

# Prevalence and Factors Associated with Obesity among Army Personnel in Malaysia

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## ABSTRACT

**Obesity is a preventable yet neglected global health issue. The Malaysian National Health and Morbidity Survey showed that the prevalence of obesity has tripled over a period of ten years. Similarly, the prevalence of obesity among army personnel is increasing in many countries. The objective of this study was to determine the prevalence of obesity and its associated factors among male army personnel in Malaysia. A cross sectional study was performed among 392 male army personnel between May and July 2008. Their sociodemographic data and anthropometric measurement were taken. Data was analyzed using SPSS version 16.0. The prevalence of overweight and obesity was 30.1% and 15.6% respectively. Only about half of the respondents (53.1%) had normal body mass index. Obesity was associated with age, duration of service, waist circumference, exercise frequency and smoking status. As a conclusion, prevalence of obesity among male soldiers in Malaysia was higher than that of the Malaysian general population. Measures need to be done to tackle the issues of overweight and obesity.**

**Keywords:** Obesity, Overweight, Army, Soldiers

## INTRODUCTION

Obesity is the most preventable yet neglected health issue that threatens many nations <sup>1</sup>. In Malaysia, the prevalence of obesity has tripled over the last decade. The Malaysian National Health and Morbidity Survey (NHMS) II in 1996 reported that 16.6% of adults were overweight while 4.4% were obese <sup>2</sup>. Ten years later, the National Health and Morbidity Survey (NHMS) III in 2006 showed the prevalence of overweight and obesity has increased to 29.1% and 14.0% respectively <sup>3</sup>. Obesity is a well known risk factor for cardiovascular diseases and many other health problems. Statistics of cardiovascular mortality in Peninsular Malaysia has shown a rising pattern since 1950 <sup>4</sup>. From the statistics, cardiovascular diseases which occupied the third place as a cause of death in 1950 has emerged as the number one killer during the 1970s and still remained in 1980s. Cerebrovascular accident and coronary heart diseases were the main contributing factors.

An increase in the prevalence of overweight and obesity is also seen among army soldiers in many countries. In Southeast Asia, it has been observed in Singapore from 1992 to 2004, where the national prevalence of obesity had increased from 5.1% to 6.9% <sup>5</sup>.

In Brazil, their army showed an upward trend in the prevalence of overweight and obesity in the last two decades <sup>6</sup>. Similarly, there is an increase in the prevalence of overweight and obesity among Saudi soldiers and it is positively correlated with the prevalence of cardiovascular risk factors <sup>7</sup>. A study among United States Navy personnel noted that those with overweight and obesity are likely to fail their physical readiness training <sup>8,9</sup>. It is therefore important to have a clear picture regarding obesity among Malaysian army personnel so that an early intervention can be carried out. The main objectives of this study are to determine the prevalence of obesity and its associated factors among male army personnel in Malaysia.

## MATERIALS AND METHODS

A cross sectional study was done between May 2008 and July 2008 involving male army personnel aged 20 years and above with no diabetes or coronary artery disease. The study was done in one of the army camps in Malaysia. The camp consists of 20 army units and has a population of approximately 5000 personnel of which can be either combat or non combat. Twenty army personnel were selected from each unit using simple random sampling. The respondents were asked to fill out a simple questionnaire which consisted of demographic data including age, race, marital status, rank position, service group of either combat or non combat, duration of service, smoking status and frequency of exercise. Weight and height were measured using the standard protocol. The weight was measured using calibrated digital scale, Tannita F39.2 Model to the nearest 0.01 kilogrammes. The height was measured to the nearest 0.1 centimetre. Body mass index (BMI) was calculated using World Health Organisation (WHO) formula ( $BMI = \text{weight in kilograms} / (\text{height in metre})^2$ ). The BMI was classified according to WHO classification (1998) <sup>10</sup>. Waist circumference was also measured using standardized measuring tape at a level midway between the superior iliac crest and the costal margin in the mid-axillary line. It was measured to the nearest 0.1 centimetre. The waist circumference was classified according to abdominal obesity defined by the National Heart Lung and Blood Institute (2000) <sup>11</sup>. A cut off point of 102 centimetres and above is taken as it is associated with disease risk.

## Statistical analysis

We determined that to achieve 90% response rate, the sample size would be 388. We later rounded off the sample size to 400. Data were analysed using Statistical Program for Social Sciences (SPSS) Version 16.0.1 software (Chicago, IL).

Descriptive analysis was done to obtain the frequency, percentage and 95% confidence interval (CI). Simple and multiple logistic regression was used to determine the potential associated factors for obesity while controlling for other confounders. The level of significance was set at 0.05.

### Ethical issues

Since military personnel is considered a vulnerable group, an independent witness who was a civilian was present throughout the consent and data collection process. Permission for this research was obtained from the Ministry of Defense, Malaysia as well as being approved by the Research and Ethical Committee, School of Medical Science, Universiti Sains Malaysia Health Campus on 21st April 2008. Permission for publication of this research was obtained from the Ministry of Defense.

**Table 1. Socio-demographic characteristics of respondents (n= 392)**

Variables	Mean (SD)	n (%)
Age (years)	28.1 (6.27)	
Race		
Malay		341 (87.0)
Indian		6 (1.5)
East Malaysian		45 (11.5)
Indigenous		
Marital status		
Single		187 (47.7)
Married		205 (52.3)
Rank position		
Officers		3 (0.8)
Non-Officers		389 (99.2)
Service group		
Combat		196 (50.0)
Non-combat		196 (50.0)
Duration of services (years)	8.4 (5.2)	
≤ 5		152 (38.8)
6 – 10		117 (29.8)
11 – 15		70 (17.9)
16 – 20		49 (12.5)
≥21		4 (1.0)
Smoking status		
Active smoker		296 (75.5)
Non-smoker		96 (24.5)
Frequency of exercise		
≥ 3 times per week		202 (51.5)
< 3 times per week		190 (48.5)

### RESULTS

A total of 400 male respondents from various units were enrolled in this research. Eight participants were dropped from the study due to missing records making a response rate of 98.0% (392). The respondents consisted of combat units, 196 (50.0%) and non-combat units, 196 (50.0%).

**Table 1** shows the baseline characteristics of the respondents. The respondents were mainly young adults with a mean age (SD) of 28.1 (6.27) years. The majority were Malays, non-officers and in service for less than ten years.

**Table 2** shows the waist circumference measurement and BMI classification among the respondents. The majority (89.5%) had a waist circumference of less than 102 cm. The mean BMI (SD) was 25.2 (4.6) kg/m<sup>2</sup>. The prevalence of overweight and obesity was 30.1% and 15.6% respectively. Only about half of the respondents (53.1%) had normal BMI.

**Table 2. Waist circumference measurement and BMI classification of the respondents (n=392)**

Variables	Mean (SD)	n (%)
Waist circumference (cm)	83.8 (12.8)	
≥ 102 cm		41 (10.5)
< 102 cm		351 (89.5)
Body mass index (kg/m <sup>2</sup> )	25.2 (4.6)	
Underweight (<18.5)		5 (1.3)
Normal (≥18.5 – 24.9)		208 (53.1)
Overweight (25.0 – 29.9)		118 (30.1)
Obese Class I (30.0 – 34.9)		51 (13.0)
Obese Class II (35.0 – 39.9)		7 (1.8)
Obese Class III (≥ 40.0)		3 (0.8)

**Table 3** shows that obesity was associated with age, duration of service, waist circumference, exercise frequency and smoking status.

### DISCUSSION

The nature of employment in Malaysian Army demands good physical and mental capabilities. Soldiers must be free from any illness or disability that would prevent them from carrying out their duties throughout the service life. Work absentees due to medical illness were seen in soldiers with high BMI, poor muscle fitness and poor physical endurance<sup>12</sup>.

Obesity problem among Malaysian Armed Force has been found to be increasing since the 1970s<sup>13</sup>. In a study among Royal Malaysian Navy in 2005, the prevalence of overweight and obesity was 29.8% and 6.4% respectively<sup>14</sup>. Our study revealed that the prevalence of overweight and obesity among male soldiers is 30.1% and 15.6% respectively. It is alarming that the prevalence of obesity was double than that of the Royal Malaysian Navy and higher than that of the NHMS III<sup>3</sup>.

**Table 3. Associated factors for obesity**

Variables	Crude OR <sup>a</sup>	(95% CI <sup>b</sup> )	LR stat <sup>c</sup>	P value
Age (years)	1.90	(1.78, 1.98)	-2.37	0.018
Duration of service (years)	1.80	(1.72, 1.96)	-2.12	0.017
Waist circumference (cm)	1.4	(1.17, 1.65)	3.81	< 0.001
Exercise Frequency				
≥ 3 times per week	1.0			
< 3 times per week	3.59	(1.04, 12.46)	2.59	0.044
Smoking status				
Non Smoker	1.0			
Smoker	4.57	(1.24, 16.81)	3.04	0.022

In South East Asian region, The Royal Thai Army had lower prevalence of overweight and obesity compared to our study<sup>15</sup>. The study which was done in 2005 also showed lower mean BMI value of 24.0 kg/m<sup>2</sup>. The upward trend of obesity prevalence was observed in many other nation armies. This is probably because war revolution has changed the soldiers towards a more sedentary lifestyle as well as the obesity trend in general is increasing. When The United State Military Service conducted the national service, they found the prevalence of obese applicants showed an increasing trend from 2.8% in 1993 to 6.8% in 2006<sup>16</sup>.

A small technical report done in 1976 regarding Malaysian Army anthropometric profiles showed that the mean BMI among Malaysian armed Force personnel was 21.3 kg/m<sup>2</sup><sup>13</sup>. In 2005, a study on Royal Malaysian Navy (RMN) showed that their mean BMI was 23.1 kg/m<sup>2</sup><sup>14</sup>. Our study shows that the mean BMI has increased further to 25.2 kg/m<sup>2</sup> only after a few years despite the current health promotion and regular medical screening among Malaysian Army personnel. In the Middle East, studies carried out in 2004 showed that the mean BMI for Saudi soldiers was 29.4 kg/m<sup>2</sup> which already fell into the overweight category<sup>7</sup>.

Our study showed that increasing age and duration of service is associated with obesity. Since about a third of the respondents have served more than ten years, this will contribute to a high proportion of army personnel who may later develop obesity. In Malaysian general population, obesity is associated with increasing age, female gender, Malay ethnicity and living in the urban area<sup>17</sup>. Meanwhile Napradit et al. also showed that increased in age is associated with overweight<sup>14</sup>, similar findings were also observed among Belgian Army and Greek Navy regarding factors associated with obesity which are increasing age and physical inactivity<sup>18,19</sup>.

The explanation for this in the Malaysian army scenario is probably the tendency of the senior personnel to be shifted to do office duty than the junior personnel. This occurs mainly after they have completed the compulsory regimental course which is usually carried out during the first 10 years of service.

Office duty may have lack of physical activity compared to field duty. Another possible explanation is the longer the service, the possibility that the person to be promoted to a higher rank is higher.

Higher rank personnel are usually in the administrative work and hence will result in lack of physical activity. Although smoking is associated with weight loss, our study showed that smokers have a higher tendency to be obese. This is in contrast to the study by Napradit et al. where smoking is inversely related to obesity<sup>15</sup>. This is alarming since both smoking and obesity are known cardiovascular risk factors especially when our study showed that about three quarter of the respondents are smokers

This study also showed that those who are obese are less likely to exercise. Only about half of the respondents adequately exercise. Although we assume that routine activity of army personnel should involve active lifestyle, it may not be adequate to maintain their ideal body weight. Regular exercise should be promoted even among army personnel. The proportion should be higher considering that they are army personnel and demand for physical fitness is higher.

#### Limitation of the study

This study only sampled one army camp in Malaysia and may not represent the true picture of the Malaysian army population as a whole. However, the population that was sampled was quite large enough and measures were taken so that the sampling represents the whole population of the camp. The cutoff point used in the classification of obesity and waist circumference was higher than that of recommended by the Malaysian guidelines (2004)<sup>20</sup>. If the Malaysian guidelines cut off point was used, the prevalence of overweight, obesity and abdominal obesity are expected to be higher. This should be put into consideration.

#### CONCLUSION

This study showed that the prevalence of obesity among army personnel is increasing in trend. In fact, it is higher than that of the general population. Assuming that their lifestyle should be more active than the general population, our study showed otherwise. The current activities in the army may not be adequate to maintain their ideal body weight as expected to carry out their duty. The arm forces should start implementing the recommended healthy lifestyle practices which include physical exercise at least three times a week and avoidance of smoking to their personnel. Not only maintaining an ideal body weight is important, efforts to reduce cardiovascular risks as a whole is more crucial. All these preventive activities are important especially in a career which demands physical fitness and being free from any serious diseases.

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