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Research Article
Physical Activity Level Among Military Veterans in Marang, Terengganu, Malaysia

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Abstract

Background and Objective: The increase in obesity among male military veterans (MVs) is often associated with low levels of physical activity and unhealthy food intake. This situation causes various health diseases if actions are not undertaken to overcome this problem. Therefore, this study aimed to evaluate the level of physical activity and to determine the relationship between body mass index (BMI) and physical activity level among MVs in Marang, Terengganu, Malaysia. **Materials and Methods:** This study involved 209 male MVs aged 40-60 years old. Data collection involved anthropometric measurements, including weight, height and waist circumference (WC). Meanwhile, the instrument comprised questions regarding sociodemographic characteristics, health status and physical activity habits. The physical activity level (PAL) was measured using the International Physical Activity Questionnaire (IPAQ). **Results:** This study showed that 41.1% of the respondents were categorized as normal weight, 42.1% overweight and 16.8% obese. The mean weight, height, BMI and waist circumference were 75.213.5 kg, 169.76.3 cm, 26.14.2 kg m^{-2} and 83.99.7 cm, respectively. A total of 20% of respondents showed a WC of more than 90 cm and were considered to be at high risk of cardiovascular disease and diabetes. Most of the subjects preferred sedentary behaviour, such as watching television/listening to the radio (52.6%), to exercise (7.2%). The average PAL of the respondents was 2445.8±642.1, with most of the respondents reporting a moderate PAL (81.3%) compared to a high (15.8%) or low PAL (2.9%). There was a negative correlation ($p<0.01$) between BMI and low, medium and high MET physical activity scores $r = 0.210$, $p = 0.002$; $r = 0.638$, $p<0.001$; $r = 0.423$, $p<0.001$, respectively). **Conclusion:** Most of the MVs in this study had moderate PALs. The Veterans Association of Malaysia Armed Forces can use the information collected to plan health-related programmes to prevent unhealthy lifestyles and chronic diseases among MVs.

Key words: Body mass index, physical activity, military veterans, lifestyle, obesity problem

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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

Exercise and physical activity can prevent the loss of body function and improve quality of life[1-3], as well as reduce the risk of illness and death[4]. Several studies reported a correlation between physical activity, physical fitness and quality of life among civilian veterans[5,6]. Prevention of declining function of life among civilian veterans has been recognized as a key clinical factor in the care of older people[7]. Overweight and obesity are the leading causes of many health problems, such as heart disease and diabetes[8]. A significant increase in obesity is not only a major concern among veterans in the general population but also among military veterans[9].

Food intake and physical activity are important factors in the prevention of various chronic diseases. The increase in the lack of physical activity among military veterans is a contributing factor to overweight and obesity, as these groups are classified as high risk because of their age. Military personnel live a hectic day-to-day life during their time in service in terms of physical training and regular dietary intake compared to their retirement lifestyle. However, several studies[10,11] have reported a high prevalence of overweight and obesity among most of the military personnel in service, which could negatively impact their mortality rate after retirement. The purpose of this study was to focus specifically on the nutritional status and level of physical activity of Malaysian military veterans. This study also determines whether this group is still practising an active lifestyle after retirement and its impact on body mass index (BMI).

MATERIALS AND METHODS

Ethical approval: This study was conducted with the approval of the Veteran Affairs Department, Malaysian Armed Forces. An approval letter to conduct this study was also obtained from the Medical Research and Innovation Secretariat Committee, Counsellor Tuanku Mukhriz Hospital (reference number: UKM PPI/111/8/JEP-2017-708).

Subject and study location: A cross-sectional study was carried out with randomly selected respondents based on a registered list as members of the Department of Veteran Affairs Malaysian Armed Forces in Marang, Terengganu. A total of 206 male military veterans who had never been paroled and who were 40-60 years old voluntarily participated in this study. The sample size was determined according to Krejcie and Morgan[12].

Sociodemographic information: A set of questionnaires was used to collect data regarding sociodemographic information, such as age, marital status, education level, household income, duration of service and latest occupation.

Anthropometric measurement: All anthropometric measurements were performed in accordance with the standard procedure. Height was measured with the participant standing upright without wearing shoes using aSECA Body Meter 208 (SECA, Germany) to the closest 0.1 cm. The TANITA Digital Lithium Scale (HD319; TANITA Corporation, Tokyo, Japan) was used to measure weight to the nearest 0.1 kg. Respondents were measured while wearing light clothing and being barefoot. Body weight and height were required to determine the BMI and were calculated based on weight (kg)/height (m)^2. BMI is an indicator of nutritional status that is used in adults; the categories were based on Waxman and World Health Assembly[13] criteria and were defined as follows: underweight: BMI <18.5 kg m^{-2}; normal: BMI 18.5-24.9 kg m^{-2}; pre-obese: BMI 25.0-29.9 kg m^{-2}; class one obese: BMI 30.0-34.9 kg m^{-2}; class two obese: BMI 35.0-39.9 kg m^{-2}; and class three obese: BMI ≤ 40.0 kg m^{-2}. The waist circumference was measured using a flexible, non-stretchable plastic measuring tape to determine waist and hip circumferences to the nearest 0.1 cm. WC was measured using a measuring tape at the mid-point between the inferior margin of the last rib and the iliac crest. Based on the cut-offs recommended for the Asian population[14], individuals with a WC greater than 90 cm are considered to be at greater risk of cardiovascular and diabetic diseases.

Questionnaires: Questionnaires on physical activity habits and physical activity levels were distributed to the subjects. Physical activity habits include the type of activities performed during leisure time, the importance of physical activity for health, level of physical activity, the frequency of physical activity and the duration of exercise. The International Physical Activity Questionnaire (IPAQ) was used to determine the level of physical activity of the respondents[15]. The respondents were required to estimate the frequency and time spent on physical activity during the last seven days. Recorded physical activities include physical activity at work, home and leisure activities, transportation from work, exercise or sports activities in their leisure time and time used for sitting. The metabolic equivalent (MET) was used to analyse IPAQ data. The formulas were calculated using the IPAQ[15] formula for calculating physical activity scores, as shown in Table 1. Scores for each type of activity were calculated by multiplying the MET values by the time (min) used and the frequency (days) of the physical activity.

Table 1: Calculation formula of physical activity score

Type of physical activity	Calculation formula (MET-min week^{-1})
Walking activity	3.3 MET × duration runs in min × the number of days in a week
Moderate physical activity	4.0 MET × duration runs in min × the number of days in a week
Heavy physical activity	8.0 MET × duration runs in min × the number of days in a week
Total score of physical activity	Total score of MET-min week^{-1} for all the three activities (walking, moderate and heavy physical activity)

Source: Ara[15]

The score is expressed as a MET-min week^{-1} score. Total physical activity was calculated by multiplying the total MET-min week^{-1} score for all activities. The physical activity score was defined as low with a MET score <600 min week^{-1}, moderate with a MET score ≥ 600 min week^{-1} and high with a MET score ≥3000 min week^{-1}.

Statistical analysis: All data obtained were analysed using Statistical Package for Social Science software (version 23.0; Armonk. NY, USA). Descriptive statistics including means, standard deviations and percentages were used for physical activity habits, physical activity levels and anthropometric measurement. The Pearson correlation test was used to determine the relationship between BMI and physical activity levels. The level of statistical significance was pre-set at $p<0.05$.

RESULTS AND DISCUSSION

Anthropometric measurement: The anthropometric measurements involved in this study included height, weight and waist circumference. Table 2 shows the mean anthropometric characteristics of the overall sample of respondents. The mean weight, height, BMI and waist circumference of the respondents were 75.2±143.5 kg, 169.7±6.3, 26.1±4.2 and 83.9±9.7 cm, respectively. A mean BMI above 25 kg m^{-2} is considered to be in the overweight category, while a mean waist circumference not exceeding 90 cm is considered to be in the normal waist circumference category. This study found that the majority of the respondents were male (67.8%) and were aged 50-59 years old (62.9%).

Based on Fig. 1, most of the respondents were overweight or obese (42.1%), followed by normal weight (41.1%), while a few respondents (16.8%) belonged to the obese group. According to the findings of Das *et al.*[16], 73% of the military veterans of the United States of America (U.S.) had BMIs above 25 kg m^{-2}, while 32.9% had BMIs above 30 kg m^{-2}. In the U.S., obesity issues have a significant impact on military veterans and most studies have shown that the prevalence of obesity among military veterans had increased[9]. A study conducted in the U.S. also reported that most of their veterans were obese

Table 2: Mean anthropometric characteristics of subjects

Anthropometric profile	Mean±standard deviation
Weight (kg)	75.2±13.5
Height (cm)	169.7±6.3
BMI (kg m^{-2})	26.1±4.2
Waist circumference (cm)	83.9±9.7

(46.9%) and overweight (37.5%)[17]. However, previous studies on U.S. military veterans show that the percentage of obesity was significantly higher than that shown in this study.

In addition, a study conducted in the U.S. on military veterans found that most had problems with overweight or obesity, in comparison to those in the general population of the same gender and age range. They reported having obesity problems and receiving treatment from health professionals due to obesity-related health problems[18]. Moreover, overweight and obesity problems have contributed to rising medical costs and the prevalence of both problems are expected to continue rising among U.S. veterans[19]. A number of studies on local soldiers have reported that most personnel who were in service suffered from overweight and obesity, which may affect their lives after retirement. The study of Sedek *et al.*[11] on the Royal Malaysian Navy (RMN) personnel showed the prevalence of overweight and obesity to be 29.3% and 7.2%, respectively, while the study of Nadiy *et al.*[10] on the Malaysian Armed Forces showed a higher prevalence of overweight (32.8%) and obesity (9.3%). Based on a study by Teachman and Tedrow[20], U.S. military personnel have a high prevalence of obesity and BMI even though they are still in service. Adebay *et al.*[21] reported that most of the Nigerian soldiers aged between 30 and 39 years were overweight and obese. The increase in overweight personnel in the military population has led to various health-related problems and job performance was also affected[22].

Waist circumference values greater than 90 cm (35 inches) in men are the cut-off point for Asian populations, which is considered at high risk for cardiovascular disease and diabetes[23]. The percentage of subjects who had normal waist circumference (80%) was higher than the percentage of those with risky levels of waist circumference (20%). This indicates that the majority of the respondents are at low risk of cardiovascular disease and diabetes. Higher waist circumference indicates high levels of fat stored around the waist and a high risk of obesity. In this study, a total of 16.8%

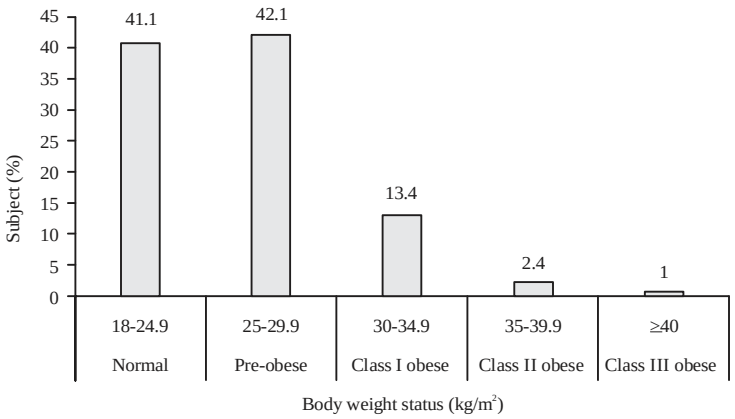

Fig. 1: Distribution of weight status

of the respondents were categorized as obese and most of them had a waist circumference greater than 90 cm. Population studies by Kusher and Blatner[24] showed that individuals with high waist circumference have poor health and tend to have a greater risk of cardiovascular disease than do individuals with normal waist circumference.

Physical activity habits: Physical activity plays an important role among older adults because physical activity improves muscle strength, endurance and flexibility to engage in daily activities in life[25]. Based on Table 3, most of the respondents recorded watching television/listening to the radio (52.6%) and other outdoor physical activities (26.8%) as the most frequent activities in their leisure time, while the rest (a small percentage of 5-8%) stated that they used computers, played sports and slept/rested regularly. The maintenance of good health and healthy lifestyles among older adults is a major challenge. This is because the ageing factor contributes to lower levels of physical activity and limited activity choices[26]. The study examined the perceptions of the respondents of the importance of physical activity for health and most respondents (89.5%) stated that physical activity is very important for health. In general, regular physical activity improves body composition, glucose homeostasis and insulin sensitivity and helps reduce blood pressure, systemic inflammation and blood clotting. Regular physical activity improves lipid profiles through reduced levels of triglycerides and low-density lipoprotein (LDL) as well as increased levels of high-density lipoprotein[27]. However, a small percentage of respondents stated that physical activity was not important for health or were unsure about whether physical activity was important for their health (5.3% for both responses). In theory, military personnel live a healthy lifestyle while in service because of the demands of their duties and responsibilities. This lifestyle becomes part of their lives but once they retire, their daily routine may change.

Table 3: Physical activity habits of subjects

	N = 209	
Physical activity habits	No.	Percentage
Often activities during leisure time?		
Watching TV/listening to the radio	110	52.6
Using the computer	12	5.7
Engaging in a sports activity	15	7.2
Sleeping/resting	16	7.7
Engaging in another outdoor physical activity	56	26.8
Is it physical activity is important for health?		
Very important	43	20.6
Important	144	68.9
Not important	11	5.3
Uncertain	11	5.3
How active you are physically?		
Active	31	14.8
Moderate active	168	80.4
Not active	10	4.8
How often you exercise for at least 20 min?		
Every day	14	6.7
4-6 times a week	8	3.8
2-3 times a week	59	28.2
Once a week	55	26.3
1-3 times in a month	37	17.7
Never	36	17.2
How long you exercise every time?		
<15 min	57	27.3
15-30 min	138	66.0
>30 min	14	6.7

Based on the results of this study, a total of 80.4% respondents assumed they were at a moderate level of physical activity. Littman *et al.*[28] stated that U.S. military veterans reported being less likely to engage in active physical activity after their retirement even though they are reported to be active in the service and this is because during their service, they are forced to abide by the rules in the military camp rather than rely on their own willingness to maintain a healthy lifestyle[29].

In addition, the results of this study also showed that the majority of the respondents reported that they exercised for at least 20 min two to three times a week (28.2%) and once a week (26.3%), while some respondents stated that they did not exercise (17.2%). The results of this study showed a drastic decrease in the physical activity of the respondents compared to their previous active life prior to retirement.

Regarding the duration of exercise, more than half of the respondents stated that they exercised for 15-30 min (66%) each session. The respondents who exercised for less than 30 min did so due to their current lifestyle, which differs from their lifestyle during their service, which required them to undergo rigorous physical training. A study conducted in the Netherlands among adult men reported that the average time spent in physical activity decreased in comparison to the time spent exercising 10 years prior[30]. The study by Haibach *et al.*[31] stated that during the early service period, the U.S. military are generally healthier than the general population; however, after the end of their service, their health level is the same or worse than that of the general population due to poor physical activity levels and unhealthy food intake.

Physical activity level: The questionnaire known as the International Physical Activity Questionnaire (IPAQ) was used to measure the physical activity levels of the respondents. The intensity and frequency of physical activity over a 7 day period and the MET scores were recorded. Table 4 shows that the mean metabolic equivalent (MET) scores for high, moderate and walking intensity were, respectively, 991.1±397.3 MET, 964.3±280.9 MET and 490.5±151.8 MET.

Fig. 2 shows a summary of the category of physical activity using the IPAQ for the study respondents. There are three categories of physical activity levels based on the IPAQ: low (<600), medium (≥600) and high (≥3000). Most military veterans involved in this study had a moderate level of physical activity (81.3%) compared to high (15.8%) and low (2.9%) levels.

The percentage of respondents who assumed themselves to be inactive (4.8%) was slightly higher than the percentage indicated by reports of physical activity levels. In addition, the increase in BMI may also influence the decline in the respondents' levels of physical activity. Based on the study by Littman *et al.*[29], most U.S. veterans have lower levels of physical activity than do those who are in service and they spend more time in sedentary activities. The results of this study are supported by the findings of Smith *et al.*[17], who showed that the level of physical activity of U.S. military veterans decreased as they retired and returned to normal life, in line with their unhealthy eating habits.

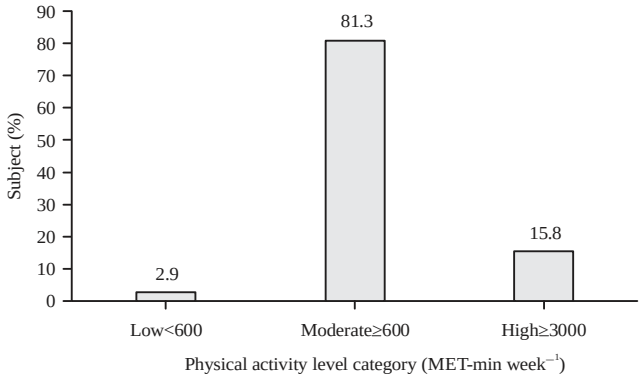

Fig. 2: The physical activity level category (MET-minutes/week) of the study subjects

Table 4: Physical activity level of the study subjects

Physical activity (MET-min week^{-1})	Mean±standard deviation
High intensity	991.1±397.3
Moderate intensity	964.3±280.9
Walking intensity	490.5±151.8
Total physical activity	2445.8±642.1

Table 5: Relationship between body mass index and MET scores of physical activity of the study subjects

	Body mass index	
MET physical activity score	r value	p-value
Low	-0.210	0.002*
Moderate	-0.638	<0.001*
High	-0.423	<0.001*

*There was a correlation between BMI and MET scores of physical activity ($p<0.01$)

Another study was conducted in the U.S. using the moderate-to-vigorous activity (MVPA) guidelines to determine if their veterans reached the same level of physical activity after retirement. The results show that only 50.4% of their veterans reached the required level of physical activity less than two years after their retirement and this shows a drastic decrease in their level of physical activity[29]. Physical activity is often influenced by individual lifestyle. It is also a major factor in health and plays an important role in preventing dangerous diseases such as cancer, obesity, diabetes and heart disease, especially in older adults[33].

Relationship between BMI and MET physical activity scores: Exercising is a great activity for fitness. Moreover, this activity helps to reduce excess body fat, reduce the risk of chronic disease and reduce daily stressors, including emotional, social and mental stress[34]. Based on Table 5, the results showed that there was a negative significant ($p<0.01$) correlation between BMI and low, moderate and high MET physical activity scores ($r = -0.210$, $p = 0.002$; $r = -0.030$, $p<0.001$ and $r = -0.423$, $p<0.001$, respectively). This indicates that low physical activity

levels among respondents contribute to an increase in BMI. This study is in line with the findings of the study conducted by Littman *et al.*[29] on U.S. military veterans, which reported that a decrease in the level of physical activity contributes to an increase in their BMI. The results of this study show that the higher the BMI is, the lower the level of physical activity of the study respondents. This condition may contribute to the higher prevalence of obesity among the respondents after retirement.

CONCLUSION

Most respondents are engaged in sedentary activities, such as watching television/listening to the radio, rather than sports activities. The proportion of respondents who perceived that they had a moderate level of activity was much higher than the proportion of those who perceived that they had a high level of activity. Four-fifths of respondents were in the category of moderate physical activity. There was a significant and negative correlation between BMI and the MET scores of low, moderate and high physical activity levels.

SIGNIFICANCE STATEMENT

This study shows that the physical activity level of military veterans can be of use to the Veterans Association of Malaysia Armed Forces and military health-related agencies, as these data could be used in the initiation of comprehensive programmes to prevent unhealthy lifestyles, low physical activity level and obesity among military veterans. This study will help researchers uncover critical issues related to unhealthy lifestyles faced by military veterans that many researchers have previously been unable to explore. Thus, a new theory on the factors that contribute to obesity can be developed to prevent low levels of physical activity.

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