



Association between Waist Circumference as Central Obesity Marker and Cooper Test Result in Security Personnel

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Abstract

Background: Obesity is a problem that is found all over the world. Individuals who has increased of waist circumference or body mass index will have reduced physical fitness. This condition can also be found in security personnel who need great physical fitness for their occupation. **Objectives:** To find the correlation between waist circumference as marker of central obesity and Cooper test result in security personnel. **Methods:** This cross-sectional study was done to security personnel at Faculty of Medicine University as Indonesia with measuring waist circumference and Cooper test or 12-minutes run test distance covered. **Result:** From 43 subjects, we found that central or abdominal obesity prevalence is 27.9% and the mean of distance covered on Cooper test is 1787.41 ± 271.71 m. Spearman correlation test from both variables give significant inversely proportional correlation. (p value = 0.02; $r = -0.430$; 95% CI = $-0.672 - -0.150$). **Conclusion:** Increasing waist circumference in a person has correlation with decreasing physical fitness especially cardiorespiratory fitness.

Keywords: Cooper test distance covered, Obesity, Security personnel, *Tes Kesamptaan Jasmani*, Waist circumference

1. Introduction

Globalization era gives simplicity in daily works. This condition results in decreasing physical exercise which also seen in Indonesia. Only 24, 96% of people above 10 years in Indonesia that doing physical exercise¹. Consequences which is non-communicable disease will affect both health and working performance including in security personnel².

Physical exercise can decrease the mortality from non-communicable disease which is 70% regarding World Health Organization³. Beside that, physical fitness will also improve physical performance⁴. Unfortunately, majority of people still neglecting the importance of physical exercise for their health and working performance including security personnel who need greater level of body performance⁴. Therefore, security personnel

candidate in Indonesia have to pass the SAMAPTA test which include Cooper test or 12-minutes run test⁵.

Lack of physical exercise may result individuals with obesity³. World Health Organization state that 5, 8% individuals in Indonesia have obesity from all categories⁶. Also, security personnel may be included in those population with decreasing physical performance. One sign of obesity is accumulation of fat in the abdomen which can be found in some security personnel⁷. Therefore, security personnel nutritional status must be monitored to prevent disturbance in their work.

Unfortunately, there is still no study on finding correlation between central obesity and physical fitness among security personnel in Indonesia. Therefore, this study aims to to investigate the association between waist circumference as central obesity marker and distance covered of Cooper test in security personnel.

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2. Subjects and Methods

This cross sectional study research 43 security personnel who passed the inclusion and exclusion criteria in Universitas Indonesia, Jakarta. This research was conducted for 3 months, starting from June 2018 to August 2018. The purpose of this study is to give information about obesity effect to health and find correlation between waist circumference as central obesity marker and 12-minutes run test distance. We used consecutive sampling method and the data were analyzed with Spearman test for correlation test and Saphiro-wilk for normality test using SPSS 20 for Windows.

The rate of central obesity were measured by waist circumference in centimetres and the 12-minutes run test distance covered were measured in metres. Before doing the test procedure, subjects have to pass the physical examination and do warming up. Subjects also need to use sports equipments which are comfortable clothes, pants and shoes for sports.

This study had received ethical approval from the Research Module of Faculty of Medicine Universitas Indonesia with the number 747/UN2.F1.D1/KBK/PDP.01/2018. Subjects have agreed to take part of this study with informed consent.

3. Result

43 security personnel were assessed and shows significant negative correlation between central obesity which measured by waist circumference and Cooper test result. ($r = -0.430$; p -value = 0.002; 95% CI = $-0.672 - -0.150$). However, Saphiro-Wilk normality test shows normal distribution for waist circumference ($p = 0.237$) when Cooper test distance has unnormal distribution ($p = 0.049$).

The mean of waist circumference which 82.69 ± 9.04 cm (95% CI = 79.92 – 85.48) is still lower than Asian men cutoff for central obesity which is 90 cm. Cooper test distance covered median was 1832.6 m with minimum distance 1260.40 m and maximum distance is 2244.30 m (95% CI-1704.79 – 1871.03). However, 27.9% subjects are classified in the central obesity level. From Cooper K classification, there are only 20.9% subjects that classified in intermediate physical fitness level and the rest are on the lower class⁸ (Table 1-3).

Table 1. Description of variable scores (n = 43 subjects)

Waist Circumference (Cm)	82.69 ± 9.04	79.92 – 85.48
Cooper Test Distance (M)	1832.60 [1260.40 – 2244.30]	1704.79 – 1871.03

*SD = Standart Deviation CI = Confidence Interval

Table 2. Distribution of waist circumference in research subject (n = 43 subjects)

Waist Circumference Interval	n (%)
60–69 cm	5 (11,6%)
70–79 cm	9 (20,9%)
80–89 cm	17 (39,5%)
90–99 cm	12 (27,9%)

*Maximum = 99 cm Minimum = 66 cm

Table 3. Distribution of cooper test distance in research subject (n = 43 subjects)

Physical Fitness Level	Cooper Test Distance	n (%)
Very Bad	< 1 Mil ≈ 1609,34 M	13 (30,2%)
Bad	1,0 – 1,24 Mil ≈ 1609,34 – 1995,58 M	21 (48,8%)
Intermediate	1,25 – 1,49 Mil ≈ 2011,68 – 2397,92 M	9 (20,9%)
Good	1,5 – 1,74 Mil ≈ 2414,02 – 2800,26 M	0 (0%)
Very Good	> 1,75 Mil ≈ 2816,35 M	0 (0%)

*Classification based on Cooper K (1968)⁸.

4. Discussion

From 43 security personnel who took part in this study, there were 12 individuals (27.9%) who have waist circumference more than 90 cm. This condition is similar with central obesity proportion in Indonesia which is 28% and higher than the proportion of obesity itself which is 23.1%⁹. This result is different with central obesity proportion in China which is 10.2%. Low rates of obesity in China caused by imbalance in globalization such as modern culinary lifestyle over the cities¹⁰. Asia Pacific Cohort Studies Collaboration also conduct a

study about obesity in Asia and found 27% of individuals in Asia are having central obesity¹¹. Ironically, we can see that security personnel who should have greater physical fitness or lower central obesity rate found similar with the rest people.

The mean of Cooper test distance in this study was 1787.41 ± 271.71 metres which 811 metres below Cooper test result in military personnel in Finlandia. Kyrolainen conducted a study from 5414 military personnel and got the mean of Cooper test distance was 2598 ± 369 metres¹². The result of this study is also below the passing grade of Tes Kesamaptaan Jasmani which is 2400 m. Therefore, security personnel of Faculty of Medicine Universitas Indonesia are not having ideal physical fitness. Unfortunately, studies either on security personnel or Cooper test still hardly found. Therefore, writer cannot compare the result to other study result.

Poor result of Cooper test distance on subjects from writers observation may be caused of sedentary lifestyle, there is not any routine physical exercise nor sports, unbalanced and unhealthy diet and also the effect of obesity itself which increases energy expenditure for doing activities. These conditions will affect physical fitness and resulted in poor Cooper test distance.

Analysis result from both study variable shows negative significant correlation (*p-value* = 0.002; *r* = -0.430; 95% CI = -0.672 - -0.150). This condition is caused by negative association between waist circumference with cardiorespiratory fitness and muscle strength¹³. This result is also supported with a study by Folgelholm, et al. who analyze 951 men to find correlation between body mass index, waist circumference, cardiorespiratory fitness and muscle strength. This study shows significant negative association in VO₂ max test (*p*<0.001; *r* = -0.48). Obesity will give bad effect for body movement because of increasing mass of the body results in reducing lower extremity strength. Beside that, increasing inertia as result of increasing mass will reduce performance on other physical activity¹⁴ (Table 4).

Table 4. Spearman correlation test result in research subject (n = 43 subjects)

	Cooper Test Distance
Waist Circumference	<i>P</i> -Value = 0.002 95% CI = -0.672 - -0.150 <i>R</i> = -0.430

*Spearman correlation test shows significant correlation (*p-value* <0.005);

*There is a negative correlation between variables in the study

Obesity measured with waist circumference and body mass index have been proved to influence various physical fitness test such as sit-up, long jump, shuttle run and sprint. Individuals with obesity will have worse test result than normal individuals, except in sit-up test. Excess body fat cause more effort needed when individuals do weight bearing activities. Consequently, individuals with obesity will avoid weight bearing activity because they need to spend more energy and slowly worsening their physical fitness as consequence for lack of exercise. Therefore, individuals with obesity who avoid with reducing physical exercise will have reduced result in cardiorespiratory fitness test especially at running test¹⁵.

Decreased cardiorespiratory fitness and muscle strength concomitant with increased age found in majority of security personnel. A study which do follow-up for 15 years in Finlandia police shows decline physical fitness because of increasing sedentary time. At the beginning of their career, their physical fitness were great as result of training given in the police academy. However, their fitness are worsening together with increasing sedentary time and resulting in worsening work index¹⁶. Increasing sedentary lifestyle which studied in the study was also found in the subjects. Therefore, there is a possibility for increasing sedentary lifestyle to affect this study result.

With this research, hopefully it can motivate other researchers to pay attention security personnels. Companies will also pay more attention to the physical fitness of their security officers and provide training for their employees. In the end, maintained physical fitness will prevent diseases in security personnel and improve work performance. However, this study still has disadvantages. There were still factors that cannot be controlled and affected the results of research due to the study design used. The number of subjects used is also small so that a larger number of subjects is needed to provide more precise results.

5. Conclusion

From this study, we can conclude that a quarter of subject have central obesity which similar with central obesity rate in Indonesia. The mean of Cooper test distance covered is below the passing grade of Tes Kesamaptaan Jasmani which is 2400 m. And finally, this study found that there is a negative correlation between central obesity with cardiorespiratory fitness which measured by Cooper test distance. This condition may be caused by

another affecting factors such as diet, physical exercise, physiological different between races and habits which have not been studied in this study.

For future studies, it is hoped to pay attention among variables such as the amount of exercise, age and gender due to affecting physical fitness. The suggested study design was case control or cohort so that the results obtained gave a higher level of trust. Then, the number of subjects is also enlarged to get more significant results.

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7. Conflict of Interest

The authors affirm no conflict of interest in this study.

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