

## Comparison of Physical Ability Based on Player Position: Study on Volleyball Club VOPAS Semarang Year 2025

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### ABSTRACT

Background: Physical performance analysis in the VOPAS Semarang volleyball club has not received special attention because it is constrained by aspects of understanding and field practice. Purpose: to analyze physical abilities based on the position of libero, setter, and spike players punched from flexibility, speed, strength and jump height. Methods: Descriptive quantitative comparative as research method. Participants were volleyball players of club VOPAS Semarang, 34 males, aged 15-19 years. Data collection techniques with tests. The instruments were sit and reach, 10-20 meter sprint, hand grip and vertical jump. Data analysis techniques descriptive and kruskall wallis test assisted with SPSS version 23. Results: Flexibility aspect is 100% excellent category, 21% jump height is poor, 70% strength is very poor, 20 meter sprint is 100% very poor, 10 meter sprint is 41% average, kruskall wallis test overall aspects get a significance value of ( $p>0.05$ ). Conclusion: Improvement is needed in the aspects of speed and strength, physical aspects in terms of player position did not have significant differences. This information can be a reference for further research and useful for the VOPAS volleyball club in physical development. Research limitations need to be improved in a wider sample, and other physical aspects must be added to make it more comprehensive.

**Keywords:** Physical performance analysis; Volleyball player positions; Flexibility; speed; strength; jump height

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## INTRODUCTION

Volleyball combines technical skills, game strategy and physicality (Maliki et al., 2025; Priambodo et al., 2022). In volleyball competitions the role of each player is not only determined by technical ability, physical aspects provide an important role. In addition, each position in a volleyball team has different physical demands in terms of strength, speed endurance and agility (Dameria et al., 2023). For example, spikers need explosive power when performing smash attacks, while setters rely more on reaction speed and agility. Therefore, the physical abilities required vary greatly (Haetami & Awanis, 2021; Supriatna, 2021).

As the sport of volleyball develops, research into differences in physical ability based on position is increasingly important to improve performance. Studies suggest each position in volleyball demands different physical skills, and a better understanding of these differences can help coaches to develop specific training programs (Aprillianti et al., 2023;



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Bedi, 2019; Fauzi et al., 2021). In this regard, as is the case in the VOPAS volleyball club Semarang. The fundamental problem is the lack of understanding in analyzing differences in physical needs based on the position of players in the volleyball team.

While physical training in general is important for all, there is little practice and research comparing volleyball players' physical abilities based on player position. This is important because each position in volleyball has different physical demands, which affects how coaches structure training programs to optimize each player's potential,

Several studies have highlighted the different physical characteristics required by players in specific positions. For example, players in the spiker position have better upper body strength, while libero players require high endurance and agility (Milić et al., 2017; Nikolaidis et al., 2015; Wahyudi et al., 2024). On the other hand, studies show that the setter position relies more on agility and the ability to move quickly and predict the opponent's movements (Mäkinen et al., 2023; M. Silva et al., 2016). While other studies, the sport of soccer has examined aspects of agility in terms of player position, in his study the position of attackers and wing midfielders has better agility (Aji et al., 2024; Prayoga et al., 2022), while other studies in soccer say the opposite that the ability of agility in each position has the same results (Abdullah et al., 2024; Hadi & Yudhistira, 2023). This is an inconsistent fact that gives skepticism in the author's mind. In addition, there are still few studies that assess and compare the physical abilities needed by each position in the volleyball team, especially in the VOPAS Semarang volleyball club.

In this context, this research fills the gap of previous research and provides an understanding that sports analysis based on the position of volleyball players is needed to plan more specific training programs. Therefore, the research objectives are (1) to provide a description of the physical abilities of flexibility, jump height, strength, 20-meter sprint and 10-meter sprint in terms of the position of libero, setter and spike players. (2) to compare the variables of flexibility, jump height, strength, 20-meter and 10-meter sprints in terms of the position of libero, setter, and spike players.

Based on the description above, this research provides significance for the development of volleyball, especially in the context of athlete development at the club level. Through understanding the differences in physical needs based on the player's position, the coach can design a more specific training program. The results of this study are expected to contribute to sports literature. In addition, this research can provide a clearer picture of the importance of developing physical abilities according to position.

## **METHOD**

### **The type of research**

This research uses a quantitative approach with a comparative research design. The main objective of the study was to compare the physical abilities of athletes based on player position in the Vopas Semarang volleyball club. The comparative design was chosen because this study aims to identify significant differences between groups of player positions (such as libero, setter and spiker) in terms of physical abilities (Khatai & Biswas, 2025). This study is descriptive-analytic in nature as it not only describes the data but also analyzes the differences between groups.

### **The time and location**

This research was conducted in 2025 at the Vopas volleyball club in Semarang, Central Java. The selection of this location was based on the existence of the club as one of the

volleyball clubs that has achievements and a well-organized team structure. Data collection is planned to be carried out for 2 months, including the preparation stage, physical test implementation, and data analysis.

### **The goals or target**

The purpose of this study was to compare the physical abilities of volleyball athletes based on player position at the Vopas Semarang club. Specifically, this study aims to identify the level of flexibility, stepping height, grip strength, sprint speed, and acceleration in each player position (Bogalho et al., 2022; Gulati et al., 2021a; Marián et al., 2016). Analyze the significant differences in physical abilities between player positions, Provide recommendations to coaches and club management to improve training programs that suit the needs of each position.

### **Research procedures**

This research procedure consists of several stages, 1) Preparation Stage: Coordinating with club management and coaches to obtain permission and determine the data collection schedule, 2) Implementation Stage: Conducting physical tests on 34 athletes who are divided into various player positions (such as Libero 8 players, setter 6 players, spike 20 players), with a height of  $\pm 158$ -185 and age 15-19 years. Physical tests include, a) Flexibility: using the sit and reach test, b) jump height: using the vertical jump test, c) grip strength: using the hand grip test, d) Sprint Speed: using a 20 meter sprint, e) Acceleration: using a 10 meter sprint. 3) Analysis Stage: The data obtained will be analyzed to identify differences in physical abilities between player positions.

### **Instruments**

The research instruments used to measure the physical abilities of volleyball players include:

1. Flexibility Test (Sit and Reach)
  - Tools: Sit and reach box.
  - Procedure: The player sits with straight legs and pushes the gauge as far forward as possible.
  - Objective: To measure the flexibility of the lower back and hamstring muscles.
2. Vertical Jump Test
  - Equipment: Vertec or springboard height measuring device.
  - Procedure: The player jumps as high as possible from a standing position.
  - Objective: To measure the explosive strength of the leg muscles.
3. Hand Grip Strength Test
  - Equipment: Handgrip dynamometer.
  - Procedure: The player holds the device and squeezes as hard as possible.
  - Objective: To measure hand and arm muscle strength.
4. 20 Meter Sprint Speed Test
  - Equipment: Stopwatch and 20 meter running track.
  - Procedure: Players run as fast as possible from the starting line to the finish line.
  - Objective: To measure short distance running speed.
5. 10 Meter Sprint Acceleration Test
  - Tools: Stopwatch and 10 meter running track.

- Procedure: Players run as fast as possible from the starting line to the finish line.
- Objective: To measure the ability to accelerate in a short time.

### Data collection techniques

Data collection was carried out directly involving all athletes of the Vopas Semarang volleyball club. Data collection techniques include: 1) Direct Observation: Researchers observe and record the implementation of physical tests, 2) Physical Measurement: Each athlete will undergo a series of physical tests in accordance with the established protocol, 3) Documentation: Physical test results are recorded in a form that has been prepared for further analysis.

### Data analysis techniques

The data obtained will be analyzed using inferential statistical techniques with the help of SPSS and Excel applications (Santoso et al., 2024). The steps of data analysis include: 1) Descriptive analysis is used to describe the characteristics of data obtained from athletes' physical tests. This method involves calculating basic statistics such as minimum value, maximum value, average (mean), and standard deviation. Descriptive analysis helps researchers understand data distribution and provides an overview of athletes' physical performance, 2) Percentage analysis is used to categorize athletes' physical abilities based on certain criteria, such as Excellent, Above Average, Average, Below Average, and Poor. This method helps researchers understand the distribution of athletes' performance within each category and identify areas for improvement, 3) The Kruskal-Wallis test was used to test whether there was a significant difference between the tested groups (libero, setter, and spiker) in terms of physical ability. This test was chosen because the data analyzed did not always meet the assumption of normality, so non-parametric tests such as Kruskal-Wallis were more appropriate.

## RESULTS AND DISCUSSION

### Findings

The results of data analysis using descriptive analysis presented the minimum, maximum, mean and std deviation values, in addition to testing the percentage to see the value of very good, good, quite good, less good, and very less good, after that testing the Kruskal Wallis test to confirm significant differences with the help of the SPSS Version 25 application, the results are presented below.

**Table 1.** descriptive results of physical test data for volleyball athletes

position	Category	n	Descriptive statistics			
			Min	max	mean	Std deviation
Libero	Flexibility (sit and reach)	8	26	45,5	32,69	6,62214
Setter		6	18,5	38,5	29,75	6,91918
Nail		20	20	48	31,98	6,98961
Libero	Jump height (vertical jump)	8	44	79	56,25	10,59312
Setter		6	47	76	60,17	11,26795
Nail		20	38	72	55,80	11,25120
Libero	Grip strenght (Handgrip)	8	20	42,9	29,76	7,21960
Setter		6	30,7	35,1	32,25	1,86521
Nail		20	9,5	44,9	28,79	9,91877

Libero	Sprint (20m)	8	3,366	4,254	3,835	,3007
Setter		6	3,579	4,365	3,865	,30695
Nail		20	3,333	4,765	3,831	,36738
Libero	Sprint (acceleration 10m)	8	2,003	2,451	2,225	,17177
Setter		6	1,970	2,440	2,188	,20169
Nail		20	1,935	2,698	2,192	,20106

**Table 2.** Percentage of physical ability of volleyball players in Semarang 2025

test data	category	frequency	percentage
Flexibility (sit and reach)	Excellent	34	100%
	Above Average	0	0%
	Average	0	0%
	Below Average	0	0%
	Poor	0	0%
Jump height (vertical jump)	Excellent	3	9%
	Above Average	10	29%
	Average	10	29%
	Below Average	7	21%
	Poor	4	12%
Grip strength (Handgrip)	Excellent	0	0%
	Above Average	1	3%
	Average	3	9%
	Below Average	6	18%
	Poor	24	70%
Sprint 20 meter	Excellent	0	0%
	Above Average	0	0%
	Average	0	0%
	Below Average	0	0%
	Poor	34	100%
Sprint acceleration 10 meter	Excellent	0	0%
	Above Average	14	41%
	Average	9	26%
	Below Average	7	21%
	Poor	4	12%

Based on the percentage analysis in Table 2, it is known that the results of the Flexibility test (sit and reach) are divided into the categories of very good 100%, good 0%, good enough 0%, poor 0%, and very poor 0%. In addition, the results of the vertical jump test are divided into the categories of very good 9%, good 29%, quite good 29%, less good 21%, and very poor 12%. In addition, the results of the hand grip strength test (hand grip) are divided into the categories of very good 0%, good 3%, quite good 9%, poor 18%, and very poor 70%. In addition, the results of the 20m sprint test are divided into the categories of very good 0%, good 0%, quite good 0%, poor 0%, and very poor 100%. In addition, the results of the 10m sprint test are divided into categories of very good 0%, good 41%, quite good 26%, less good 21%, very poor 12%.

**Table 3.** Kruskal Wallis test

Variable	Significant	Description
Flexibility (sit and reach)	0,778	Insignificant
Tinggi lompatan	0,717	Insignificant
Kekuatan	0,733	Insignificant



Sprint 20meter	0,930	Insignificant
Sprint Acceleration 10meter	0,805	Insignificant

Based on the results of the Kruskal-Wallis test conducted on the physical ability variables of the VOPAS Semarang 2025 soccer players, there is no visible difference between the tested groups for each physical ability characteristic of the VOPAS Semarang 2025 soccer players, based on the findings of the Kruskal-Wallis test. Power was  $0.717 > 0.05$ , strength  $0.733 > 0.05$ , 20-meter sprint  $0.930 > 0.05$ , 10-meter sprint acceleration  $0.805 > 0.05$ , and flexibility  $0.778 > 0.05$ , all of which had statistical significance (p-value). Therefore, it can be said that for each of these factors, there is no statistically significant difference between the studied groups.

## Discussion

The results of this study provide comprehensive information on the physical abilities of VOPAS Semarang players in 2025. A number of physical attributes were analyzed, including agility (sit and reach), vertical jump (jump height), handgrip strength, 20-meter running time, and 10-meter running acceleration. In addition, this study used the Kruskal-Wallis statistical test to identify significant differences between groups based on player position (libero, setter, and spiker). The results of this study provide important information about athletes' physical condition and the implications for their performance in the sport of volleyball.

The flexibility test results show that 100% of athletes fall into the Very Good category. This shows that each player has a very high level of flexibility. Flexibility is an important component in volleyball, especially for movements such as diving, blocking, and passing that require physical strength and agility (A. F. Silva et al., 2019; Smith et al., 2020). A high level of flexibility can also reduce the risk of muscle and joint injuries, which often occur in volleyball players as a result of repetitive and high-intensity movements (Nasrulloh et al., 2023; Sinulingga et al., 2023). Despite the excellent flexibility test results, it should be noted that flexibility is only one component of physical fitness. Other factors, such as endurance, strength, and speed, must also be considered to achieve ideal performance (Simanjuntak et al., 2022; Yulianto et al., 2024).

The results show that there is significant variation in the high jump. Approximately 9% of employees fell into the Excellent category, 29% fell into the Above Average category, 29% fell into the Average category, 21% fell into the Below Average category, and 12% fell into the Poor category. Jump height is an important factor in the sport of volleyball, especially for spiker and blocker positions, which require the ability to smash and block (Ramirez-Campillo et al., 2020; Sattler et al., 2015). The results showed that although the largest number of athletes had excellent jumping ability, there were still a number of athletes who needed to improve their jumping ability. A program that focuses on improving leg muscle and springboard ability might be recommended for athletes who fall into the below-average and deficient categories.

The grip strength test gave quite striking results, with 70% of the population falling into the Poor category, 18% falling into the Below Average category, 9% falling into the Average category, and only 3% falling into the Above Average category. There were no athletes in the Excellent category. Grip strength is an important indicator of performance in volleyball, especially for passing and blocking techniques that require effective ball control (Khanna & Koley, 2020; Martin et al., 2024). The results showed that most large athletes have high hand strength, which may affect their ability to control the ball and

perform basic techniques effectively. Training programs that focus on improving hand strength, such as grip strength training and forearm training, should be implemented quickly (Chen et al., 2014; Sya'fa et al., 2023).

The results of the 20 meter short distance running test show that all athletes are in the Lack category. This indicates that the short distance running speed of each athlete is still fairly slow. Short distance running speed is an important component in volleyball, especially for learning the game and making fast movements throughout the match (Gulati et al., 2021b; Nur Rahmad et al., 2021). Research results show that training programs that emphasize increasing speed and acceleration should be prioritized to improve athletes' speed, plyometric activities and interval sprints can be recommended (Azmi & Kusnanik, 2018; Susanti et al., 2021).

The results of the 10-meter sprint acceleration test showed better variation than the 20-meter sprint. About 41% of the employees fell into the "above average" category, 26% fell into the 'average' category, 21% fell into the "below average" category, and 12% fell into the "poor" category. While there are some athletes with excellent acceleration, most of them still need to improve to reach peak performance. Good acceleration is essential in the sport of volleyball, especially for quick movement and reaction to the ball (Afilah & Supriatna, 2025; Pleša et al., 2021). Programs that emphasize improving agility, such as plyometric and agility training, can help athletes improve athlete performance (Kons et al., 2023; Susanti et al., 2021).

Based on the results of the Kruskal-Wallis test, there were no significant differences between groups based on player position (libero, setter, and spiker) for all variables tested. The significance level (p-value) for flexibility was 0.778, for high jump was 0.717, for grip strength was 0.733, for the 20-meter sprint was 0.930, and for the 10-meter sprint acceleration was 0.805. Since all the above-mentioned significance values are greater than the standard significance threshold ( $>0.05$ ), it can be concluded that there are no statistically significant differences between the examined groups for each of the variables in question. This suggests that additional factors, such as training programs, usage, or sensitivity levels, may have a greater impact on the physical variables being measured.

Based on the results of this study, it can be concluded that although athletes' flexibility was at a very good level, there were significant weaknesses in the aspects of hand strength and 20-meter sprint speed. The jumping height and 10-meter acceleration of most athletes were at an average level, but improvement was still needed to achieve better performance. A training program focused on improving strength, speed, and jump height is recommended to improve athletes' overall performance. In addition, the Kruskal-Wallis test results showed that there was no significant difference between the groups based on player position. This indicates that the training programs offered to employees should be tailored to the needs of each individual, not just based on their position within a certain period of time. The coach and support team should conduct a more thorough evaluation based on the physical condition and needs of each player in order to design a more effective training program.

## CONCLUSION

Overall, although there were no significant differences in the players' positions, this information provides important information on areas that need to be emphasized. A training program that focuses on improving sprint speed, hand strength, and high jump is recommended to improve the athletes' overall performance. In addition, careful

monitoring and evaluation of the athletes' progress is also necessary to ensure that the training program is delivering the best results.

Based on this, this article provides comprehensive information on the physical abilities of VOPAS Semarang football players and recommendations for improving athlete performance. This article can also serve as an effective platform to illustrate these concepts and provide practical advice for students to improve athlete performance

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## CONFLICT OF INTEREST

All authors declare no conflict of interest

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