OPEN ACCESS Asian Journal of Clinical Nutrition

ISSN 1992-1470
DOI: 10.3923/ajcn.2018.

Research Article
Relationship Between Body Composition and Physical Fitness among Royal Malaysia Police Personnel in Selangor, Malaysia

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Abstract

Background and Objective: The challenging study of police officers requires high level of physical fitness and good aerobic fitness. The primary aim of the study was to identify the relationship between body composition and physical fitness among Royal Malaysia Police (RMP) personnel in Selangor, Malaysia. **Method:** A total of 263 male personnel aged 20-39 years were randomly selected from a district police headquarter in Selangor. Anthropometric measurements, including height, weight and waist circumference (WC) were taken. Body composition was measured using bioelectrical impedance analysis method. The physical fitness tests consisted of sit-ups, push-ups, standing long jump and a 4×10 m shuttle run. The VO_2 max test was carried out to evaluate aerobic fitness. **Results:** The prevalence of normal, overweight and obesity in this study were 34.6, 43.0 and 22.4%, respectively. Results showed that BF was significantly correlated with number of sit-ups ($r = -0.257$, $p<0.001$), push-ups ($r = -0.621$, $p<0.001$), standing long jump ($r = -0.603$, $p<0.001$) and 4×10 m shuttle run ($r = 0.695$, $p<0.001$). BMI was also significantly correlated with number of sit-ups ($r = -0.742$, $p<0.001$), push-ups ($r = -0.799$, $p<0.001$), standing long jump ($r = -0.765$, $p<0.001$) and 4×10 m shuttle run ($r = 0.787$, $p<0.001$). Body weight also showed significant correlation with number of sit-ups ($r = -0.702$, $p<0.001$), push-ups ($r = -0.716$, $p<0.001$), standing long jump ($r = -0.714$, $p<0.001$) and 4×10 m shuttle run ($r = 0.709$, $p<0.001$). WC was significantly correlated with number of sit-ups ($r = -0.643$, $p<0.001$), push-ups ($r = -0.671$, $p<0.001$), standing long jump ($r = -0.675$, $p<0.001$) and 4×10 m shuttle run ($r = 0.717$, $p<0.001$). **Conclusion:** All body composition components observed to influence physical fitness component and aerobic fitness among RMP. The RMP should plan specific programs on fitness to improve body composition and enhance overall fitness of their personnel.

Key words: Royal Malaysia police, body composition, obesity, physical fitness, aerobic fitness, body mass index

Citation: Nur Izzatun Nasriah Nasruddin, Razalee Sedek and Saiful Irwan Zubairi, 2018. Relationship between body composition and physical fitness among royal Malaysia police personnel in Selangor, Malaysia. Asian J. Clin. Nutr., CC: CC-CC.

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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

The police occupations regularly involve occasional episodes of high physical exertion and unexpected events involving danger or risk[1]. Physical challenges such as foot chases, arresting suspects or being in critical life-saving situations are common to police officers, which require them to stay fit and strong at all times. Due to these demanding tasks, attaining sufficient physical fitness is crucial for them to perform their job-tasks diligently. Rossomanno *et al.*[2] in his study involving Finnish police officers suggested that police should be physically fit than the general population. However, previous study reported that physical fitness of police officers begin to deteriorate upon completing their training at the academy[3]. It is undeniable that they may be at their best state of physical fitness during their time in the academy but the overall daily police work may lead to a sedentary nature which eventually affect their physical fitness.

There are various causes that may be contributed to the deterioration of fitness level among police officers. Rapid rise of overweight or obesity (47.7%) among adults in Malaysia as reported in previous health survey by NHMS[4] may become one of the contributing factors. Sedek *et al.*[5] in his study among Royal Malaysian Navy (RMN) personnel recorded the prevalence of overweight or obesity of 36.5% while another study involving Turkish police officers revealed the prevalence of overweight or obesity at 65.6%[6].

Rahimi *et al.*[7] in her study found that body composition had significant correlation with all physical fitness component. Findings from Violanti *et al.*[8] revealed that body fat (BF) was significantly associated with decreased in overall fitness among police officers in the US North-eastern states. Physical fitness is highly associated with muscular endurance, power, agility, cardiorespiratory fitness and body composition. It was also revealed that physical fitness and healthy eating have positive effects on job performance and general health of police officers. According to Crawley *et al.*[9], police officers are often required to adapt from sedentary to hostile environments quickly and this changes certainly requires a high physical fitness level. It is important to evaluate body composition, anaerobic power, aerobic capacity and muscular strength among the police officers as these components will affect their fitness status and their overall job performance.

In addition, the daily work exposure of police officers can lead to serious health-related problems such as obesity, high blood pressure, cardiovascular diseases and diabetes[1]. As a result, police officers should maintain their health by being physically fit which helps in alleviating the risk of health-related issues. Although various research on physical fitness and body composition had been carried out, a particular study involving law enforcement officers, especially the RMP personnel in Malaysia is still very scarce.

The objective of this study was to assess body composition, physical and aerobic fitness among RMP personnel in Selangor, Malaysia and to determine the relationship between the variables studied.

METHODS

Ethical approval: Approval from the Medical Research and Ethics Committee of Universiti Kebangsaan Malaysia (reference number: UKM PPI/111/8/JEP-2017-212) was obtained prior to the study. An approval letter to conduct this study was also obtained from RMP Bukit Aman headquarter, Kuala Lumpur (reference number: 10/8/1). A thorough discussion was held with the head of district police headquarter for a complete briefing on procedures carried out in the study.

Respondent and study location: This cross-sectional study was carried out from April-May, 2017at one of the selected district police headquarter in Selangor, Malaysia. Random sampling method was used and sample size was determined using Krejcie and Morgan[10] table. Drop out factor of 10% was included in the sampling size calculation which resulted in a total of 263male RMP personnel beinginvolved in this study. Their age range was between 20-39 years old. All respondents were healthy and RMP personnel with previous injury history were excluded from the study. A complete briefing on the procedures was given to respondents on the day of the studyand respondents were required to fill in a consent form indicating their agreement to participate in the study.

Anthropometric and body composition measurement: The height of the respondents was measured without them wearing shoes to the nearest 0.1 cm using the SECA body meter (Model 208, Seca, Germany). Body weight was measured to the nearest 0.1 kg using the Tanita TBF-300A body fat analyzer (Tanita Corp, Japan). Standard weight of training clothes was deducted during the measurement. The BF and the body weight were measured concurrently using the body fat analyzer. All respondents were required to fast for 4 to 5 h, avoid any consumption of alcohol and caffeine within 24 h and avoid heavy physical activity for 12 h prior to the measurements. The range of BF percentage that can be

considered as healthy and optimal is 14-20% for the age group of less than 30 years and 17-23% for the age group of 30 years and above (Tanita TBF-300A). Waist circumference (WC) was measured to the nearest 0.1 cm at the mid-point between inferior margin of the last rib and the iliac crest using a flexible, non-stretching measuring tape. The body mass index (BMI) was calculated as weight (kg) divided by height (m^2). The BMI categories based on WHO (1998) was used to classify the RMP personnel's weight status. Underweight is below 18.5 kg m^{-2}, 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.

Physical fitness test: Physical fitness tests involved in the study were one min sit-up, one min push-up, standing long jump and 4×10 m shuttle run. The physical fitness tests were performed to measure muscular endurance, strength and power of the respondents. For one min sit-up, the respondents lay on their back with bent knees and flat heels on the floor whilst having a colleague holding their feet. Hands were placed on the back of the head while both elbows were pointed to the sides of the room. The upper body was raised from the floor towards the knee. Each repetition was counted when the respondent returned to the starting point. One min push-up was used to measure upper-body muscular endurance. Prone positioning was maintained during push-up with hands firmly placed on the ground, directly under shoulders. The counting begins when respondents pushed their body above the mat with their arms fully extended whilst keeping the toes as the pivot point. The respondent completed as many repetitions as possible within one min and the total number of consecutive repetitions was recorded. Standing long jump was measured to monitor respondent's leg strength. Respondents were required to stand behind a line marked on the ground and jumped as far as possible by landing on both feet without falling backwards. Results for standing long jump were recorded in centimetres and longer distance will be noted as high scores with good performance. 4×10 m shuttle run was conducted to test speed, body control and agility of the respondents. A handled stopwatch was used to time the test. The respondents stood behind the marked line before starting the test and began running upon hearing the starting signal. All respondents were instructed to run 10 m forward, turned around once reaching a cone and ran 10 m to the next cone. The time to complete all 4 times of 10 m run was then recorded.

Aerobic fitness test: A maximal multi-stage 20 m shuttle run was performed to measure maximum oxygen consumption of the respondents[11]. A cassette with beep sounds according to fitness level described by Brewer *et al.*[12] was used in this aerobic fitness test. All respondents were required to do warm-up exercises and trial runs before starting in order to adapt to the beep sounds from the cassette with different fitness levels. The test was carried out on flat, clean and non-slippery surface. The respondents were required to run between two marked lines of 20 m apart, concurrent with the beep sounds and time interval from the cassette. Upon hearing the first beep sound, the respondents began their run starting from the first to the second line. Initiating the run with slow speed was highly suggested as the running velocity will increase by 0.5 km h^{-1} after every one min stage. The respondent should always wait before continue running even if they reached the line before the next beep sound. The test was stopped when the respondent can no longer reach the line before the beep sound, with at least two warnings beforehand. The level and sub level in which the respondent stops was used to determine the VO_2max value based on the VO_2max table[13].

Data analysis: The Statistical Package Social Science (SPSS) software version 20.0 (SPSS Inc, Chicago, IL, USA) was used to analyze the collected data. Descriptive statistical analysis was conducted to determine mean and standard deviation of physical characteristics, body composition and physical and aerobic fitness of the respondents. Frequency and percentage were used to express the distribution of the respondents according to BMI classification. Pearson test was performed to determine the relationship between BF, BMI, body weight with physical and aerobic fitness test scores and VO_2max.Statistical significance was set at $p<0.05$.

RESULTS AND DISCUSSION

Anthropometric characteristics and body composition: Summary of anthropometric characteristics and body composition are shown in Table 1. The mean WC in this study was 91.8 cm. This WC value was higher than the cut-off point for Asian male population(<90 cm) based on WHO[14] which was considered as high risk for cardiovascular diseases and diabetes. Meanwhile, mean BF percentage among the respondents was 27.3%, thus classifying the respondents as high level of BF. Figure 1 shows the distribution of BMI classification of respondents. None of the respondents was underweight and altogether, 65.4% of the respondents were either overweight or obese.

Physical and aerobic fitness: Table 2 shows mean scores of physical and aerobic fitness assessments of the respondents.

The mean scores for sit-ups, push-ups, standing long jump and 4×10 m shuttle run were 27.7±8.0 count, 31.7±6.7 count, 156.2±28.6 cm and 14.4±1.5 sec, respectively. All respondents participated in the study completed both physical and aerobic fitness tests. The mean score of VO_2max was 30.9±3.1 mL kg^{-1} min^{-1} with the range from 26.8-37.1mL kg^{-1} min^{-1}. VO_2max refers to the maximal rate of oxygen consumption during exercise. Maximal oxygen consumption as a measure of aerobic capacity has been used as the international standard of physical activity[15]. It also reflects the fitness status of an individual. The mean VO_2max value reported in this study was 30.9 mL kg^{-1} min^{-1}. This value was considered lower than the suggested VO_2max value of 35 mL kg^{-1} min^{-1} in order to maintain a good health[16].

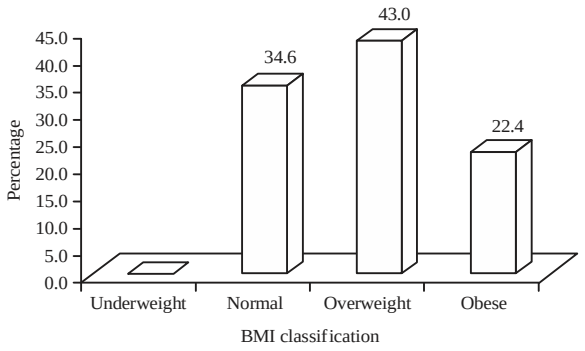

Fig. 1: Distribution of respondents according to BMI classification (n = 263)

Table 1: Physical characteristics and body composition of the respondents (n = 263)

Characteristics	Mean±SD	Range
Height (cm)	170.0±4.4	157.0-184.0
Weight (kg)	78.2±11.4	55.4-112.0
Waist circumferences (cm)	91.8±9.6	77.0-120.0
Body fat (%)	27.3±7.7	10.9-50.3
BMI (kg m^{-2})	27.1±4.0	19.7-39.0
Free fat mass (kg)	56.2±5.9	39.5-75.7

Table 2: Physical fitness and aerobic fitness score of the respondents

Parameters	Mean±SD	Range
Fitness scores		
Sit up (count)	27.7±8.0	15.0-84.0
Push up (count)	31.7±6.7	10.0-60.0
Standing long jump (cm)	156.2±28.6	100.0-230.0
4×10 m shuttle run (sec)	14.4±1.5	11.0-17.4
Aerobic fitness test scores		
VO_2 max (mL kg^{-1} min^{-1})	30.9±3.1	26.8-37.1

Relationship between body composition with physical and aerobic fitness: Pearson correlation test was carried out to determine the relationship between body composition and components of physical fitness. Correlation between body fat, BMI, body weight and WC with physical fitness tests are shown in Table 3. The findings reported that BF, BMI, body weight and WC had a significant correlation with all components of physical fitness ($p<0.001$).

Maximal oxygen uptake (VO_2max) has been characterized as the best indicator of cardio respiratory endurance and fitness[15]. Table 4 shows that aerobic fitness also had a moderate and significant inverse correlation with BF, body weight, BMI and WC ($p<0.001$).

The findings from this study revealed that majority of the RMP personnel were overweight and obese, had high BF percentage and high WC value which exceeds the 90 cm ideal cut-off point. A previous study by Rahimi *et al.*[7] that involved Malaysian fire fighters (FFs) aged 20-39 years reported lower means of body weight (73.6 kg), BF (25.7%) and BMI (25.6 kg m^{-2}) in comparison with this study. The BF percentage reported in this study (27.3%) was relatively higher than Malaysian Army (MA) personnel (23.4%) with the age range between 20 and 48 years[17]. It was also reported by Nadiy *et al.*[17] that 42.1% of the MA personnel were either overweight or obese. The findings from this study however showed that more than half (65.4%) of the RMP personnel were either overweight or obese. Nevertheless, a study by Kayapinar and Savas[6] with Turkish police reported a prevalence of overweight or obese(65.6%) which is almost similar with this study. The WC value (91.8 cm) in this study was immensely higher when compared with a study by Sedek *et al.*[5] on RMN personnel aged between 18-50 years old which reported a much lower mean WC of 82.2 cm. According to Alasagheirin *et al.*[18], WC measurement is related to obesity health risks and it is also a stronger index of obesity among community police officers compared with BMI[19].

Table 3: Correlation between body fat, BMI, body weight, WC with physical fitness test

Parameters	n	Body fat (r)	p-value	BMI (r)	p-value	Body weight (r)	p-value	WC (r)	p-value
Fitness tests									
Sit up (count)	263	-0.592	<0.001**	-0.742	<0.001**	-0.702	<0.001**	-0.643	<0.001**
Push up (count)	263	-0.621	<0.001**	-0.799	<0.001**	-0.716	<0.001**	-0.671	<0.001**
Standing long jump (cm)	263	-0.603	<0.001**	-0.765	<0.001**	-0.714	<0.001**	-0.675	<0.001**
4×10 m shuttle run (sec)	263	0.695	<0.001**	0.787	<0.001**	0.709	<0.001**	0.717	<0.001**

**Significantly correlated at p<0.001

Table 4: Correlation between body fat, BMI, body weight and WC with VO_2 max

Parameters	n	VO_2 max (r)	p-value
Body weight	263	-0.668	<0.001**
BMI	263	-0.721	<0.001**
Body fat	263	-0.548	<0.001**
WC	263	-0.608	<0.001**

**Significantly correlated at p<0.001

Physical fitness among the RMP personnel was assessed using sit-ups, push-ups, standing long jump and 4×10 m shuttle run. The findings showed that the mean number of sit-ups (27.7±8.0 count) was relatively lower when compared to a study by Rahimi *et al.*[7] among Malaysian FFs (41.5 counts). A previous study by Janssen *et al.*[20] that involved a group of younger RMN trainees with the age range of 18-25 years old also reported higher mean of sit-up (42.7 counts). However, the mean number of push-ups among the RMP personnel (31.7 counts) was comparatively higher than Finland military fresher (28.7 counts) with the mean age of 25.5 years old[21]. The mean distance of standing long jump (156.2±28.6cm) among RMP personnel was lower compared with Malaysian FFs (222 cm)[7]. In this study, it showed that the distance achieved by the RMP personnel during standing long jump was relatively shorter, thus, indicating lower muscle power. The 4x10m shuttle run test measured flexibility, muscle strength and power of respondents. The mean time for the respondents to complete the 4×10 m shuttle run test was 14.5 sec. The RMP personnel took longer time to complete compared with RMN trainees (11.1 sec)[20] and Malaysian FFs (10.3 sec)[7]. As suggested by Boyce *et al.*[1], the differences in physical job requirements and working conditions between FFs and police officers may affect the result of the fitness tests. The FFs and RMN were said to have more physically demanding job and on-duty exercise time which may affect their physical fitness. As for the police, apart from the critical functions of their job such as arresting suspects and rescuing victims, the overall routine of their work such as riding in patrol car or preparing documents are unnecessary for them to maintain high level of physical activity. Moreover, the findings from this study showed that majority of the RMP personnel were either overweight or obese and had high body fat percentage, which may have an influence on their physical fitness. A previous study showed that low level of physical activity triggers in weight gain which may lead to various health issues and can affect fitness of adults[22].

Cardiorespiratory fitness of the RMP personnel was assessed using the 20 m shuttle run. The value of VO_2max (30.9 mL kg^{-1} min^{-1}) among RMP personnel was considered lower than the suggested VO_2max value of 35 mL kg^{-1} min^{-1} in order to maintain a good health[16]. When comparing the VO_2max value from this study with that of Malaysian FFs (37.7 mL kg^{-1} min^{-1}), it showed that the fitness level of RMP personnel were much lower than the Malaysian FFs[7]. A previous study involving male volunteers for the Turkish National Police aged 20-23 years reported much higher VO_2max value (62.1 mL kg^{-1} min^{-1})[23] in comparison with this study. Findings from Wittink *et al.*[24] revealed that Dutch law enforcement officers with the age range of 20-29 years old had high VO_2max value of 43.3 mL kg^{-1} min^{-1}, which was also much higher than the present study.

The results of this study revealed that all body composition components including BF, body weight, BMI and WC were significantly correlated with all physical and cardiorespiratory fitness components. According to Violanti *et al.*[8], a study among US North-eastern states police found that BF was inversely correlated with the number of push-ups (p<0.001) and sit-ups (p<0.001). Similarly with this study, an increase in BF decreased the number of push-ups and sit-ups among the US North-eastern states police. The findings from this study were consistent with the study of the US North-eastern states police, where high BF percentage also affected both physical and aerobic fitness of the RMP personnel. It was also shown from this study that higher BMI results in low fitness level among the RMP personnel. A previous study by Angoorani *et al.*[25] reported similar findings where BF and BMI had inverse significant relationship with physical fitness of Iranian military personnel.

The present study also showed that aerobic fitness was affected significantly by BF, body weight, BMI and WC among the RMP personnel. The findings were supported by previous study that also revealed a significant negative correlation between BF and VO_2max among Malaysian adults with the mean age of 26.5 years old[26]. Ross and Katzmarzyk[27] also reported that those with lower BMI and total abdominal obesity tend to have high cardiorespiratory endurance, thus, indicating that BMI had inverse relationship with aerobic fitness. Although the overall working environments of police officers were basically sedentary as suggested by Boyce *et al.*[1], the police however should maintain their physical fitness at least for daily living. Low levels of physical activity not only affect body weight but would also increase BF, thus reducing the fitness status of an individual[8]. Overall, this study revealed that higher body weight, BF, BMI and WC resulted in lower levels of both physical and aerobic fitness among the respondents.

CONCLUSION

The present study showed that all physical fitness components were significantly correlated with BF, body weight, BMI and WC. Aerobic fitness was also significantly correlated with BF, body weight, BMI and WC. Physical fitness among RMP personnel seem to be affected by their body weight, body fat, BMI and WC in this study. As physical fitness is essential to ensure occupational effectiveness of a police officer, it is important for RMP to maintain a good body composition. The results from this study can be used as a reference for the RMP to create health-related programmes focusing on maintaining a good body composition and enhancing fitness among RMP personnel.

SIGNIFICANCE STATEMENT

This study shows the prevalence of obesity and the level of physical fitness of RMP personnel. This study will help the researcher to uncover the critical areas of the level of physical fitness faced by police personnel that many researchers were not able to explore especially in Malaysia. Thus, a new theory on the factors that may contribute to the the level of physical fitness among RMP may be developed. In addition to a new theory, this study is intended to serve as reference source for health-related programmes of RMP and provide useful information to formulate new health policy regarding body composition and physical fitness.

ACKNOWLEDGMENTS

The author would like to thank the RMP for allowing the study to be conducted at one of the selected district police headquarter in Selangor, Malaysia and also to RMP personnelwho participated in the study. We also appreciate the support obtained from the Faculty of Science and Technology, Universiti Kebangsaan Malaysia throughout the study.

REFERENCES

1. Boyce, R.W., S. Ciulla, G.R. Jones, E.L. Boone, S.M. Elliott and C.S. Combs, 2008. Muscular strength and body composition comparison between the Charlotte-Mecklenburg fire and police departments. Int. J. Exercise Sci., 1: 125-135.
2. Rossomanno, C.I., J.E. Herrick, S.M. Kirk and E.P. Kirk, 2012. A 6-month supervised employer-based minimal exercise program for police officers improves fitness. J. Strength Cond. Res., 26: 2338-2344.
3. Brown, C.N., 2005. Survey of physical agility testing and officer fitness levels in Kentucky police departments. MPA/MPP Capstone Projects, University of Kentucky.
4. NHMS., 2015. Global database fact sheet 2015. National Health and Mobidity Survey, March 2015. http://www.iku.gov.my/index.php/research-eng/list-of-research-eng/iku-eng/nhms-eng/nhms-2015
5. Sedek, R., P.B. Koon and I.M. Noor, 2010. Body mass index and body composition among Royal Malaysian Navy (RMN) personnel. J. Defence Secur., 1: 65-82.
6. Fatma, C.K. and S. Behsat, 2012. Nutrition knowledge levels of police officers (An example study). Procedia-Social Behav. Sci., 47: 1232-1236.
7. Rahimi, N.A., R. Sedek, A.H. Teh and M.S. Harun, 2017. Relationship between body composition and physical fitness of rescue firefighter personnel in Selangor, Malaysia. Pak. J. Nutr., 16: 77-83.
8. Violanti, J.M., C.C. Ma, D. Fekedulegn, M.E. Andrew and J.K. Gu *et al*., 2017. Associations between body fat percentage and fitness among police officers: A statewide study. Safety Health Work, 8: 36-41.
9. Crawley, A.A., R.A. Sherman, W.R. Crawley and L.M. Cosio-Lima, 2016. Physical fitness of police academy cadets: Baseline characteristics and changes during a 16-week academy. J. Strength Cond. Res., 30: 1416-1424.
10. Krejcie, R.V. and D.W. Morgan, 1970. Determining sample size for research activities. Educ. Psychol. Meas., 30: 607-610.
11. Beck, A.Q., J.L. Clasey, J.W. Yates, N.C. Koebke, T.G. Palmer and M.G. Abel, 2015. Relationship of physical fitness measures vs. occupational physical ability in campus law enforcement officers. J. Strength Cond. Res., 29: 2340-2350.
12. Brewer, J., R. Ramsbottom and C. Williams, 1988. Multistage fitness test: A progressive shuttle-run test for the prediction of maximum oxygen uptake. National Coaching Foundation, Leeds, UK.
13. Leger, L.A. and J. Lambert, 1982. A maximal multistage 20-m shuttle run test to predict VO_2 max. Eur. J. Applied Physiol. Occup. Physiol., 49: 1-12.
14. WHO., 2011. Waist circumference and waist-hip ratio. Report of a WHO expert consultation. World Health Organization, Geneva.
15. Shete, A.N., S.S. Bute and P.R. Deshmukh, 2014. A study of VO_2 max and body fat percentage in female athletes. J. Clin. Diagn. Res., 8: BC01-BC03.
16. Blair, S.N., H.W. Kohl III, R.S. Paffenbarger, Jr., D.G. Clark, K.H. Cooper and L.W. Gibbons, 1989. Physical fitness and all-cause mortality: A prospective study of healthy men and women. J. Am. Med. Assoc., 262: 2394-2401.
17. Nadiy, I., S. Razalee, M.K. Zalifah and M.J. Zulkeffeli, 2013. Nutritional status and random blood glucose, cholesterol and triglyceride test among Malaysian army (MA) personnel in Kuala Lumpur. AIP Conf. Proc., 1571: 660-668.

18. Alasagheirin, M.H., M.K. Clark, S.L. Ramey and E.F. Grueskin, 2011. Body mass index misclassification of obesity among community police officers. AAOHN J., 59: 469-475.
19. Jakicic, J.M., 2002. The role of physical activity in prevention and treatment of body weight gain in adults. J. Nutr., 132: 3826S-3929S.
20. Janssen, I., P.T. Katzmarzyk and R. Ross, 2004. Waist circumference and not body mass index explains obesity-related health risk. Am. J. Clin. Nutr., 79: 379-384.
21. Sedek, R., P.B. Koon and I.M. Noor, 2012. Relationship between body composition, smoking and physical fitness of Malaysian armed forces naval trainees. Open Access Scient. Rep., Vol. 1. 10.4172/scientificreports.548.
22. Vaara, J.P., H. Kyrolainen, J. Niemi, O. Ohrankammen, A. Hakkinen, S. Kocay and K. Hakkinen, 2012. Associations of maximal strength and muscular endurance test scores with cardiorespiratory fitness and body composition. J. Strength Cond. Res., 26: 2078-2086.
23. Kayihan, G., A. Ozkan, Y. Koklu, E. Eyuboglu, F. Akca, M. Koz and G. Ersoz, 2014. Comparative analysis of the 1-mile run test evaluation formulae: Assessment of aerobic capacity in male law enforcement officers aged 20-23 years. Int. J. Occup. Med. Environ. Health, 27: 165-174.
24. Wittink, H., T. Takken, J. De Groot, M. Reneman, R. Peters and L. Vanhees, 2015. Assessing peak aerobic capacity in Dutch law enforcement officers. Int. J. Occup. Med. Environ. Health, 28: 519-531.
25. Angoorani, H., A.A. Naghavi-Moghadam and A.R. Khoshdel, 2014. Body mass index and composition in physical preparedness of Iranian military personnel. Ann. Mil. Health Sci. Res., 12: 70-74.
26. Amani, A.R., M.N. Somchit, M.M.B Konting and L.Y. Kok 2010. Relationship between body fat percent and maximal oxygen uptake among young adults. J. Am. Sci., 6: 1-4.
27. Ross, R. and P.T. Katzmarzyk, 2003. Cardiorespiratory fitness is associated with diminished total and abdominal obesity independent of body mass index. Int. J. Obesity, 27: 204-210.