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The Correlation of Body Composition and Fitness Level of Students in Medical Faculty Unwar

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Abstract

Medical students beside they are as a member of the medical rescuer, the team is also to have good physical fitness due to consider that Indonesia involves a disaster drawn area. The study was conducted on a member of Tim Bantuan Medis (Medical Rescuer Team) of FKIK Warmadewa University. This simple random sampling was carried out to choose the sample. The data was analyzed using the Spearman correlation test to find out the correlation between body composition and physical fitness. The result from body composition showed that the highest percentage is in the average category (40.7%) and the smallest percentage is in the fair category (3.35%). Whereas the level of physical fitness that assessed through muscle endurance and cardio-respiratory endurance show a level in the poor as follow 38,5% and 85,7%. The conclusion is a significant correlation (relatively strong) between body composition and physical fitness (muscle endurance and cardio-respiratory endurance) ($r=0.30$ dan $r=0.18$)

Keyword: level of physical fitness, body composition.

Abstrak

Mahasiswa kedokteran di samping mereka sebagai anggota penyelamat medis, tim juga harus memiliki kebugaran fisik yang baik mengingat bahwa Indonesia termasuk dalam kawasan bencana. Penelitian ini dilakukan pada anggota Tim Bantuan Medis Fakultas Kedokteran dan Ilmu Kesehatan (FKIK) Universitas Warmadewa. Metode acak sederhana ini dilakukan untuk memilih sampel dalam penelitian ini. Data dianalisis dengan menggunakan uji korelasi Spearman untuk mengetahui kekuatan korelasi antara komposisi tubuh dan kebugaran fisik. Hasil dari komposisi tubuh menunjukkan bahwa persentase tertinggi berada di kategori *average* (40,7%) dan persentase terkecil berada di kategori *fair* (3,35%). Sedangkan tingkat kebugaran fisik yang dinilai melalui daya tahan otot dan daya tahan jantung-paru masing-masing menunjukkan tingkat pada kategori *poor* sebanyak 38,5% dan 85,7%. Kesimpulan yang diperoleh dalam penelitian ini adalah terdapat korelasi yang signifikan (relatif kuat) antara komposisi tubuh dan kebugaran fisik (daya tahan otot dan daya tahan jantung-paru) ($r=0.30$ dan $r=0.18$)

Kata kunci: tingkat kebugaran, komposisi tubuh

BACKGROUND

Various studies have proven physical inactivity is a major risk factor for various health problems today. Physical inactivity causes 9% of premature deaths, ie 5.3 million deaths from a total of 57 million deaths worldwide in 2008. Although physical inactivity cannot be eliminated, reducing physical inactivity by around 10% to 25% will reduce the risk of death as many as 533,000 to 1.3 million annually. It is estimated that eliminating inactivity will increase the life expectancy of humans in the world by 0.68 years (range between 0.41 to 0.95 years).

Medical Assistance Team (TBM) is one of the student activities in medical faculty that is engaged in emergency and humanitarian fields. As part of TBM, students are required to having basic medical assistance competency, and they also should have

excellent physical fitness, considering that emergencies can occur anywhere in various terrain conditions from mild to extremely severe ('History of PTBMMKI PTBMMKI', no date). One of the requirements for achieving optimal health and fitness levels is physical activity. Various studies have proven physical inactivity is a major risk factor for various health problems today.⁵

Medical students will become doctors who will be involved in the community who are not only required to be capable and competent in solving all health problems, but also must be able to set an example and role model in driving a healthy life for the community. Doctor Sam Hazledine from New Zealand has made a petition to amend the oath of Hippocrates 2500 years ago. He stated that doctors care about health as well as their patients. One revi-

sion of the Hippocrates oath reads "I will ask for health, well-being and personal ability to manage maximum health." (New points in the revision of the Hippocratic Oath to be sought by all doctors in the world', no date).

Indonesia is one of the countries with a high level of vulnerability to natural disasters in the world, based on data released by the United Nations Agency for the International Strategy for Disaster Risk Reduction (UN-ISDR). The location of Indonesia is among the three large plates meeting, called the Eurasian Plate, the Indo-Australian Plate and the Pacific Plate. Besides, Indonesia, archipelago state, is also located between two large oceans namely the Pacific Ocean and Indian Ocean. On the other hand, Indonesia is threatened by non-natural disasters such as terrorism, riots, horizontal conflicts that cause many victims. ('Indonesia is a disaster-prone country - BBC News Indonesia', no date).

Related to the tasks of each TBM member, it is necessary to adjust the level of fitness of each member. Body composition, at least shows how the level of activity that has been undertaken by someone. Suppose someone whose body composition is composed of muscle mass is most likely to do more physical activity that relies on muscle power.⁴ Therefore, this study wants to see whether there is a relationship between a composition body with a level of fitness on TBM students.

Physical fitness consists of eleven components, of which five are directly related to health. The five components are:

1. Cardiorespiratory endurance, which is the ability of the heart and respiratory system to supply oxygen during ongoing physical activity.
2. Muscle strength or muscle strength, which is the ability of muscles to exert strength against a load/force.
3. Muscle endurance or muscle endurance, which is the ability of muscles to continue working without fatigue.
4. Flexibility or flexibility that is the ability of the range of movement in the joints.

5. Body composition, which is the relative amount of muscle tissue, fat, bone, and other vital parts of the body⁴.

The level of physical fitness can be assessed through measurements of cardiorespiratory endurance or cardiovascular endurance and muscular endurance. Muscle endurance is the ability of muscles to perform repeated contractions over a certain period to cause muscle fatigue, or maintain a specific percentage of maximum voluntary contraction (MVC) for a relatively long period of time. When compared with muscle strength (muscle strength) which is contraction against maximum load with short reps (1-6 reps) or short time (0-30 seconds), then muscle endurance (muscle endurance) is a contraction against submaximal loads with long reps (8-15 or more reps) or longer periods (1-3 minutes).⁵ The composition of the human body consists of fat mass (fat mass) and fat-free mass (fat-free mass). Measurement of body composition aims to detect the body's need for food intake and obtain relevant information related to disease prevention and treatment efforts.^{1, 2, 4}

METHOD

This research is an analytic study using a cross-sectional study design with a total sample of 91 medical students who are a member of TBM selected by a simple random method. The study was conducted for 8 months, starting from May until December 2018 at FKIK Unwar. Ethical feasibility is carried out at the Research and Development Unit of Udayana University, Denpasar. The data obtained were analyzed descriptively and Spearman correlation test was performed to see the relationship of body composition with the level of fitness in FKM Unwar TBM students.

RESULTS

Characteristics of respondents

The total number of respondents was 91 people. The percentage of males and females is almost balanced. There were 45 males (49.5%) and 46 females (50.5%) as shown in table 1.

Table 1 Characteristics of Respondents

No.	Characteristics	Frequency (n)	Percentage (%)	Mean	Standard deviation
1.	Gender:				
	• Male	45	49,5	-	-
	• Female	46	50,5	-	-
2.	Age (year)	91		19	0,907
3.	Pulse (beats/minutes)			85,25	11,64
4.	Systolic (mmHg)			113,07	9,083
5.	Diastolic (mmHg)			74,51	9,54
6.	Height (cm)			163,98	7,76
7.	Weight (kg)			65,42	13,86
8.	body mass index (kg/m ²)			24,26	4,58

The age of respondents is between 17 to 21 years, with a dominant distribution at age 19 years (35.2%), followed by age 18 years (33%), age 20 years (26.4%), age 21 years (4.4%) and the smallest percentage is at the age of 17 years (1.1%). Table 1 also presents the mean values and standard deviations of some respondent characteristics such as pulse rate, systolic and diastolic blood pressure, height, weight, and body mass index.

Overview of body composition

Body composition was assessed through the measurement of the subcutaneous fat layer. Body composition figures based on skinfold measurements showed that the highest percentage of respondents measured in the average category was 37 people (40.7%) and the smallest percentage was in the fair category of 3 people (3.35) as shown in table 2.

Table. 2 Skinfold Categories

Skinfold Categories	Frequency	Percentage	Valid Percent	Cumulative Percent
<i>Average</i>	37	40.7	40.7	40.7
<i>Excellent</i>	21	23.1	23.1	63.7
<i>Fair</i>	3	3.3	3.3	67.0
<i>Good</i>	17	18.7	18.7	85.7
<i>Poor</i>	13	14.3	14.3	100.0
Total	91	100.0	100.0	

Fitness level overview

The description of a person's fitness level can be assessed from several things including the assessment of muscle endurance and heart-lung endurance. Muscle endurance is assessed through pushups and sit-ups. While heart-lung endurance is assessed through the Harvard Step Test.

Muscle endurance which was assessed through push up test results obtained as shown in table 3 which consists of five categories. The highest levels of fitness based on push up tests were in the poor category of 61 people (67%) and the lowest percentage was in the excellent category as many as 2 people (2.2%)

Table. 3 Push up categories

Push up categories	Frequency	Percentage	Valid Percent	Cumulative Percent
<i>Average</i>	7	7.7	7.7	7.7
<i>Excellent</i>	2	2.2	2.2	9.9
<i>Fair</i>	15	16.5	16.5	26.4
<i>Good</i>	6	6.6	6.6	33.0
<i>Poor</i>	61	67.0	67.0	100.0
Total	91	100.0	100.0	

While muscle endurance which was assessed from the sit-up test showed the highest and lowest percentages that were in the same category as the push-up test which is the poor category of 35 people (38.5%) and the excellent category of 5 people (5.5%) such as shown in table 4.

Fitness which is assessed through heart-lung endurance is also divided into five categories. From the results of data analysis of respondents' measurements, the highest percentage was in the poor category of 78 people (85.7%) and the lowest percentage was in the excellent category of 2 people (2.2%) as shown in table 5

Table 4 Sit up categories

Sit up categories	Frequency	Percentage	Valid Percent	Cumulative Percent
<i>Average</i>	22	24.2	24.2	24.2
<i>Excellent</i>	5	5.5	5.5	29.7
<i>Fair</i>	20	22.0	22.0	51.6
<i>Good</i>	9	9.9	9.9	61.5
<i>Poor</i>	35	38.5	38.5	100.0

Table 5 Categories of heart-lung endurance

Categories	Frequency	Percentage	Valid Percent	Cumulative Percent
<i>Average</i>	5	5.5	5.5	5.5
<i>Excellent</i>	2	2.2	2.2	7.7
<i>Good</i>	3	3.3	3.3	11.0
<i>Fair</i>	3	3.3	3.3	14.3
<i>Poor</i>	78	85.7	85.7	100.0
Total	91	100.0	100.0	

Correlation between body composition and fitness level

The correlations of each of the variables assessed were analyzed by the Spearman correlation test. Table 6 shows the relationship between body composition assessed with skinfold and fitness level assessed from pushups, sit-ups, and heart-lung en-

durance. All three show a positive correlation. The level of correlation between each aspect of physical fitness is different. Skinfold correlation with upper body muscle endurance (push up test), middle body muscle endurance (sit up test), and heart-lung endurance (Harvard Step Test) were 0.30, 0.18, and 0.38, respectively.

Table 6 Correlation of body composition with fitness level

Fitness level	Body composition (skinfold)	
	Correlation Coefficient (r)	P Value
<i>Push up</i>	0,304	0,003
<i>Sit up</i>	0,182	0,085
Heart-lung endurance	0,386	0,000

DISCUSSION

Respondents are students of the Faculty of Medicine and Health Sciences at Warmadewa University in the first semester to the fifth semester so that their average age is relatively homogeneous. The total number of each respondent's gender is relatively similar between male and female respondents.

The body composition of respondents is mostly at the average level, while the body composition which is categorized as ideal for health is 41.8% in the good and excellent level, and body composition which is categorized as not ideal for health is in the fair and poor level of 17.6%. This

shows that the fat content of the majority of respondents from the Faculty of Medicine and Health Sciences at Warmadewa University is still in the ideal category.

Similar results were demonstrated by the study of Taranikanti et al., 2015 in India which examined body composition in medical students judged by several parameters. The results of his research showed body fat percent of 201 respondents measured, as many as 44, 77% (90 people) were in the healthy category (20-23) and only 1, 49% (3 people) were in the obese category (> 38).

For fitness of upper body muscle endurance (push up test), most respondents are at a poor

level, while fitness for muscle endurance which is categorized as ideal for health should be at a good and excellent level. In this study, the good and excellent category was 8.8%. while the categories which are not ideal for health are 83.5% (fair and poor). This shows that the upper body muscle endurance of the majority of respondents in the medical and health sciences students at Warmadewa University is still in the ideal category.

For fitness on the middle part of the body muscles (sit-up test), most respondents are at a poor level, while fitness for endurance in the middle part of the body which is categorized as ideal for health is in the level of good and excellent. 15.4% of respondents in the good and excellent category, whereas 60.5% of respondents are at a fair and poor level of 60.5%. This shows that upper body muscular endurance most of the students of the Faculty of Medicine and Health Sciences at Warmadewa University are still not ideal (Thompson et.al, 2009a)

Cardio-respiratory endurance fitness (Harvard Step test), most respondents are in the poor level, while cardio-respiratory endurance fitness which is categorized as ideal for health is in a good and excellent level of 5.5%, and those categorized as not ideal for health care in the fair and poor level of 89.0%. This shows that the heart-lung endurance of the majority of respondents from the Faculty of Medicine and Health Sciences at the University of Warmadewa is still not in the ideal category.

Body composition is divided into fat free mass (FFM) and fat mass (FM), where physical fitness is positively correlated with FFM and negatively correlated with FM. The relationship between body composition with physical fitness muscle endurance (pushups and sit-ups) and heart-lung endurance has a positive correlation. The relationship of body composition with endurance of the heart-lung has the highest correlation, while the endurance of the middle body muscles (sit-up test) has the lowest correlation.

Most of the respondents did not or rarely did regular physical exercise, while physical fitness was influenced not only by body composition but also by the type of physical exercise. Physical exercise is a specific adaptation, meaning what is being trained is what adapts and develops, for example if someone exercises upper muscles like pushups then the muscles of the upper body are like pectoralis major, deltoid, triceps that adapt and develop, while the muscles of the middle body and below, like the

abdominal rectus, and quadriceps do not develop significantly. So, people who practice pushups will adapt and develop in these activities, not in other activities such as sit-ups and the Harvard Step Test.

Conclusion

Based on the results, it can be concluded that:

1. Body composition figures show that the highest percentage is in the average category (40.7%) and the smallest percentage is in the fair category (3.35%)
2. The level of physical fitness which is assessed through muscle endurance and heart-lung endurance each shows that they are at a poor level.
3. There is a positive correlation between body composition and fitness level among TBM FKIK Unwar members.

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