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Analysis Of Anthropometric Measurements And Physical Fitness Levels: A Survey Study On The Men's Volleyball Team

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Abstract

Study purpose. The purpose of this study was to determine the level of physical fitness and anthropometric conditions of male athletes in Volleyball.

Materials and methods. This study used a descriptive form survey with an observational approach method and analysed using quantitative descriptive statistics. The population in this study amounted to 12 male Volleyball athletes, the variables studied were anthropometric measurements and physical fitness levels.

Result. The results of the study with a total sample of 12 male Volleyball athletes showed the results of anthropometric measurements dominant in the moderate category, namely 52%. In the physical fitness level test the dominant in the good category is 50%. In the anthropometric test the athletes who won the 1st mayor cup of Probolinggo city on average were in the moderate category while in the physical fitness level test the athletes who won the 1st mayor cup of probolinggo city had an average in the good category. The data collected is primary data through the measurement of the Indonesian Physical Fitness Test (TKJI) and anthropometry. Anthropometric characteristics of respondents in the form of Body Weight (BB), Height (TB) and also the age of the respondent.

Cunclotion. The implementation of anthropometric analysis and physical fitness tests can help or play an important role in evaluating the condition of athletes for achievement to a higher level. With the analysis of anthropometric measurements and physical fitness levels, it is hoped that it can be used as a reference for coaches or trainers in knowing which athletes have superior quality so that they can provide maximum coaching and athletes can contribute better achievements in the national and international arena.

Keywords: Anthropometry, Physical Fitness, Volleyball

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Introduction

Sport is a necessity that every individual needs in an effort to improve physical conditions in life. In addition to physical health, sports can also be used to form individuals who are physically, spiritually and emotionally healthy in order to create quality human beings.

All of these things are in line with the national development goals that make humans highly dedicated and qualified in various fields (Rusiawati & Wijana, 2022). In building the soul and body should not be separated because they become one and must always be in harmony in life. A healthy lifestyle is a lifestyle that pays attention to all aspects of health conditions both in terms of nutrition and in terms of one's behaviour in everyday life, such as doing sports as a physical activity that aims to maintain health and fitness conditions and efforts to avoid all things that become diseases for the body (Mulyaningsih et al., 2023).

One of the sports that is favoured by many people in Indonesia is volleyball because this sport can be played from children to adults, both men and women (Afandi & Sistiasih, 2023). Through Volleyball sports activities, people have the potential to improve their achievements. However, the potential of each individual is different, depending on the individual himself in actualising his abilities. There are several components of physical fitness (physical fitness) both related to health and related to skills (Rohmah & Muhammad, 2021). Health-related components of physical fitness include cardiorespiratory endurance, muscular endurance, muscle strength and body composition. While the components of physical fitness related to skills include speed, agility / agility, balance, reaction speed, flexibility and coordination. In the sport of volleyball, having a tall body and a good body shape is very necessary to get maximum achievement (Widy & Sulistyarto, 2016).

In the sport of volleyball in addition to body shape there are several other factors that need to be owned by an athlete, namely concentration, accuracy, strength and the most important thing is the level of physical fitness of an athlete (Prasetya & Sulistyorini, 2020), if the athlete has good physical fitness then the athlete is able to face long rallies without feeling significant fatigue and without good physical fitness conditions then the athlete cannot play optimally, for that the physical fitness of an athlete must be maintained and improved. According to (Rifki et al., 2020) During this time the athlete selection programme is only determined based on achievement and ability when competing alone, whereas to obtain maximum achievement requires a good level of physical fitness and is supported by good posture as well. With a combination of intensive training and good nutritional intake, it can shape the athlete's body morphology for the better (Rico-González et al., 2024). Athletes with anthropometric structures and good physical fitness levels and in accordance with their sports tend to show good and maximum sports performance so that they can support maximum achievement (Maulina, 2018).

In this volleyball game, the net used is approximately 2 metres high as a barrier between the two teams (Prasetya, 2022). For this reason, body shape or anthropometry is one of the important factors that must be possessed by a Volleyball athlete, for example, with sufficient height, you can do smash and block well (Ningtiyas, 2024). Humans will basically have different shapes, sizes (height, width, etc.), weights, and others. With a qualified body shape, the existing abilities will be maximised in accordance with their field because it will affect the athlete's physical condition ability to perform movements or techniques of the sport. Based on the results of observations at the volleyball match championship event which is often held in the city of Probolinggo, it is found that there are several athletes who have different and varied postures and there are also several athletes who experience a lot of physical fatigue and movement activity becomes less good (M & Dita, 2021). This is also based on the fact that athletes have never been measured or taken tests and measurements during their time as athletes.

According to (Widowati, 2015) To find out the anthropometric conditions and physical fitness levels of Volleyball athletes, therefore an effort is needed with the aim of knowing, studying and adding information related to anthropometric conditions and good physical fitness levels, tests and measurements are needed. To measure the level of physical fitness of athletes can use the Indonesian Physical Fitness Test (TKJI) measurement while to measure the body

proportions of athletes can use anthropometric measurements (Kuswahyudi, sri nuraini, 2023). The purpose of anthropometric measurements is to determine the size of human body part (Prasetya & Sulistyorini, 2020). Anthropometry was chosen because it uses a safe method because this measurement is carried out without inserting objects into the body.

From the explanation above, it can be seen how important anthropometric and physical fitness measurement research is carried out to find out which athletes have superior quality so that they can contribute to efforts to achieve achievements both in the national and international arena.

Materials and methods

Study participant

The population in this study amounted to 12 male Volleyball athletes from Probolinggo city. The sample is a group of populations that will be researched. The sample in this study used total sampling. The requirements that can be done in sampling in research are all male volleyball athletes who have won the 2024 Mayor Cup tournament championship in Probolinggo City aged 16-19 years. Time and place of implementation at GOR Mastrip, Jl Mastrip, Kedopok, Probolinggo City, East Java.

Study organization

This study uses an observation method approach and includes a type of quantitative research with a descriptive approach. The variables studied include: anthropometry and physical fitness level. The method used in this study is a survey method with data collection techniques using tests and measurements using the Indonesian Physical Fitness Test (TKJI) including a 60 metre running test, elbow hanging test (pull up), sit up test, vertical jump, 1200 metre running test and anthropometric tests including height test, weight test, arm length test and leg length.

Statistical analysis

The data analysis technique used in this study is descriptive quantitative using Ms excel tools, because it can describe the anthropometric conditions of athletes and athletes' physical fitness levels. The analysis used includes finding the mean value (to calculate the average value) and calculating the percentage value (M & Dita, 2021).

Results

Research on the analysis of anthropometric measurements and physical fitness of male volleyball athletes was carried out in July 2024 with a total of 12 people. Respondents of this study consisted of male Volleyball athletes who had won the 2024 mayor cup championship in Probolinggo city aged 16-19 years. The following are the results of anthropometric measurements including: height, weight, arm length and leg length can be seen in [table 1](#).

Table 1. Presentation of Anthropometric Results of Athletes Normative Criteria Dominant

No	Body Anthropometry Test	Data Type		
		Criteria	Frequency	Percentage %
1	Body Height	High	2	16.7%
		Fair	7	58.3%
		Less	2	16.7%
		Very Less	1	8.3%
2	Body Weight	High	2	16.7%
		Fair	6	50.0%
		Less	3	25.0%
		Very Less	1	8.3%
3	Arm Length	High	2	16.7%
		Fair	6	50.0%
		Less	3	25.0%
		Very Less	1	8.3%
4	Limb Length	High	2	16.7%
		Fair	6	50.0%
		Less	2	16.7%
		Very Less	2	16.7%

Anthropometry in the [table 1](#) above totalled 12 male volleyball athletes. of these athletes got several dominant value criteria, including height as many as 7 athletes (58%) were in the sufficient criteria. In the weight test as many as 6 athletes (50%) were in the sufficient criteria. In the arm length test as many as 6 athletes (50%) are in the sufficient criteria. In the leg length test as many as 6 athletes (50%) are in the sufficient criteria. [Table 2](#) is the data on physical fitness level

Table 2. Presentation of Physical Fitness Level Results Based on Dominant Criteria

No	Types of Physical Fitness Elements	Type Test	Criteria	Data Type	
				Frequency	Percentage %
1	Speed	Run 60 Metres	Very good	2	16.7%
			Good	6	50.0%
			Medium	4	33.3%
			Very poor	0	0.0%
2	Arm muscle strength and endurance	Pull Up Test	Very good	1	8.3%
			Good	4	33.3%
			Medium	5	41.7%
			Very poor	2	16.7%
3	Limb Muscle Explosiveness	Vertical Jump Test	Very good	2	16.7%
			Good	5	41.7%
			Medium	2	16.7%
			Very poor	3	25.0%
4	Abdominal Muscle Strength and Endurance	Sit Up Test	Very good	2	16.7%
			Good	6	50.0%
			Medium	2	16.7%
			Very poor	2	16.7%
5	Limb Length		Very good	2	16.7%
			Good	6	50.0%

Run 1200	Medium	2	16.7%
Metres	Very poor	2	16.7%

The results of the physical fitness test on male volleyball athletes with a total of 12 athletes get several value criteria from each test, including the 60 metre running test getting good criteria with 6 athletes (50%). In the pull up test get medium criteria with 5 athletes (41%). In the sit up test get good criteria with 6 athletes (50%). In the vertical jump test getting good criteria with 5 athletes (41.7) and in the 1200 metre run test getting good criteria with 6 athletes (50%).

Table 3. Assessment of the results of the Classification of Physical Fitness Levels of Volleyball Athletes

No	Category	Frequency	Percentage %
1	Very good	1	8.3%
2	Good	6	50%
3	Medium	3	25%
4	Less	2	16.7%
5	Very Poor	0	0
Total		12	100%

Based on the data in [table 3](#), the value data obtained is then summed up with other value data and obtained in the form of a total number of summation of various physical fitness test values. The total number of physical fitness test values is adjusted to the norm and obtained the category of physical fitness level of athletes who won 1st place in the mayor cup championship in 2023-2024 with a total of 12 athletes so that 1 athlete (8.3%) is at a very good level, as many as 6 athletes (50%) are at a good level, as many as 3 athletes (25%) are at a moderate level, as many as 2 athletes (16.7%) are at a poor level.

Discussion

Based on the data from the results of the research that has been carried out, a discussion can be made about the anthropometric level and physical fitness of male Volleyball athletes in probolinggo city. The discussion of the anthropometric level and physical fitness level of the 12 athletes is as follows: Volleyball sports require good and good anthropometric conditions, because this has the aim of supporting the ability of Volleyball athletes ([Ningtiyas, 2024](#)). Besides that, it can also find out the normal and proportional body shape. The anthropometry measured in this study includes height, weight, arm length and leg length ([Rusiawati & Wijana, 2022](#)). An athlete's weight has a very significant influence on his performance and chances of winning. An athlete's motor skills will be impaired if his body weight is not optimal, such as being overweight which will reduce his endurance and agility ([Nurrochmah, 2024](#)). If you are underweight, it will affect the athlete's strength ([Maulina, 2018](#)). In the anthropometric tests and measurements that have been carried out, the dominant data is obtained in the moderate category which has normal anthropometric conditions . However, there are also some that cause the results in overall anthropometric conditions to be different, namely there are several factors, including: (1) Age, the height of the human body will experience growth from birth to the age of 20-25 years (2) Gender, generally men are taller than women. (3) Race and Ethnicity, related to the location of the region or place of residence. (4) work and activity, a person's habit of doing an activity for a long period of time will affect a person's posture. (5) Socio-economic conditions, affecting the provision of nutrients, nutrition and food that have an impact on growth and development. Meanwhile, based on the results of research on the level of physical fitness known as a whole, from the results of research and the results of calculations it can be

concluded that the average level of physical fitness of male Volleyball athletes is included in the Good category (B) but some also have a moderate level of physical fitness and even less. However, the level of physical fitness required depends on the characteristics or characteristics of the sport being followed. So in this case there are several factors that can affect the level of physical fitness, among others: a. athletes do enough physical activity outside of training hours, b. adequate food and nutrition, c. adequate rest, d. regular and healthy living habits and environmental factors (Mulyaningsih et al., 2023).

These factors determine each factor's role, which is as follows: Food and nutrition factors: The body need a sufficient amount of nutrient-dense food to function as a source of building blocks, energy, and regulatory substances. A person's physical fitness and overall health are influenced by their diet (Cholidah et al., 2020). Therefore, in order for people to live healthy lives, be able to carry out everyday duties with ease, and have a robust immune system, we must frequently consume foods that contain enough nutrients (Purnomo & Siti Nurrochmah, 2023), b. Sports and physical exercise components. Practicing sports and physical activities correctly, consistently, and on a regular basis helps one reach their ideal level of physical fitness (Muhammad and Rohmah, 2021). Regular exercise will help us become more physically fit. Among the gains include better movement, reduced weariness, enhanced abilities, and more energy (Angga Permadi et al., 2023), c. Factors related to rest and sleep. The body becomes fatigued after physical exercise, so we relax. A good night's sleep is one that lasts for at least eight hours and doesn't involve any activity (Fikri, 2017), d. Environmental influences and lifestyle choices. Physical fitness will be impacted by healthy lifestyle choices. The surroundings we live in have an impact on our physical health as well. These surroundings include the social environment, which is the condition of the society we live in, as well as the mental environment, which is the psychological climate of an individual's life (Farradika et al., 2019).

Conclusion

The implementation of anthropometric analysis and physical fitness tests can help or play an important role in evaluating the condition of athletes for achievement to a higher level. In this study, several factors were found that could affect the level of physical fitness, among others: a. athletes do enough physical activity outside of training hours, b. adequate food and nutrition, c. adequate rest, d. regular and healthy living habits and environmental factors while in anthropometric tests several factors were found that could affect the results of anthropometric tests between athletes with one another such as: (1) Age of athletes (2) Gender (3) Race and Ethnicity and (4) work and activities (5) socio-economic conditions. With the analysis of anthropometric measurements and physical fitness levels, it is hoped that it can be used as a reference for coaches or trainers in knowing which athletes have superior quality so that they can provide maximum coaching and athletes can also contribute even better achievements in the national and international arena.

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Conflict of interest

There is no internal conflict

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