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The Relationship Between Anthropometricity and Physical Condition of The Women's Kabaddi Team in Central Java

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Abstract

Kabaddi is a high-intensity sport that requires speed, agility, strength, and neuromuscular coordination. However, studies on the physiological characteristics and physical condition of kabaddi athletes, especially in Indonesia, are still very limited. This study aims to analyze the anthropometric profile and physical condition of female kabaddi athletes in Central Java and identify the relationship between Body Mass Index (BMI) and physical condition. The study used a quantitative, descriptive approach and involved 12 athletes selected through purposive sampling. The instruments included anthropometric measurements (height, weight, BMI, leg length, and arm span) and physical condition tests (speed, agility, endurance, flexibility, and strength). The data were analyzed using T-Scores and Chi-Square tests. The results showed that the majority of athletes had a BMI in the Obesity I category (58.33%), but most of their physical condition was in the moderate category (41.67%). The Chi-Square test produced a p-value of 0.310, indicating no significant relationship between BMI and physical condition. These findings confirm that BMI is not an accurate indicator of athlete fitness, as athletes with high BMI but excellent physical condition tend to have low body fat and high muscle mass, while athletes with low BMI and poor physical condition have excess body fat that hinders performance. Further research can use more accurate body composition measurements and more specific training programs according to individual needs and playing positions.

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INTRODUCTION

Comprehensive athlete development serves as a key foundation for achieving sustainable athletic achievement. This approach extends beyond physical development to encompass mental development, technical mastery, and tactical planning. The application of the principles of sports physiology is crucial in this process to ensure that the training methods employed enhance athletes› endurance and strength while minimizing the risk of excessive fatigue and injury. Sports physiology is a branch of science that studies the body›s responses and adaptations to physical activity (Anggriawan, 2015). Physical activity is defined as movement of the musculoskeletal system that is influenced by energy expenditure (Wirdati et al., 2025; Riyanto & Mudian, 2019) . Physical activity is closely related to an athlete›s physical fitness. A higher level of physical fitness will minimize significant fatigue (Aldiansyah & Asriansyah, 2020) . Each sport has distinct fitness component characteristics. One such sport is kabaddi, which is still relatively new in Indonesia (Hussain & Cunningham, 2021).

High-intensity body contact sport , where the game lasts 40 minutes with a 2-minute break (Padmawan et al., 2024) . Kabaddi consists of 2 teams competing for points. The application of kabbadi in the sports field is identical to the components of agility and speed, namely athletes need to change direction quickly without losing balance to avoid or defend against opponents (Nabillah et al., 2023) . Kabaddi demands complex movement patterns and rapid changes of direction, the game of kabaddi requires high motor qualities and neuromuscular coordination, such as speed, endurance, agility, flexibility, and leg strength. Therefore, profiling physical conditions is very important to understand player performance and create specific training programs for them (Shobha, 2019) . Judging from the game, this sport does not use equipment, but relies entirely on the agility of the athletes. Kabaddi players are positioned into four categories: raiders , corners , covers , and all - rounders (Sathshivam et al., 2023) . The diversity of positions in the game requires specialized skills to achieve success. Previous research, using anthropometric measurements, found that body type is a component correlated with performance in kabaddi (Bangari & Haridas, 2021) .

The urgency of this research lies in the importance of understanding the physiological conditions and physical characteristics of kabaddi athletes, which are still rarely studied, especially in Indonesia, considering that this sport is relatively new. The development of kabaddi athletes requires a scientific approach based on sports physiology so that the applied training methods are in accordance with the demands of high game intensity and the dominance of agility, speed, and muscle strength components. Therefore, this study aims to analyze the physical condition profile and anthropometric characteristics of kabaddi athletes as a basis for developing a more specific, effective, and safe training program. The novelty of this research lies in the focus of the study on the relationship between physiological components, physical fitness, and anthropometric parameters with the performance of kabaddi athletes in Indonesia, which has not been studied comprehensively. Therefore, the results of this study are expected to provide scientific and practical contributions to the development of kabaddi sport achievements.

METHOD

This research was conducted using a quantitative approach with a descriptive analysis method. The quantitative approach is a knowledge process based on numerical data as research analysis material (Aziza, 2023) . The population in this study were athletes from the Central Java Women's Kabaddi Team. The sample in this study amounted to 24 female. The sampling technique used was purposive sampling, because the selected respondents met specific research characteristics and followed the data collection until the end (Subhaktiyasa, 2024) . All samples have agreed to be participants and agreed to the research procedure by signing the consent form until the end of this study.

The instruments used in this study are anthropometric measurements and physical conditions. Where anthropometric measurements are Height, Weight, BMI, and Leg Length. Physical condition measurements include 5 aspects, namely Speed (20m Sprint), Agility (Illionis), Endurance (Beep test) and Flexibility (Sit and Reach) and Strength (Push Up and Sit Up). The raw data results are changed to have the same size by using a substitute unit of measurement, namely the T-Score. Next, add up the T-Scores from each type of ability test and divide them by the number of test item types to obtain the average T-Score. The average T-Score results will then be converted using the following formula **Table 1.**

Table 1. Assessment norms

Interval class	Category
X ≥ M+1.5 SD	Very high
M+0.5 SD ≤ X < M+1.5 SD	Tall
M-0.5 SD ≤ X < M+0.5 SD	Currently
M-1.5 SD ≤ X < M-0.5 SD	Not enough
X ≥ M-1.5 SD	Very less

Information:
x = Score obtained
M = Average
SD = Standard deviation

RESULTS AND DISCUSSION

This study involved 12 female athletes. Based on anthropometric analysis of kabaddi athletes, their weight ranged from 52 to 88 kg, and their height ranged from 154 to 173 cm. The Body Mass Index (BMI) values were relatively homogeneous, ranging from 25 to 26. Leg length ranged from 90 to 101 cm, and arm length ranged from 151 to 178 cm.

Table 2. Anthropometric Measurements

Variables	Min	Max	Mean ± Std
Weight	52	88	65.83 ± 9.37
Height	154	173	162.17 ± 6.12
BMI	25	26	25.67 ± 0.58
Leg Length	90	101	94.33 ± 3.45
Arm Span Length	151	178	162.25 ± 8.20

The results **Table 2** of descriptive analysis show that the average weight of kabaddi athletes is 65.83 ± 9.37 kg, with an average height of 162.17 ± 6.12 cm. The Body Mass Index (BMI) value is 25.67 ± 0.58. In addition, the average leg length is 94.33 ± 3.45 cm and the arm span is 162.25 ± 8.20 cm.

Table 3. BMI Classification

Category	Mark	Frequency	%
Underweight	< 18.5	0	0%
Normal	18.5-22.9	2	16.67%
Overweight	23-24.9	3	25%
Obesity Level I	25-29.9	7	58.33%
Obesity Class II	> 30	0	0%

Based on the results **Table 3** of the Body Mass Index (BMI) classification of kabaddi athletes, it was found that there were no athletes in the underweight (<18.5) or obesity level II (>30) category. A total of 2 athletes (16.67%) were included in the normal category (18.5–22.9), while 3 athletes (25%) were in the overweight category (23–24.9). The majority of athletes, namely 7 people (58.33%), were classified as obesity level I (25–29.9). These results indicate that most kabaddi athletes have a BMI above the normal range, which may indicate a body composition with high muscle mass due to the demands of physical activity and strength in the game.

Table 4. Physical Condition Test Results

Interval class	Category	Frequency	%
≥ 175	Very high	1	8.33%
159.35 - 175	Tall	2	16.67%
143.7 - 159.35	Currently	5	41.67%
128.05 - 143.7	Not enough	4	33.33%
≤ 128.05	Very less	0	0%
Amount		12	100%

Based on **Table 4** above, it was found that 1 athlete (8.33%) was in the very high category, 2 athletes (16.67%) were in the high category, and the majority, namely 5 athletes (41.67%) were in the medium category. In addition, there were 4 athletes (33.33%) who were in the poor category, while no athletes were classified as very poor. Overall, these results indicate that most athletes have a level of physical condition in the moderate to high category, but there is still a fairly large proportion of athletes with poor physical condition who need attention in the training program.

Table 5. Relationship between BMI and Level of Physical Condition

BMI	Physical Condition			
	Very high	Tall	Currently	Not enough
Normal		1	1	
Overweight		1		2
Obesity Level I	1		4	2

Based on the results **Table 5** of the analysis of the relationship between Body Mass Index (BMI) and the level of physical condition of kabaddi athletes, there is a tendency that athletes with normal BMI tend to have better physical condition, where there is 1 athlete in the high category and 1 athlete in the medium category. In the overweight group, there is 1 athlete with high physical condition and 2 athletes with less condition, indicating a variation in physical performance even though body weight has exceeded the ideal limit. Meanwhile, the group with obesity level I has the largest distribution, namely 1 athlete

is very high, 4 athletes are moderate, and 2 athletes are less, which indicates that although some athletes with high BMI are still able to achieve good physical condition, being overweight in general has the potential to reduce fitness levels.

Table 6. Chi-Square Results

Item Test	Value	df	Asymp.Sig.	Description
Pearson Chi-Square	7.114 a	6	.310	Not Significant

Based on the results **Table 6** of the Chi-Square test presented in the table, the Pearson Chi-Square value is 7.114 with a significance (p-value) of 0.310 > 0.05, it can be concluded that there is no statistically significant relationship between the variables tested.

This study successfully mapped the anthropometric profile and physical condition of female Kabaddi athletes in Central Java. The findings showed physical characteristics with an average height of 162.17 cm and a weight of 65.83 kg, resulting in an average Body Mass Index (BMI) of 25.67, which is conventionally classified as Level I Obesity. Kabaddi requires agility, speed, and explosive changes of direction (Santika & Maryoto Subekti, 2020) . Body proportions indicated by leg length (94.33 cm) and arm span (162.25 cm) which are almost equal to height, are valuable assets in a game that relies on reach and the ability to reach opponents. Meanwhile, the BMI classification revealed that the majority of the sample (58.33% or 7 out of 12 athletes) were in the Level I Obesity category, followed by 25% in the Overweight category. Only 16.67% of athletes had a normal BMI. This data can initially be interpreted as a risk factor for performance. However, in the context of athletes, a high BMI not only reflects a high percentage of body fat but also indicates that a Kabaddi athlete's body mass is predominantly muscle mass, developed as a result of continuous, high-intensity strength training (Subekti & Santika, 2021) . BMI tests, which cannot differentiate between muscle mass and fat mass, are limited in accurately measuring an athlete's body composition.

On the other hand, the results of the physical condition test showed that the majority of athletes (41.67%) were in the "Moderate" category, while 33.33% were in the "Poor" category. Only 25% of athletes reached the "High" and "Very High" categories. Despite having good body proportions, it turns out that this does not correlate linearly with overall physical fitness levels, which include the components of endurance, agility, and speed.

Cross-analysis of BMI and physical condition provides more contextual insights. Athletes with a normal BMI consistently demonstrate good physical condition (High and Medium categories). Meanwhile, in the Overweight and Obese Level I groups, there is a wide variation in performance. For example, in the Obese Level I group, there is 1 athlete with a physical condition of "Very High", but 4 other athletes are in the "Moderate" category and 2 athletes in the "Poor" category. This suggests that body composition does not guarantee good physical condition (Natalina et al., 2025) . Athletes with a high BMI but very good physical condition are likely to have a low body fat percentage and high muscle mass, while athletes with a low BMI and physical condition may actually have excess body fat that hinders performance (Witt & Bush, 2005; Provencher et al., 2018)

The results of the Chi-Square statistical test demonstrate the complexity of this relationship. With a p-value of 0.310 (>0.05), it can be concluded that there is no statistically significant relationship between BMI category and physical condition category. This means that, based on these data, BMI category cannot consistently predict whether an athlete will be in good physical condition. This finding is significant because it confirms that in the athlete population, BMI is not a reliable indicator of fitness or performance potential.

This insignificant relationship can be explained by several factors. First, as mentioned, the limitations of BMI as a measurement tool. More precise measurements, such as Body Fat Percentage (BFS) using the skinfold method or BIA, would provide a more valid picture of an athlete's body composition (Ernalia et al., 2020) . Second, training specificity plays a crucial role. An athlete with a high BMI may be highly trained in specific strength and power components for attacking or defending, but less trained in aerobic endurance or agility components (Ayu et al., 2023; Ilham et al., 2025).

From an exercise physiology perspective, the profile of a Kabaddi athlete reflects the body's adaptation to training demands. High-intensity, interval training like Kabaddi tends to promote muscle hypertrophy, particularly in the legs and upper body, contributing to weight gain and BMI (Manaf et al., 2024) . However, neuromuscular and energy system adaptations may vary across athletes. Some athletes may excel in the anaerobic system (which supports short bursts of power), while others may still be developing the aerobic system, which is the foundation of recovery

endurance.

The practical implications of these findings are clear for Kabaddi coaches and athlete development programs. First, the use of BMI for athlete monitoring needs to be complemented by more accurate body composition measurements. Second, training programs should be individualized and focused on each athlete's specific weaknesses. For athletes with "less" physical condition, despite their large build, programs should emphasize improving aerobic capacity and agility. For athletes in good physical condition, programs can focus on maintaining and improving explosive power. Future research is strongly recommended to increase sample sizes and incorporate body composition measurements and more position-specific physical conditioning tests.

CONCLUSION

This study successfully uncovered an interesting dynamic between anthropometry and the physical condition of female Kabaddi athletes. Although the majority of athletes had a BMI in the overweight and obese categories, this does not necessarily indicate poor physical condition, nor does it guarantee good physical condition. The statistically insignificant results confirm that BMI is a limited tool in the athlete context. Therefore, a holistic coaching approach, which considers actual body composition and designs specific training programs based on each athlete's profile and playing position, is key to optimizing Kabaddi athletes' long-term performance.

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