



A Survey of Indicators of Fat Content and Body Mass Index on the Physical Condition of Martial Arts Athletes in Kota Batu Ahead of the East Java Porprov VII

Moch. Yunus^{1*}, Eldiene Zaura I'tamada², Zihan Novita Sari³

^{1,2}Sports Coaching Education, Faculty of Sport Science, Universitas Negeri Malang

³Physical Education, Health and Recreation, , Faculty of Sport Science, Universitas Negeri Malang

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Abstract

Physical conditions as a reference for athletes' abilities can be used as a supporting process for evaluation materials for coaches and athletes in assessing the abilities of their athletes after the training process is carried out. Some things that support the physical condition of athletes include anthropometry, fat content, body mass index (BMI), nutrition, psychology, environment, and the training process in each sport. In this case, BMI and fat content are part of this study to identify the relationship between physical condition and BMI and body fat levels of Kota Batu martial arts athletes with a total of 45 athletes. T a tool to measure BMI and body fat levels in this study using the Body Composition Analyzer, Tanita DC-360Phe method used in this study is a survey with descriptive data presentation that correlates indicators of fat content, and body mass index with the physical condition of martial athletes which include: (1) arm muscle strength, (2) abdominal muscle strength, (3) leg muscle strength, (4) back muscle strength, (5) balance, (6) leg muscle power, (7) arm muscle power, (8) agility and (9) cardiovascular endurance. The physical fitness level of Kota Batu martial arts athletes has a fairly good percentage with an average score of 76% for male athletes and 77% for female athletes. Athletes have a fairly ideal body condition because the fat mass of all athletes is at normal levels and 33 athletes are at the ideal BMI.



*Corresponding email : moch.yunus.fik@um.ac.id

INTRODUCTION

Body composition assessment is commonly done in various fields such as medicine, anthropology, ergonomics, sports achievement, and child development. There are still many measurements made by measuring the level of body fatness about health status and body performance in carrying out physical activities. Measuring body composition has evolved significantly in recent years due to the adoption of new technologies. Human structure in terms of increasing complexity ranging from atoms and molecules to anatomical structures described as hierarchies of cells, tissues, organs, systems, and organisms become things that can be studied easily. In this regard, given that kinanthropometry examines the structure and function of the human body throughout life, its application also makes it possible to estimate the biological maturation status of children and preadolescents (Mirwald et al., 2017; Patel et al., 2019; Söğüt et al., 2019). Structure refers to the measured dimensions of the human body, such as height, leg and arm length, width, circumference, and skinfold thickness. Therefore, the specific functions required for different sports, for example categories based on body mass, are expected to be related to specific morphology which includes stature, upper body length, or body composition adaptation, i.e. higher musculoskeletal tissue, lower adiposity. This information becomes very important for coaches to compare the status of their athletes with athletes from other regions or participating in specific competitions (for morphological potential and performance results). On the other hand, maturation is a process that occurs in all tissues, organs, and systems of the human body in a time-dependent and biological manner (Bonilla et al., 2020).

Understanding body composition, growth status, and how it affects the performance of children and adolescents is very important for professional sports given that it plays an important role in neuromuscular development, physical conditioning, and risk of injury (Icheli et al., 2009). Interestingly, anthropometric measurements have been used to estimate Peak Height Velocity (PHV) in children and adolescents (Mirwald et al., 2002). In this case, the development of self-defense sports is currently being followed from early childhood to adulthood, in the competition each class will separate the age and weight of the athletes so that the matches carried out will bring them together more with the same enemy every year. Children with a faster growth process will benefit greatly because martial arts competitions are characterized by a combination of movements with high intensity and short duration, such as hitting, kicking, and wrestling. This measure highlights the need for higher levels of muscle strength (Bagley et al., 2016), especially in the upper and lower limbs and both dynamic and isometric muscle strength, high muscle endurance, and aerobic movement (James et al., 2017). Given the multivariate nature of the sport and the fact that it is a fighting sport. Its anthropometric and physiological profile has become good scientific literature, such as in wrestling, boxing, kickboxing, and Brazilian Jiu-Jitsu (Andreato et al., 2017; Chaabène et al., 2015; Mirwald et al., 2017). The importance of the sport-specific physiological profile of martial arts can assist sports practitioners in terms of talent identification, athlete selection, and training monitoring. Therefore, it is important for sports practitioners to know the anthropometric profile of martial arts athletes with data derived directly from each sport, so that they can properly design their training plans according to their

specificity (classes that are followed and or according to body weight).) of each branch of self-defense sports.

Based on the results of observations, many of the problems experienced by athletes are found, one of which is the athlete's weight loss which affects the physical condition of the athlete.

METHODS

This study uses a survey method with descriptive data presentation that correlates indicators of fat content, and body mass index with the physical condition of martial athletes which include: (1) arm muscle strength, (2) abdominal muscle strength, (3) leg muscle strength, (4) back muscle strength, (5) balance, (6) leg muscle power, (7) arm muscle power, (8) agility and (9) cardiovascular endurance. This research was conducted on martial arts athletes in Batu City who participated in Porprov VII with sports including (1) wushu, (2) boxing, (3) karate, (4) jiu-jitsu, (5) taekwondo, (6) fighting degrees. , (7) Pencak silat with a total of 45 athletes which include 34 male athletes and 11 female athletes. The sampling technique was carried out using a total sampling system based on the overall data of martial arts athletes who will take part in Porprov VII. The tests used to collect data on fat content and body mass index using a body composition tool called Tanita, and for physical ability tests using test instruments include (1) push-ups, (2) sit-ups, (3) leg dynamometer, (4) back dynamometer, (5)

bass test, (6) triple jump, (7) seated medicine ball, (8) side-step test, and (9) VO ² Max (Harvard step test) which has been adjusted to the characteristics of the sport self-defense.

The data were analyzed by identifying and describing the data in the form of statements from each instrument. Physical ability test data is categorized according to the norm (very good, good, sufficient, less, very less), fat content data is categorized according to the athlete's described norm (under, normal, over) and body mass index data is categorized into three which include underweight, ideal, and overweight. Results are presented as mean \pm standard deviation (SD) and range (minimum and maximum values) (Hopkins et al., 2009)

RESULT AND DISCUSSION

This study uses several tests to determine the physical abilities of athletes which include push-ups, sit-ups, leg dynamometer, back dynamometer, bass test, triple jump, seated medicine ball, side-step test, and VO ² Max (Harvard step test). The results of the data obtained were grouped based on the gender of the athlete then the data was analyzed by calculating the average and standard deviation of each test. The average is calculated to determine the clarification of the results on each test and the standard deviation is carried out to determine the distribution of the existing data. The results of data analysis on physical condition tests for martial arts athletes in Kota Batu

Table 1. Results Test Ability Physical (Mean \pm SD) of Kota Batu Martial Athlete

Variables	Gender Groups					
	Man (n=34)			Women (n=11)		
	Mean \pm SD	Max	Min	Mean \pm SD	Max	Min
Bass Test	9.26 \pm 0.67	10	8	9.27 \pm 1.01	10	7
Right Triple Jump	6.46 \pm 0.50	7.78	5.24	4.92 \pm 0.34	5.52	4.54
Left Triple Jump	6.22 \pm 0.65	7.64	4.69	4.82 \pm 0.41	5.33	4.19
Back Dynamometer	104.91 \pm 16.93	142	65.5	62.14 \pm 11.51	76.5	43.5
Leg Dynamometer	210.11 \pm 65.79	300	11.9	128.59 \pm 20.88	163	100
Sit-Ups	23.42 \pm 3.55	34	17	21.55 \pm 2.16	25	18
Push-Ups	29.03 \pm 5.64	40	20	20.36 \pm 4.86	29	14
Side Step Test	21.82 \pm 2.42	27	15	20.22 \pm 2.99	25	17
Medicine Ball	3.64 \pm 0.39	4.48	2.63	2.97 \pm 0.49	3.92	2.41
Harvard Step Test	49.55 \pm 5.87	65.21	41.28	47.04 \pm 4.43	57.69	41.66

The results of data analysis of Body mass index and physical fat content of the Kota Batu martial arts athletes include:

Table 2. Results Test BMI and Fat Body (Mean \pm SD) of Kota Batu Martial Athlete

Variables	Gender Groups					
	Man (n=34)			Women (n=11)		
	Mean \pm SD	Max	Min	Mean \pm SD	Max	Min
Body mass index	22.03 \pm 3.37	29.1	17.1	20.50 \pm 2.66	25.1	16.6
Body fat	12.86 \pm 4.99	30.1	5	26.81 \pm 5.64	37.7	19.8

From these data, the overall results of the athlete's physical ability test, BMI, and body fat mass were analyzed with the final results of the percentage of achievement, including:

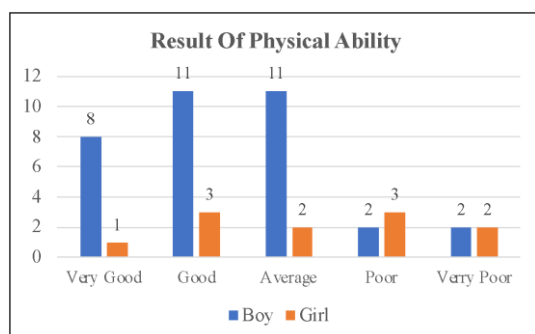


Figure 1 . Data Analysis of Physical Ability Test of Kota Batu Martial Athletes

From these data, it can be concluded that the physical ability of male athletes in the very good category has a percentage of 23.52% with a total of 8 athletes, in the good physical ability category with a percentage of 32.35% as well as the moderate category with 11 athletes, and 5.88% in the less and less category with 5 athletes each. For female athletes in the very good category, there is 1 athlete with a percentage of 9.09%, the good and poor categories have the same percentage and number of athletes, namely 27.27% with 3 athletes each and 18.18% percentage with each number. every 2 athletes are in the category of enough and very less.

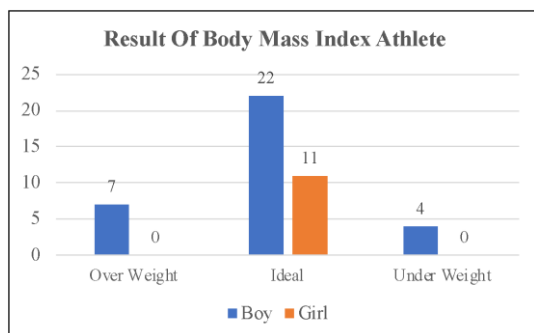


Figure 2. Data Analysis of Kota Batu Martial Athletes' BMI Acquisition Data

From these data, it can be concluded that the relationship between the athlete's body mass index and the physical ability of the Batu City self-defense athletes has a fairly high percentage in ideal conditions, while the percentage for male athletes has a percentage in the overweight category of 20.58%. The ideal category is 64.70% and 14.70% is in the underweight category. Overall female athletes are in the ideal category with a total of 11 athlete.

Table 3 . Body Mass Index Data Analysis with Ability Physique of Kota Batu Martial Athlete

Category Physical Ability	Physical Ability Results with Body Mass Index						Amount in Each Category
	Man			Woman			
	Underweight	Ideal	Overweight	Underweight	Ideal	Overweight	
Very well	2	6			1		9
Well	1	9	1		3		14
Enough	3	5	3		2		13
Not enough		2			3		5
Less once	1		1		2		4

The results of data analysis on the physical abilities of athletes with body mass index have different percentages, for male athletes, physical abilities in the very good category with BMI underweight have a percentage of 5.88%, for the good category with BMI underweight have a percentage by 2.94%, in the ward category with underweight BMI has a percentage of 8.82% and the very poor category with underweight BMI has a percentage of 2.94%. The ideal BMI results in male athletes with a very good physical ability category of 17.65%, the good category of 26.47%, the insufficient category with a total percentage of 14.71%, and the category of poor physical ability having a percentage of 5.88%. The results of BMI overweight in male athletes in the good category has a percentage of 2.94%, in the moderate category, has a percentage of 8.82%, and 2.94% in the category of very

poor physical ability. The highest overall results were athletes with good physical condition with an ideal BMI of 12 athletes with a percentage of 26.66%.

CONCLUSION

The physical fitness level of the Kota Batu martial arts athletes has a fairly good percentage with an average score of 76% for male athletes in the good category and female athletes with an average percentage of 77% in the good category. The average athlete has a fairly ideal body condition because the fat mass of all 45 athletes is at normal levels and 33 athletes are at the ideal body mass index. The physical abilities of athletes with very good and good categories who have an ideal body mass index are 19 athletes, 7 athletes with ideal body mass and sufficient physical ability, 5 athletes in

poor physical condition with an ideal body mass index and 2 athletes who are in poor physical condition. The maximum percentage of male athletes' physical ability is 88% and at least 58% with a standard deviation of 0.2086. Female athletes have a maximum percentage of 90% and a minimum percentage of 66% with a standard deviation of 0.1697. In this case, martial arts athletes are more likely to have an ideal body mass index, but in terms of their physical condition, it depends on their respective abilities so it is not necessarily athletes with less physical conditions who have a high body mass index, as for the results of this research that all Kota Batu martial athletes have a normal amount of body fat mass so that their high body mass index is not at an excessive level.

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