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Analysis of aerobic endurance capacity level and body mass index of safin pati sports school soccer players born in 2006

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Abstract
Coaches have difficulty identifying players' aerobic endurance capabilities based on their body proportions. The purpose of this study was to determine the level of aerobic endurance capacity and the ideal body condition of Safin Pati Sports School soccer players born in 2006. The analysis presented in the form of a classification and through a research approach based on a quantitative descriptive approach.(Allsabah, 2021). The quantitative approach to data measurement is quantitative and the statistics are objective using calculations from predetermined samples. The method in this study is a quantitative descriptive sampling method using purposive sampling and the analysis method uses quantitative descriptive statistics. Participants in this study were Safin Pati Sports School soccer students born in 2006. The sample consisted of 22 students out of 26 students who met the criteria, 4 of whom had injuries. The measurement tests used were Multistage Fitness Test, weighing and measuring height. The results of the study showed that the level of aerobic endurance capacity of Safin Pati Sports School soccer students averaged a value of 49.7 in the excellent category and the average player's body mass index value was 20.49 in the normal category. The conclusion from the results obtained from this study is that those who have excellent endurance are 82%, those who have good endurance are 14%, and those who have sufficient endurance are 5%. While the body mass index value of players in the underweight category is 14% and in the normal category is 86%. Coaches must maintain the level of aerobic endurance capacity and body mass index values they have and continue to pay attention to the training program with the food intake received by their players.

Keywords: BMI, endurance, football

INTRODUCTION

Football has become a sport that has achieved international recognition. Modern football requires a higher level of endurance. Aerobic and anaerobic endurance are essential for a match to last for 2 x 45 minutes. Early childhood development in football is essential for honing skills. From an early age, football players who dream of competing professionally must train their endurance to improve in each training session and match.(Wirman & Welis, 2019).

Football involves several basic techniques that both professional and amateur players must master and learn to ensure a compelling game and effective play. As a competitive sport, endurance is crucial. In football, players are constantly in contact with other players and constantly jog or sprint. Aerobic endurance plays a crucial role in football, enabling players to play at a high tempo and for extended periods of time.(Anam et al., 2021; Satria, 2018).

Prime physical condition will affect the performance of the game in the team and will interfere with football playing skills.(Ahsan & Ali, 2021; Anam et al., 2023). The components of physical condition in question are Strength, Speed, and Endurance.(Halim, 2018), Muscle Power(Ninzar, 2018), Flexibility, Agility(Halim, 2018), Coordination, Balance, Accuracy, Reaction, and Power(Ninzar, 2018). Endurance (aerobic and anaerobic) plays a major role in soccer. Every player must maintain a high level of concentration during matches, relying on excellent physical condition and endurance.

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Aerobic endurance is the ability to maintain movement or perform activities for a relatively long duration of time in a stable manner without causing too much fatigue.(Kalinowski et al., 2021; Ramadhan & Agus, 2019). Therefore, endurance is the most important component of physical condition in the game of football.(Ramadhan & Agus, 2019). The level of endurance capacity of football players must be achieved with training methods that aim to increase aerobic endurance capacity.(Wigiyantoro & Anam, 2022).

Endurance plays an important role in the sport of football,aerobic endurance and anaerobic endurance,Besides endurance, supporting factors are also needed, namely nutritional intake. Nutritional intake can affect body composition, which is whycan be influenced byfood intake received by the body andphysical activity so thatmetabolism is running well.The criteria for measuring a person's ideal weight is called the body mass index. The body mass index is calculated by dividing body weight (kg) by height (m) squared. Once the value is obtained, it is classified according to the WHO-defined categories: underweight, normal, overweight, and obesity.(Flegal et al., 2014; Kusnandar et al., 2011).

Overweightaffected by the problemObesity can affect a person's mobility in carrying out sports activities.In addition, obesity can increase the risk of developing several cardiovascular diseases.(Shamiss et al., 2016)Body mass index (BMI) is measured based on a person's height and weight. A soccer athlete needs an ideal body to facilitate mobility on the field.(Khanna et al., 2022)Overweight players will experience excessive fatigue if they don't balance this with endurance training.

Based on the researcher's observations, coaches have not yet tested and measured the players' aerobic endurance, making it difficult for them to identify their level of aerobic endurance. Many players still experience fatigue, especially in the second half, which affects their performance on the field. For example, during the second half, players who started in the first half appear to be excessively tired, preventing them from optimally implementing the coach's desired strategy. Therefore, this study aims to determine the aerobic capacity and body mass index of Safin Pati Sports School soccer players born in 2006.

METHOD

The quantitative descriptive approach is a method that calculates the value of independent variables, using one or more variables without analyzing the comparison and influence on other variables.(Abdullah, 2015; Dimas Kevinyanto Tri Pamungkas & Khoiril Anam, 2022)Researchers use survey methods with testing and measurement techniques. Survey techniques are used to measure and investigate existing variables without considering the relationships and influences between them, instead using the collected data to solve existing research problems.(Abdullah, 2015).

A sample is a small part or the entire population that has characteristics that match those that will be used as research objects by researchers.(Halim, 2018)The sampling technique used by the researcher is a purposive sampling technique which is not based on strata, random, or region, but is based on a specific objective.(Abdullah, 2015)according to the age group within the scope of Safin Pati Sports School. The sample to be used by the researcher in this study is Safin Pati Sports School soccer players born in 2006, totaling 22 players out of a total of 26 players born in 2006.

The instrument used by researchers for this study is the Multistage Fitness Test (MFT), which measures aerobic endurance and requires weighing and measuring height to calculate the player's body mass index. In the MFT, participants are required to run a distance of 20 meters, consisting of 21 speed levels that must be increased after a "bleep" sound until the maximum level the test participant can reach.(Syaifullah & Irawan, 2021).The data collection used by researchers used aerobic endurance tests and measurements using the MFT instrument. The test method using the Multistage Fitness Test (MFT) is one way to determine the level of aerobic endurance of a sports athlete.(Kalinowski et al., 2021)Before conducting the Multistage Fitness Test, players are first weighed and their height measured to determine their body mass index (BMI).

Techniques in descriptive quantitative research, the data that has been received by the researcher in the data collection conducted will be analyzed, the type of data used is continuous data., the type of data used is continuous data. The data analysis technique used in the study is descriptive statistical techniques. The data analysis used is quantitative descriptive statistical analysis with percentages. In this study, the researcher will describe or explain the percentage of the level of endurance ability of

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soccer players. The presentation of the results of the MFT and BMI tests and measurements that have been carried out is in the form of a reference category of 5 category norms, namely very good, good, moderate, less, and very less.

Table 1.MFT Assessment Norms

Instrument	Category	Age	
		16-19 years old	20-29 th
Multistage Fitness Test	Very well	≥ 46.5	Multistage Fitness Test
	Good	40.8-46.4	38-48
	Enough	33.6-40.7	31-37
	Not enough	28.7-33.6	24-30
	Less than once	≤ 28.7	≤ 23

(Aditia et al., 2022)

Table 2.BMI norms

Instrument	Category	Information
Body Mass Index	Underweight	<18.50
	Normal	18.50-25.00
	Overweight	25.00-30.00
	Obesity	≥30.00

(Prasetio et al., 2018)

RESULTS AND DISCUSSION

The data obtained from the test and measurement results were then analyzed using descriptive analysis. The data generated from the MFT measurement test on the SPSS player is described in the following table:

Table 3. Description of Research Data

Data Analysis Statistics		
	Aerobic Endurance (MFT Results)	Body Mass Index
N	22	22
Mean	49,7	20,49
Median	50,5	21,18
Mode	50,2	22,21
STDEV	4,19	2,8
Max	56,8	23,84
Min	39,5	10,71
Range	17,3	13,13

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The available research data are classified based on the above category norms. Based on the results of the table above, it can be explained that from 22 samples, the average aerobic endurance value was 49.7 with a maximum value of 56.8 and a minimum value of 39.5. Then, for the body mass index, the average value was 20.49 from 22 samples, with a maximum value of 23.84 and a minimum value of 10.71. Furthermore, the results of the aerobic endurance analysis using MFT obtained the results as in Table 4.

Table 4. Frequency Distribution of Aerobic Capacity

No.	Category	Frequency	Presentation
1.	Very well	18	82%
2.	Good	3	14%
3.	Enough	1	4%
4.	Not enough	0	-
5.	Less than once	0	-
	Amount	22	100%

Based on the aerobic endurance research using MFT conducted in this study, from the 22 samples used, the anaerobic capacity data obtained were 18 players (82%) in the very good category, 3 players (14%) in the good category, and 1 player (5%) in the sufficient category.

The frequency distribution of aerobic endurance capacity levels is depicted in a bar chart to make the frequency distribution of the samples clearer.

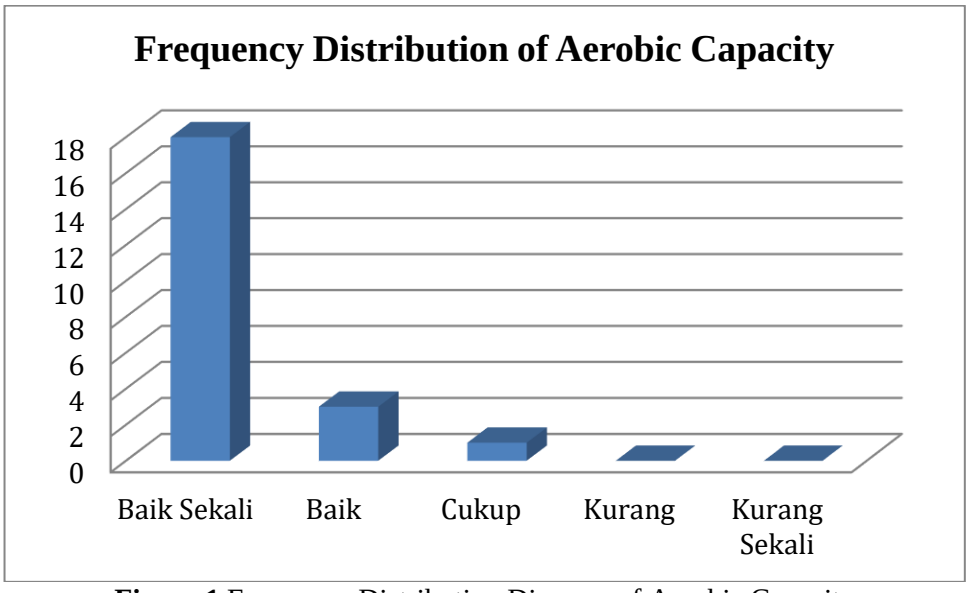

Figure 1. Frequency Distribution Diagram of Aerobic Capacity

The results showed that of the 22 samples, 18 players were in the excellent category, 3 players in the good category, 1 player in the adequate category, and no players in the poor to very poor categories. Furthermore, the results of the aerobic endurance analysis using MFT were as shown in Table 5.

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Table 5. Frequency Distribution of Body Mass Index (Research, 2023)

No.	Category	Frequency	Presentation
1.	Underweight	3	14%
2.	Normal	19	86%
3.	Overweight	-	0
4.	Obesity	-	0
	Amount	22	100%

Based on the body mass index research conducted in this study, from the 22 samples used, the body mass index results obtained were 3 players (14%) in the overweight category, and 18 players (86%) in the normal category.

The frequency distribution of the Fatigue Index values is depicted in a bar chart to make the sample frequency distribution clearer.

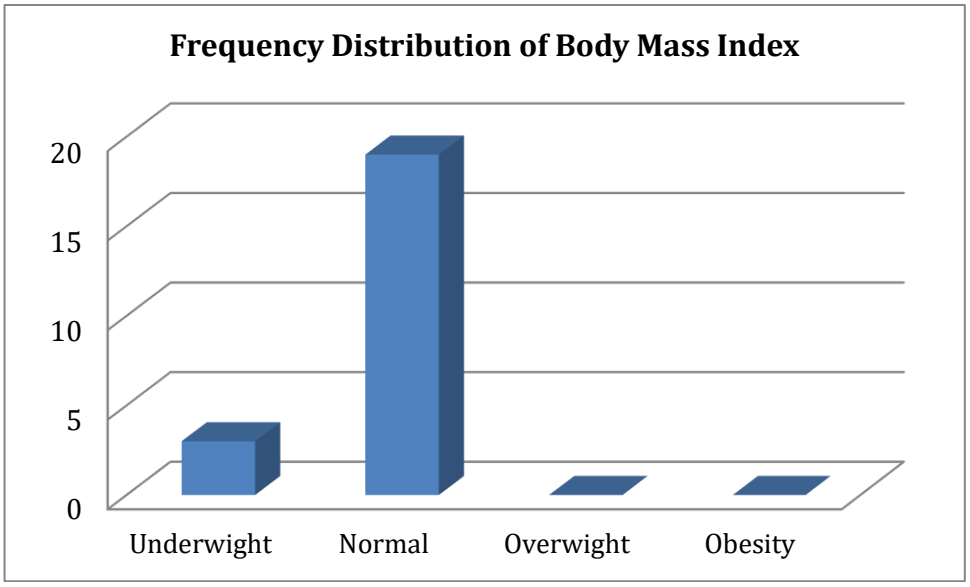

Figure 2. Frequency Distribution of Body Mass Index

The results data show that out of 22 samples there are 3 players in the categoryunderweight,19 players are in the normal category and there are no players in the overweight to obesity category.

Aerobic Endurance

Based on research conducted on Safin Pati Sports School soccer players born in 2006, the average aerobic endurance capacity of 22 players was found to be "very good." These results were obtained after analytical calculations by the researchers.i.Aerobic endurance is one of the important components in football.(Suhadak & Syafi'i, 2017). Observations made by researchers found that coaches implement training methods specifically programmed to increase the aerobic endurance capacity of their players. Coaches have training methods that can increase aerobic power. Coaches have training methods that can increase aerobic endurance. Efforts to increase aerobic endurance capacity can be through several training programs. Each sport has a different method, and each coach has a variety of methods. Some training methods used by coaches that can improve aerobic endurance include:

Small Side Games

Training models are a common feature used by coaches in their programs. The training programs they employ always emphasize the importance of players' aerobic endurance. Small-sided

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games are modified versions of soccer, typically played with 11v11 players, but reduced to 7v7 or even 9v9 depending on the number of players available for the training program.(Nugroho & Kusuma, 2022).

Observations made by researchers found that coaches frequently provide training programs that improve aerobic endurance capacity in between soccer technique drills. The coaches have implemented one aerobic endurance training program effectively.

50m Jog and Sprint

In addition to small side games, the Safin Pati Sports School coach, born in 2006, implemented another endurance program that falls under the Interval Training category. The coach created a square using cones with each cone 50m apart. Players were required to jog for the first 50m, then sprint for the next 50m, and then jog again until the coach set a time limit. The Safin Pati Sports School coach, born in 2006, gave a time limit of 10-15 minutes to complete this exercise. The Safin Pati Sports School coach, born in 2006, implemented another endurance program that falls under the Interval Training category. The coach created a square using cones with each cone 50m apart. Players were required to jog for the first 50m, then sprint for the next 50m, and then jog again until the coach set a time limit. The Safin Pati Sports School coach, born in 2006, gave a time limit of 10-15 minutes to complete this exercise.

As many as 82% of the total samples used were in the excellent category. This is in accordance with observations that have been made.,Coaches implement training programs to improve aerobic endurance. Observations found that Safin Pati Sports School provides a training program that can improve aerobic endurance. Having good aerobic endurance is a key asset, in addition to having good soccer skills. The level of aerobic endurance capacity must be continuously maintained by the players themselves and by the coaches in implementing the training program.(Kusuma, 2015)However, not all samples fell into the excellent category; 14% fell into the good category. Trainers need not be concerned with these results, as several factors influence aerobic endurance capacity.(Halim, 2018; Nirwandi, 2017)However, coaches must continue to provide training programs and evaluations to improve their players' aerobic endurance capacity. The 5% that fall into the adequate category can be attributed to dietary intake.(Wulansari et al., 2021)Although the dormitory provides scheduled meals, some students still purchase snacks and food outside the dormitory. In addition to coaches, players need to pay attention to their training activities. Players should increase their independent training hours to improve their aerobic endurance capacity and achieve even better results.(Wahono, 2013).

Body Mass Index

Body mass index values have a large relationship with the risk of disease and other health problems.(Situmorang, 2015). Body mass index is not a benchmark for an athlete regarding nutritional status, body composition, percentage of body fat or muscle mass.(Setiowati, 2014)Based on research conducted on Safin Pati Sports School soccer players born in 2006, the average body mass index (BMI) of 22 samples was within the normal range. This demonstrates that the training process and nutritional intake of the students were excellent.

The frequency distribution of body mass index values shows that 3 players or 14% of Safin Pati Sports School students born in 2006 are included in the underweight category. This category indicates that some players do not have normal or ideal body portions for their weight and height. The role of coaches must pay attention to nutritional intake and ensure that their players receive the same portion of training. However, 18 players or 86% of SPSS students born in 2006 have normal body mass index values. This demonstrates the success of the Safin Pati Sports School staff who develop their athletes by providing dormitories and a canteen with a special chef to select nutritious food for their athletes.

One of the risks when players, coaches, and other staff fail to pay attention to their nutritional intake or lack of training intensity is the potential for underweight or overweight. Athletes must maintain their ideal body condition to avoid mild overweight or obesity. Mild overweight is a condition of imbalance between body weight and body fat, caused by the accumulation of fat in the adipose tissue. This condition arises from excessive food intake and minimal exercise. If this continues, obesity can develop.(Almy & Sukadiyanto, 2014).

An imbalance between the amount of energy entering the body and the energy expended by the body will affect body composition and lead to excess body weight. (Ariani & AF, 2017; Gurunathan & Myles, 2016)One of the risks when a soccer player is overweight is that their range of motion is limited,

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which can impact the heart's pumping system.(Ulumuddin & Yhuwono, 2018)When a player is overweight, the biggest challenge is to follow a diet program, either through additional training or reduced food intake. However, a diet program can influence how a person's body adapts to sports activities or training. One function of energy intake is to supply energy for training activities.(Setiowati, 2014).

Therefore, a sports athlete must havecompositionideal body.Ideal body weight is one indicator of a person's health. Athletes must maintain a healthy diet and activity level to maintain a healthy lifestyle and maintain optimal body condition.(Andini, 2019).

Research that can be carried out at a later opportunity could be the level of anaerobic endurance ability of soccer players in the same age group.

CONCLUSION

Based on the research results described above, the analysis of aerobic endurance capacity and body mass index of Safin Pati Sports School soccer players showed that the average endurance capacity of the players showed excellent results. Meanwhile, the average body mass index of the players was within the normal category. Although the average aerobic endurance capacity of the players was excellent, players should not neglect their diet and increase their training to maintain their physical condition and not affect their body mass index.Coaches must be able to maintain aerobic endurance capacity and fatigue index values, while still considering training programs and the nutritional intake of their players. Future research is recommended to consider players' anaerobic endurance capacity.

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