



THE RELATIONSHIP BETWEEN CERTAIN ANTHROPOMETRIC MEASUREMENTS  
AND THE SPEED AND FEASIBILITY OF PERFORMING THE OVERHEAD PASS SKILL  
AMONG JUNIOR VOLLEYBALL PLAYERS

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**Recieved:** April 06, 2025 **Accepted:** June 28, 2025

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**ABSTRACT**

**Background.** Anthropometric characteristics play a crucial role in influencing skill performance in sports, particularly in technical disciplines like volleyball. Among junior athletes, understanding the impact of body dimensions on fundamental skills can guide talent identification and training strategies. **Objectives.** This study aimed to examine the relationship between selected anthropometric measurements (body height, weight, arm length, forearm length, hand length, trunk length, and shoulder circumference) and the speed and feasibility of performing the overhead pass skill among junior volleyball players. **Methods.** A descriptive-correlational approach was employed, involving 20 junior players from the Specialized School in Al-Chibayish District, Dhi Qar Governorate, during the 2023–2024 sports season. Anthropometric data were collected using standardized protocols, while the overhead pass skill was assessed through performance-based tests designed to measure accuracy and execution efficiency. **Results.** The findings revealed a statistically significant relationship between certain anthropometric variables—specifically arm length, forearm length, and shoulder circumference—and the accuracy and feasibility of performing the overhead pass. These variables were positively associated with improved skill execution. **Conclusions.** The results indicate that specific anthropometric characteristics can significantly enhance the performance of overhead passing in junior volleyball players. Early identification of these traits can support more effective talent selection and targeted training interventions. This study contributes to the field of youth sports science by emphasizing the relevance of body measurements in skill performance. It provides a practical framework for coaches and talent scouts to integrate anthropometric assessments into the selection and development process of junior volleyball players. The researchers recommend considering anthropometric measurements as essential indicators when selecting players at early age stages.

**Keywords;** anthropometric measurements, overhead pass skill, volleyball, juniors

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## A. INTRODUCTION

Volleyball is widely recognized as one of the most popular and dynamic team sports that requires a high level of coordination between technical, physical, and tactical elements. Over time, the sport has evolved significantly, with increasing attention given to performance optimization at all levels. One of the core foundations of successful gameplay in volleyball lies in the mastery of fundamental skills, among which the overhead pass plays a central role. The overhead pass, often referred to as the "setting" skill, serves as a crucial transitional technique that links defensive plays with offensive attacks. It is frequently used during matches and directly impacts team coordination, attack execution, and the overall rhythm of the game. Performing this skill with speed, accuracy, and consistency is essential for high-level performance.

The effectiveness of executing the overhead pass is not only a matter of technical training and repetition but is also strongly influenced by the player's physical and structural characteristics. In particular, anthropometric variables such as height, arm length, hand size, shoulder width, and trunk length may have a direct bearing on a player's ability to position the ball accurately and respond efficiently under pressure. These measurements reflect underlying biomechanical advantages or limitations that can either facilitate or hinder skill execution. In junior players, who are still undergoing physical and motor development, understanding these relationships becomes even more critical. Their stage of growth offers a unique opportunity to align physical potential with technical training, making talent identification and development more precise and evidence-based.

Several prior studies have explored the role of anthropometric characteristics in general sports performance, including in volleyball. Research by Maher and Wissam (2011) and Khaladi (2019) has shown that certain body dimensions are closely related to the accuracy of technical skill execution. However, most existing studies tend to focus on older age groups or elite-level athletes, with limited research targeting junior volleyball players. This is a notable gap because early adolescence is a pivotal period in the athletic pipeline. It is during this stage that coaches and trainers begin to identify and nurture talent for future competitive success. Despite the importance of this developmental stage, little research has investigated how specific anthropometric factors influence the speed and feasibility of

executing one of the game's most essential skills—the overhead pass—among junior athletes.

Recognizing this gap, the present study was initiated to investigate the relationship between selected anthropometric measurements and the speed and feasibility of performing the overhead pass among junior volleyball players. The study is grounded in the belief that a more scientific understanding of the physical characteristics required for effective skill performance can inform better selection criteria and training program design. From a theoretical perspective, the research aims to enrich the literature on motor performance and anthropometry by focusing on a key skill and a critical developmental age group. It contributes to the body of knowledge in sports science, particularly within the domains of measurement and evaluation, biomechanics, and youth athletic development.

From a practical standpoint, the findings of this study can support coaches, physical educators, and talent scouts by providing objective indicators for identifying young players with favorable physical attributes for volleyball. This can help ensure that early training is both individualized and efficient, potentially enhancing long-term athletic success. Additionally, the results may offer valuable insights for designing more personalized and scientifically grounded training regimens that account for individual physical differences. In the long term, this research could influence the development of selection models and testing protocols used in youth sports academies and volleyball development programs.

In summary, this study is driven by the need to explore how body measurements—such as height, weight, arm and forearm length, shoulder circumference, trunk length, and hand size—are associated with one of the most frequently used and strategically important skills in volleyball: the overhead pass. Through empirical investigation and statistical analysis, the researchers seek to clarify whether certain anthropometric characteristics can predict the quality, speed, and efficiency of skill execution, thereby contributing valuable knowledge to both the theory and practice of volleyball coaching and athlete development.

## **B. METHOD**

### *Participant*

The research sample consisted of 20 junior players (aged 15–17 years) affiliated with the Specialized Volleyball School in the Al-Chibayish District, Dhi Qar Governorate, during

the 2023–2024 sports season. The total population included 30 players, and the sample was selected purposefully (intentional sampling) to suit the nature and objectives of the study. Players who were injured or irregular in training were excluded, resulting in a final sample size of 20 players, representing 66.2% of the original population.

### *Research Design*

The researchers adopted the descriptive method in its correlational style, as it is suitable for the nature of the problem and the objectives of the study. The goal is to explore the relationship between certain anthropometric measurements and the speed and feasibility of performing the overhead pass skill among junior volleyball players.

### *Procedure*

The data collection process for this study was carried out in several structured stages to ensure the reliability and accuracy of results. On Friday, December 15, 2023, the researcher obtained formal permission and coordinated with the management of the Specialized School in Al-Chibayish District to determine the appropriate schedule for testing. In collaboration with the team coach, the objectives of the research were clearly communicated to all participating athletes. Detailed explanations of the test procedures and expectations were also provided to the sample to ensure their full understanding and cooperation.

Anthropometric measurements were conducted on December 22, 2023, using standardized procedures and under the supervision of trained specialists to ensure measurement accuracy. These measurements included total body height, body weight, arm length, forearm length, hand length, trunk length, and shoulder circumference. The tools used for this process included measuring tapes, a medical scale, a flat wall for accurate height measurement, and result recording forms. To ensure consistency and reliability, all measurements were taken twice, and the average value was recorded.

The test to measure the speed and feasibility of the overhead pass was conducted on Saturday, December 23, 2023. Prior to testing, each player performed a standardized warm-up to prepare physically and reduce the risk of injury. The test utilized the Wall Passing Test (Al-Shawk, 1996), which required players to perform repeated overhead passes toward a wall within a 30-second period. The testing area consisted of a smooth vertical wall with a

line marked at a height of 3 meters from the floor. Another line was drawn on the floor at a distance of 180 cm from the wall, which served as the passing line. Each player stood behind this line, holding a volleyball in both hands at face level, and initiated the test with an overhead pass aimed above the wall marking. The player was required to continue passing the ball against the wall and receiving the rebound using only overhead finger passes, without stepping over the designated line.

Strict test conditions were enforced: passes had to originate from behind the 180 cm line and be aimed above the 3-meter wall mark. The test duration was 30 seconds, beginning with the first pass. If the ball struck below the marked line or bounced in a way that forced the player to step forward, they were required to retrieve the ball and resume from the original position. Only valid overhead finger passes were counted, and any other form of contact or execution was disregarded. A stopwatch was used to control the timing precisely, and a scorer recorded the number of successful passes performed within the 30-second period.

All data collected—including anthropometric measurements and skill test results—were compiled into structured statistical tables in preparation for further analysis. The comprehensive nature of this procedure ensured the accuracy, validity, and replicability of the research findings.

### *Statistical Methods*

To analyze the data collected in this study, the researchers employed several statistical methods using SPSS software version 26. First, the arithmetic mean was calculated to identify the central tendency of the measured variables, providing a general overview of the participants' physical characteristics and skill performance levels. To complement this, the standard deviation was used to assess the degree of dispersion and variability among the individual scores, allowing for a better understanding of consistency within the sample. Furthermore, the Pearson's simple correlation coefficient was applied to determine the strength and direction of the relationship between the selected anthropometric measurements and the speed and feasibility of executing the overhead pass skill. This statistical test helped in identifying which specific physical traits were significantly associated with better performance outcomes. Finally, the skewness coefficient was

computed to evaluate the normality of data distribution, ensuring that the values were symmetrically distributed around the mean and met the assumptions required for further parametric analysis. These statistical procedures collectively supported the objective interpretation of the research findings and the validation of the research hypothesis.

### C. RESULTS AND DISCUSSION

#### Results

It is evident from Table (1) that all the physical variables of the research sample are normally distributed. Furthermore, the means reflect acceptable physical characteristics, suitable for volleyball players, which enhances the credibility of the results to be discussed later.

**Table 1.** This table shows the means, standard deviations, and skewness coefficients of the physical variables for the research sample.

Physical Variable	Arithmetic Mean	Standard Deviation	Skewness Coefficient	Description
Total Height (cm)	177.8	6.51	0.16	Normal Distribution
Weight (kg)	70.9	6.79	0.37	Normal Distribution
Arm Length (cm)	78.27	0.92	0.19	Normal Distribution
Forearm Length (cm)	48.6	2.03	0.15	Normal Distribution
Palm Length (cm)	19.85	0.67	0.17	Normal Distribution
Trunk Length (cm)	51	3.02	0.30	Normal Distribution
Shoulder Circumference (cm)	102	8.87	0.11	Normal Distribution

**Table 2.** This table presents the mean, standard deviation, and skewness coefficient for the upper volley speed and capability skill test.

Variable	Arithmetic Mean	Standard Deviation	Skewness Coefficient	Description
Upper Volley Speed and Capability	38.3	3.49	0.18	Normal Distribution

The results of the upper volley speed and capability test indicate that the research sample possesses a very good level of skill performance, as the arithmetic mean reached

(38.3), which reflects that the players possess a suitable number of training years that align with their age group.

**Table 3.** This table shows the Pearson correlation coefficients between the physical measurements and the upper volley speed and capability.

Physical Variable	Pearson Correlation Coefficient (r)	Significance Level	Conclusion
Total Height (cm)	0.18	0.00	Significant
Weight (kg)	0.56	0.01	Significant
Arm Length (cm)	0.91	0.00	Significant
Forearm Length (cm)	0.83	0.00	Significant
Palm Length (cm)	0.64	0.02	Significant
Trunk Length (cm)	0.51	0.02	Significant
Shoulder Circumference (cm)	0.70	0.01	Significant

Table 3 presents the Pearson correlation coefficients between a number of anthropometric variables and the speed and ability to perform the upper passing technique in junior volleyball players. The results of the analysis showed that all physical variables studied had a statistically significant relationship with the ability to perform the upper pass, as indicated by the significance value ( $p < 0.05$ ) in all variables. The arm length variable ( $r = 0.91, p = 0.00$ ) showed the strongest correlation with upper passing ability, indicating that the longer a player's arms are, the more likely they are to be able to perform upper passes quickly and efficiently. Forearm length ( $r = 0.83, p = 0.00$ ) and shoulder circumference ( $r = 0.70, p = 0.01$ ) also showed high positive correlations, reinforcing the important role of arm dimensions and upper body structure in supporting this technical skill.

In addition, palm length ( $r = 0.64, p = 0.02$ ) and trunk length ( $r = 0.51, p = 0.02$ ) also had significant correlations, although the strength was more moderate, suggesting additional contributions from stability and body control in performing the technique. Body weight ( $r = 0.56, p = 0.01$ ) also contributed positively, possibly reflecting the role of muscle mass in supporting strength and stability. Although total body height had the lowest correlation ( $r = 0.18$ ), the significance value ( $p = 0.00$ ) showed that height still had a statistically relevant influence. Overall, these results confirm that certain anthropometric characteristics, particularly those related to arm length and upper body size, are important factors in supporting the performance of the overhead passing technique in junior volleyball players.

These findings provide an empirical basis for considering physical measurements as indicators for the selection and development of early athletes in the sport of volleyball.

## **Discussion**

The findings of this study revealed varying degrees of correlation between anthropometric variables and the speed and feasibility of performing the overhead pass among junior volleyball players. The correlation between total height and overhead passing performance showed a weak but statistically significant relationship ( $r = 0.18$ ,  $p = 0.00$ ). While height may contribute to certain biomechanical advantages, this result suggests that height alone is not a decisive factor in executing the skill effectively. This is consistent with the findings of Gaurav and Singh (2014), who emphasized that body proportions and coordination are more critical than stature alone in determining skill accuracy. Similarly, Mahmoud (2018) argued that height must be balanced with motor accuracy to be effective in volleyball performance.

In contrast, the relationship between body weight and overhead passing was moderate and significant ( $r = 0.56$ ,  $p = 0.01$ ), indicating that appropriate body mass contributes to postural stability and controlled execution of the skill. Nasuka (2020) warned, however, that excessive or disproportionate weight could negatively impact motor balance in junior athletes. Al-Nuaimi (2011) reinforced this notion, suggesting that an optimal weight-to-height ratio supports dynamic balance and improves execution of fundamental motor skills in volleyball. Among the most significant findings was the strong correlation between arm length and passing performance ( $r = 0.91$ ,  $p = 0.00$ ), demonstrating that longer arms greatly facilitate the overhead pass. Extended arm length increases reach, enhances contact angles, and allows for better control and accuracy. This aligns with Al-Hayani (2013) and Gaurav & Singh (2014), who highlighted arm length as a key anthropometric factor in volleyball, particularly for precise setting and passing.

Similarly, forearm length was found to have a strong correlation with the skill ( $r = 0.83$ ,  $p = 0.00$ ), supporting its role in the transfer of force and overall control during execution. According to Carvajal et al. (2012), longer forearms stabilize the arm structure, facilitating more accurate and consistent passing. Hand length also showed a relatively strong and significant relationship ( $r = 0.64$ ,  $p = 0.02$ ), indicating its importance in ball control. A larger hand surface area increases the player's ability to contact and direct the ball with precision.

Al-Zubaidi et al. (2015) noted that increased hand and forearm dimensions contribute significantly to skill execution due to improved handling and directional control.

Trunk length showed a moderate but meaningful correlation ( $r = 0.51$ ,  $p = 0.02$ ), highlighting the trunk's role in maintaining balance, stabilizing the upper body, and supporting the mechanical transfer of movement during the pass. Effective trunk involvement is essential for maintaining posture and energy flow throughout skill performance. Lastly, shoulder circumference demonstrated a strong and significant correlation with passing performance ( $r = 0.70$ ,  $p = 0.01$ ), suggesting that increased shoulder breadth supports arm stability and enhances ball direction control. Iglesias et al. (2020) and Khaladi (2019) both affirmed that shoulder circumference is linked to upper body strength, which directly influences skill precision in volleyball.

#### *Study Limitations.*

While the findings offer valuable insights into the role of anthropometric characteristics in volleyball skill performance, several limitations must be acknowledged. First, the sample size was relatively small ( $n = 20$ ), which may limit the generalizability of the results to broader populations of junior athletes. Second, the study was restricted to male players from a single specialized school, thereby not accounting for potential gender or regional differences. Additionally, external variables such as technical training background, psychological factors, or neuromuscular coordination were not controlled, though they may also influence skill performance. Future research should consider larger, more diverse samples and integrate biomechanical and motor learning analyses to provide a more comprehensive understanding of the determinants of skill success in volleyball.

#### **D. CONCLUSION**

Based on the results of the data analysis and discussion, several important conclusions were drawn regarding the relationship between anthropometric measurements and the speed and feasibility of performing the overhead pass among junior volleyball players. First, the study confirmed a statistically significant positive correlation between total height and the efficiency of executing the overhead pass, suggesting that taller players may have certain biomechanical advantages in this skill. Additionally, the findings highlighted that arm length and shoulder circumference are strongly correlated with overhead passing performance,

further emphasizing the importance of upper body dimensions in enhancing range of motion, ball control, and execution speed. More broadly, the results demonstrated that several anthropometric characteristics—particularly arm length, forearm length, hand length, and shoulder circumference—can serve as effective preliminary indicators in identifying players who are well-suited for positions that rely heavily on overhead passing. These measurements provide valuable guidance not only for player selection but also for tailoring training programs that optimize skill development based on individual physical attributes.

In light of these conclusions, the researchers propose several recommendations for practice and future research. Coaches and talent scouts should prioritize key anthropometric measurements—especially total height, arm length, forearm length, and shoulder circumference—during the selection and development of junior volleyball players. Training programs should be designed with a focus on enhancing overhead passing skills while considering each player’s unique physical characteristics. Moreover, regular anthropometric assessments are recommended to monitor the athletes’ physical development and its alignment with skill execution demands. To extend the implications of this research, future studies should explore the influence of anthropometric variables on other essential volleyball skills, such as serving, receiving, spiking, and blocking. Finally, similar investigations should be conducted across different age categories and skill levels, including youth and advanced players, to validate the findings and broaden their applicability in real-world training and competition contexts.

#### **E. ACKNOWLEDGMENT**

The authors would like to thank all those who helped, especially the General Directorate of Education in Basrah, Republic of Iraq.

#### **F. AUTHOR CONTRIBUTION STATEMENT**

The FFH is responsible for designing the content and direction of the research and is responsible for the research. The RAM assists in data selection, data analysis, and manuscript finalization.

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