Review of Body Mass Index (BMI) Status Among Basketball Athletes at SMK Negeri 1 Semarang

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Abstract: To support optimal performance during basketball games without disruption, an athlete must maintain an ideal body composition. Ideal body composition reflects an athlete's health status, which can be assessed through anthropometric measurements. This study aims to determine the body mass index (BMI) of basketball athletes at State Vocational High School 1, Semarang, to provide a summary of their weight classification. Sample: The subjects of this study were 12 basketball athletes from State Vocational High School 1, Semarang. Method: This research used the ex-post-facto method. The instruments used were body weight and height to determine BMI. Results: The Body Mass Index (BMI) of the basketball athletes at State Vocational High School 1 Semarang showed that three athletes, or 25%, were in the underweight category, eight athletes, or 67%, were in the normal weight category, one athlete, or 8%, was in the overweight category, and there were no athletes in the obesity or severe obesity categories. Thus, the average body mass index (BMI) of the basketball athletes at State Vocational High School 1 Semarang falls within the normal category, indicating good results for their performance. One important predictor of motor ability is the combination of height and weight, as these two factors significantly affect an athlete's motor skills. Conclusion: Body Mass Index (BMI) is one way to assess the physical condition of athletes to prepare and maintain their performance in both the short and long term.

Keywords: body mass index, basketball athletes.

INTRODUCTION

To improve their health status, every individual must follow a healthy lifestyle, especially athletes (Wijaya et al., 2021). An athlete is an individual who is dedicated to sports and usually participates in sports championships, both at the national and international levels. Athletes play a pioneering role in sports competitions and can bring honor to their country on the international stage (Winario et al., 2023). Therefore, an athlete must pay attention to their physical condition during competitions.

Athletes need to undergo measurements or tests of their physical capacity. These measurements aim to ensure that athletes from various sports disciplines are ready to compete at regional, provincial, and national levels (Rahmadhani et al., 2024). Readiness encompasses not only mental aspects but also physical condition, allowing athletes to avoid injuries and trauma on the field and perform optimally in their respective sports.

Good health and an ideal body shape are essential for an athlete. An ideal body shape can be determined through anthropometric measurements to produce superior athletes (Putri & Dhanny, 2022). Superior athletes must possess good technique, strong physical fitness, and a body shape suitable for their specific sport. Sports experts have conducted various physical tests and measurements on athletes, but the results show that only a few athletes from talent scouting (PPLP and PPLM) excel in regional, national, or international championships (Rusdi & Damrus, 2019).

Basketball is a sport that requires high physical fitness and skills from its athletes and is highly popular among people in our country (Yuan et al., 2021). Basketball players need fitness, flexibility, strength, power, agility, endurance, and good vertical jumping skills to achieve their sports goals (Sukhiyaji, R. B., & Patel, 2020), player speed is also crucial (Daulatabad et al., 2020), because the game is high-tempo and active (Setia & Winarno, 2021).

An athlete must maintain an ideal body condition to perform better in competitions. Optimal body condition allows athletes to execute techniques and strategies more effectively, increasing speed, strength, and endurance during matches. When the body is in prime condition, the risk of early fatigue is reduced, enabling athletes to maintain high performance throughout the competition duration (Arini & Wijana, 2020).

Body weight is the result of the balance between energy intake through nutrition and energy expenditure through physical activity or exercise (Prasetyo, 2019). If energy intake is greater than expenditure, body weight will increase. Conversely, if energy expenditure is greater than intake, body weight will decrease (Gurning, 2024). Body weight must be kept within the ideal range, neither under nor over the established standard. Body Mass Index (BMI) is a parameter used to determine whether a person's weight falls into the normal, underweight, or overweight categories (Kusnandar et al., 2020).

An ideal anthropometric composition, supported by good technique, will result in an optimal performance for a basketball athlete in competitions. Anthropometric characteristics, body composition, and mass contribute to training and competition performance. In basketball, anthropometry is closely related to the athlete's Body Mass Index (BMI), as an ideal BMI influences ideal anthropometry. BMI is calculated by dividing weight (kg) by height (m) squared. Body Mass Index (BMI) can be used to measure body composition and categorize

athletes' weight as underweight, normal, or overweight (Budi et al., 2020). An ideal Body Mass Index is crucial for supporting the technical skills and physical abilities of a basketball athlete.

An ideal Body Mass Index (BMI) is crucial for supporting the technical skills and physical abilities of a basketball athlete. An ideal BMI helps ensure that an athlete has the correct body proportion of muscle mass and fat, which is vital for performance in sports that rely on strength, speed, and agility (Abdul Muin & Nugroho, 2022).

In basketball, having an ideal BMI allows players to move faster on the court, jump higher, and sustain longer in intense matches (Garcia-Gil et al., 2018). Optimal body weight also helps prevent injuries often caused by excessive strain on joints and muscles. An athlete with an ideal BMI can be more effective in dribbling, shooting, and defense, which all require a combination of precision, strength, and endurance (Setiowati, 2014).

Additionally, an ideal BMI contributes to the body's metabolic efficiency, ensuring players have enough energy for high performance throughout the game. Players with an ideal BMI tend to have better stamina, enabling them to play at high intensity without tiring quickly. This is crucial in basketball games, which often proceed at a fast pace and require consistent performance from start to finish (Arini & Wijana, 2020).

Measuring Body Mass Index has become a priority in basketball, but in Indonesia, especially among school athletes, Body Mass Index measurement has not been widely implemented. So far, athlete development has focused more on physical, technical, tactical, and mental aspects. The health aspect, particularly Body Mass Index measurement, is still considered less important. This study aims to analyze the Body Mass Index (BMI) levels of basketball athletes at State Vocational High School 1 Semarang to provide an overview of the weight categorization of basketball athletes. The results of BMI measurements serve as a basis for appropriate training and athlete development programs.

METHOD

This study utilizes a descriptive ex-post-facto research method (Ramadhan, G., & Juniarti, 2020). Ex-post-facto is a type of research method that does not have direct control over the variables (Sugiyono., 2016). The population and sample include all basketball athletes from State Vocational High School 1 Semarang, totaling 12 athletes. The sampling technique used is total sampling. The number of extracurricular basketball athletes includes 12 male respondents (the respondents' age is 16.08 ± 0.69 years, height is 166.58 ± 0.69 cm, weight is 55.98 ± 9.87 kg). Data collection was conducted in October 2023 in the sports hall of State Vocational High School 1 Semarang. The research instrument used is the

Body Mass Index (BMI) test, with the BMI calculation formula carried out by measuring body weight (kg) divided by height (cm^2) (Borowiec et al., 2023).

$$\text{BMI} = \frac{\text{Weight}}{(\text{Height})^2}$$

Picture 1. Formula BMI

The data collection technique was conducted using procedures for measuring weight and height, with a validity and reliability rate of 0.98 (Prasetyo, 2019). Data analysis used the Criterion-Referenced Assessment (CRA) to measure Body Mass Index (BMI) criteria. The BMI for Indonesians has been categorized based on clinical experience and research from several developing countries (Kemenkes, 2018) as shown in the table below.

Table 1. BMI Criteria for Basketball Athletes

No	Criteria	BMI (Kg/M2)
1.	*Underweight*	BMI < 18,5
2.	Normal	BMI 18,5 - 22,9
3.	Overweight	BMI 23 - 24,9
4.	Obesity	BMI 25-29,9
5.	Obesity II	>30

The Body Mass Index measurement data was then analyzed using Microsoft Excel to determine the number of basketball athletes categorized as underweight, normal, overweight, obese, and obese II.

RESULTS

Descriptive statistics of the study are presented as mean and standard deviation. The data in this study are displayed as Mean + SD. The primary data in this study are Height 166.58 + 4.96, Weight 55.75 + 7.81, and Body Mass Index 20.14 + 2.24. Below is Table 2 with the statistical results:

Table 2. Statistical Analysis of Research Samples

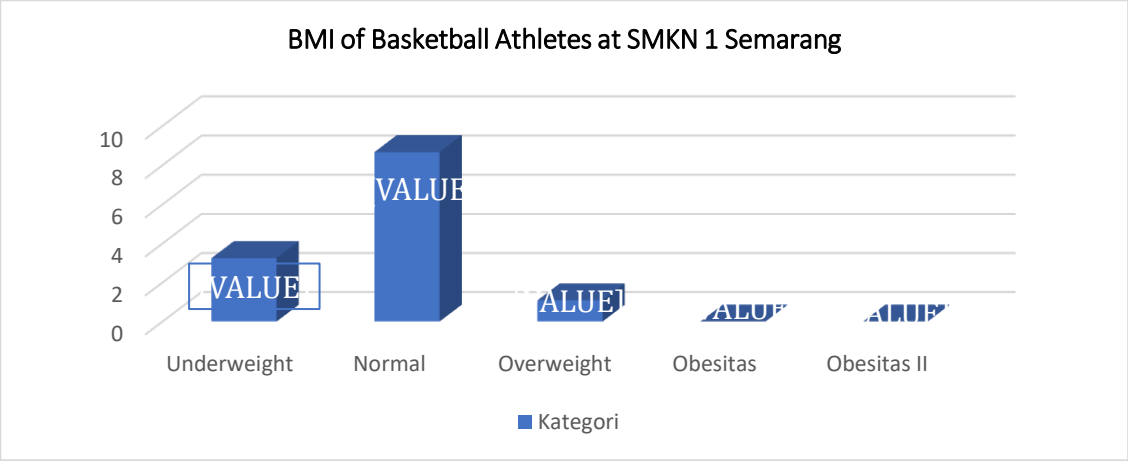
Statistics	Age	Height	Weight	BMI
Mean	16.08	166.58	55.75	20.142
Median	16.00	165.50	53.50	19.900
Mode	16	165	52	19.5
Std. Devation	.515	4.963	7.818	2.2436
Variance	.265	24.629	61.114	5.034
Kurtosis	2.220	4.999	-.196	-.325
Range	2	20	26	7.5
Minimum	15	160	45	17.0
Maximum	17	180	71	24.5
Sum	193	1999	669	241.7

The results of the Body Mass Index (BMI) levels in basketball athletes from

State Vocational High School 1 Semarang, using the Criterion-Referenced Assessment (CRA), can be seen in Table 2 and Figure 2 below.

Table 3. BMI Criteria for Basketball Athletes

No	Criteria	BMI (Kg/M2)	N	Percentage
1.	*Underweight*	BMI < 18,5	3	25%
2.	Normal	BMI 18,5 - 22,9	8	67%
3.	*Overweight*	BMI 23 - 24,9	1	8%
4.	Obesity	BMI 25-29,9	0	0%
5.	Obesity II	>30	0	0%
		Total	12	100 %



Picture 2. BMI Diagram Results for Basketball Athletes at SMKN 1 Semarang

Based on Table 2 and Figure 1 above, the Body Mass Index (BMI) of basketball athletes from State Vocational High School 1 Semarang shows that three athletes, or 25%, are in the underweight category, eight athletes, or 67%, are in the normal weight category, and one athlete, or 8%, is in the overweight category. There are no athletes in the obese or obese II categories. Thus, the average Body Mass Index (BMI) of basketball athletes from State Vocational High School 1 Semarang falls within the normal category.

DISCUSSION

The Body Mass Index (BMI) of basketball athletes at SMK Negeri 1 Semarang overall falls into the normal category. BMI is a comparison of weight to height (Adiningsih et al., 2014), which helps determine if an athlete's weight is ideal relative to their body size. An athlete's BMI is also influenced by body posture, age, gender, ethnicity, heritage, and energy balance according to research (Aprilia & Sumi., 2014). The interaction between weight and height is a significant predictor of motor skills (Gryko et al., 2022).

Based on the research results, the average BMI of basketball athletes at SMK Negeri 1 Semarang falls within the moderate category. This indicates that the

athletes at this school have a good weight balance, supporting the maintenance of an ideal weight crucial for their activities. This ideal body condition positively impacts athlete performance during training and matches (Martín-Rodríguez et al., 2024). Maintaining a balanced and ideal BMI not only enhances on-court performance but also reduces injury risk (Guimarães et al., 2023). Athletes with controlled weight tend to have better endurance and speed, which are critical aspects of basketball (Hoffman, 2020).

Therefore, it is crucial for athletes to continuously monitor and maintain their BMI within the optimal range. This will support their success in the short term, such as performance in upcoming matches, and in the long term, such as their overall sports career. Maintaining an ideal BMI supports not only physical performance but also the general health of athletes (El Ghoch et al., 2013). However, it is important to continually monitor and evaluate their diet to ensure that nutritional intake remains optimal according to the needs of their bodies and athletic performance.

This research aligns with a study by Fatikasari et al. (2021) which found that BMI is predominantly in the normal category. This is positive, as basketball requires an ideal body composition to perform skills in the game, and basketball athletes need to have an ideal BMI; otherwise, it will affect their performance (Wibowo, C., & Dese, 2019).

The research also shows that some basketball athletes fall into the underweight and overweight BMI categories. This condition is clearly less advantageous for the individual athletes and the team, as suboptimal weight can reduce the effectiveness of athletes in performing various basketball techniques. Basketball techniques can be more successfully executed with good physical condition and anthropometry (height and weight). Therefore, anthropometric parameters also play an important role in determining agility results, such as the importance of body dimensions in motor test results, namely height, weight, or BMI (Popowczak et al., 2022).

Basketball emphasizes ideal body characteristics in addition to physical and technical abilities. This high-intensity sport requires technical skills to pass the ball to teammates and score points against the opposing team (Hapis, W., Kes, M., & Iqroni, 2020). Other critical components in basketball include strength, speed, and endurance. Strength is needed for throwing, receiving the ball, and defending against opponents' attacks (Cao et al., 2024).

Speed is necessary for quick movements and evading opponents, while endurance is required to last through a 40-minute game. Basketball will proceed well if the supporting factors are well mastered (Nur & Irawan, 2020). Both physical and non-physical factors are essential components that all basketball athletes need to master.

CONCLUSION

Based on the results of this study, it can be concluded that Body Mass Index (BMI) is a method to assess the physical condition of athletes in order to prepare and maintain performance in both the short and long term. The majority of basketball players at State Vocational High School 1 Semarang have a Body Mass Index (BMI) within the normal range, indicating that they have a healthy and ideal weight for their athletic performance. Factors such as strength, speed, endurance, playing skills, understanding of strategies, and teamwork are also important in basketball. However, there are still some players with BMI below or above the normal range, indicating room for improvement in weight management and nutrition. Therefore, it is recommended that the school and basketball coaches collaborate to develop nutrition and training programs specifically designed to meet the needs of each player.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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