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### Analysis Of Anthropometric Factors and Physical Conditions Determinants of Back Service Ability in Sepaktakraw Game

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#### Abstract

Anthropometric measurements and physical condition of the ability to serve back sepaktakraw will be conducted on male sepaktakraw athletes in Central Java. Research objectives for analyzing Anthropometric factors and physical disorders that dominate the ability to do the back in the game of sepaktakraw. This type of research is quantitative; the data obtained were analyzed using the confirmatory method using the SPSS 23 computerized statistical program. The sampling technique used purposive random sampling with 15 athletes and data collection using test and measurement sheets. The results of this study indicate that the anthropometric factor of height has a dominant effect, and the physical condition of balance has a dominant impact on the back-serving skill of sepak takraw. The conclusion is that anthropometric factors have a dominant effect on the backs of sepaktakraw service skills. At the same time, physical condition factors also dominate the talents of the backs of sepaktakraw services. For Sepaktakraw, coaches in Central Java pay attention to the anthropometric components and physical conditions that influence increasing sports achievement.

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## INTRODUCTION

Sport is a physical activity regulated formally and informally by competing against others or oneself to get pleasure or victory (Lumpkin et al., 2017). A person's sports involvement will automatically form character (Ali, 2015). Sports achievements have a high prestige value for a nation by giving rise to excellence in international competition. Sepaktakraw is a sport carried out by kicking a ball over a barrier net or net played on a field the size of a badminton court (Sujae & Koh, 2015).

Sepaktakraw is included in the category of team sports or team sports. A sport consists of several interconnected individuals who work together to achieve a successful outcome (Duarte et al., 2015). In line with an opinion (Chen & Xiao, 2017), *"There are several forms of Sepak Takraw, but the most popular is the "Regu" format, where opposing teams of 5 players, 3 on-court with two substitutes, line up against each other"*.

According to (Putra et al., 2020), the game of takraw has several basic techniques that must be mastered, including soccer or ball control techniques. According to (Nusufi, 2014), in the game of takraw, good physical conditions are needed to carry out the basic techniques of the game.

In the sepak takraw, each team holds and manages the ball three times on the permitted body parts and kicks to score the winning goal (Udomtaku & Konharn, 2020). One occurs in the back serve movement, where the player

must swing one of his legs over his head to kick the ball (Bhasavanija & Kuan, 2017).

According to (Sam, 2019), mastery of takraw skills is necessary, aiming for the game to run well. According to (Ibrahim et al., 2022), *"Sepaktakraw players must have good soccer skills to perform defensive and attacking techniques in the game of takraw."* Furthermore, the statement (Astra, 2017), *"Sepak Takraw Playing Technique course, fundamental techniques,"* Each player in the takraw game must be able to handle and keep the ball in the air with good defense and attack.

Anthropometry pays attention to the relationship between the structure and function of the human body, especially in the context of movement (Eston, 2016). Same with (Ita, 2019), *"The anthropometric structure is related to the measure of the athlete's ability to make movements related to the sports involved."* Anthropometry is a term that describes body dimensions such as height, Weight, circumference, and folds (Tour & Bibiloni, 2019). Sports performance is influenced by factors seen from the physical aspect, including body height, body weight, sitting height, length of the upper and lower limbs, and body type (Furqon, 2016).

An essential part of talent scouting is anthropometry (Mylsidayu & Kurniawan, 2015). Anthropometric measurements are a series of quantitative measurements of muscle, bone, and adipose tissue to assess body composition (Casadei & Kiel, 2021). So anthropometry is closely related to body characteristics and sports achievements (Thirumagal, 2013).

Increasing the achievement of Sepaktakraw in Central Java continues to be carried out through the efforts of various supporting factors. One of the efforts to improve the ability to serve back in the game Sepaktakraw is the need for support from good physical abilities. Physical condition is essential in developing techniques, tactics, and mentality (Wahyuri, 2018). A player's success as a tekong or a player who serves is critical because points are earned by serving well, accurately, hard, and producing points for the team (Aji, 2017).

Exercise is essential in increasing the ability to function in the human body's organ systems to make it easier to perfect movements (Sukadiyanto, 2016). According to (Wijayanti et al., 2015), planning exercises must be directed, theoretical, future-oriented, and structured.

Research by Rezaei & Mimar (2013) with the title Identification of gestures on the talent of Professional Sepaktakraw Athletes with the results of Sepaktakraw players does not show a significant difference in the parameters of the range of motion of the legs and knee joints.

Based on the results of initial interviews with three informants as Central Java Sepaktakraw coaches, namely Setyo Budi, Bambang Edy, and Nor Kholis, on November 9, 2021, it can be concluded that several problems on the field, such as tekong, who has a short stature, does not perform well at the senior level, tekong has experienced a decline in quality at the end of the game, there is no specific guidance instrument regarding

anthropometric characteristics and physical conditions needed in back service. By statement (Ardhi & Asim, 2022) that good physical condition plays a role in the appearance movement and influences the functions and systems of the body's organisms.

Anthropometric tests and measurements and the physical condition of the ability to serve back Sepaktakraw will be conducted on men's Sepaktakraw athletes in Central Java. In this case, the athletes involved in the tests and measurements were PPLP athletes, former PPLP athletes, and Pelatda athletes.

Based on the background of the problems described above, the authors want to conduct a study to analyze anthropometric factors and physical conditions that dominate the ability to serve back in the game Sepaktakraw.

## **METHODS**

This type of research is quantitative (Ramadan & Juniarti, 2020). Data collection techniques in the form of test sheets and data measurements. The data obtained were analyzed by the confirmatory method. Data analysis in this study included height, Weight, leg length, cardiovascular endurance, Speed, flexibility, leg muscle power, and abdominal muscle strength on serving skills. takraw back.

## **FINDINGS AND DISCUSSION**

This research has the following objectives: 1) Analyze Anthropometric factors that dominate the ability to serve the back in the game of Sepaktakraw. 2) Analyze the physical condition factors that have a dominant influence on the ability to serve the back in the game of

sepak takraw Central Java (Factor Analysis of Height, Weight, Leg Length, Cardiovascular Endurance, Speed, Flexibility, Leg Muscle Power, Balance and Abdominal Muscle Strength in Central Java Men's Sepaktakraw Athletes in 2021).

**Findings**

Test results and measurements from the primary data of anthropometric factors and physical condition factors as independent variables and back serving ability Sepaktakraw in Men's Sepaktakraw athletes in Central Java.

Table 1 . Statistical description of anthropometric factors and physical conditions that determine the ability to serve in the back of the sepaktakraw in men's sepaktakraw athletes in Central Java

	N	Minimum	Maximum	Means	std. Deviation
Height	15	169	176	172.07	2,120
Weight	15	56,60	70.50	63.8733	4.44289
Leg Length	15	86	91	88,60	1,724
Durability	15	40.5	50,4	47,653	2.7576
Speed	15	2.87	3.60	3.1720	,18358
flexibility	15	0	3	1.60	,910
Leg Muscle Power	15	56	69	60,87	3,662
Balance	15	16,14	31.71	22,8500	4.66830
Abdominal Muscle Strength	15	58	75	64,20	4,296
Service Test	15	5	16	9.60	3,397
Valid N (listwise)	15				

Source: Primary data processed (2022)

Based on the descriptive statistical table of the research above, information was obtained about the anthropometric component, namely the height of the men's sepaktakraw athletes in Central Java. The number of samples involved in the study was 15 athletes; the minimum score was 169, the maximum score was 176, the average score was 172.07, and the standard deviation value of 2.120. The athlete's body weight has a minimum value of 56.60, a maximum value of 70.50, an average of 63.8733, and a standard deviation of 4.44289.

The minimum value of the athlete's leg length is 86; the maximum value is 91, the average value is 88.60; and the standard deviation value of 1.724. The athlete's cardiovascular endurance, the minimum value is

40.5, the maximum value is 50.4, the average value is 47.653, and the standard deviation value is 2.7576. The athlete's Speed has a minimum value of 2.87, a maximum value of 3.60, an average value of 3.1720, and a standard deviation value of 0.18358. The athlete's flexibility minimum value is 0; the maximum value is 3, the average value is 1 .60; and the standard deviation value of 0.910. The athlete's leg muscle *power* has a minimum value of 56, a maximum value of 69, an average of 60.87, and a standard deviation of 3.662. The athlete's balance has a minimum value of 16.14, a maximum value of 31.71, an average value of 22.8500, and a standard deviation of 4.66830.

The athlete's arm muscle strength has a minimum value of 58, a maximum value of 75,

an average of 64,20, and a standard deviation of 4.296. The ability to serve the back on the minimum athlete value is 5; the maximum value is 16, the average value is 9.60, and the standard deviation value of 3.39. The anti-image matrix correlation table above shows that three

variables have a measure of sampling adequacy (MSA) value below 0.5, namely body Weight with a value of 0.487, cardiovascular endurance with a value of 0.429, and abdominal muscle strength with a value of 0.489.

Table 2. The anti-image matrix correlation I anthropometric factors and physical condition results determine the ability to serve back sepaktakraw in men's sepaktakraw athletes in Central Java.

<i>Anti-image Correlation</i>	Height (X1)	Body Weight (X2)	Leg Length (X3)	Cardiovascular Endurance (X4)	Speed (X5)	Flexibility (X6)	Power (X7)	Balance (X8)	Abdominal Muscle Strength (X9)
Height (X1)	<b>0.720<sup>a</sup></b>	0.123 <sub>-</sub>	-0.387 <sub>-</sub>	0.172 <sub>-</sub>	0.106 <sub>-</sub>	0.468 <sub>-</sub>	0.031 <sub>-</sub>	-0.254 <sub>-</sub>	-0.160 <sub>-</sub>
Body Weight (X2)	0.123 <sub>-</sub>	<b>0.487<sup>a</sup></b>	0.250 <sub>-</sub>	0.510 <sub>-</sub>	0.276 <sub>-</sub>	0.299 <sub>-</sub>	-0.078 <sub>-</sub>	0.093 <sub>-</sub>	0.196 <sub>-</sub>
Leg Length (X3)	-0.387 <sub>-</sub>	0.250 <sub>-</sub>	<b>0.739<sup>a</sup></b>	0.305 <sub>-</sub>	0.136 <sub>-</sub>	0.141 <sub>-</sub>	0.275 <sub>-</sub>	0.016 <sub>-</sub>	-0.028 <sub>-</sub>
Cardiovascular Endurance (X4)	0.172 <sub>-</sub>	0.510 <sub>-</sub>	0.305 <sub>-</sub>	<b>0.429<sup>a</sup></b>	0.773 <sub>-</sub>	0.620 <sub>-</sub>	0.051 <sub>-</sub>	-0.281 <sub>-</sub>	0.294 <sub>-</sub>
Speed (X5)	0.106 <sub>-</sub>	0.276 <sub>-</sub>	0.136 <sub>-</sub>	0.773 <sub>-</sub>	<b>0.547<sup>a</sup></b>	0.315 <sub>-</sub>	0.213 <sub>-</sub>	-0.131 <sub>-</sub>	0.077 <sub>-</sub>
Flexibility (X6)	0.468 <sub>-</sub>	0.299 <sub>-</sub>	0.141 <sub>-</sub>	0.620 <sub>-</sub>	0.315 <sub>-</sub>	<b>0.512<sup>a</sup></b>	-0.288 <sub>-</sub>	-0.259 <sub>-</sub>	0.491 <sub>-</sub>
Power (X7)	0.031 <sub>-</sub>	-0.078 <sub>-</sub>	0.275 <sub>-</sub>	0.051 <sub>-</sub>	0.213 <sub>-</sub>	0.288 <sub>-</sub>	<b>0.542<sup>a</sup></b>	-0.417 <sub>-</sub>	-0.651 <sub>-</sub>
Balance (X8)	-0.254 <sub>-</sub>	0.093 <sub>-</sub>	0.016 <sub>-</sub>	-0.281 <sub>-</sub>	-0.131 <sub>-</sub>	0.259 <sub>-</sub>	-0.417 <sub>-</sub>	<b>0.680<sup>a</sup></b>	0.056 <sub>-</sub>
Abdominal Muscle Strength (X9)	-0.160 <sub>-</sub>	0.196 <sub>-</sub>	-0.028 <sub>-</sub>	0.294 <sub>-</sub>	0.077 <sub>-</sub>	0.491 <sub>-</sub>	-0.651 <sub>-</sub>	0.056 <sub>-</sub>	<b>0.489<sup>a</sup></b>

Source: Primary data processed (2022)

Based on the *commonalities table*, it is broken down that the variable with the greatest function is height, which has a value of 0.864, and the variable with the smallest function is

Speed, which has a value of 0.524. The six variables above obtain *commonalities values* greater than 0.5. This explains that further tests can be carried out with factor analysis

Table 3. Results of commonalities analysis of anthropometric factors and physical conditions determining the ability to serve back sepaktakraw in men's sepaktakraw athletes in Central Java

Variable	Initial	Extraction
Height	1,000	0.864
Leg Length	1,000	0.730
Speed	1,000	0.524
flexibility	1,000	0.778
Leg Muscle Power	1,000	0.681

Balance	1,000	0.706
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Source: Primary data processed (2022)

## Discussion

Factor anthropometry that HAS a dominant influence on the ability to serve the back in the game of takraw, namely 1 ). Height in doing back serves high body can help reach in doing back serves; athletes with tall bodies can do back serves with a higher ball bounce, and the results will be better than players with short bodies. *Tekong*, with a height advantage, is more profitable when doing back serves. Based on the *commonalities value* of the height factor, it has a value of 0.864, and thus the percentage of the height factor is 86% of the factor role. This is relevant to Sajoto's (1998) theory in Akhmad Aji Pradana (2013: 5), which states that height is one factor that influences an athlete's performance. 2). Weight is one of the important components in sports including the sport of sepaktakraw. However, the *tekong* position is not a dominant component in the back serve because there is no jumping motion in the *tekong* movement. 3). Leg length is dominant in the sport of sepaktakraw, especially for the *tekong* position. Long leg length can help *tekong* perform sharp serves.

The fact supports this in research that athletes with appropriate leg length can positively impact the results OF SEPAKTAKRAW back serve. Based on the *commonalities value* on the sole length factor, it has a value of 0.730, and thus the percentage of the foot length factor is 73% of the factor role. This is relevant to what was disclosed by (Purwaditia & Suropto, 2017). On the other hand, *tekong* has a relatively high body height,

so this is very effective for producing very fast *tekong*.

Dominant Influence on Back Servicing Ability in Sepaktakraw Games, namely: 1). Cardiovascular endurance is not a dominant component in the back serve because the *tekong* movement does not require as much energy as the *smasher position* in the sepak takraw game. 2). Speed is the most important component always needed to display superior sports abilities. When serving the back, players with good Speed will be able to produce explosive movements quickly to serve more deadly, increasing the success of serving back. Based on the *commonalities value* of the speed factor, it has a value of 0.524, and thus the percentage of the speed factor is 52 %. 3). flexibility in the game of sepaktakraw flexibility is needed, especially for *tekong* because, with good flexibility, *tekong*, when serving, can straighten both legs up to 180 degrees so that his leg reach can be higher.

With a higher leg reach, it helps *Tekong* to get a deadly serve. Based on the *commonalities value* of the speed factor, it has a value of 0.778, and thus the percentage of the speed factor is 77 % of the factor role. 4). Leg Muscle Power is a fundamental element and important in producing quality athletes. A player with good leg *power* will be able to serve hard. Based on the *commonalities value of the leg muscle power* factor, it has a value of 0.681; thus, the percentage of leg muscle *power* is 68% of the factor role. As stated by T. Bumpa &

Carrera (2015), *Power* is a key element in all sports requiring high-speed movement and technical skills. 5) Balance dominant influence on the back service sepak takraw.

Based on *commonalities*, the leg muscle power factor has a value of 0.706, thus that the percentage of leg muscle power is 70% of the factor role. 6) Abdominal Muscle Strength does not have a dominant effect on the back service skills of sepak takraw because, in the game of sepak takraw, the strength of the abdominal muscles plays a more dominant role if a smasher owns it.

## CONCLUSION

Based on the analysis of research data in the previous section, the following conclusions are drawn:

1. Body height and leg length are the dominant anthropometric factors determining the ability to serve back sepak takraw.
2. The dominant physical condition factor that determines the ability to serve the back sepak takraw is speed, flexibility, leg muscle power, and balance.

From this research, it is hoped that it can be carried out extensively in order to cover deficiencies if there are still other aspects that still have an impact on the ability to serve the back sepak takraw.

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