intake (p=0.001). 80% of families with income above RM 7500 spent between RM 201- 250 per person, whereas only 18.18% of families with household income between RM 1501- 3500 were able to spend RM 201- 250 per person. Though 91.38% of households reported eating outside the home, the mean frequency of meals was only 2.6 times per month. Food groups assessed through the shopping receipts did not follow recommendation of the Malaysian Food Pyramid because mean security of the household clearly influenced purchasing patterns.

B29 Nutrition knowledge among elderly in Kuala Lumpur

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A cross sectional study was conducted to determine the nutrition knowledge among the elderly in Kuala Lumpur. This study involved 110 subjects (51 males and 59 females) aged 60 years and above. Nutrition knowledge was evaluated by personal interview using a set of questionnaires (NCCFN, MOH) that consisted of socio-demographic, nutrition knowledge, attitude and practice (KAP) and health status. Anthropometric measurements including height, weight and waist circumference were taken. Majority (43%) of the elderly were in the 60-65 years age range, followed by 29% 66-70 years and 28% 70 years and above. There were 52% Malays, 26% Chinese and 23% Indians. 62% of elderly were married, 34% widowed, 4% divorced and 1% single. Only 23% of the elderly had never attended school, 53% had completed their primary school and the remaining had secondary education (24%). For their health status, 75% had health problems such as hypertension (48%), diabetes (26%), heart problems (16%) and other health problems (hypercholesterolemia, stroke and asthma). The results showed mean score for the nutrition knowledge was 44.0 ± 18.26 . Only 8% had good nutrition knowledge (75-100), 24% had average nutrition knowledge (51-74) and most of them (68%) had poor nutrition knowledge (0-50). Only 21% of the elderly knew what the food pyramid was. More than half of the subjects did not know about balanced diet (53%), food with the highest energy

(54%) and food for developing body tissues (62%). They also did not know which foods were good sources of carbohydrate (69%), protein (65%) and vitamins, mineral and fiber (65%). However, the majority of the elderly knew about high salt food (86%), high cholesterol food (66%), food preparation that will increase fat (79%) and the consumption of excessive calories with obesity (82%). Body Mass Index (BMI) indicated 49% elderly were overweight, 35% had normal weight and only 3% were underweight. This study showed that appropriate nutrition education should be implemented to improve nutrition knowledge among the elderly.

Group C: Nutrients and Other Components in Food

C01 Antioxidant and anti-cancer properties of *Leucaena leucocephala*

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Leucaena leucocephala is also known as leadtree or 'petai belalang' and comes from the family leguminosae. Medicinally, the bark is eaten for internal pain and a decoction of the root and bark is taken as a contraceptive. The aim of our study was to assess the antioxidant and anti-cancer properties of *L. leucocephala*. Antioxidant activities were assessed by measuring the ability of the plant extracts to reduce ferric ions and to scavenge the 2,2-diphenyl-1-picrylhydrazyl (DPPH) radicals. The MCF-7 cancer cell lines were utilised to investigate the anti-cancer properties of this plant.

The methanol and water extracts of the pods and leaves of *L. leucocephala* had high total phenolic content (231-432 µg/ml gallic acid equivalents) in contrast to the ethyl acetate extract which showed low levels (<100 µg/ml gallic acid equivalents). Both the methanol and water extracts of *L. leucocephala* exhibited strong antioxidant activities and were able to reduce ferric ions to ferrous ions (FRAP values between 215-498 µmole/l). The methanolic extract of the plant was better at scavenging the free radicals DPPH (percent inhibition: 51-71%) compared to the water extract (percent inhibition: 35-45%) and ethyl acetate extract (percent inhibition: 13-21%).

The water extract of *L. leucocephala* was able to inhibit cancer cell proliferation (51-66%). In contrast, the methanol extract of the plant stimulated cancer cell proliferation. The ethyl acetate extract of the plant showed some anti-proliferation capacity (17 %).

In conclusion, *L. leucocephala* has the ability to act as antioxidants and possibly inhibit cancer cell proliferation. However, the preparation of the extracts and the solvent used in extracting the active compounds is crucial in determining the antioxidative and anti-cancer action of the plant.

C02 Determination of folate content in legumes by using microbiological method employing tri-enzyme extraction

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Folate is an essential dietary component which plays a role as a coenzyme and is necessary for the synthesis of DNA and the metabolism of some amino acids. It is important to prevent the diseases of neural tubes defects (NTDs), megaloblastic anaemia, chronic diseases, coronary heart disease, cancer, and malignant transformation. The objective of this study was to analyse the folate content in five types of dried beans including red beans, mung beans, black beans, soy beans, and black eye peas by using microbiological assay method with *Lactobacillus casei* employing a tri-enzyme extraction procedure (α -amylase, protease and folate conjugase). Following the tri-enzyme treatment, folate was measured microbiologically using a 96-well microplate method. The results showed that treatment at 37°C with α -amylase for 4 hours, followed by protease for 1 hour and finally by folate conjugase for 4 hours significantly increased the measurable folate in black beans and black eye peas compared with those without tri-enzyme extraction ($p < 0.05$). In the tri-enzyme extraction group, there were significant differences among the five types of the beans ($p < 0.05$) and the black beans had the highest folate content with mean value of 26.24mg in 100g of the sample. However, there were no significant differences in folate content among the samples without extraction ($p = 0.130$) and soy beans showed the highest folate content in the group without using the tri-enzyme treatment. Overall this study showed that the tri-enzyme extraction with α -amylase, protease and folate conjugase prior to microbiological assay using *Lactobacillus casei* was important for analysing total folate content in the legumes.

C03 Determination of folate content in green leafy vegetables

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The essentiality of dietary folate for human health has been known for many years. An adequate intake of dietary folate can prevent the risk of neural tube defects during pregnancy, cardiovascular disease and megaloblastic anaemia. In this study, the undeconjugated (free folate) and total folate contents of 5 types of vegetables commonly consumed by Malaysians were determined by microbiological assay method. These vegetables are mustard leaves (*Brassica juncea*), spinach (*Amaranthus viridis*), swamp cabbage (*Ipomoea aquatica*), tapioca shoots (*Manihot utilissima*), and Chinese kale (*Brassica alboglabra*). Tri-enzyme extraction (α -amylase, protease and folate conjugase) method was conducted prior to the microbiological assay to determine the total folate content while the undeconjugated folate content was determined without the treatment by tri-enzyme extraction. The results indicated that Chinese kale contained the highest level of total

folate content at 369.62 ± 22.74 $\mu\text{g}/100\text{g}$, followed by spinach (305.08 ± 54.93 $\mu\text{g}/100\text{g}$), mustard leaves (283.98 ± 28.17 $\mu\text{g}/100\text{g}$), swamp cabbage (274.12 ± 66.50 $\mu\text{g}/100\text{g}$) and finally tapioca shoots (168.51 ± 67.50 $\mu\text{g}/100\text{g}$). The range of unconjugated folate content in these vegetables is 9.83- 20.61 $\mu\text{g}/100\text{g}$. Folate content of samples treated with tri-enzyme extraction significantly increased compared with those did not undergo tri-enzyme extraction. Therefore, a tri-enzyme extraction is essential to determine the folate content in vegetables.

C04 Determination of antioxidant activity and total phenolic content in turmeric (*Curcuma longa*) and torch ginger (*Etlingera elatior*)

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Turmeric (*Curcuma longa*) and torch ginger (*Etlingera elatior*) are some of the herbs that are widely used in South East Asia's cooking and as traditional folk medicine. The objective of this study was to determine the antioxidant activity and total phenolic content in rizom and leaf of turmeric (RK and DK) and flower and pith of torch ginger (BK and EK) in aqueous and organic extract. Distilled water was used for aqueous extract while 80% (v/v) was used for organic extract. Two methods were used to determine antioxidant activity; α -Carotene bleaching method and DPPH radical scavenging method. Folin-Ciocalteu method was used to determine the total phenolic content of the samples. For aqueous extract, RK had the highest antioxidant activity followed by EK, BK and DK ($76.96\% \pm 7.01$ SD, $76.76\% \pm 3.61$ SD, $51.64\% \pm 4.75$ SD and $42.31\% \pm 14.21$ SD). BK had the highest DPPH radical scavenging activity followed by EK, DK and RK ($69.99\% \pm 0.23$ SD, $66.65\% \pm 0.36$ SD, $54.93\% \pm 0.60$ SD and $19.53\% \pm 3.13$ SD). Total phenolic content in RK was the highest followed by BK, DK and EK (1.76 ± 0.55 SD, 1.50 ± 0.01 SD, 1.21 ± 0.06 SD and 0.47 ± 0.01 SD mg/g GAE). While for organic extract, BK had the highest antioxidant activity followed by EK, RK and DK ($89.25\% \pm 0.29$ SD, $69.52\% \pm 28.88$ SD, $66.14\% \pm 28.21$ SD and $52.51\% \pm 4.09$ SD). EK had the highest DPPH radical scavenging activity followed by BK, RK and DK ($74.75\% \pm 0.01$ SD, $65.83\% \pm 2.12$ SD, $63.42\% \pm 0.21$ SD and $57.39\% \pm 1.05$ SD). The sequence for total phenolic content of organic extract was similar to aqueous extract which was RK, BK, DK and EK (5.30 ± 0.74 SD, 2.75 ± 0.21 SD, 1.92 ± 0.04 SD and 1.83 ± 0.03 SD mg/g GAE). To compare between the herbs, torch ginger has higher antioxidant activity ($71.80\% \pm 1.90$ SD) and DPPH radical scavenging activity ($71.33\% \pm 4.84$ SD) than turmeric ($59.48\% \pm 17.07$ SD and $48.82\% \pm 10.38$ SD respectively). However, turmeric has higher phenolic content than torch ginger which was 2.55 mg/g GAE ± 1.39 SD and 1.64 mg/g GAE ± 0.69 SD respectively. Overall, the organic extract of samples was found to have higher antioxidant activity and total phenolic content than the aqueous extract. In conclusion, turmeric rizom had higher antioxidant activity and total phenolic content than its leaf; while torch ginger flower had higher antioxidant activity and total phenolic content than its pith. Between the herbs, torch ginger had higher antioxidant activity than turmeric; while turmeric had higher phenolic content than torch ginger.

C05 Boric acid content of selected commercially available noodles in Malaysia

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The present study was conducted based on the current issue of boric acid abuse in noodles which had been recently reported in Malaysian newspapers. Boric acid has been declared unsafe and definitely prohibited by Food Act 1983 and Food Regulation 1985 due to its toxicological effects. This study was aimed at determining and comparing the boric acid content in four types of noodles locally known as 'hokkien', 'wontan', 'tou qinn' and 'yellow' noodles. The effects of washing and cooking on boric acid content were also investigated. Two types of analysis were carried out, namely qualitative (turmeric paper) and quantitative (curcumin assay). Total boric acid content in raw, washed and cooked noodles was in order of hokkien > tou qinn > yellow wantan > whereas the intensity of red/orange colour formation was in the order of hokkien > yellow > tou qinn > wantan when noodle extract reacted with turmeric paper. The mean boric acid contents in raw hokkien, tou qinn, wantan and yellow were $3.28\text{mg} \pm 0.02\text{mg}/100\text{g}$, $2.98\text{mg} \pm 0.08\text{mg}/100\text{g}$, $2.82\text{mg} \pm 0.05\text{mg}/100\text{g}$ and $2.35\text{mg} \pm 0.05\text{mg}/100\text{g}$, respectively. There was significant difference ($p < 0.05$) in boric acid content among raw noodles. Boric acid content in washed hokkien, tou qinn, wantan and yellow noodles, were $2.46\text{mg} \pm 0.10\text{mg}/100\text{g}$, $1.09\text{mg} \pm 0.09\text{mg}/100\text{g}$, $2.25\text{mg} \pm 0.03\text{mg}/100\text{g}$ and $2.06\text{mg} \pm 0.13\text{mg}/100\text{g}$, respectively, and for cooked hokkien, tou qinn, wantan and yellow noodles, the boric acid contents were $0.58\text{mg} \pm 0.03\text{mg}/100\text{g}$, $0.38\text{mg} \pm 0.03\text{mg}/100\text{g}$, $0.50\text{mg} \pm 0.05\text{mg}/100\text{g}$ and $0.23\text{mg} \pm 0.03\text{mg}/100\text{g}$, respectively. Statistical analysis (one-way ANOVA) showed significant differences ($p < 0.05$) of boric acid contents among the washed and cooked noodles studied. Boric acid contents of all the noodles were in order of raw > washed 3 min > cooked 5 min. Washing up to 3 minutes and cooking for 5 minutes could reduce 32% and 85% of boric acid contents in noodles, respectively.

C06 Fatty acid composition and antioxidant activity of rock melon (cucumis melo reticulates) and Golden Langkawi (cucumis melo L.) cantaloupe seed oils extracted with supercritical fluid extraction

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The purpose of this study was to extract cantaloupe seed oil using SFE, as liquefied carbon dioxide is an excellent medium to extract nutraceuticals and compared with conventional Soxhlet extraction method. The cantaloupe seed oil fractions from two species of cantaloupe; rock melon and Golden Langkawi extracted using SFE were then analysed for fatty acid composition and antioxidant activity using two antioxidant tests, stable radical diphenylpicrylhydrazyl (DPPH) assay and beta-carotene-linoleic assay

(BCB). The SFE fractionation aimed at looking for differential antioxidant activity of the different fractions was carried out at intervals of 1, 2 and 3 hrs. The fatty acid composition of rock melon at the 1st hr was 82.63% saturated fatty acid (SFA), 6.83% mono-unsaturated fatty acid (MUFA) and 10.54% polyunsaturated fatty acid (PUFA). The 2nd hr of rock melon showed 66.2% SFA, 8.09% MUFA and 25.71% PUFA. The rock melon in the 3rd hr consisted of 60.41% SFA, 15.92% MUFA and 23.68% PUFA. The Golden Langkawi in the 1st hr consisted of 65.62% SFA, 15.22% MUFA and 19.18% PUFA. The Golden Langkawi in the 2nd hr consisted of 64.87% SFA, 9.51% MUFA and 25.62% PUFA. The Golden Langkawi in the 3rd hr consisted of 61.41% SFA, 8.67% MUFA and 29.91% PUFA. For Golden Langkawi, the highest SFA and MUFA were from the 1st hr, and the highest PUFA was from the 3rd hr. For rock melon, the highest SFA was from the 1st hr, highest MUFA was from the 3rd hr and highest PUFA came from the 2nd hr. The major fatty acids were palmitic acid and eicosanoic acid in rock melon whereas for Golden Langkawi they were arachidic acid and linoleic acid. Using, LSD (post hoc) there were significant differences ($p < 0.05$) in the fractionation of BCB antioxidant activity of Golden Langkawi and Rock Melon. There were, however, no significant differences ($p > 0.05$, $p = 0.595$) for DPPH result of Golden Langkawi 1st hr and rock melon 2nd hr. There were no significant differences ($p > 0.05$, $p = 0.307$) for Golden Langkawi 1st hr and Golden Langkawi 3rd hr. There were significant differences ($p < 0.05$) for the other combination. In conclusion, antioxidant activity for both species was higher for extraction from the 1st hour, followed by 2nd hr and 3rd hr. The number of fatty acids also decreased with time.

C07 Antioxidant activity of pink-flesh guava (*psidium guagava* L.)

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A preliminary study was conducted to determine the characteristics of pink guava fruit (*Psidium guagava* L.). The mean weight of the fruit was 232 gm, volume determined using water displacement was 196.6 ml, and specific gravity was 1.17 (w/v). The pH for the puree was found to be 4.2 with 10% total soluble solid and viscosity of 2600 cps using viscometer (spindle no. 4 at 30 rpm). The titratable acidity as citric acid was found to be 0.4. The antioxidant capacity of the skin and the pulp of pink guava fruits were examined. Remarkable high antioxidant activity (29.6 $\mu\text{g/gm}$ TE using DPPH free radical scavenging method) and (22.4 $\mu\text{g/gm}$ TE using ferric reducing antioxidant power method FRAP), high total phenolics content (209 mg/100gm GAE), and high vitamin C content (209mg/100gm) were found in the skin compared to the flesh. To utilise this significant source of natural antioxidants, further characterisation of the phenolics composition is needed.

C08 Determination of acid value, saponification value, vitamin E content and fatty acid compositions of selected blended vegetable oils

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Vegetable oils are the main type of cooking oil used in Malaysia. Most of the vegetable oils consumed are single oils, commonly palm oil, and only a few are blended oils. The objective of this study was to determine and compare fatty acid composition, acid value, saponification value and vitamin E content of selected blended vegetable oils. Analyses were carried out for single vegetable oils: palm oil (PO), corn oil (CO), rice bran oil (RBO) and sesame oil (SO) and blended vegetable oils: blending of palm oil with corn oil (PO-CO), rice bran oil (PO-RBO) and sesame oil (PO-SO) in a ratio of 1:1. Analyses of fatty acid composition and vitamin E content were carried out by Gas Chromatography and High Performance Liquid Chromatography while acid and saponification values were determined by titration method. For single oil, the acid value in PO, CO, RBO and SO were 0.84 ± 0.4 , 0.56 ± 0.0 , 0.42 ± 0.2 and 0.84 ± 0.0 , respectively. For blended oil, the acid value of PO-CO, PO-RBO and PO-SO were 0.84 ± 0.4 , 0.56 ± 0.0 and 0.56 ± 0.0 , respectively. The saponification value in PO, CO, RBO and SO were 194.25 ± 0.99 mg KOH/g, 194.25 ± 2.98 mg KOH/g, 189.34 ± 3.97 mg KOH/g and 188.64 ± 0.99 mg KOH/g. For blended oil, the saponification value of PO-CO, PO-RBO and PO-SO were 141.66 ± 1.99 mg KOH/g, 136.75 ± 4.96 mg KOH/g and 154.28 ± 1.99 mg KOH/g, respectively. ANOVA test showed that there was no significant difference ($p > 0.05$) in acid value, but there were significant differences ($p < 0.05$) in saponification value among single and blended oils. The vitamin E content (ppm) of oil samples was calculated as the sum of all the seven vitamin E isomers except β -tocotrienol. Vitamin E content in PO, CO, RBO and SO were 295.5 ± 7.2 ppm, 433.5 ± 7.9 ppm, 557.4 ± 2.5 ppm and 4578.4 ± 5.0 ppm, respectively. For blended oil, vitamin E content of PO-CO, PO-RBO and PO-SO were 348.6 ± 5.6 ppm, 452.0 ± 3.2 ppm and 2774.0 ± 6.3 ppm, respectively. ANOVA test showed that there was significant difference ($p < 0.05$) in vitamin E content among single and blended oils. Fatty acid compositions of single and blended oils were expressed as a percentage of total fatty acids. In comparison with PO, blending of CO with PO caused reduction in SFA (44%) and MUFA (10%) and 2 times increment in PUFA of initial PO. Blending of RBO with PO caused reduction in SFA (27%) and MUFA (10%) and increment in PUFA (73%) of initial PO. Blending of SO with PO caused reduction in SFA (33%) and MUFA (17%) and 2 times increment in PUFA of initial PO. In conclusion, blending of unsaturated oils with palm oil resulted in no changes to the acid value, reduction in saponification value, reduction in saturated fatty acid and vitamin E content.

C09 Determination of peroxide value, free fatty acid and composition of fatty acid in fried foods selected from pasar malam Sri Serdang

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Fried foods are very popular among Malaysians due to its unique taste, smell and texture. This study was carried out to determine peroxide value, free fatty acid and fatty acid composition of fried foods (cakoi, penderam and fish ball) and the frying oil used at the pasar malam Sri Serdang. Oil and food samples were collected at three sessions of the night market, early, middle and late. Food lipid was prepared using 100g freeze dried sample lipid extraction. Peroxide and free fatty acid value were determined by titration method while fatty acid composition was determined using Gas Chromatography. The mean value of peroxide in oil used for frying cakoi, penderam and fish ball samples were 19.5 ± 0.7 mEq/kg, 10.5 ± 3.5 mEq/kg and 15.5 ± 2.1 mEq/kg respectively while for food samples, the mean value of peroxide are 24.5 ± 7.8 mEq/kg, 66.0 ± 1.4 mEq/kg and 13.5 ± 2.1 mEq/kg respectively for cakoi-, penderam- and fish balls-fried oils. There were no significance differences in the peroxide value of food samples (cakoi and fish ball) except for penderam at $p < 0.05$. The free fatty acid content of oil used was found to be highest in fish ball-, penderam- and cakoi-fried oil in the order of $0.96 \pm 0.12\%$, $0.42 \pm 0\%$ and $0.36 \pm 0\%$ respectively while for food samples the levels were $0.25 \pm 0\%$, $0.22 \pm 0.04\%$ and $0.30 \pm 0\%$ respectively. No significance difference was observed in the free fatty acid level of cakoi samples while significant differences were observed in penderam and fish ball samples at $p < 0.05$. For Gas Chromatography analysis, results showed that highest total saturated fat was found in penderam samples in a range from 48.0% to 64.9%. In all three food and oil samples, saturated fat was higher than unsaturated fat. As a conclusion, this study found that fried foods from the night market contained high level of free fatty acid, lipid oxidation product (peroxide) and increased level of saturated fatty acids.

C10 Minerals content (potassium, calcium, magnesium, iron, sodium, copper, zinc, lead, & cadmium) in selected drinking water

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The aim of this study was to determine the mineral content namely potassium, calcium, magnesium, iron, sodium, copper, zinc, lead and cadmium in drinking water. Sixteen samples of water were used, 5 brands each from bottled mineral water and drinking water while another 6 were samples of tap water from 6 different locations in Peninsular Malaysia. Minerals were determined using Flame Atomic Absorption Spectrometry (AAS novAA 400, Germany). Serial standard solutions for each mineral were prepared to build the standard curve and samples were analysed and compared to their standards respectively. The mineral waters analysed contained potassium (2.77-4.71

mg/L), calcium (8.71-38.95 mg/L), magnesium (3.50-4.58 mg/L), iron (0.108-0.120 mg/L), sodium (3.86-7.56 mg/L), copper (0.004-0.024 mg/L), zinc (0.037-0.064 mg/L), lead (0.217-0.268 mg/L), and cadmium (0.038-0.052 mg/L) while the drinking waters analysed contained potassium (0.03-4.97 mg/L), calcium (0.47-8.71 mg/L), magnesium (0.04-4.58 mg/L), iron (0.128-0.142 mg/L), sodium (0.29-4.53 mg/L), copper (0.010-0.015 mg/L), zinc (0.057-0.068 mg/L), lead (0.273-0.296 mg/L), and cadmium (0.036-0.044 mg/L). The levels of potassium, calcium, magnesium, iron, sodium, copper, zinc lead and cadmium for tap water samples were between 1.74-4.58 mg/L, 6.55-19.27 mg/L, 0.25-1.48 mg/L, 0.167-0.250 mg/L, 2.21-6.37 mg/L, 0.012-0.033 mg/L, 0.056-0.094 mg/L, 0.281-0.299 mg/L, and 0.032-0.036 mg/L respectively. Results showed that there were significant differences ($p \leq 0.05$) in mineral levels between different types of water except for potassium and copper. In general, mineral water contains higher mineral level compared to drinking water and tap water. Data obtained from this study also showed that the level of iron in tap water of Kuala Lumpur (0.25 mg/L) and Perak (0.21 mg/L) exceeded the limit set at 0.20 mg/L (EU 1998). Surprisingly all samples analysed for lead and cadmium were also far above the maximum limit. This could be due to errors during samples analysis and repeated confirmatory tests are needed to ensure the safety of these products as both metals could be toxic in the body.

C11 Determination of antioxidant activity and total phenolic content in long yard beans (*Vigna sesquipedalis* (L.) Fruhw) and french beans (*Phaseolus vulgaris* L)

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Antioxidants are known for their inhibitory activity and their ability to act as a defense against the free radical damage postulated to contribute to the etiology of many chronic diseases. This study aimed to determine the antioxidant activity and total phenolic contents of long yard beans (LYB) and french beans (FB). Samples were prepared in three ways: fresh, cooked for 5 minutes and cooked for 20 minutes. Samples were homogenised and extracted by using 70% (v/v) ethanol. The β -carotene, DPPH radical scavenging activity and Follin-Ciocalteu methods were used to determine the antioxidant activity and total phenolic contents of the sample by measuring absorbance at 470nm, 517nm and 725 nm with UV/VIS spectrophotometer respectively. The results obtained from the cooked extracts sample showed less antioxidant activity, scavenging effects and phenolic contents compared to the fresh samples. For β -carotene, fresh FB indicated the highest antioxidant activity (65.59 ± 0.91), followed by fresh LYB (65.35 ± 0.36), 5-minute cooked FB (64.52 ± 0.28), 5-minute cooked LYB (62.46 ± 0.74), 20-minute cooked FB (59.81 ± 0.28) and the lowest was 20-minute cooked LYB (55.67 ± 0.51). In DPPH radical scavenging activity, fresh LYB (49.55 ± 0.35) indicated the highest scavenging activity and followed by 5-minute cooked YB (45.44 ± 0.08), fresh FB (45.33 ± 0.23), 5-minute cooked FB (43.80 ± 0.12), 20-minute cooked LYB (41.31 ± 0.35) and the lowest scavenging activity showed in 20-minute cooked FB (39.86 ± 0.58). Meanwhile, the highest phenolic contents were indicated by fresh FB (0.73 ± 0.06 mg GAE/g) and followed by 5-minute cooked FB

(0.48 ± 0.01 mg GAE/g), fresh LYB (0.19 ± 0.00 mg GAE/g), 20-minute cooked FB (0.12 ± 0.02 mg GAE/g), 5-minute cooked LYB (0.11 ± 0.01 mg GAE/g) and the lowest phenolic content was indicated by the 20-minute cooked LYB (0.08 ± 0.02 mg GAE/g) sample. As the conclusion, fresh samples indicated the highest phenolic contents and antioxidant activity compared to cooked samples. Methods and preparations of samples contributed to the result of the samples.

C12 Determination of mineral profiles, phenolic content and antioxidant activity in selected types of palm dates (*Phoenix dactylifera*)

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Palm dates are one of the most ancient cultivated crops in the world while red dates have been used in traditional Chinese medicine for ages. Both types of dates have high nutritional value where various content of minerals, phenolics and antioxidants contribute to the wholesomeness of this fruit. This study was carried out to determine mineral profiles, phenolic content and antioxidant activity in fresh (FR) and dried (*Agwah*, AG; *Safawy*, SAF; *Sofry*, SOF; and *Naghal*, NA) *Phoenix dactylifera* and red dates (*Ziziphus zizyphus*). Selection of dried dates was based on the market price where high priced (AG), moderate priced (SAF, SOF) and cheap priced (NA) dates were chosen. Minerals such as Mg, Ca, Fe, Pb, and As were determined using AAS while Folin-Ciocalteu method was used to determine total phenolic content in methanolic extract of the samples. Aqueous extract of the dates was used to determine antioxidant activity. Red dates (RD) contained the least antioxidant activity but contained the highest phenolic content (1.10 mg GAE per 100g edible portion). However, fresh dates (FR) showed opposite results to RD and also had higher major minerals content (Mg, Fe) as compared to RD. The lower phenolic content in FR could be due to the major polyphenol in dates (tannins) still at low concentration as tannin plays a role in the darkening process during maturation and drying process of dates. It also could be due to other phenolic compounds that are not soluble in water as the determination of antioxidant activity was carried out using aqueous extract. The dried dates (AG, SAF, SOF and NA) have lower mineral levels and phenolic content compared to FR and RD. Mineral profile of NA (low priced) was similar to profile of AG (high priced) which suggests that price does not necessarily represent higher nutritional value. Significant differences in phenolic content and mineral profiles were observed in different date types at $p < 0.05$. Finally, this study revealed that both red and fresh dates are more nutritious than dried dates for its phytochemical and minerals content.

C13 Heat effect to the fatty acid composition and peroxide value of palm oil and soybean oil

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Many studies have been conducted on the fatty acid composition and peroxide value in commonly used cooking oils, such as palm oil and soybean oil. This study is focusing on the effect of continuous heat on the fatty acid composition percentage between two types of cooking oil that have been heated in a stainless steel pot for $\pm 150^{\circ}\text{C}$ and kept overnight before the next cycle of heating. The objective of this study was to determine and compare continuous heat effect to the fatty acid composition and peroxide values of two types of cooking oil, which are palm oil and soybean oil. Oil samples were collected from cycle 0 (fresh oil), 1, 5, 8, 10 and 15. Fatty acid composition was analysed using gas chromatography (GC) DB-23 column and the values were converted into percentage of saturated fatty acid, monounsaturated fatty acid, and polyunsaturated fatty acid. As for peroxide values, titration method was conducted and the values measured in mEq peroxide/kg lipid. Results for gas chromatography showed changes in fatty acid composition percentage for both palm oil and soybean oil: palm oil results for cycle 0-15, saturated fatty acid (49.71%, 49.81%, 50.29%, 50.11%, 50.30% and 54.40% respectively), monounsaturated fatty acid (45.64%, 45.79%, 45.44%, 45.14%, 44.86% and 45.70% respectively) and polyunsaturated fatty acid (4.66%, 4.41%, 4.29%, 4.78%, 4.83% and 4.77% respectively); soybean oil for cycle 0-15, saturated fatty acid (12.05%, 12.59%, 39.14%, 54.95%, 57.63% and 68.37% respectively), monounsaturated fatty acid (23.99%, 23.81%, 39.40%, 27.17%, 30.64% and 28.08% respectively), and polyunsaturated fatty acid (63.94%, 63.59%, 20.90%, 17.87%, 21.57% and 17.92% respectively). From the results, it shows that saturated fatty acid increased as the cycle increased and this was obvious from the soybean oil results. For peroxide values, the scores for palm oil were 42.5 ± 3.53 , 52.5 ± 3.53 , 135 ± 7.07 , 175 ± 14.14 , 272.5 ± 45.96 and 385 ± 21.21 ; for soybean oil score, 27.5 ± 3.53 , 47.5 ± 3.53 , 100 ± 0 , 160 ± 7.07 , 312.5 ± 3.53 and 420 ± 14.14 . Analysis of peroxide values using SPSS version 11.5, for Paired T-test (oil from cycle 1 with cycle 15) $p < 0.05$ showed there were significant differences for palm oil and soybean oil. Analysis of palm oil and soybean oil peroxide values for cycle 1 and 15, $p > 0.05$ showed no significant differences between these two groups. As a conclusion for this study, oil that is continuously heated will have changes in terms of percentage of fatty acid composition and its peroxide values. Palm oil fatty acid composition percentage shows that it is more stable than soybean oil after continuous heating.

C14 Development of nutrition information card based on chemical analysis of macronutrients and energy content in Asian menus served at athlete's cafeteria, National Sports Institute of Malaysia

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Good nutritional status plays an important role in an athlete's performance. 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 conducted to develop a nutrition information card based upon the determination of macronutrients and energy composition in selected Asian menus prepared for the athletes that are served at the athlete's cafeteria in the National Sports Institute. Sixteen types of Asian menus have been chosen by the chef based on the popularity of the foods and later were divided into four groups comprised of breakfast meals (*Mee Mamak*, Roti Canai with Dalca, Mee Hoon Soup, *Nasi Impit Kuah Kacang* and Hong Kong Porridge with Condiments), rice (Tomato Rice and Basmathi Rice), vegetables (Stir Fried Mixed Vegetables and *Sup Sayur Berempah*) and main entrees (*Sambal Belacan*, Fried Tofu with Peanut Sauces, *Ayam Panggang Berlada*, *Rendang Ayam*, *Kurma Daging*, Mutton Varuval and Tom Yam Seafoods). Each sample was collected 2 times from 2 different cycles in duplicates (n=2). At the end of the sampling, 4 replicates were conducted for each sample. The moisture, ash, crude protein and fat of these samples were analysed using the AOAC (1995) method except for the determination of carbohydrate and energy. Carbohydrate was calculated 'by difference' while energy was calculated by multiplying the carbohydrate, protein and fat content using Atwater factors respectively (4 kcal/g, 4 kcal/g and 9kcal/g). Results showed that *Ayam Panggang Berlada* contained the highest content of fat (10.4 ± 2.2 g/100g), protein (29.0 ± 2.1 g/100g), and energy (216 kcal/100g). Roti Canai with Dalca contained the highest carbohydrate (37.2 ± 0.4 g/100g) while *Sambal Belacan* had the highest ash (3.1 ± 0.0 g/100 g) and the lowest fat (0.1 ± 0.0 g/100g) content. Moisture content was highest in *Sup Sayur Berempah* (94.2 ± 0.9 g/100g), which also showed the lowest content of protein (0.8 ± 0.3 g/100g) and energy (20.3 ± 1.5 g/100g). Results from nutrient analysis were used in developing a nutrition information card for each menu. This card contained information on macronutrients and energy value of foods, serving size, photo per serving size and were colour-coded. The colour-coded system used red for high fat, blue for high protein and green for high carbohydrate. Result from this study were very beneficial in helping athletes to choose menus that are appropriate with their nutrient requirements. At the same time, athletes can use good nutrition practices to achieve a balanced diet that will eventually help them maximise their sports performance.

C15 Bioavailability of calcium, iron and zinc in selected meals by *in vitro* digestion method

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Calcium, iron and zinc are important minerals in maintaining optimal health of individuals. However, low bioavailability of this mineral is becoming a global health problem since its deficiency can lead to micronutrient diseases and abnormal development. This is due to the presence of dietary factors that inhibit the absorption of minerals in the digestive system. Realising this problem, this study was conducted to estimate the fraction of calcium, iron and zinc that is available to be absorbed in the gastrointestinal system after the digestion process. Determination of the total content and bioavailability percentages of calcium, iron and zinc were made in 5 types of cereals-based meals that are commonly consumed by Malaysians, namely mee-hoon soup, coconut milk rice, chicken rice, fried noodle and *roti canai*. All the samples were collected from Seventeenth College Canteen, UPM by convenience sampling. The bioavailability of calcium, iron and zinc from these selected meals were estimated on the basis of simulated gastrointestinal digestion by mineral solubility and dialysability values. The ranking of samples according to bioavailability depended on the use of solubility or dialysability as followed. From dialysis method, coconut milk rice, mee-hoon soup and *roti canai* showed the highest percentage of bioavailability of calcium (34%), iron (63%) and zinc (33%), respectively. These results were significantly different at $p < 0.05$ except for zinc bioavailability percentage. For solubility method, mee-hoon soup showed the highest bioavailability percentages for both calcium (9%) and iron (25%), while *roti canai* showed the highest bioavailability for zinc (5%). This study has showed that the availability of minerals could be related to the compositions in the meals itself or interaction that occurred among the nutrients. Overall, the solubility method showed a significantly low bioavailability of the mineral compared to dialysability method.

C16 Determination of antioxidant activity and total phenolic content of turmeric leaves (fresh, boiled and boiled water)

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Turmeric (*Curcuma longa*) is one of the herbs that has potential health effects for humans. The rhizom of turmeric has an antioxidant property due to the presence of curcuminoids. This study was carried out to determine the antioxidant activity and total phenolic content of turmeric leaves. Fresh leaves, boiled leaves after 10 minutes and boiled water were used as samples. The antioxidant activity was determined using beta-carotene bleaching method and DPPH radical scavenging method. Total phenolic content was estimated using Folin-Ciocalteu reagent assay. Values are expressed as mean

± standard deviation. For the beta-carotene bleaching method, the results revealed that fresh leaves of turmeric had the highest percentage of antioxidant activity ($76.1\% \pm 0.71$), followed by boiled leaves ($74.8\% \pm 0.28$) and boiled water of turmeric's leaves ($63.3\% \pm 0.28$). For the DPPH radical scavenging method, the percentage of fresh leaves of turmeric was $72.4\% \pm 0.35$ at concentration of 0.5 mg/ml, meanwhile the percentage of boiled leaves was $46.5\% \pm 0.57$ at concentration of 0.5 mg/ml and the percentage of boiled water of turmeric's leaves was 75.9% at concentration of 5 mg/ml. Fresh leaves of turmeric had shown the highest total phenolic content (0.40 ± 0.02 mg GAE/g), followed by boiled leaves (0.22 ± 0.01 mg GAE/g) and boiled turmeric water (0.08 ± 0.003 mg GAE/g). There is a significant difference between antioxidant activity and total phenolic content of the three samples ($p < 0.05$). One-way ANOVA test was used to analyse the data. As a conclusion, fresh leaves of turmeric had the highest antioxidant activity and total phenolic content as compared to boiled leaves of turmeric and boiled turmeric water.

C17 Determination of phytic acid in breakfast cereals

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Phytic acid is the principal store of phosphate in plants. Phytic acid can be found in most grains, seeds and beans. Phytic acid has many health promoting effects such as antioxidant, anticarcinogenic, hypocholesterolemic and hypolipidemic effects. However, its structure is what gives it the ability to bind minerals, protein and starch resulting in lower absorption of these elements. The level of phytic acid was determined in breakfast meals such as tosai, capati, roti canai, wholemeal bread, white bread, corn flake, whole wheat cereal and oat. Sample of tosai, capati and roti canai were bought from restaurants while samples of wholemeal bread, white bread, corn flake, whole wheat cereal and oats were bought from the supermarket. Each sample was ground and then freeze-dried. Lipid extraction from tosai, capati and roti canai was done by using hexane overnight. All of the samples were then extracted with 0.5 M hydrochloric acid. Each sample was purified to remove phosphate inorganic by using anion exchange chromatography and the level of phytic acid was determined with High Performance Liquid Chromatography (HPLC) technique at 460nm. The results of One-Way ANOVA test indicated that there were significant differences ($p < 0.05$) in the means of phytic acid level for all samples except for tosai, capati and roti canai. Tosai indicated the highest mean level of phytic acid that is $0.76\text{mg/g}^{-1} \pm 0.14$ while whole wheat cereal indicated the lowest mean level of phytic acid that is $0.29\text{mg/g}^{-1} \pm 0.00$. The high level of phytic acid in tosai may be due to the ingredients that are high in fibre such as flour and rice. The lowest level of phytic acid in whole wheat cereal may be due to the processing, storing and packaging which oxidised the phytic acid. As a conclusion, all samples of breakfast cereals contain phytic acid.

C18 Macronutrient content in food at the orphanage institution (RAY) in Tambunan, Sabah

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Healthy eating for children and adolescents can be achieved by consuming a variety of food. Orphanage institutions set up by the government, such as RAY in Tambunan, Sabah, enjoy the privilege of having food supplied by the contractors. This study was conducted to determine the dietary intake of children and adolescents in RAY. Instrument measurements such as demographic data, anthropometric measurements, three-day 24hr-recall and food frequency questionnaires were used to determine their dietary intakes. Macronutrients in food were analysed using proximate analyses and food composition database (NutriCal) Version 11.01. There were 157 respondents, which consisted of 73 (45.5%) males and 84 (54.5%) females between the age categories, 7-12 years old and 13-19 years old. Results from the anthropometric measurement of the 7-12 year old group for weight and height showed that 34 (54.8%) respondents were categorised as underweight (<10th percentile) and 43(69.4%) respondents were categorised as stunted (<5th percentile). Body Mass Index (BMI) between the ages 13-19 years old showed that 85 (89.5%) had a desirable weight at a percentile of >5th-85th. The average energy and macronutrient intake from 3-day 24hr-recall of the 7-12 year old respondents were at 2083.3kcal energy, 14.5% (246.70g±13.8) protein, 34.69% (80.30g±14.1) fat and 50.82% (264.70g±49.4) carbohydrate. The results from T-test analysis showed a significant difference ($p<0.05$) in energy and macronutrient intake between the 7-12 year old boys and girls. The number of meals they missed and ate away from RAY increased from early adolescence. 11 females (44.0%) skipped meals more often than males; 14 males (41.2%) frequently took food during morning break at school. About 54 (56.8%) respondents between the ages of 13-19 prepared and ate instant food especially Maggie for supper. NutriCal database results showed that the average amounts of energy and macronutrient content in food were 1493.26kcal energy, 73.10g (19.58%) of protein, 77.25g (41.71%) fat and 171.45g (45.93%) carbohydrate. Average results from proximate analysis found 1508.61kcal energy, 69.94g (18.54%) of protein, 65.81g (39.26%) fat and 159.14g (42.19%) of carbohydrate. Results from these two methods showed that the amount of energy in the food eaten was less than the Recommended Nutrient Intakes for Malaysia (RNI) 7-12 year old girls (1590-1990kcal) and boys (1780-2180kcal), and for 13-19 year old adolescents, females 2180-2000kcal and males 2690-2440kcal.

C19 Food content analysis and in vitro toxicity profile of local raw food products from Terengganu

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Preliminary retrospective study showed that intake of several raw food products (shrimp paste, salted fish, dried shrimp and anchovies) were associated with breast cancer risk. Therefore, this study was conducted to evaluate in vitro toxicity level and food content that may increase the cancer risk. Food sampling was done in several places as referred to by the state Fisheries Department (Terengganu - Setiu, Besut dan Kuala Terengganu). Proximate analysis showed shrimp paste did not comply with the moisture standard (>40%) as required in Food Act 1983. Salt was found as the main additive with the highest percentage, exceeding 20%, detected in shrimp paste. In heavy metal analysis, massive amounts of arsenic were found in every sample. Cytotoxicity effect was evaluated via MTT assay (3-(4,5-dimethyl-2-thiazolyl)-2,5-diphenyl-2H-tetrazolium bromide) against Chang liver cells using three different concentrations (60 µg/ml, 500 µg/ml, 2000 µg/ml) following 72 hours incubation. Generally, methanol extracts showed weak cytotoxicity effect compared to aqueous extracts (no cytotoxicity effects). Mutagenicity effect was evaluated via Ames test and only aqueous anchovies extracts from Setiu showed positive response. After metabolic activation with S9 liver microsomal fraction, several extracts showed increase in mutagenicity response. For alkaline Comet assay which detects single-cell DNA damage, the damage was evaluated by tail moment (TM) and tail intensity (TI). All extracts did not cause DNA damage to the Chang liver cell at 60 µg/ml following 24 hours incubation as compared to the positive control, hydrogen peroxide (TM - 9.50 ± 1.50 ; TI - 30.50 ± 2.50). Micronucleus assay which was used to determine clastogenic effect of the food extract was conducted by using three different concentrations (60 µg/ml, 500 µg/ml, 2000 µg/ml) against V79 cell line following 3 hours and 24 hours incubation. All samples showed low percentage of micronuclei formation compared to positive control (Mitomycin C, 3 hours - 45.25 ± 1.75 ; 24 hours - 56.75 ± 0.48) (p<0.05). In conclusion, food extracts from Terengganu showed weak cytotoxicity effect, weak response in mutagenicity test, weak DNA damage effect and negative clastogenicity effect. Outcomes from this study are important to determine allowable daily intake (ADI) for each food sample to reduce the cancer risk.

C20 Development of nutritional card based on nutrient analysis for selected bakery and pastry products from athletes' cafeteria, National Sports Institute of Malaysia

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Sports nutrition research has elucidated the need for macronutrients during training and to fuel peak performance during competition. This study was conducted to develop nutritional information cards for selected bakery and pastry products served at the athletes' cafeteria at National Sports Institute (NSI), Bukit Jalil. Twenty types of bakery and pastry products were selected from a 28-day cycle menu based on popularity. The products were grouped into breads (whole meal bread, whole grain bread, crusta bread, malt bread and soy bread), buns (potato bun, pandan kaya bun, sausage roll and sardine bun), cakes and mousses (chocolate fudge, walnut orange cake, coffee mousse and raspberry mousse), assorted pastries (hazelnut cherry tart, chocolate brownies, chocolate salami and cream puff) and puddings (corn caramel and sweet corn pudding). Each sample was collected in duplicates from 2 different cycles providing a total of 4 replicates. Moisture, ash, crude protein and fat were analysed using proximate analysis whereas amount of total carbohydrate was calculated 'by difference'. Energy value was determined by multiplying protein, fat and carbohydrates by factors of 4 kcal/g, 9 kcal/g and 4 kcal/g respectively. Samples were categorised into 4 colour-coded groups based on percentage of energy from macronutrients. Foods that are high in carbohydrate, source or high protein and low fat were coded green. High carbohydrate and low fat foods were coded orange. High protein foods were coded blue, and high fat foods coded red. Results showed that whole grain bread contained the highest carbohydrate (56.71 ± 3.96 g/100g) whereas sweet corn pudding had the lowest (23.6 ± 1.2 g/100g). Soy bread had the highest protein content (14.3 ± 0.5 g/100g) and highest ash content (2.5 ± 0.2 g/100g). Chocolate salami contained the highest energy content (493 ± 10 kcal/100g), highest fat content (29.5 ± 1.4 g/100g) and lowest protein content (2.9 ± 0.3 g/100g). Moisture content ranged from 11.8 ± 0.9 g/100g in chocolate salami to 72.2 ± 1.2 g/100 g in sweet corn pudding. Green-coded foods comprised of whole meal bread, whole grain bread, crusta bread, malt bread, soy bread, chocolate bun, potato bun, pandan kaya bun, chocolate fudge, coffee mousse and cream puff. Orange-coded foods were corn caramel and sweet corn pudding, while sausage roll and sardine bun were coded blue. Walnut orange cake, raspberry mousse, hazelnut cherry tart, chocolate brownies and chocolate salami were coded red. Overall, most of the samples were low in fat (less than 30% energy from fat) with the exception of the five types of food coded red. The findings in the present study will be useful to NSI dietitians in menu planning and recipe modification, as well as providing a guide to athletes in making food choices to achieve a performance-oriented diet.

C21 Effect of blanching on β -carotene content in *bayam merah*

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Carotenoids are abundantly present in yellow-orange fruits and vegetables. Epidemiological and clinical studies have shown that high intake of carotenoids in the form of foods have a significant effect on reducing the risk of age-macular-degenerative disease, cancer, cardiovascular disease and decreasing the risk of vitamin A deficiency. In practice, *bayam merah* is cooked with water for quite some time before being consumed. Studies have found that the cooking processes would change the physical characteristics and chemical composition of vegetables. Thus, this study was aimed to evaluate and compare the β -carotene content in the raw and blanched *Amaranthus gangeticus* (*bayam merah*) after undergoing the blanching process. Reversed phase high performance liquid chromatography (HPLC) on a C₁₈ column with photodiode array detection under isocratic conditions was used for quantification of β -carotene. β -carotene was the highest in the raw sample (3.42 ± 0.14 mg/100 g dry weight) compared to the 3 min blanched (0.76 ± 0.03 mg/100 g dry weight), and 5 min blanched (0.61 ± 0.04 mg/100 g dry weight) samples. The percentage loss of β -carotene between the raw and 3 min, and raw and 5 min, were 78 %, and 82 %, respectively. There was a significant difference ($p < 0.05$) between the raw and 3 min blanched samples, raw and 5 min samples, as well as 3 min and 5 min samples. The study showed that blanching for more than 3 min at 100°C caused the loss of β -carotene of more than 70%.

C22 Determination of antioxidant activity and phenolic content in *Gnetum gnemon* (belinjau) extract

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Antioxidants play an important role in inhibiting and scavenging radicals, thus providing protection to humans against infections and degenerative diseases. There are two basic categories of antioxidants, namely natural and synthetic antioxidants. Natural antioxidants occur in plants and all parts of them. *Gnetum gnemon* is a scientific name for belinjau which can be found in east coast of Peninsular Malaysia and also in Indonesia. This study was carried out to determine antioxidant activity and phenolic content in three selected parts of belinjau; fruits, buds and sprouts. These parts of belinjau were cut into smaller portions, freeze-dried and then extracted either with distilled water or 80% (v/v) methanol. The antioxidant properties of belinjau extracts were evaluated and compared with synthetic antioxidant butylated hydroxytoluene (BHT) using Ferric Thiocyanate (FTC), Thiobarbituric Acid (TBA) and 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging methods. Folin-Ciocalteu method was used to determine the phenolic content of belinjau extracts and calculated as gallic acid equivalent (GAE). All selected parts of

belinjaw showed antioxidant activity, DPPH radical scavenging activity and phenolic content at 1 mg/ml of concentration. The results of One-Way ANOVA test showed that there were significant differences ($p < 0.05$) in the means of antioxidant activity (FTC) and DPPH radical scavenging activity for water extract, while for the other two methods (TBA and Folin-Ciocalteu), organic extract showed the significant difference at $p < 0.05$. Belinjaw fruits exhibited the highest antioxidant activity in water and methanolic extracts which are 72.21 ± 5.04 and 34.09 ± 9.07 for FTC and also 54.75 ± 6.10 and 70.37 ± 4.20 for TBA method. DPPH radical scavenging activity also showed highest activity in belinjaw fruits in water and methanolic extracts which were 39.19 ± 12.33 and 10.05 ± 1.88 respectively, but lower activity compared to BHT (90.36%). These results were slightly different for Folin-Ciocalteu method which indicated high phenolic content in belinjaw sprouts (0.031 ± 0.01 mg/GAE) for water extract and also in belinjaw fruits (0.033 ± 0.01 mg/GAE) for methanolic extract. In conclusion, belinjaw fruits exhibited the highest DPPH radical scavenging activity and antioxidant activity for both FTC and TBA method. Water extract showed higher antioxidant activity and phenolic content than methanolic extract.

C23 Antioxidative properties of *Pandanus odoratus* sp.

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Pandan which comes from *Pandanus* family is said to be a restorative, deodorant, indolent and phylactic agent, promoting a feeling of well-being and acting as a counter to tropical lassitude. It may be chewed as a breath sweetener or used as a preservative in foods. It is also said to have flavonoids which are believed to have a variety of healthful properties, including antiviral, anti-allergen, antiplatelet, anti-inflammatory, and antioxidant. This study was carried out to examine antioxidant activity (b-carotene bleaching method), dpph-radical scavenging activity (1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging assay), total phenolic content (Folin-Ciocalteu method) and total flavonoid content (Lamaison and Carnet method) of methanol and water crude extracts from *pandan* leaves. Antioxidant vitamin (A, C and E) content in *pandan* was also investigated following the method by AOAC. The methanol extracts of *pandan* showed higher antioxidant activity in b-carotene bleaching method, showing the percentage of 76.50 ± 0.33 % while the water extract showed 61.46 ± 0.98 %. On the other hand, *pandan* methanol extract showed weak effect in scavenging DPPH radical with the EC₅₀ value of 1.25 ± 0.01 mg/ml, compared to the water extract which exhibited 0.98 ± 0.01 mg/ml. Total phenolic content in the methanolic and water extracts of *pandan* leaves were expressed as gallic acid equivalents (GAEs); whereas total phenolic in the methanolic extract (16.83 ± 0.12 mg of GAEs/g sample extract) was higher than the water extract (10.46 ± 0.03 mg of GAEs/g sample extract). Methanol extract of *pandan* was also found to contain higher total flavonoid content with 24.23 ± 0.07 mg of REs/g sample extract, compared to the water extract with 6.43 ± 0.04 mg of REs/g sample extract. Results were expressed as rutin equivalents (REs). Among vitamin A, C and E, *pandan* leaves showed the highest content of vitamin C (137.79 ± 3.73 mg/100 g sample), followed by vitamin A (24.03 ± 1.25 mg/100 g sample) and vitamin E (0.33 ± 0.00 mg/100 g sample). From the results, it was shown that the methanol extract reflected better results than the water

extract. Phenolic and flavonoid content, as well as vitamin A, C and E might contribute to the total antioxidant and radical scavenging activities of *pandan* leaves. Finally, it can be concluded that *Pandanus odoratus* may have potential as natural antioxidants.

C24 Nutrient composition of white pitaya (*Hylocereus undatus*) and its nutritional comparison with red pitaya (*Hylocereus spp*) fruit

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Fruit has become an important food in our life. High fruits intake is associated with health benefits for many diseases such as cancer, cardiovascular disease, diabetes and hypertension. One of the fruits that is becoming more popular in Malaysia is pitaya fruits. Thus, this study was conducted to analyse the nutrient composition of white pitaya (*Hylocereus undatus*) obtained from plantation in Kluang, Johor. The pitaya was determined for its proximate composition (moisture, ash, protein and fat), carbohydrate, total crude fiber, mineral and selected water-soluble vitamin (vitamin C). The methods used to analyse the nutrient contents were internationally recognized by AOAC. Proximate analysis of white pitaya gave the following results: moisture ($83.36\% \pm 0.55$), ash ($0.73\text{g} \pm 0.19$), protein ($0.192\text{g} \pm 0.019$) and fat ($0.141\text{g} \pm 0.0082$). These results were slightly different compared with the red pitaya. White pitaya contained less moisture (4.73%) and fat (63.12%) than the red pitaya. On the other hand, white pitaya contained more ash (4.11%) and protein (16.67%) compared with red pitaya. The mean available carbohydrate in white pitaya was $11.44\text{g} \pm 0.154$ with total dietary fiber $11.49\text{g} \pm 0.01$. These results showed that white pitaya contained higher carbohydrate (87.06%) and total dietary fiber (12.10%) than red pitaya. The average mineral composition of the white pitaya, e.g., Fe, Ca, Zn, Se and Cu were $0.204\text{mg}/100\text{g} \pm 0.096$, $0.117\text{mg}/100\text{g} \pm 0.014$, $0.050\text{mg}/100\text{g} \pm 0.051$, $0.094\text{mg}/100\text{g} \pm 0.027$ and $0.138\text{mg}/100\text{g} \pm 0.008$, respectively. The red pitaya contained lower Fe (83.33%), Ca (51.28%), Cu (99%) and higher Zn (537.4%). The average vitamin C content was $132.82\text{ mg}/100\mu\text{l} \pm 0.18$. Conversely, red pitaya contained much higher vitamin C ($525.32\text{mg}/100\mu\text{l} \pm 3.09$) which was about 295.5% higher than white pitaya. In conclusion, these results indicated that both red and white pitaya have good nutritional value and potential health benefits as they contain high fiber and vitamin C. Therefore, it should be included in the daily diet.

Group D: Clinical Nutrition/Intervention Trials

D01 Effect of supplementation of vitamin B₁ on primary dysmenorrhea among university students

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The main objective of this study was to determine the effect of vitamin B₁ on primary dysmenorrhea among university students. In this randomised clinical trial we recruited 90 girls, aged 18-22 years, who suffered from primary dysmenorrhea, and had moderate, severe or very severe spasmodic dysmenorrhea. The participants were selected from among 1100 students at Azad University dormitories in Brujerd, Iran. We prescribed 100mg Thiamin hydrochloride (vitamin B₁) for 45 students (treatment group), and 45 students took placebo (control group) daily for three months. Data were gathered via a questionnaire and a checklist. Dependent variables in this study were intensity and duration of the pain and the number of sedatives used by the participants. All the participants were monitored for 4 cycles. For the first cycle (baseline), severity of the dysmenorrhea and other data were obtained from the participants. For the next three cycles, data were collected after supplementation of vitamin B₁ or placebo. We used Man-Witney, Fridman, Wilcoxon test to analyse the data. The results revealed significant pain relief among students who took vitamin B₁ supplementation compared to those who took the placebo (P=0.000). There was a significant difference in the duration of pain between two groups (P=0.000). In conclusion, vitamin B₁ can be an effective way to relieve primary dysmenorrhea, and can alleviate dysmenorrhea completely.

D02 The effects of high fiber rice consumption on blood glucose control and lipid profile among patients with type 2 diabetes

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A randomised crossover study was carried out to determine the effects of high fiber rice consumption on postprandial serum glucose and lipid profile concentration among type 2 diabetic patients. Forty subjects aged between 40 and 73 years participated and were randomised into two groups. The subjects consumed high fiber rice containing 11.4 g fiber/100 g (HF group) and low-fiber rice containing <1 g fiber/100 g (LF group) as part of their daily diet for 4 weeks after a 2-week washout period. Fasting blood glucose (FBG), fasting serum lipid (FSL), blood pressure (BP) and anthropometric measurements were collected pre and post study. Dietary intakes were assessed using food records for 3 non-consecutive days which were two weekdays and one weekend. FBG, HbA1c, fructosamine, total cholesterol (TC), high density lipoprotein (HDL cholesterol) and

triglycerides levels were measured using commercial kits. Low density lipoprotein (LDL cholesterol) was calculated using the Friedewald formula. The results showed that body weight, waist circumference and BP in both groups did not change during the study period. Total energy intake did not differ significantly between groups: 1764 ± 272 kcal (HF group) and 1767 ± 237 kcal (LF group). The distributions of macronutrient intake in HF group were 53.5% carbohydrate, 15.9% protein and 29.2% fat whereas in LF group were 52.1% carbohydrate, 16.3% protein and 31.5% fat. Mean total fiber, soluble and insoluble fiber intakes were statistically higher in HF group compared to LF group ($p < 0.05$). After the study period, FBG and fructosamine in HF group were significantly reduced ($p < 0.05$) by 9.9% and 5.9% respectively compared to baseline. However, HbA1c was significantly reduced in both groups but the reduction was more significant ($p < 0.01$) in HF group. FBG, HbA1c and fructosamine in HF group showed an inverse significant correlation with total fiber ($r = -0.59$, $r = -0.37$, $r = -0.33$), soluble fiber ($r = -0.39$, $r = -0.42$, $r = -0.43$) and insoluble fiber intakes ($r = -0.47$, $r = -0.35$, $r = 0.39$) ($p < 0.05$), respectively. This study also found that the serum lipid levels in both groups did not change significantly after the study period compared to the baseline. However, HDL-C was significantly reduced in both HF (-4.4%) and LF (-4.9%) groups ($p < 0.05$; $p < 0.01$). In conclusion, type 2 diabetic patients demonstrated a favorable improvement in their glucose control after consuming high fiber rice. However, this was not shown for lipid control.

D03 Validation of Eating Disorder Inventory-2 (EDI-2) test among Malaysian adolescents

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Eating disorders have been increasing dramatically in the recent decades and are currently affecting adolescents. This cross sectional study was carried out to examine the validity of Eating Disorder Inventory-2 (EDI-2) test among Malaysian adolescents. The test was used for screening the components related to eating disorders. It consisted of 11 subscales with 91 items, mainly questions on attitudes and behaviours concerning eating, weight, and shape (Drive for thinness, Bulimia, Body dissatisfaction), and clinical constructs or psychological traits (Ineffectiveness, Perfectionism, Interpersonal distrust, Interoceptive awareness, Maturity fears), and three provisional subscales (Asceticism, Impulse regulation, and Social insecurity). A total of 214 boys and 211 girls aged 13 and 14 years old were randomly chosen from five secondary schools in four different zones in Kuala Lumpur. Social demography forms were used to collect information on demographic data and socioeconomic status. Subjects completed the EDI-2 questionnaire at their school. Anthropometric measurements such as weight, height and body mass index (BMI) were measured. Subjects were categorised into three groups that were underweight, normal weight, and overweight based on WHO (1995) BMI-for-age classification. This study found that 27.7 % underweight subjects, 37.1 % normal weight subjects and 28.2 % overweight subjects had body image distortion. Analysis of consistency internal for the EDI-2 subscales found that 6 out of the total 11 subscales, which were Drive for thinness, Body Dissatisfaction, Ineffectiveness, Perfectionism, Interoceptive awareness, and Impulse regulation, demonstrated an adequate reliability for both boys and girls,

with alpha ranging from 0.68 for Interoceptive awareness to 0.81 for Body dissatisfaction. However, Ineffectiveness subscale was unreliable for girls. Total alpha coefficients were 0.89 for either boys or girls. The subscale's item-total correlations for the Body dissatisfaction and Perfectionism were acceptable without any exception, while other subscales with correlation less than 0.3 were less acceptable. Group comparison analyses revealed significant race differences in several EDI-2 subscales, which were Drive for thinness, Perfectionism, Interpersonal distrust, Asceticism, and Impulse regulation. Comparison of boys and girls showed that only two subscales (Interpersonal distrust and Interoceptive awareness) were significantly different. For age comparisons, older girls (14 years) differed significantly from younger girls (13 years), scoring lower on Drive for thinness and Ineffectiveness. Older boys were scoring significantly higher in Bulimia than younger boys. Overall, this study showed that only the EDI-2 subscales and items (with higher consistency and item total correlation) were suitable for use in screening eating disorders among Malaysian adolescents. It also highlighted the importance of establishing race-specific and age-specific norms for the inventory. Further studies are needed to validate the use of this inventory among adolescents and different populations.

D04 The effect of sports drinks on blood glucose and lactate response via time trial performance test among national cyclists

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This study was designed to examine the effect of isotonic and hypertonic sports beverages on glucose and lactate response on the time trial performance. Six cyclists from National Sports Institute (VO_2 max: $58.9 \pm 7.63 \text{ mL} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$) performed two simulated 20km time trials on LODE cycle ergometer. In the first trial they ingested 600ml isotonic drink (4%) 30 minutes before the time trial started. For the second trial 7 days later, they ingested 600ml hypertonic drink (9%) 30 minutes before the time trial started. The time was recorded and biochemical assessments such as glucose and lactate levels were carried out through capillary blood withdrawal every 20 minutes. Weight, height and body fat composition were determined by anthropometric measurements. The estimation of daily energy intake was assessed by food diary, and daily activity pattern to derive energy expenditure was determined by time and motion study, which was carried out simultaneously with food intake record. Mean body weight and height were $61.7 \pm 5.7 \text{ kg}$ and $1.71 \pm 0.03 \text{ m}$, respectively while mean BMI was $20.9 \pm 1.34 \text{ kg} \cdot \text{m}^{-2}$. The mean body fat percentage and lean body mass ranges from 5.4% - 9.5% and 49.8 kg - 62.4 kg, respectively. The mean of energy intake was $3357 \pm 182 \text{ kcal} \cdot \text{day}^{-1}$ while energy expenditure was $3342 \pm 106 \text{ kcal} \cdot \text{day}^{-1}$ with positive energy balance of 15 kcal. The biochemical assessment showed that no significant differences were found between isotonic and hypertonic drinks for both glucose and lactate levels. The mean time recorded showed that the isotonic sports drink recorded the faster time (0:59:54 minutes) compared to hypertonic sports drink (1:00:56 minutes). It is therefore concluded that ingesting 4% isotonic sports and 9% hypertonic sports drinks resulted in a similar response on short term (i.e., <60minutes) short distance (i.e., 20km) cycling performance in young cyclists

D05 Satisfaction with the hospital food service system among hospitalised geriatric patients at Hospital Kuala Lumpur

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Previous studies had found that the quality of service provided to patients became the predictor for patients' satisfaction. During hospitalisation, satisfaction towards the hospital food service system may affect patients' food intake. This cross sectional study was conducted among hospitalised geriatric patients aged 60 and above at Hospital Kuala Lumpur to determine their satisfaction towards the hospital food service system and the association with the hospital food intake. A questionnaire-guided interview was used to obtain patients' satisfaction towards the hospital food service system. Hospital food intakes were measured using weighed food record and outside food intake was recorded using a 24-hour diet recall. The mean Body Mass Index (BMI) was 23.82 ± 4.67 kg/m² and 58.9% were considered normal. Majority of patients (93.2%) were satisfied and 6.8% were moderately satisfied with the food service system. The mean score for the overall satisfaction towards the food service system was 33.58 ± 3.35 . About 49% of them met their energy requirement whereas 86.3% met their protein requirement for the hospital food. The mean energy intake from hospital food was 1481.46 ± 446.64 kcal and protein was 68.93 ± 22.26 gram. Low intake of outside food was found with the mean energy intake 116.32 ± 235.21 kcal and protein 7.35 ± 12.79 gram. There was no significant difference between gender and satisfaction towards the food service system. Nevertheless, significant differences were found between calorie intake ($p < 0.05$) and protein intake ($p < 0.05$) of hospital food among male and female patients. There was no correlation between calorie intake and the overall score for satisfaction with the food service system but protein intake of hospital food was correlated with the overall score for satisfaction toward the food service system ($\rho = 0.265$, $p < 0.05$). Although less than 50% of patients met their calorie requirement, 93.2% of them were satisfied with the food service system thus resulting in low intake of outside foods. Therefore further study should be conducted to ensure that the food provided in the hospital can supply adequate nutrients to meet patients' needs.

D06 Effect of diet counseling on serum lipid profile among hyperlipidemia patients

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Changes in the nutritional diet are the main principles suggested by Malaysian Dietetics Association (MDA) and National Heart Institute (IJN) to control risk factors of cardiovascular disease especially hyperlipidemia. Therefore, the purpose of this study was to evaluate the effect of diet counseling on serum lipid profile among hyperlipidemia patients after undergoing non-pharmacological treatment. This study involved 40

subjects (22 male and 18 female), all ethnic groups (Malays; Chinese; India), aged between 45 and 67 years and not taking lipid-lowering drugs. Serum lipid profile were analysed and subjects completed questionnaires on knowledge, attitude & practice (KAP), cholesterol food frequency questionnaire (FFQ) and 24 hours diet recall before and after the study. Subjects attended the diet counseling session over three months. Results showed there was a significant ($p<0.05$) increment in subjects' knowledge after (71+11%) receiving diet counseling compared with before (60+12%) the study. Subjects' knowledge score after diet counseling was found to be positively ($r=0.295$) and significantly ($p<0.01$) correlated with their knowledge score before the intervention. There were significant ($p<0.05$) differences in energy and fiber intake, as well as the percentage of energy from macronutrients before and after subjects received the diet counseling. Percentage of energy from fat was found to be significantly ($p<0.05$) but negatively ($r=0.220$) correlated with the knowledge score after the intervention. For each category of foods, margarine (73.5%), chicken (98.8%), fish (98.8%) and white egg (100%) had the highest relative frequency of consumption by subjects after receiving diet counseling. There were no significant changes in serum lipid profile [triglyceride (TG), total cholesterol (TC), high density lipoprotein-cholesterol (HDL-C) and low density lipoprotein-cholesterol (LDL-C)] among subjects after receiving diet counseling. This study showed that diet counseling may improve and control the serum lipid profile among hyperlipidemia patients.

D07 Association between oxidative DNA damage, fruits and vegetables intake with breast cancer risk: A case-control study

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A case-control study was conducted to assess the association between oxidative DNA damage, fruits and vegetables intake, and breast cancer risk among 100 women (cases $n=50$, controls $n=50$) around Klang Valley. The cases and controls were matched for age and ethnicity. Data on socio-demographic data, health status and medical history and fruits and vegetables intake, were obtained through an interview-based questionnaire. A total of 3mL fasting venous blood was drawn to assess lymphocytes oxidative DNA damage by using Alkaline Comet assay. Results indicated that consumption of less than 4 servings/day total fruits and vegetables intake was found to increase breast cancer risk (OR 4.33; 95% CI 1.78-10.53; $p<0.001$). Fruits and vegetables from family groups of solanaceae, myrtaceae, caricaceae, apiaceae ($p<0.05$) and rutaceae ($p<0.01$), broccoli, orange, carrot, watermelon ($p<0.01$) and brinjal ($p<0.05$) for controls were 0.5-1 servings/week higher as compared to cases. However, intake of fruits from rosaceae family and apple was higher among cases ($p<0.01$) than controls. The estimated intake of nutrients including β -carotene, carotenoids, vitamin A, vitamin C ($p<0.001$), α -carotene and lycopene ($p<0.05$) were higher among controls than cases. Mean DNA damage level of cases were 3.5 and 3.9 times higher than the value of controls for % DNA damage in

tail and tail moment, respectively. Total intake of fruits and vegetables, intake from rutaceae and solanaceae family, cauliflower, mung bean ($p<0.05$), water spinach ($p<0.01$) and also vitamin C, lycopene ($p<0.05$), β -carotene, carotenoids and vitamin A ($p<0.001$) was found to be protective against DNA damage. As a conclusion, fruits and vegetables act as a chemopreventive agent by protecting against oxidative DNA damage.

D08 Plasma fatty acid status among leukemic children

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A cross-sectional study was carried out to determine the fatty acid composition in plasma phospholipids in leukemia patients aged 4 to 12 years old in Hospital Universiti Kebangsaan Malaysia, Kuala Lumpur and Institut Pediatrik, Kuala Lumpur. A total of 51 respondents (32 boys and 19 girls) were recruited from January to November 2006 and divided into three age groups. Group A: 4 to 6 years old ($n=19$), group B: 7 to 9 years old ($n=14$) and group C: 10 to 12 years old ($n=18$). Anthropometric measurements were assessed by weight, height, triceps skin fold and mid upper arm circumference. Children's nutritional status were determined using NCHS (WHO 1983) and Frisancho's standards (1981) for MUAC-for-age. Plasma fatty acid composition was measured by gas-liquid chromatography. Descriptive and statistical analyses were done using SPSS ver 13.0. The results are shown below:

Figure 1: Plasma fatty acid composition (% of total fatty acids) of leukemic children grouped by anthropometrical parameter (weight-for-age)

Fatty acid type (% of total fatty acids)	Weight for age		P
	< -2 z-score ^a (n = 11)	> median to +2 z-score (n = 14)	
SFAs	54.95 ± 2.91	53.60 ± 3.30	p>0.05
MUFAs	27.70 ± 4.30	28.28 ± 2.52	
PUFAs	7.42 ± 1.61	7.67 ± 1.80	
Ratio of n-3/n-6	2.55 ± 4.97	1.06 ± 0.02	

Figure 2: Plasma fatty acid composition (% of total fatty acids) of leukemic children grouped by anthropometrical parameter (height-for-age)

Fatty acid type (% of total fatty acids)	Height for age		P
	< -2 z-score ^a (n = 11)	> median to +2 z-score (n = 14)	
SFAs	55.85 ± 3.58	54.77 ± 2.36	p>0.05
MUFAs	28.46 ± 4.08	27.25 ± 3.19	
PUFAs	7.90 ± 1.86	7.64 ± 1.99	
Ratio of n-3/n-6	2.56 ± 4.97	1.06 ± 0.03	

Figure 3: Plasma fatty acid composition of leukemic children grouped by anthropometrical parameter (MUAC-for-age)

Fatty acid type (% of total fatty acids)	MUAC for age		P
	< -10 percentile moderate malnutrition (n = 5)	10 - 90 percentile Normal (n = 46)	
SFAs	56.77 ± 3.40	55.04 ± 3.58	p>0.05
MUFAs	27.30 ± 1.85	27.84 ± 3.62	
PUFAs	6.02 ± 2.81	7.72 ± 1.95	
Ratio of n-3/n-6	1.05 ± 0.03	1.43 ± 2.43	

The results showed no significant difference in the plasma fatty acid status in malnourished leukemic and non-malnourished leukemic children (p>0.05). This study showed that weight status is not associated with plasma fatty acid status (essential fatty acid)

D09 Nutritional and antioxidant status of patients undergoing renal replacement therapy at Hospital Kuala Lumpur

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Oxidative stress and defective antioxidant systems are implicated in the Malnutrition-Inflammation-Atherosclerosis syndrome associated with chronic kidney disease (CKD). Therefore the objective of this study was to assess nutritional and antioxidant status of three groups undergoing renal replacement therapy (Haemodialysis=HD; Continuous ambulatory peritoneal dialysis=CAPD; Kidney

transplant patients=TX). This was a cross sectional study at Hospital Kuala Lumpur. 163 CKD patients undergoing either HD (n=54), CAPD (n=54) or have undergone TX (n=55) for a minimum period of 1 year were recruited into the study. Overall, the body mass index (BMI) of dialysis patients (CAPD and HD) was lower than TX patients, with 26.4% HD being underweight (BMI < 18.5 kg/m²) followed by 20.4% CAPD and only 9.1% TX patients. More over, measures of serum albumin give a clearer picture on the nutritional status of each group whereby CAPD (27±7 mg/L) have a significantly lower value (p<0.05) as compared to HD (35±4 mg/L) and TX (37±4 mg/L). Macronutrient intake also showed a similar pattern whereby a significant proportion of CAPD and HD had energy intake less than 30g/kg body weight (18.87% and 29.62% respectively). Mean protein intakes of CAPD group was also significantly lower as compared to TX (0.9±0.2 g/kg IDBW vs 1.1±0.3 g/kg IDBW, p<0.05). Mean dietary intakes of vitamin C were lower in HD group as compared to CAPD and TX (45±30 mg/d vs 61±34 mg/d; 58±39 mg/d, p<0.05). Moreover, HD and CAPD groups had a significantly lower mean plasma vitamin C as compared to TX (31.79±18.64 µmol/L; 34.11±15.47 µmol/L vs 43.72±18.97 µmol/L, p<0.05). In conclusion, dialysis group (HD & CAPD) have poorer nutritional status, whereby CAPD suffer the severest degree of malnutrition as compared to HD. Lower plasma levels of vitamin C may be influenced by both dialysis modality and decreased dietary consumption.

Group E: Food Science and Technology

E01 Development of dadih sweetened with honey and flavoured with honeydew and jackfruit

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Honey is a natural sweetener that possesses a wide range of beneficial nutritional properties. The objective of this study was to identify physicochemical and sensory properties of cow's milk dadih incorporated with honey and flavoured with honeydew and jackfruit puree. Five formulations of dadih were prepared namely; dadih with sugar as a control (A), dadih in 8% honey flavoured with honeydew (B); dadih in 12% honey flavoured with honeydew (C), dadih in 8% honey flavoured with jackfruit (D) and dadih in 12% honey flavoured with jackfruit (E). Dadih processing was carried out by heating a mixture of milk added with sugar or honey, salt, carrageenan, tairu and fruit puree. The products were subjected to colour, pH, texture and sensory analysis. Results showed that there were significant differences in terms of colour and pH between control and other treatments. The lightness, redness and yellowness for the fruit flavoured honey dadih were significantly higher than control. The pH of the fruit flavoured honey dadih was also higher than control. For firmness, there was a significant difference between control and other treatments. The firmness of control was found to be highest compared to others. Sensory evaluation showed that there were significant differences for colour, texture, taste and overall acceptability. Treatment E was preferred for taste and overall acceptability, while, dadih A was preferred for colour and texture. Substitution of sugar with honey and the addition of honeydew and jackfruit were acceptable to sensory panelists.

E02 Development of mango flavoured dadih with different concentrations of carrageenan and honey

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Dadiah is a milk product which is very popular in Malaysia and Indonesia. The objective of this study was to determine the sensory and physicochemical properties of cow's milk dadiah incorporated with carrageenan and honey. Carrageenan was used to solidify the dadiah. The addition of honey (madu Tualang) will provide some health benefits to dadiah. Dadiah processing was carried out by heating a mixture of milk added with sugar or honey, salt, carrageenan and mango puree. Four different levels of honey (H) and carrageenan (C) were studied. The treatments were 0.3%C and 8%H; 0.8%C and 8%H; 0.3%C and 12%H; 0.8%C and 12%H, respectively. The products were subjected to sensory, colour, pH, and texture analysis. Results showed that there were no significant differences in terms of aroma, taste, texture and overall acceptability among the dadiah formulated with different levels of honey and carrageenan. However there were significant differences in colour attributes. Dadiah with 0.3%C and 12%H was most acceptable by the panelists. Increasing the amounts of carrageenan and honey decreased the lightness (L-value) of the samples. Addition of carrageenan and honey increased the pH of the dadiah. Dadiah with 0.8%C showed a stability in the pH until 12 days of storage, while for the 0.3%C, the pH was only stable until 8 days of storage. In texture analysis, higher concentrations of carrageenan produced dadiah with higher value of firmness, cohesiveness, elasticity and gumminess. Result from this study showed that carrageenan is suitable to be used as a solidifying agent to improve the texture of dadiah. Honey flavoured dadiah was acceptable in terms of taste but the products were darker in colour.

E03 Development of rice pudding premixes

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Rice pudding was developed using local rice variety. MARDI rice variety MR220 was used in the formulation of rice pudding. This low amylose content of rice is found to be suitable for the texture of rice pudding. 47% of powdered *santan* from well-known brands were used, including 49% of rice flour (from the MR220 variety), 3.0% salt and 1.0% of powdered agar. The chilled rice pudding was served with 15g (1 tablespoon) of palm sugar solution at 50°brix. The chilled rice puddings were tested via sensory evaluation, while the premixes were monitored via proximate analysis and microbiological quality. Results showed that consumer panelists of sensory evaluation have concluded that the rice pudding is a good snack for all ages. Proximate analysis of the premix for rice pudding also showed that it is a good energy booster in the early morning and as a late night snack. Water activity, a_w for the rice pudding premix is 0.46. Microbiology quality of the premix for rice pudding shows a good acceptance in terms of yeast and mould

count and *Bacillus cereus* count. Future research should be conducted to study the shelf life of the premix for rice pudding and how to prolong it. Substituting the *santan* powder with milk or soy bean powder could enhance the nutritional value of the product.

Group F: Experimental Nutrition

F01 Nutrient composition and effect of *Strobilanthes crispus* juice on wound closure in normal and diabetic rats

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The objective of this study was to determine the nutrient composition and the effect of *Strobilanthes crispus* juice supplementation on antioxidative enzymes activity and wound healing in normal and streptozotocin-induced diabetic male albino *Sprague dawley* rats. The methods of AOAC International (2000) were used to determine the moisture, ash, fat and total sugar in *S.crispus* juice. The determination of protein was by the Kjeldahl methods, dietary fibre determination was by Prosky *et al.* (1992). The amount of vitamin was determined using HPLC and minerals were determined using ICP-OES. This study was conducted on normal and streptozotocin-induced diabetic male *Sprague dawley* rats fed with basal diet and *S. crispus* juice with different doses, 0.5, 0.75 and 1.0 ml/kg body weight for 7 days. A total of 48 male albino *Sprague dawley* rats (24 normal and 24 streptozotocin-induced diabetic rats), weight 150 – 200 g were used. The rats were divided into 8 groups with 6 rats in each group. The healing of 2 cm linear incisions created on the back of each rat was monitored by measuring the length of the wounds daily. Blood samples were taken at 0 and 7 days after the wounds were created for determination of superoxide dismutase and glutathione peroxidase activities using Chemistry Analyser Selectra E. *S. crispus* juice was found to be particularly high when compared with *S.crispus* tea in mineral content especially calcium (172.88 ± 3.70 mg/100g), potassium (124.99 ± 3.24 mg/100g), sodium (37.21 ± 0.61 mg/100g), magnesium (27.86 ± 0.64 mg/100g), phosphorus (8.18 ± 0.19 mg/100g) and zinc (1.49 ± 0.02 mg/100g). *S.crispus* juice contained moderate amounts of total sugar (20.92 ± 0.16 g/100g) and dietary fibre (12.29 ± 0.02 g/100g; low in protein (0.53 ± 0.0008 mg/100g), fat (0.06 ± 0.002 mg/100g), vitamin C (936.65 ± 23.55 µg/100g) and vitamin A (232.41 ± 13.54 µg/100g). The result showed a significant increase ($p < 0.05$) in the percentage of wound closure at day 3 and 7 in the treated group especially those treated with 1.0 ml/kg b.w. *S.crispus* juice in diabetic (Day 3 : 18.33 ± 2.79 % vs 7.50 ± 4.33 % ; Day 7 : 44.00 ± 3.32 % vs 25.00 ± 5.4 %) and normal rats (Day 3 : 27.50 ± 1.44 vs 11.67 ± 6.01 %; Day 7 : 69.17 ± 5.39 % vs 33.33 ± 6.01 %) compared with the control. *S.crispus* juice increased activity of glutathione peroxidase and superoxide dismutase significantly ($p < 0.05$) in the treated group of diabetic rats. Significant correlation ($p < 0.05$ and $p < 0.01$) was found between wound closure, GPx and SOD enzymes. *S. crispus* juice enhances wound closure in normal and diabetic rats. Its mechanism may involve the nutrient content (zinc, total sugar, vitamin A and vitamin C), reduction of free radicals and increased glutathione peroxidase and superoxide dismutase.

F02 Effect of Jin Batu (*Strobilanthes crispus*) leafy extracts in assisting body weight loss of diet-induced obese rats

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The objective of this study was to investigate the effects of Jin Batu (*Strobilanthes crispus*) leaves extract in assisting weight loss of diet-induced obese rats fed a normal rat chow diet *in vivo*. Lean Sprague-Dawley rats (350-450g) were fed a high-fat diet containing 31.1% fat for 14 weeks to induce obesity. Obese rats were given *S. crispus* extract (1%w/w) in drinking water and standard rat chow diet for another 14 weeks. The assay for adipose tissue lipolysis effect was performed by measuring changes of adipose tissue weight, plasma leptin and glycerol level and lipoprotein lipase mRNA expression before and after treatment with *S. crispus* extract. The time course of body weight, food intake, organ weight (left and right inguinal, retroperitoneal and mesenteric adipose tissue, liver, heart and kidney), plasma parameters (triglyceride, total cholesterol, high-density lipoprotein, low-density lipoprotein and insulin), fasting blood glucose and fecal output of total fat were measured. Hepatic histological examinations were also performed. After 14 weeks, rats treated with *S. crispus* extract were found to have lower mean body weight, mean body weight gain and feed efficiency than control group. They also have significantly lower adipose tissue and liver weight, and leptin level compared to control group. Lower glucose level and hepatic steatosis combined with high lipolysis rate and LPL mRNA expressed in adipose tissue was also noted in treated group. These results demonstrated that adding 1% (w/w) *S. crispus* extract to a normal rat chow diet could ameliorate obesity and fatty liver in obese rats better than normal rat chow diet alone.

F03 Evaluation on oral toxicity of probiotics in rats

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The acute oral toxicity of Ohhira Probiotics was evaluated in Sprague Dawley rats of different age groups (weaner, adult and old). The dose rate used was those of 2000, 4000 and 8000 mg/70 kg body weight, respectively. Each rat was dosed twice daily (before feeding) for a period of three days. Body weights and selected serum biochemical profiles were taken prior to and at the end of the experimental period. All rats were monitored twice daily for the development of any clinical abnormalities. At the end of the experimental period, all rats were killed with an overdose of diethyl ether, necropsied and selected tissues were fixed in 10% buffered formalin for histological examination.

None of the rats died as a result from overt toxicity following oral administration of the product and the bodyweight fluctuations and levels of creatinine alanine transferase (ALT), blood urea nitrogen (BUN) and creatinine in all groups were within normal limits. Histopathology examination was normal with no significant microscopic changes in kidney, liver and heart, except for the stomach. At doses above 4000 mg/70 kg body-weight, the stomach revealed evidence of degenerative changes. Thus, the doses used were found to be relatively non-toxic. However, dosage higher than 4000 mg/kg body weight may elicit irritating effects on the gastric mucosa and hence judicious intake of the preparation by those with gastritis should be emphasised. A more prolonged observational period is recommended (at least two weeks post-feeding) to highlight development of latent lesions, if any.

F04 The efficacy of probiotics in abating abdominal sepsis in rats

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The efficacy of oral Ohhira Probiotics supplementation against abdominal sepsis was evaluated in Sprague Dawley rats of different age groups (weaner, adult and old). A total of 72 rats were divided into 5 groups; control (C), sepsis (S), sepsis + antibiotic (SA), sepsis + probiotics (SP) and sepsis + antibiotic + probiotics (SAP). One day prior to the oral supplementation or antibiotic injection, 10^9 cfu/ml haemolytic *E. coli* was injected intraperitoneally into respective rats. The probiotics supplementation was intubated into the stomach at the rate of 2000 mg/kg body weight (B.I.D) while antibiotics treatment was administered by a single intramuscular injection of oxytetracycline, given at the rate of 20 mg/kg body weight for respective groups. All rats were monitored twice daily for the development of any clinical abnormalities. Body weights and haemogram profiles were taken prior to and at the end of the experimental period. All rats were then killed with excessive diethyl ether, necropsied and fixed in 10% buffered formalin for histology examination. While rats in other groups remained clinically healthy, four out of six rats from the S group died as a result of sepsis. The haemogram profile in the sepsis group signified neutrophilia with lymphopaenia. *Escherichia coli* was isolated from most tissues of rats induced with sepsis except in those of the probiotics-supplemented group. The extract alone was potent enough to eliminate the sepsis via diminishing the presence of bacteria in selected tissues. However, its combination with tetracycline was futile.

F05 Effect of *Brucea javanica* (Lada Pahit) on blood glucose level of diabetic-induced mice

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This was an in-vivo study with the objective of investigating the effect of *Brucea javanica* (Lada Pahit) on blood glucose levels of hyperglycemic mice. Twenty five male albino Bulb/C mice weighing between 25g and 45g were randomly divided into five groups and each group consisted of five mice. The five groups were; normal control (NO), normal with treatment 0.1ml of 100mg/ml (NE), diabetic control (DO), diabetic with treatment 0.1ml of 100mg/ml (DE), and diabetic with treatment 0.1ml of 200mg/ml (DE2). This study was conducted for 5 weeks where during the first week; hyperglycemia was induced in three groups of mice using streptozotocin and followed by 4 weeks of treatments with *B. javanica*. *B. javanica* was prepared through several steps including drying, blending and extraction. These extractions were prepared in two different concentrations i.e. 100mg/ml and 200mg/ml. Treatments were given using force feed method and they were allowed to freely access ad libitum water and basal diet. Body weight and blood glucose tests were measured at the end of each week and they were sacrificed at the end of this experiment. Analysis was done by using Oneway ANOVA and Paired samples t-test. Based on Oneway ANOVA, there was a significant difference in blood glucose level ($p = 0.020$; $p < 0.050$) between DO and DE2 in the first week of treatment where mean \pm SD for DO was 10.860 ± 3.370 and 8.88 ± 2.280 for DE2. In the following week, there were significant differences in blood glucose level between DO (11.62 ± 3.69) and DE (11.00 ± 6.84) where $p = 0.003$; $p < 0.050$ and also between DE (mean \pm SD = 16.50 ± 1.91) and DE2 ($p = 0.00$; $p < 0.05$). No significant differences were found between the other groups throughout the treatment weeks. Meanwhile, there was no significant difference in body weight among all the groups in four weeks of treatment. Result from paired t-test showed that there was no significant difference in both mean blood glucose level and mean body weight of NE after four weeks of treatment where blood glucose level only reduced for about 0.600mmol/L and body weight decreased about 1.280g. For DO, there was only a significant difference in mean body weight ($p = 0.036$; $p < 0.05$) where it reduced about 7.01% (mean difference = -2.420 ± 1.741) in four weeks of treatment. No significant difference was shown for both mean blood glucose level and mean body weight after four weeks of treatment in either DE nor DE2. After four weeks, mean difference in glucose level for DE was only 9.733 ± 4.406 (increased about 123.20%) and 1.433 ± 1.950 (increased about 4.52%) for body weight; while for DE2, mean difference in blood glucose was 4.920 ± 5.228 (increased about 64.91%) and 0.280 ± 2.823 (increased about 0.84%) for changes in body weight in four weeks treatment. Thus in conclusion, this study showed that the extract from *B. javanica* (lada pahit) did not reduce the blood glucose levels in hyperglycemic mice over four weeks of treatment.

F06 Effect of white flesh Pitaya fruit (*Hylocereus sp.*) supplementation on plasma lipid profiles (TG, LDL-C, HDL-C, and TC level) of induced hypercholesterolemic rats

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Hypercholesterolemia is one of the major risk factors for cardiovascular disease. In conjunction with this, fruit and vegetable consumption has been shown to lower cholesterol levels in hypercholesterolemic patients. These are attributed to the beneficial nutritive values contained in the fruits and vegetables. Many studies have proved that these potential effects relate to a lower risk of cardiovascular disease. Therefore, the aim of this study was to evaluate the hypocholesterolemic effects of white flesh Pitaya supplementation (*Hylocereus sp.*) on plasma lipid profiles of induced hypercholesterolemic rats. This study was done using forty Sprague Dawley male rats and was divided into four groups (n=10 for each group). Groups 1 and 2 were negative and positive control groups. Meanwhile, groups 3 and 4 were given treatment whereby, group 3 was supplemented with white flesh Pitaya (0.271g/day) and group 4 with Lovastatin drug (0.083mg/kg/day). For 10 weeks, the rats in group 1 were fed with basal diet, while groups 2, 3 and 4 were fed with basal diet enriched with 1% cholesterol and 0.1% cholic acid. This study consisted of 2 weeks for adaptation, 2 weeks for inducing hypercholesterolemia and 6 weeks for treatment. For lipid profile analysis, 5ml fasting blood was drawn by cardiac puncture five times (week 2, 4, 6, 8, and 10) during the study and was analysed using chemical auto-analyser (Hitachi). All data were analysed using SPSS version 13.0. From the results, it showed that there was a significant increase ($p<0.05$) in mean body weight of each group (1, 2, 3, 4). After 6 weeks of treatment, results showed that the group supplemented with 0.271g/day of white flesh Pitaya (group 3) showed the highest percentage of decrease in TC (37.57%), TG (51.26%), and LDL (67.04%), which was a significant change ($p<0.05$). Meanwhile, Lovastatin treatment group (group 4) showed a significantly ($p<0.05$) higher percentage of increase in HDL level which is 70.58% as compared to Pitaya treatment group (69.93%). A comparison of the effectiveness between Pitaya and Lovastatin supplementation showed that there was no significant difference ($p>0.05$) between the groups. The result reveals that both treatments showed a similar effect in increasing HDL and lowering TC, TG and LDL levels. Overall, the group with white flesh Pitaya supplementation showed a significant difference ($p<0.05$) in mean of TC, TG, LDL and HDL level compared to positive control and negative control groups after 6 weeks of treatment. In conclusion, white flesh Pitaya supplementation gave a positive effect on plasma lipid profiles in rats fed with cholesterol diets. This positive influence is probably due to the bioactive components present in the Pitaya fruit such as antioxidants, phytochemicals and dietary fiber. Therefore it may also have an indirect potential health benefit in reducing the risk factor of cardiovascular disease.

F07 Effect of white flesh pitaya fruit supplementation on blood glucose level of induced hyperglycemic rats (*Hylocereus sp.*)

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This study aims to determine the effects of white pitaya fruits (*Hylocereus sp.*) on blood glucose level and body weight of induced hyperglycemic rats. Forty *Sprague Dowley* male rats were used and were divided randomly into four groups (n=10). Diabetes was induced in three groups (n=30) of rats using 55mg/kg streptozotolin (STZ) and another ten rats were not induced (negative control). The four groups were; 1-normal control (negative control), 2-diabetes control (positive control), 3-diabetes treatment with 500g pitaya fruits (0.271g/day) and 4-diabetes treatment with glibenclamide (10mg/kg body weight). Duration of the study was 10 weeks, consisting of 1 week for adaptation, 3 weeks for inducing hyperglycemia and 6 weeks for treatment. The rats were induced for diabetes with streptozotolin (STZ) on the second week. After 3 weeks, all rats were diagnosed as diabetic (fasting plasma glucose level >11.0mmol/l) and were used in this study. Supplementation of pitaya and glibenclamide was given through forced feeding for 6 weeks. A total of 3 ml fasting blood sample was drawn 5 times (week 2,4,6,8,and10) by cardiac puncture and was analysed using chemical auto-analyser machine (Hitachi). Data were analysed using SPSS version 11.5. Paired samples t-test and ANOVA were used. From the result, pitaya and glibenclamide treatment groups showed there was a significant ($p<0.05$) reduction in blood glucose levels. This result reveals that both pitaya and glibenclamide could lower blood glucose level but the percentage of reduction by glibenclamide (39.68%) was higher than the pitaya fruits (23.43%). Changes in body weight also showed that there were significant differences ($p<0.05$) among treatment groups. Treatment group supplemented with 500g pitaya showed an increase of 26.63% of body weight at the end of the study (week 10) as compared to glibenclamide treatment (8.68%). In conclusion, pitaya supplemented group offered better management in body weight and reduced glucose level among diabetes mellitus subjects.