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Research Article
Nutritional Status and Food Pyramid Knowledge Among Royal Malaysia Police Personnel in Selangor, Malaysia

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Abstract

Background and Objective: Various studies on nutritional status and nutrition knowledge have been widely reported but studies involving royal Malaysia police (RMP) are very limited. The purpose of the study was to evaluate physical characteristics and body composition of RMP personnel, to determine level of food pyramid knowledge and to identify relationship between socio-demographic and physical characteristics with food pyramid knowledge. **Materials and Methods:** A total of 286 male RMP personnel were randomly selected from a district police headquarter in Selangor. Anthropometric measurements involved height, weight, waist circumference (WC) and body mass index (BMI). Body fat and fat mass were measured using bioelectrical impedance analysis method. Questionnaire was used to assess the food pyramid knowledge. **Results:** This study showed that 33.6% subjects had normal BMI, 44.4% were overweight and 22.0% were obese. About 50.7% subjects had WC value of 90 cm or more and 78.3% subjects had high body fat. The mean food pyramid knowledge score was 56.8±11.9% corresponding to a moderate level of knowledge. Inverse correlation between food pyramid knowledge with age ($r=-0.173$, $p<0.05$) and duration of services ($r=-0.160$, $p<0.05$) was reported while positive correlation was observed between food pyramid knowledge and BMI ($r=0.124$, $p<0.05$). **Conclusion:** Majority of the RMP personnel were having high BMI, high WC and high body fat percentage. Level of food pyramid knowledge was moderate among the RMP personnel. Nutritional education and fitness program should be incorporated in the RMP to optimize their health and knowledge.

Key words: Royal Malaysia police, police officers, nutritional status, food pyramid knowledge, body mass index

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

It is generally known that the police force plays a vital role in protecting the country's safety and peace. This requires police to stay fit and maintain health at most times. However, a rising trend of obesity among law enforcement officers, including police is at stake[1]. Today, almost 30% of the world's population, around 2.1 billion people are either overweight or obese. Overweight and obesity are defined as accumulation of excessive or abnormal fats that may impair health[2]. Health surveys in Malaysia have shown a rapid rise of obesity and it is currently seen as a public health problem[3]. Royal Malaysia police (RMP) recently set an obligation for all police to have a normal body mass index (BMI 18.0-24.9 kg m^{-2}) and passed a specific fitness test in order to prevent heaps of overweight and obese among RMP personnel[4]. Abdominal obesity on the other hand, is affecting health as it is an independent risk factor for cardiovascular disease, hypertension and diabetes mellitus among adults[4]. Waist circumference measurement is used to determine prevalence of abdominal obesity, in reference to WHO cut-off point recommendation at 90 cm mark[5]. According to Nadiy *et al.*[6], the increasing trend of obesity among Malaysian adults is mostly because of unhealthy dietary habits and inactive lifestyle. It is even more worrying when obesity happened to police officers. A healthy body, physically and mentally comes from a healthy lifestyle. Healthy lifestyle can be achieved by practicing good nutrition and be physically active. Nutrition is the key component that needs to be maintained by each individual[7]. According to Wardle *et al.*[8], appropriate nutrition has significant effect in one's life, which includes sustaining physical and mental performance, preventing illness and maintaining the whole population's health. In addition to that, it shows that nutrition knowledge is essential in selecting healthy diet and obtaining a healthy body. The RMP personnel should be practicing healthy lifestyle due to the nature of their profession which requires them to work in long hour and respond to any cases immediately as suggested by Aaron[9] in this study. In addition, Yahia *et al.*[10] also stated that having basic nutrition knowledge definitely helps in maintaining a good health and body. So far, various studies have been conducted on nutritional status and nutrition knowledge in various population groups in Malaysia, however, there is still lack of studies that focus on RMP personnel in Malaysia. More attention should be paid to them, looking at their contributions and importance to the well-being of the country. Thus, this study was conducted with the aim to evaluate physical characteristics and body composition of RMP personnel, to determine level of food pyramid knowledge and to identify relationship between socio-demographic and physical characteristics of RMP personnel with food pyramid knowledge.

MATERIALS AND METHODS

Ethical approval: This study was conducted with the approval of the Medical Research and Ethics Committee Ministry of Health and Medical Research and Ethics Committee of Universiti Kebangsaan Malaysia (reference number: UKM PPI/111/8/JEP-2017-212). An approval letter to conduct this study was also obtained from Royal Malaysia police Bukit Aman headquarter, Kuala Lumpur (reference number: 10/8/1). Before conducting this study, a thorough discussion was carried out with the head of district police headquarter to explain the procedures involved in this study.

Subject and study location: A cross-sectional study was carried out at selected district police headquarter in Selangor state of Malaysia from April-May, 2017. A total of 286 healthy male RMP personnel aged 18-60 years old were involved in this study. Random sampling method was used and sample size was determined according to Krejcie and Morgan[11]. Drop out factor of 10% was included in the sampling size calculation.

Socio-demographic characteristics: A set of questionnaire was used to collect data regarding the socio-demography information such as age, race, education level, police ranks, marital status, the household income and duration of service.

Anthropometric and body composition measurement: All anthropometric measurements were done in accordance to the standard procedure. Height was measured without wearing shoes using SECA Bodymeter 208 (Seca, Germany) to the closest 0.1 cm. The TANITA TBF-300A body fat analyser (Tanita Corp, Japan) was used to measure weight to the closest 0.1 kg. Standard weight of training clothes was deducted from the displayed weight on the weighing machine. The RMP personnel were then classified into body fat categories according to body impedance analysis (BIA) criteria. For subjects below 30 years old, 14-20% body fat is considered normal range while 17-23% body fat is normal for subjects over 30 years old. Body mass index (BMI) was calculated using the formula of weight (kg) divided by height in metre squared (m^2). The BMI categories based on WHO (1998) was

used to classify the RMP personnel's weight status. Underweight is below 18.5, 18.5-24.9 kg m^{-2} is classified as normal, 25.0-29.9 kg m^{-2} is classified as overweight and above 30 kg m^{-2} is considered as obese. Waist circumference (WC) was measured using a flexible, non-stretching measuring tape to the closest 0.1 cm.

Food pyramid knowledge: A questionnaire in Bahasa Malaysia was used to assess the understanding and knowledge of food pyramid among the subjects. A pre-test was done on the questionnaire which involved about 30 male RMP personnel. The pre-test was done to identify the ability of the police to answer the questionnaire in given time and to get any feedback regarding the questionnaire. Reliability of the questionnaire was tested using Cronbach's alpha and 0.78 was measured which indicates an acceptable internal consistency of the scale item[12]. The questionnaire consists of 19 multiple-choice questions on food pyramid, daily servings of each food group and food groups based on food pyramid diagram. For each correct answer, it was scored as 1, if incorrect, the score was 0. Percentage scores of food pyramid knowledge were divided into 3 categories, percentage scores of $\leq$50 marks are indicated as poor, percentage scores of 51-74.9 are moderate and percentage scores of $\geq$75 are considered as good[13].

Statistical analysis: All the data were analyzed using statistical package social science (SPSS) software version 20.0 (SPSS Inc, Chicago, IL, USA). Based on stem and leaf test and box plot, the quantitative data was normally distributed. Descriptive analyses such as frequency, mean, standard deviation and percentage were used to describe socio-demographic and anthropometric measurements of the subjects and food pyramid knowledge. Bivariate correlation was used to determine the correlation between food pyramid knowledge with physical and socio-demographic characteristics of subjects. One way ANOVA was used to determine the differences between means of socio-demographic groups and statistical significance was set to $p<0.05$.

RESULTS AND DISCUSSION

Socio-demographic characteristics: The socio-demographic characteristics of subjects are shown in Table 1. A total of 286 healthy male police were involved in this study. Age of the majority of the subjects (56.6%) were between 20-29 years. About 82.5% of them were Malay followed by Bumiputera of Sabah and Sarawak (14.3%). Most of the subjects were Malaysian Education Certificate (MEC) holders (79.4%) while only 2.8% were degree holders. It also showed that more than half of the subjects participated in this study were married (68.2%). The majority of subjects (98.3%) were junior officers, mostly because of their job scopes which enabled them to participate in the study. It was also observed that most of the subjects (37.8%) earned between RM 2000-RM 2999 monthly, followed with 22.0% of the subjects whom earned RM 1500-RM 1999 monthly. Majority of the subjects have served for 1-10 years (75.9%), followed with 18.5% of subjects served for 11-20 years and only small percentage of subjects (5.6%) have served for 21-30 years.

Table 1: Socio-demographic characteristics of the subjects (n = 286)

Characteristics	Sample size (n) ($\sum$ n = 286)	Percentage
Age (years)		
20-29	162	56.6
30-39	102	35.7
$\geq$40	22	7.7
Race		
Malay	236	82.5
Chinese	4	1.4
Indian	5	1.7
Others	41	14.3
Education level		
MEC	227	79.4
STPM/Diploma	51	17.8
Degree	8	2.8
Rank		
Junior officer	281	98.3
Senior officer	5	1.7
Marital status		
Single	91	31.8
Married	195	68.2
Household income		
RM 1500-1999	63	22.0
RM 2000-2999	108	37.8
RM 3000-3999	61	21.3
> RM 4000	54	18.9
Duration of services (years)		
1-10	217	75.9
11-20	53	18.5
21-30	16	5.6

Table 2: Distribution of BMI status (n =286)

BMI category (kg m^{-2})	Frequency	Percentage
Underweight (<18.5)	0.0	0.0
Normal (18.5-24.9)	96.0	33.6
Overweight (25.0-29.9)	127.0	44.4
Obese ($\geq$30.0)	63.0	22.0

Prevalence of overweight and obesity: According to BMI classification by WHO[14], no subject was underweight, 33.6% were normal, 44.4% were overweight and 22.0% were obese as shown in Table 2. Altogether, about 66.4% of RMP personnel who were either overweight or obese. A prevalence

Table 3: Mean of physical and socio-demographic characteristics of subjects (n =286)

Characteristics	Mean±SD	Range
Age (years)	30.3±6.80	20.0-58.00
Height (cm)	170.0±4.60	150.0-184.0
Weight (kg)	78.2±11.2	55.4-112.0
Waist circumference (cm)	92.0±9.50	76.0-120.0
Body fat (%)	27.1±7.00	10.9-44.20
Free fat mass (kg)	56.3±3.80	37.0-67.10
BMI (kg m^{-2})	27.1±3.90	19.7-39.00

Table 4: Food pyramid knowledge level scores according to demographic groups and BMI status

Knowledge level/groups	Subject (n)	Percentage	Mean (%)
Knowledge level			
Good	14	4.9	81.6±4.00[a]
Moderate	210	73.4	60.0±6.00[b]
Poor	62	21.7	40.2±9.20[c]
Overall	286	100.0	56.8±11.9
Age (years)			
20-29	162	56.6	57.4±12.6[a]
30-39	102	35.7	57.1±10.0[a]
≥40	22	7.7	50.3±13.4[b]
Education level			
Secondary education	227	79.4	56.3±12.2[a]
Tertiary education	59	20.6	58.5±10.8[a]
Marital status			
Single	91	31.8	57.0±12.6[a]
Married	195	68.2	56.6±11.6[a]
Household income			
RM <3000	171	59.8	56.8±12.0[a]
RM≥3000	115	40.2	56.7±12.0[a]
Duration of services (years)			
1-10	217	75.9	57.1±11.9[a]
11-20	53	18.5	57.9±9.70[a]
21-30	16	5.6	47.4±14.6[b]
BMI status			
BMI <25 kg m^{-2}	96	33.7	54.7±14.2[a]
BMI ≥25 kg m^{-2}	190	66.4	57.7±10.4[b]

[a,b,c]Different letters indicate significant differences between groups at $p<0.05$

study on obesity among Turkish police also showed almost similar value of 65.6% were overweight or obese[15]. A study conducted by Sedek *et al.*[16] among Royal Malaysian Navy (RMN) personnel recorded 29.3% were overweight and 7.2% were obese while study conducted with Malaysian Army personnel (MA) reported 32.8% were overweight and 9.3% were obese[6]. Another study done with rescue fire fighters in Selangor, Malaysia reported 44.8% were overweight and 13% were obese[17]. Prevalence of overweight and obesity in this study was significantly higher than studies conducted with RMN personnel, MA personnel and rescue fire fighters in Selangor, Malaysia.

Anthropometric measurements and body composition: Summary of anthropometric characteristics and body weight status are shown in Table 3. In general, the mean age, height, weight, WC, body fat percentage, free fat mass (FFM) and BMI were 30.3±6.8 years old, 170.0±4.6 cm, 78.2±11.2 kg, 92.0±9.5 cm, 27.1±7.0%, 56.3±3.8 kg, 27.1±3.9 kg m^{-2}, respectively. A total of 50.7% subjects had mean WC exceeded the cut-off point for Asian male (>90 cm) which was considered high risk for diabetes and cardiovascular diseases as shown in Fig. 1. The WC percentage in this study was higher when compared to studies with RMN personnel where only 26% of them exceeded 90 cm and a previous study with MA personnel which reported abdominal obesity (AO) of 44%[6,16]. A similar study on Malaysian rescue fire fighters reported 34.8% personnel with AO which was relatively lower when compared to this study[17]. Figure 2 showed distribution of subjects according to BIA body fat level criteria, TBF 300A. A large percentage of subjects (78.3%) had high body fat level. Meanwhile, 12.9% of the subjects had healthy body fat level and only 2.4% had low body fat level. Body fat level in this study however, was higher when compared to other study with Malaysian rescue fire fighters in which 63.7% personnel had high body fat[17].

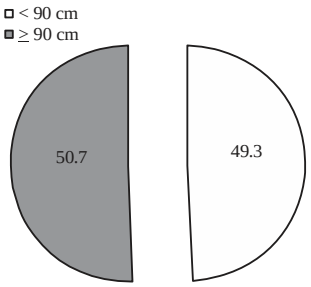

Fig. 1: Distribution of subjects according to waist circumference (n = 286)

Comparison of food pyramid knowledge scores according to demographic groups and BMI status: The mean food pyramid knowledge according to selected demographic groups and BMI status are shown in Table 4. In general, majority of the subjects (77.4%) had moderate food pyramid knowledge, 21.7% had poor food pyramid knowledge while only a small percentage (4.9%) had good knowledge in food pyramid. This study found that there was a significant lower mean score of knowledge between both younger age groups and the older group ($p<0.05$). A similar study done with college students in USA also reported similar findings[10]. Although in previous study by Sedek *et al.*[13] on RMN personnel found that education level showed significant results to the nutrition knowledge level, this study somehow showed that education level did not affect the knowledge of food pyramid among the subjects. This may due to the lack of interest in

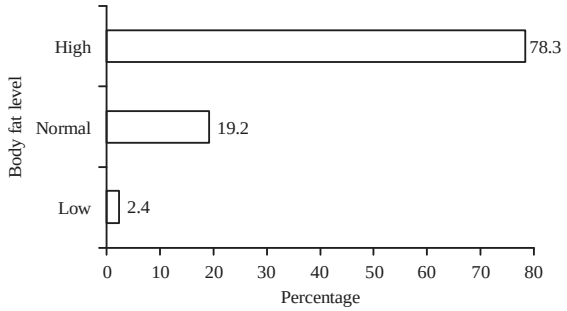

Fig. 2: Distribution of subjects according to body fat levels (n = 286)

food pyramid and nutrition knowledge among the subjects, regardless of their education level. A study on nutrition knowledge showed that only those who are health-conscious and had intention to learn were concerned about food pyramid knowledge or nutrition knowledge, regardless of their age, background and education level[18]. There was no significant difference in mean score of knowledge with marital status. Although it is expected that married subject should have higher food pyramid knowledge since they have families to take care of. However, opposite results were shown in this study.

Similarly, there was no significant difference in mean of food pyramid knowledge between household income groups in this study. A previous research by Cluss *et al.*[19] reported low nutrition knowledge among low-income parents in USA. Parents with high-incomes have a broader choice in food shopping and food preparation, so having basic nutrition knowledge would help them in choosing the best nutrition for their children. However, it seemed that RMP personnel who have served 1-10 years and 11-20 years obtained significantly higher ($p<0.05$) in mean of food pyramid knowledge compared to those who have served for 21-30 years ($p<0.05$). Younger RMP personnel may have their own initiative to learn food pyramid knowledge or may have been taught the food pyramid knowledge during school or University. This study also found that group with higher BMI scored higher mean of food pyramid knowledge compared to group with normal BMI. A study on obesity reported that people with higher BMI scored better in nutrition knowledge questionnaire despite being overweight or obese. A previous research by Thakur and D'Amico[20] reported that those with higher BMI tend to equipped themselves with proper nutrition knowledge in order to practice healthy lifestyle as well as to lose weight to attain a normal BMI.

Table 5 showed negative correlations between food pyramid knowledge with age ($r = -0.173$, $p<0.05$) and duration of service $r = -0.160$, $p<0.05$). It is observed that younger age and shorter duration of services had significant correlation with food pyramid knowledge. There was a weak positive correlation between food pyramid knowledge and BMI ($r = 0.124$, $p<0.05$). Meanwhile, there were no significant correlation between food pyramid knowledge with household income ($r = 0.001$, $p>0.05$), WC ($r = 0.110$, $p>0.05$), body fat percentage ($r = 0.096$, $p>0.05$) and free fat mass ($r = 0.058$, $p>0.05$).

Table 5: Correlation between food pyramid knowledge with physical and socio-demographic characteristics (n = 286)

	Food pyramid knowledge
Characteristics	r
Age (year)	-0.173**
Household income (RM)	0.001
Duration of services (year)	-0.160**
Waist circumference (cm)	0.110
Body fat (%)	0.096
Free fat mass (kg)	0.058
BMI (kg m^{-2})	0.124*

**Correlation is significant at 0.01 level (2-tailed), *Correlation is significant at 0.05 level (2-tailed)

Table 6: Correct answers for each question by the subjects

Questions	Percentage
Lowest intake of food group in food pyramid	95.9
Nutrients in a balanced diet	94.4
Food group for sweet condensed milk, cheese and butter	90.7
Food group for rice, noodle and bread	88.4
Food group for meat, egg, fish and legumes	88.4
Daily serving size of fat	86.6
Food group for tomato, orange and spinach	85.4
Definition of food pyramid	81.7
Application of food pyramid	79.1
Daily serving size of protein	66.4
Determine position of food group 5 in food pyramid	64.9
Determine position of food group 4 in food pyramid	61.6
Daily serving size of fruits and vegetables	47.0
Determine position of food group 3 in food pyramid	44.0
Determine position of food group 1 in food pyramid	21.6
Highest intake of food group in food pyramid	17.5
Determine position of food group 2 in food pyramid	15.7
Daily serving size of rice, noodle and bread	14.6
Daily serving size of carbohydrate	6.3

Analysis of questions on food pyramid knowledge: Table 6 showed questions used to assess the understanding and knowledge of food pyramid among RMP and the percentage of correct answers for each question. A total of 9 questions obtained >50% correct scores while most questions on daily serving of each food group and naming each food group based on food pyramid diagram obtained low percentage of less than 50%. Question on the lowest intake of food group in food pyramid recorded the highest percentage (95.9%), followed with question on important elements in food pyramid (94.4%). Questions on food groups with food

examples recorded almost similar values (90.7, 88.4, 88.4 and 85.4%). It was then followed with questions on definition and application of food pyramid at 81.7 and 79.1%. Questions on daily serving size of protein and food groups 5 and 6 based on food pyramid diagram also recorded almost similar values (66.4, 64.9 and 61.6%).

Most questions related to carbohydrate such as daily serving size and food group 1 based on food pyramid diagram recorded low percentage (6.3, 14.6 and 21.6%). Another low percentage was recorded for question on highest intake of food group in food pyramid at 17.5%. A study regarding nutrition knowledge among RMN personnel reported that question on highest intake of food group in food pyramid recorded low percentage of 21.8%, which almost similar to this study (17.5%)[13]. A study on college students stated that in order to get high scores in nutrition knowledge, basic understanding of nutrition is necessary[10]. Otherwise, it is possible for subjects to randomly answer the questions without knowing the correct answer. This statement is supported by a study among Canadian University students which stated that students with basic or high nutrition knowledge were able to answer most of the questions correctly and thus practice healthy eating especially in fat consumption in their diets[21].

CONCLUSION

This study showed presence of overweight and obesity among RMP population. Two-third of the subjects was either overweight or obese. A large percentage of subjects have abdominal obesity and body fat percentage. Majority of the subjects was in a moderate category for food pyramid knowledge. There was an inverse significant correlation between food pyramid knowledge with age and duration of services while positive correlation with BMI. Healthy dietary habits and sufficient nutrition and food pyramid knowledge are essential components in maintaining health and also preventing obesity and other non-communicable diseases.

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