

Nutritional Status and Food Habits of Middle-aged Adults in Selected Areas of Selangor

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ABSTRACT

A food habits and health status study was carried out among 100 Malay adults aged 40 years and above. The study protocol incorporated anthropometric measurements, evaluation of food habits and determination of blood glucose, cholesterol and blood pressure. Mean body mass index (BMI) for men and women were $27.2 \pm 4.2 \text{ kg/m}^2$ and $27.0 \pm 5.2 \text{ kg/m}^2$ respectively, which on average showed that the subjects were overweight. Food habits evaluation indicated that rice, fish and vegetables were the foods consumed almost everyday by the majority of the subjects. Meat, dairy products and fruits were eaten once to three times per week. Food intake score for sugar and salt demonstrated that a majority of men and women consumed moderate amounts of these foods. Most subjects exercised twice to three times a week for 15 min per session. Blood glucose tests revealed a mean of $5.04 \pm 1.60 \text{ mmol/l}$ in men and $4.86 \pm 2.10 \text{ mmol/l}$ for women. Mean cholesterol for men was $5.06 \pm 1.22 \text{ mmol/l}$ while it was $4.90 \pm 1.34 \text{ mmol/l}$ in women. Mean systolic and diastolic blood pressure in men was normal of $127.69 \pm 13.60 \text{ mm Hg}$ and $85.87 \pm 7.97 \text{ mm Hg}$, while in women it was $127.42 \pm 17.54 \text{ mm Hg}$, $83.53 \pm 9.50 \text{ mm Hg}$. The mean value for glucose, cholesterol and blood pressure increased with age. The food habits of these adults were satisfactory; however blood test for the nutrients of interest exhibited an increasing trend towards blood pressure, blood cholesterol and glucose with age. Middle-aged adults should adapt to a more active lifestyle and be more cautious of their food habits. This is to ensure a healthy well being throughout their life span.

INTRODUCTION

Lifestyle changes related to unhealthy eating habits, socio-economic pressure, smoking and decreased physical activity are risk factors of chronic diseases (Lam & Khor, 1997). Being older, more specifically being 50 years and above, of Malay or Indian descent appeared to have a higher mortality and morbidity rate towards cardiovascular diseases (Corrao *et al.*, 1990; Jayamalar, 1991; Khor, 1994; Heng *et al.*, 2000). The National Health and Morbidity Survey 1996 (NHMS 2) in Malaysia which was conducted among some 30,000 multi-ethnic adults aged 18 years and above demonstrated that 30% of these adults exhibited blood pressure above 140/90, 7% showed glucose levels exceeding 11.1 mmol/l and 20% had cholesterol above 6.2 mmol/l (Lim *et al.*, 2000). A study carried out by Khor in the early 1990s (1991) indicated that death due to cardiovascular diseases was twice higher among the Indians compared to Malays and Chinese. These studies provided some indication of how health could deteriorate if necessary measures with regard to lifestyle were neglected in the daily life. There have been numerous nutritional and health status studies among the young adults and the elderly (Ismail *et al.*, 1995;

Khor *et al.*, 1998; Norimah & Leong, 2000; Suzana *et al.*, 2000). However, there is a dearth of studies on middle-aged adults, particularly between 40 to 60 years old. Thus this study was carried out to focus on this age group and to examine two objectives: namely to determine the nutritional status of this age group of adults and to evaluate their health status.

MATERIAL AND METHODS

A total of 100 Malay adults, 45 men and 55 women aged 40 years and above were recruited into the study. Briefings to explain the objectives and the protocol to be undertaken in the study were carried out in three areas. These areas were the Universiti Kebangsaan Malaysia (UKM) campus in Kuala Lumpur, the UKM complex in Tanjung Karang, Selangor and at Sek. Keb Pulau Meranti in Puchong, Selangor. The areas were selected because of their convenient location; the sampling for this study was therefore convenient sampling. From these initial meetings, 130 adults agreed to participate, having met the inclusion criteria of this study. The inclusion criteria were (a) of Malay descent, (b) at least 40 years and older, and (c) had neither been diagnosed as diabetic, hypertensive, hypercholesterolemic nor had cardiovascular disease. At the end of the study, 100 adults successfully completed the study protocol .

A self-administered four-part questionnaire, was distributed to each subject. Those subjects who were illiterate were guided by the researcher (HKM) to answer the questionnaire. Part I had questions pertaining to demography while Part II examined the health history. For Part III of the questionnaire, subjects were requested to respond to questions on food habits, frequency of food intake and main meals as well as factors which influenced their food intake. Part IV was a food frequency questionnaire (FFQ) which consisted of food items high in sugar and salt. The food frequency questionnaire was specifically developed by the researchers for this study. Food items included in the FFQ were selected based on a 24-hour recall by interview on 30 subjects. The food items mostly consumed and had high salt and sugar content (based on Malaysian Food Composition Table-Tee *et al.*, 1997) were identified and then included into the FFQ. A scoring system was given to each food item based on frequency of intake. Each subject could score a minimum of 24 points and a maximum score of 120. This score was then converted to percentage and categorized accordingly as low (<33%), medium (33-66%) and high (>66%) consumers based on the percentage achieved.

Anthropometric measurements taken included weight, height, waist and hip circumferences. SECA Digital (model 713 Germany) was used to measure body weight and recorded to the nearest 0.05 kg. The height was taken using SECA bodymeter 280 and the reading was recorded to the nearest 0.01 cm. Body mass index (BMI) was calculated using the following formula: weight (kg)/height (m²) and classified accordingly based on WHO (1998). A non-elastic measuring tape was used to measure waist and hip circumferences and recorded to the nearest 0.1 cm. The cut-off point for waist to hip ratio (WHR) used to indicate that subjects were at risk of cardiovascular disease was more than 1.0 for men and 0.85 for women (WHO, 1998).

Determination of blood glucose and cholesterol was carried out after an overnight fast of at least 10 hours. 32ul blood was taken from finger prick into a heparinized capillary tube. The blood sample was analysed immediately using a Reflotron (Boehringer Mannheim). The evaluation

criteria for glucose was based on the classification of WHO (1994), while for cholesterol, reference was made to the National Cholesterol Education Program (NCEP, 1988). Blood pressure measurement was taken using the sphygmomanometer. Subjects were requested to rest for 15 minutes before blood pressure measurement was taken on the left arm twice and the mean was recorded.

The collected data was analyzed using the SPSS programme version 10.01. The results are presented as mean and standard deviation. Independent t-test was used to determine differences between sex for anthropometric measurements and the blood profile. Pearson correlation was carried out to examine the relationship between blood profile and anthropometric measurements.

RESULTS AND DISCUSSION

Demography

Table 1 shows the demographic characteristics of the subjects by sex. A total of 100 subjects of whom, 29 were from the urban area, 32 from semi-urban and 39 from the rural area, participated in the study. The majority of the subjects (47%) completed secondary education, 21% had no formal education, 19% attended school up to primary level while 13% obtained tertiary education. Sex distribution with regard to education attainment was quite skewed towards minimum education among women, in that one-third women (33%) never attended school and another one-fifth (21%) attained only primary school education. This study, however, reflects that education among women in urban and semi urban areas was at least better off than their counterparts in the rural area. This was based on a comparison with a study conducted in a rural setting which indicated that 65% of women in that study never attended school at all; however the study cohort was elderly women of 65 years and above (Suzana *et al.*, 2001). The occupation of the subjects in this study reflect the level of education that they received. Although more than half (56%) were working in the government or public sector, 7% (all men) were farmers or fishermen, 5% were pensioners (all men) while 2% (all men) were self-employed. The remaining 30% consisted of housewives. 54% of women in this study were not working. A study in a rural Malay community in Raub also reported a high proportion of the women (72%) as housewives (Norimah *et al.*, 1999).

Anthropometry

The physical attributes of the subjects are presented in Table 2. There was a significant difference between the sexes for weight, height and WHR; however no significant difference was observed for BMI. Mean body mass index (BMI) was $27.2 \pm 4.2 \text{ kg/m}^2$ for men and $27.0 \pm 5.2 \text{ kg/m}^2$ for women, and this demonstrates that on average subjects in this study were overweight. Further analysis of BMI showed 2% of men and women were underweight, while 24% of men and 35% of women had normal body weight (Figure 1). The prevalence of overweight was 51% among men and 35% among women, while obesity was present in 22% of men and 27% of women. This finding contradicts another study in an urban area, where overweight was reported to be more prevalent among women. (Ng, Tee & Azriman, 1995). However, the prevalence of overweight and obesity was higher than in a Malay community in the rural setting (Ismail *et al.*,

1995; Norimah *et al.*, 1999) and in the urban area (Ismail *et al.*, 1995). Although the number of subjects in this study was small and the age of the subjects was older than the study of Ismail *et al.* (1995) and Norimah *et al.* (1999), this study implies that overweight and obesity could be a potential health problem among adults in this age group and that this problem should be addressed accordingly. This was not the only study reporting prevalence of overweight and obesity that should be a cause for concern. Similar results have been reported in the rural as well as among estates workers (Ng *et al.*, 2000). Obesity has been recognized as a risk factor for a number of chronic diseases such as cardiovascular disease, hypertension and diabetes, which relates to a unhealthy diet (Tee, 1999). Thus adults, especially those within the studied age group, should be more prudent about their nutritional and health care to ensure that the development and progression of chronic diseases is constrained. In this study, it was shown that the blood profile tended to increase with age (Table 7). This is a clear indication that nutrition and health awareness should be reviewed.

Table 1. Demographic characteristics of subjects by sex

Parameters	Men (n=45)	Women (n=55)	All (n=100)
Location			
Kuala Lumpur (urban)	14	15	29
Puchong (semi urban)	18	14	32
Tg.Karang (rural)	13	26	39
Education			
No formal education	3	18	21
Primary school	7	12	19
Secondary school	27	20	47
Tertiary education	8	5	13
Occupation			
Government servant	20	15	35
Private servant	11	10	21
Farmers/fishermen	7	0	7
Self-employed	2	0	2
Housewives	0	30	30
Pensioner	5	0	5

Table 2. Mean anthropometric measurements by sex

Anthropometric Measurements	Men (n=45)	Women (n=55)
Weight (kg)	72.75±12.50	61.40±12.00*
Weight range	(49.00-106.45)	(37.30-98.4)
Height (cm)	163.3±5.4	151.1±6.1*
Height range	(152.0-173.1)	(140.0+165.5)
BMI (kg/m ²)	27.2±4.2	27.0±5.2
BMI range	(16.0-36.7)	(16.8-39.9)
WHR	0.92±0.07	0.83±0.06*
WHR range	(0.76-1.16)	(0.83-0.98)

* Significant difference at p<0.01

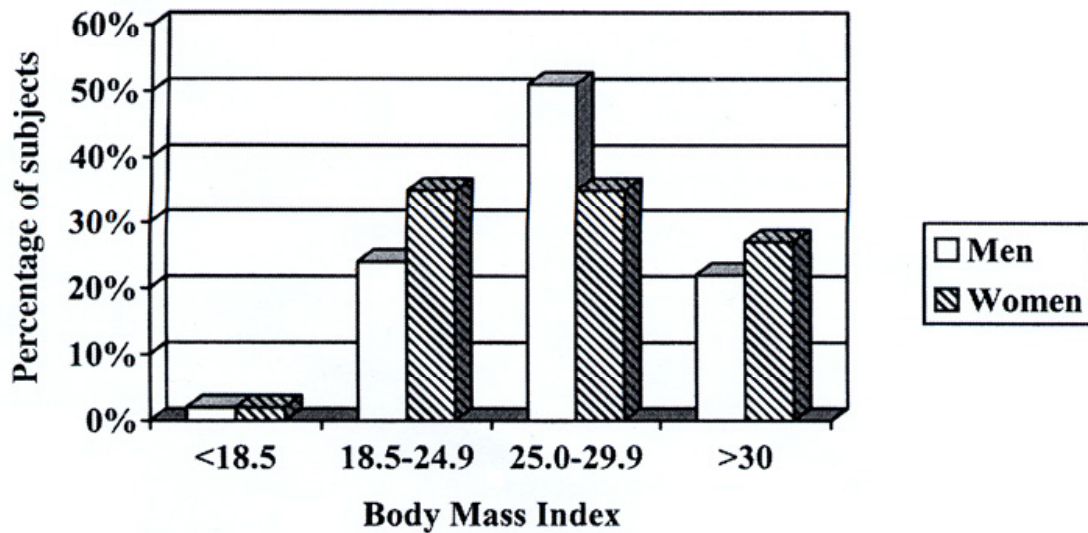


Figure 1. Distribution of Body Mass Index according to sex

Body mass index and WHR according to age and sex is shown in Table 3. In both sexes, while BMI increased with age, it decreased among the 60-year-olds. Suriah *et al.* (1998) and Suzana, Dixon & Earland (1999) also noted similar tendencies. Mean BMI in men and women tended to increase at age 40 and 50 and decline at age 60. This was also shown by Lim *et al.* (2000) in the National Health and Morbidity Survey. WHR also indicated a similar trend; increasing at age 40 and 50 and decreasing at 60. This finding was also observed in a Malay community with subjects of similar age groups (Norimah *et al.*, 1999). The mean WHR of the subjects for both sexes demonstrated an acceptable ratio which complied to the WHO (1998) recommendation. The anthropometric indices such as BMI and WHR are indicators which can be used to evaluate health status. What is evident here, is that these indices increase with age regardless of sex. Results from studies of nearly two decades ago (Chong *et al.*, 1984) and a decade ago (Ng *et al.*, 1995) as well as more recently in the National Health and Morbidity Survey (Lim *et al.*, 2000), clearly show that there is an increasing trend in the mean BMI and WHR from then until now. One plausible factor to explain this trend would be the decreased physical activity among the above 40s particularly. Table 4 shows the exercise pattern of the subjects. Although some 62% of the subjects admitted doing exercise, only 19% did so regularly, which was more than three times a week. Another 66% exercised once to three times a week while the remaining 15% exercised only once to twice a month. The majority (74%) of subjects would exercise between less than 15 to 30 min for each exercise session; and more women (82%) than men (66%) were spending this amount of time to exercise. In contrast 34% of men and only 18% of women would expend between 30 to more than 45 min of their time for an exercise session. Some exercises which were undertaken and favoured by these subjects included badminton, cycling, walking and static exercise.

Table 3. Physical characteristics according to age group and sex

Anthropometric Measurements	Age (years)	(n)	Men (n=45)	(n)	Women (n=55)
Weight (kg)	40-49	25	74.55 ± 10.94	31	60.54 ± 13.24
	50-59	15	72.60 ± 13.84	14	63.74 ± 10.95
	>60	5	64.22 ± 14.85	10	60.79 ± 9.71
Height (m)	40-49	25	1.65 ± 0.05	31	1.52 ± 0.06
	50-59	15	1.61 ± 0.06	14	1.52 ± 0.07
	>60	5	1.63 ± 0.05	10	1.49 ± 0.06
BMI (kg/m ²)	40-49	25	27.4 ± 3.7	31	26.2 ± 5.8
	50-59	15	27.9 ± 4.0	14	28.3 ± 4.1
	>60	5	23.7 ± 5.7	10	27.6 ± 4.6
WHR	40-49	25	0.90 ± 0.05	31	0.82 ± 0.07
	50-59	15	0.94 ± 0.06	14	0.84 ± 0.06
	>60	5	0.96 ± 0.12	10	0.82 ± 0.03

Food habits

The meal pattern of the subjects is shown in Table 5. More than two-thirds of the subjects (69% to 93%) consumed breakfast, lunch and dinner everyday. Men appeared to be skipping lunch more often than women (13% men vs 7% women) while women skipped dinner almost as often as men (12% women vs 11% men). It could be possible that those who skipped dinner made up this meal difference by taking supper as shown by the rather high percentage of women (29%) and men (22%) consuming supper everyday. The daily consumption of the main meals in this group was lower than those of an elderly group. Suzana *et al.* (2000) reported that 90 to 99% of the elderly consumed breakfast, lunch and dinner everyday.

Table 6 shows the frequency of food groups consumed per week among the subjects. Only 53% men and 49% women reported consuming cereals everyday and this percentage did not actually represent their actual intake. Dietary record data (3-day food record) showed that rice was consumed everyday by the subjects. This discrepancy could only be explained by under-reporting by these subjects. Quite a number of subjects misunderstood the definition of cereals. Many understood that cereals only included rice and flour and excluded products of rice and wheat such as noodles and breakfast cereals. More men (78%) consumed vegetables than women (75%) on a daily basis while more women (46%) than men (38%) ate fruits everyday. However, more than 50% of men and women ate fruits at least 1–3 times per week to 4–5 times per week. The daily consumption of cereals, vegetables and fruits would definitely contribute to the carbohydrate and fibre in their diet. Dietary fibre has been reported to reduce LDL cholesterol (Brown *et al.*, 1999)

Table 4. Exercise pattern of subjects according to sex (percent)

Parameter	Men (n=45)	Women (n=55)	All (n=100)
Exercise			
Yes	64.4	60.0	62.2
No	35.6	40.0	37.5
Frequency of exercise			
1-2 times per month	13.8	15.2	14.4
Once a week	20.7	21.2	21.0
2-3 times per week	48.3	42.4	45.4
>3 times per week	17.2	21.2	19.2
Duration of exercise			
<15 minutes	34.5	45.5	40.0
15-30 minutes	31.0	36.4	33.7
30-45 minutes	13.8	6.0	9.9
>45 minutes	20.7	12.1	16.4

Table 5. Frequency of main meal per week

Sex	Meal	Frequency (%)			
		Rare/ Never	1-3X per week	4-5X per week	Everyday
Men	Breakfast	4.6	4.4	11.1	80
	am snack*	46.6	15.6	8.9	28.9
	Lunch	2.2	11.1	17.8	68.9
	pm snack**	33.4	22.2	11.1	33.3
	Dinner	2.2	8.8	11.1	77.8
	Supper	46.7	24.4	67.0	22.2
Women	Breakfast	0.0	3.6	3.6	92.8
	am snack*	54.6	12.7	1.8	30.9
	Lunch	5.4	1.8	5.5	87.3
	pm snack**	41.9	14.5	9.1	34.5
	Dinner	7.3	5.5	12.7	74.5
	Supper	47.3	14.5	9.1	29.1

* morning tea

**afternoon tea

Table 6. Frequency of food groups consumed per week

Sex	Food group	Frequency (%)			
		Rare/ Never	1-3X per week	4-5X per week	>6x per week
Men	Cereals	0.0	42.3	4.4	53.3
	Fish	2.2	17.8	17.8	62.2
	Meat	6.7	64.4	20.0	8.9
	Milk/Dairy	17.8	26.7	11.1	44.4
	Vegetables	2.2	11.1	8.9	77.8
	Fruits	4.4	40.0	17.8	37.8
Women	Cereals	0.0	32.7	18.2	49.1
	Fish	2.2	18.6	14.5	67.3
	Meat	25.4	56.4	12.7	2.5
	Milk/Dairy	20.0	20.0	14.5	45.5
	Vegetables	1.9	9.1	14.5	74.5
	Fruits	3.5	25.5	25.5	45.5

The consumption of fish has always been recommended because fish contains omega-3 fatty acids such as docoheaxanoic acid (DHA) and eicopentanoic acid (EPA). These fatty acids have been known to reduce blood pressure and heart disease (Khor, 1997). In this study, 62% of men and 67% of women consumed fish everyday. Meat and poultry were consumed in moderation, once to three times per week by 64% of men and 56% of women. More men (9%) than women (5%) ate meat and poultry everyday.

We also evaluated the level of sugar and salt intake of subjects using a questionnaire. Scores were calculated and the subjects were categorized into tertiles of intake i.e. either into high, medium or low consumers of sugar and salt. Based on this classification, the majority of the subjects, 76% of men and 64% of women, consumed moderate amounts of sugar, 24% of men and 31% of women were low consumers while only 6% of women and no men were high consumers of sugar. On the other hand, 64% and 55% of men and women respectively were categorized as low consumers of salt; 36% and 45 % were moderate while none were high consumers of salt (Table 7)

The food habits of adults in this study showed a satisfactory habit, in line with the suggestion of the Malaysian Dietary Guideline (1999). Although by and large, the subjects demonstrated acceptable food habits, the anthropometric indicators such as BMI and WHR were not particularly satisfactory especially as one grew older. The lifestyle factor, for example, physical activity pattern indicated that only a fifth of subjects took time to exercise regularly and diligently for more than 15 to 30 min to gain the benefit. These adults should be encouraged to adopt a more active lifestyle. There are many advantages of exercise, one of which is improving the metabolism of fat, glucose and insulin sensitivity. To achieve this benefit, moderate but continuous exercise is recommended (Arakawa, 2000).

Blood cholesterol, glucose and blood pressure

The mean glucose, cholesterol and blood pressure of the subjects are shown in Table 8. The mean glucose levels of men and women were 5.04 ± 1.60 mmol/l and 4.86 ± 2.10 mmol/l respectively and no significant difference was found between sexes. The mean glucose levels of both sexes were within the recommendation of WHO (1994). When examined individually, 5% of the subjects were found to be at risk of developing diabetes, with blood glucose levels exceeding 7.8 mmol/l, indicating possible impaired glucose tolerance. Analysis of blood glucose according to age showed that there was an increase in mean glucose levels with age, but only among women (Table 9). This was in contrast to studies by Teo, Chong & Zaini, (1988), Osman & Zaleha (1995) and recently Lim *et al.*, (2000) which reported increased glucose levels in both sexes.

Table 7. Status of sugar and salt intake by sex

Status of intake	Men (%) (n=45)	Women (%) (n=55)
Sugar		
High consumers	0	5.5
Moderate consumers	75.6	63.6
Low consumers	24.4	30.9
Salt		
High consumers	0	0
Moderate consumers	35.6	45.5
Low consumers	64.4	54.5

Table 8. Blood parameters (mean \pm std dev) by sex

Blood parameters	Men (n=45)	Women (n=55)	All (n=100)
Glucose (mmol/l)	5.04 ± 1.60	4.86 ± 2.10	4.94 ± 1.88
Cholesterol (mmol/l)	5.06 ± 1.22	4.90 ± 1.34	4.97 ± 1.29
Systolic (mm Hg)	127.69 ± 13.60	127.42 ± 17.54	127.54 ± 15.82
Diastolic (mm Hg)	85.87 ± 7.97	83.53 ± 9.50	84.58 ± 8.88

The mean cholesterol levels of men and women were 5.06 ± 1.22 mmol/l and 4.90 ± 1.34 mmol/l respectively (Table 8). There was no significant difference between sexes. The mean cholesterol levels of both sexes were below 5.20 mmol/l, complying with the recommendation of NCEP (1988). Cholesterol levels are categorized as low risk of hypercholesterolemia if blood level is below 5.2mmol/l, moderate risk if levels fall within 5.2–6.2 mmol/l and high risk for levels greater than 6.2 mmol/l (NCEP, 1988). Based on this cut off values, 18% of men and 16% of women were found to be at high risk of hypercholesterolemia, with the 50-59 age group demonstrating the highest prevalence in both men and women. Reiterating the glucose scenario, cholesterol levels in this cohort appeared to increase with age. Similar findings were reported by

Ng *et al.*, (2000) and Lim *et al.* (2000). The prevalence of hypercholesterolemia in this study was lower than that reported by Hapizah *et al.* (2002) among a rural Malay community.

Table 9. Blood parameters (mean ± std dev) by age and sex

Blood parameters	Men	Women
Glucose (mmol/l)		
40-49 years	5.29 ± 1.09	4.49 ± 1.77
50-59 years	4.82 ± 1.68	5.08 ± 3.02
>60 years	4.55 ± 3.17	5.69 ± 1.23
Cholesterol (mmol/l)		
40-49 years	4.92 ± 1.17	4.72 ± 1.22
50-59 years	5.21 ± 1.32	5.35 ± 1.21
>60 years	5.25 ± 1.39	4.80 ± 1.82
Systolic (mm Hg)		
40-49 years	126.00 ± 10.80	119.23 ± 11.85
50-59 years	127.73 ± 14.16	136.30 ± 18.30
>60 years	136.00 ± 23.02	136.20 ± 19.49
Diastolic (mm Hg)		
40-49 years	86.24 ± 7.90	80.71 ± 9.00
50-59 years	83.87 ± 7.90	88.07 ± 6.75
>60 years	90.00 ± 7.07	86.00 ± 11.74

Mean systolic blood pressure (SBP) was 127.54 ± 15.82 and diastolic blood pressure (DBP) 84.58 ± 8.88 in all subjects.) Mean SBP of both men and women was similar (127.69 ± 13.60 for men, 127.42 ± 17.54 for women) while DBP was higher among men (85.87 ± 7.97) than in women (83.53 ± 9.50) These values were higher than the elderly in Tg Karang (Suzana, Fatimah & Idris, 1993) and cardiovascular patients in Kuala Lumpur (Lam & Khor,1997). Analysis of blood pressure according to age groups demonstrated an increasing systolic blood pressure with age; however no specific trend was observed for the diastolic blood pressure. This pattern of increasing blood pressure with age was also reported by Norimah *et al.*, (2001) among the rural community in Raub. The Raub study also showed that prevalence of hypertension tended to increase with higher BMI and WHR. In this study, a significant but weak correlation was found between BMI and systolic ($r=0.39, p<0.05$) and diastolic ($r=0.20, p<0.05$) blood pressure. Individual systolic and diastolic blood pressures indicated that the majority of subjects, whether men or women, had normal diastolic blood pressures for all age groups in this cohort. However, there were more men (40%) than women (20%) who had high systolic pressure in the 60-year-old cohort.

CONCLUSION

Adults in the middle aged category can be regarded as a group of individuals in their prime, especially in relation to productivity at work or at home. In this study we found that generally both men and women were overweight, demonstrated satisfactory food habits and met the recommendation of the Malaysian Dietary Guideline. However, the physical activity, health and

anthropometric indicators were not favourable. Only one-fifth of the adults studied exercised regularly. BMI and WHR increased with age. The increase was only observed for biochemical data such as blood glucose and systolic blood pressure in women while for men it was in cholesterol and systolic blood pressure. These results indicate that some form of intervention is needed to address these problems. In particular, a change of lifestyle from sedentary to a more active one is warranted in order to improve their health status. This should increase energy expenditure and simultaneously induce weight loss and improve blood profiles.

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