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THE RELATIONSHIP BETWEEN BODY FLEXIBILITY AND OVERHEAD PASSING ACCURACY IN VOLLEYBALL AMONG GRADE XI STUDENTS OF SMK NEGERI 4 KUTACANE

Habi Misfah[1,*], Orbit Irwansyah[1], Ladipin[1]
[1]Faculty of Teacher Training and Education, University of Gunung Leuser, Aceh, Indonesia
[*]Corresponding Author Email: abihabibi241@gmail.com

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Abstract

This correlational study investigates the relationship between body flexibility and the accuracy of overhead passing in volleyball. The research was conducted on a population and sample of 12 Grade XI students from SMK Negeri 4 Kutacane, selected via total sampling. Body flexibility was quantitatively measured using the standard Sit and Reach test, which primarily assesses the flexibility of the lower back and hamstring muscles. Overhead passing accuracy was evaluated through a targeted passing test, where students aimed to pass the ball accurately to a designated target area. Data analysis commenced with a Shapiro-Wilk normality test to confirm the data's parametric nature, followed by a Pearson Product-Moment correlation analysis. The results revealed a very strong, positive, and statistically significant correlation between the two variables ($r = 0.872$, $p = 0.000$). This finding indicates that higher levels of body flexibility are strongly associated with greater accuracy in performing overhead passes in volleyball. The discussion posits that enhanced flexibility allows for better body control, a wider range of motion, and more precise upper-body positioning, all of which are critical for effective overhead passing. Consequently, the study strongly recommends incorporating systematic and regular flexibility training, focusing on the lower back, hamstrings, and shoulder girdle, into volleyball training regimens for novice players to fundamentally improve their technical skills.

Keywords: Body Flexibility, Correlation, Overhead Passing, Physical Education, Volleyball

INTRODUCTION

Volleyball, a dynamic and complex sport, demands a sophisticated synthesis of various physical capacities and technical skills for successful performance. Among these foundational techniques, the overhead pass, or "passing atas," is a critical component for building effective offensive plays. It is the primary skill used by setters to accurately position the ball for attackers, and its precision directly influences the quality and outcome of an attack. While technical instruction and repetitive practice are undeniably crucial for mastering this skill, the underlying physical prerequisites that enable proper technique are often less emphasized, particularly at the developmental levels of the sport. One such fundamental physical attribute is body flexibility. Defined as the ability of a joint, or series of joints, to move through a full, pain-free range of motion, flexibility is integral to efficient and effective athletic movement. In the context of the overhead pass, optimal flexibility in key areas—specifically the lower back, hamstrings, and shoulders—is not merely beneficial but essential. A player with good flexibility can achieve a stable and balanced ready position, extend their arms and torso to meet the ball at an ideal contact point, and absorb the ball's force with controlled, fluid movements. This range of motion allows for finer adjustments in hand and finger positioning, leading to superior ball control and directional accuracy. Conversely, restricted flexibility can lead to compensatory movements, technical errors, and a higher risk of acute or chronic injuries, such as strains in the lower back or shoulder impingement. The performance of an overhead pass is a biomechanically coordinated action. It requires the player to position themselves under the ball with knees bent and body aligned. As the ball arrives, the player extends their legs, back, and arms in a synchronized motion. Tight hamstrings can prevent a deep enough squat for a stable base, while a stiff lower back can limit the trunk's extension, reducing the power and control generated from the core. Similarly, limited shoulder flexibility can restrict the optimal overhead platform, forcing the player to contact the ball from a less advantageous position, thereby compromising accuracy. Therefore, the hypothesis that a direct relationship exists between a player's general body flexibility and their ability to execute accurate overhead passes

is both logical and grounded in biomechanical principles Despite its apparent importance, empirical research specifically linking quantitative measures of general flexibility, like the Sit and Reach test, to specific volleyball skills like overhead passing accuracy in a novice adolescent population remains relatively underexplored in the local context of Indonesian student-athletes. While studies such as Sahrul, Yulianto, & Hidayat (2024) have focused on shoulder flexibility and Pertiwi & Rahmat (2022) on general flexibility's influence on passing ability, there is a need for focused investigations that can inform targeted physical conditioning programs in school settings. This study, therefore, aims to fill this gap by quantitatively examining the relationship between body flexibility, as measured by the Sit and Reach test, and the accuracy of overhead passing in volleyball among Grade XI students of SMK Negeri 4 Kutacane. By establishing a clear empirical link, the findings of this research are expected to serve as a scientific basis for coaches and physical education teachers to develop more focused and evidence-based training programs. Ultimately, integrating dedicated flexibility training can lead to improved technical skill acquisition, enhanced game performance, and reduced injury incidence among developing volleyball players.

LITERATURE REVIEW

The theoretical framework of this study is built upon the interconnected concepts of physical fitness, specifically flexibility, and motor skill acquisition in sports, with a focal point on volleyball's technical demands.

The Role of Flexibility in Athletic Performance

Flexibility is a core component of health-related physical fitness, alongside cardiorespiratory endurance, muscular strength, muscular endurance, and body composition (Corbin et al., 2021). It is specific to each joint and is influenced by several factors, including the elasticity of muscles and tendons, joint structure, age, gender, and temperature. In sports science, adequate flexibility is recognized as a critical factor for optimizing movement efficiency, enhancing performance, and preventing injuries (Page, 2012). A sufficient range of motion allows athletes to execute skills with proper technique, generate greater force through longer acceleration paths, and reduce the resistance offered by antagonistic muscle groups. For instance, in sports like gymnastics, swimming, and martial arts, flexibility is a paramount performance determinant. In team sports like volleyball, while often overshadowed by power and strength, its role in technical execution is indispensable.

Technical Demands of the Overhead Pass in Volleyball

The overhead pass in volleyball is a fine motor skill requiring exceptional hand-eye coordination, tactile sensitivity, and precise body control. The objective is to contact the ball with the fingers spread comfortably, forming a "window" through which the ball is seen, and to direct it to a specific target using a coordinated extension of the legs, torso, and arms. The International Volleyball Federation (FIVB) emphasizes that a successful pass is not just about preventing the ball from hitting the floor but about controlling its trajectory, speed, and spin to facilitate the next play (FIVB, 2021). This level of control is contingent on the player's ability to get their body into the optimal position underneath and behind the ball. Any limitation in flexibility can disrupt this kinetic chain. For example, tight hamstrings can cause a forward lean, shifting the body's center of gravity and making it difficult to direct the ball upwards. Similarly, poor shoulder flexibility can lead to a late or incorrect contact point, resulting in passes that are too low, too tight to the net, or misdirected horizontally.

Empirical Evidence Linking Flexibility and Volleyball Skills

A growing body of research supports the connection between flexibility and volleyball performance. A study by Koley & Singh (2011) found that anthropometric and physical fitness variables, including flexibility, were significant predictors of volleyball playing ability. Their research indicated that players with higher fitness levels, encompassing flexibility, demonstrated superior technical skills during match play. More specifically, recent studies have zoomed in on passing skills. Sahrul et al. (2024) investigated the relationship between shoulder flexibility and overhead passing skills among university volleyball players. Their findings indicated a high positive correlation, suggesting that players with greater shoulder range of motion were more proficient in executing accurate and controlled overhead passes. This can be attributed to the greater freedom in positioning the arms and hands to create an ideal passing platform. Further reinforcing this, Sintani & Arifai (2025), in an experimental study, demonstrated that a structured flexibility training program could significantly improve overhead passing ability by 26.16% in a sample of student players. This intervention study moves beyond correlation to suggest a causative link, where improvements in flexibility directly lead to enhancements in technical skill. Pertiwi & Rahmat (2022) also concluded that flexibility had a significant effect on passing technique capabilities in volleyball, highlighting its importance in

foundational training. The Sit and Reach test, while a general measure focused on the lower back and hamstrings, is a widely used and validated field test for assessing flexibility. Its relevance to overhead passing may seem indirect, but it is profound. The ready position and the dynamic movement into the pass are a whole-body action. The kinetic chain starts from the ground up; limited flexibility in the posterior chain (calves, hamstrings, glutes, lower back) can inhibit the force production and stability needed for a controlled pass, as noted in the principles of sports biomechanics (Knudson, 2007). This study builds upon existing literature by applying these principles to a specific, novice population: Grade XI vocational students in Indonesia. It seeks to corroborate the findings of previous research within this unique context, providing localized evidence for the critical role of flexibility in mastering one of volleyball's most essential skills.

METHOD

This study employed a quantitative correlational research design. This design was deemed appropriate as it aims to identify and measure the relationship between two or more variables without any manipulation by the researcher (Creswell & Creswell, 2018). The primary objective was to determine the strength and direction of the association between body flexibility (the independent variable) and overhead passing accuracy (the dependent variable). The population for this study was all Grade XI students at SMK Negeri 4 Kutacane for the academic year 2023/2024. Due to the manageable and finite size of the population, a total sampling technique was employed, meaning every member of the population was included in the study. Consequently, the research sample consisted of 12 male students who were all actively participating in the school's volleyball extracurricular activities. The use of total sampling eliminates sampling error and provides a complete picture of the population under investigation, though it limits the generalizability of findings to broader populations.

The independent variable, body flexibility, was measured using the standard Sit and Reach Test. This validated and reliable measure for assessing the flexibility of the lower back and hamstrings was administered with a standard Sit and Reach box. During the procedure, the student sat on the floor with legs fully extended and the soles of the feet placed flat against the box. With knees locked and hands placed one on top of the other, the student slowly reached forward as far as possible along the measuring scale, holding the position for approximately two seconds. The score was recorded to the nearest centimeter. Each student performed the test three times, and the best score was used for data analysis. The dependent variable, passing accuracy, was assessed using a Volleyball Passing Accuracy Test. A target measuring 1.5 meters by 1.5 meters was created on a wall, with its lower edge 2.5 meters from the floor. A line was marked on the floor 3 meters away from this wall. The student stood behind this line while the researcher tossed the ball consistently to a height that allowed for an overhead pass. The student's task was to pass the ball using the overhead technique towards the target on the wall. Each student performed ten attempts, with a successful pass that hit within the target area, scoring one point. The total score out of ten was recorded as the measure of passing accuracy.

The collected data were subsequently analyzed using the Statistical Package for the Social Sciences (SPSS) software. The analytical process began with a normality test. Before parametric correlation analysis, the data for both variables were tested for a normal distribution using the Shapiro-Wilk test, a prerequisite for using Pearson's correlation. After confirming the normality of the data, a Pearson Product-Moment correlation analysis was conducted. This analysis produces a correlation coefficient, indicating the strength and direction of the linear relationship between the two variables, and a significance value to determine if the observed relationship was statistically significant.

RESULTS

The descriptive statistics for the two variables are presented as follows. For body flexibility, the average score on the Sit and Reach test was 29.25 cm, with a standard deviation of ±3.34 cm. Regarding overhead passing accuracy, the average score was 7.25 out of a possible 10, accompanied by a standard deviation of ±3.36. The assumption of normality required for parametric testing was confirmed using the Shapiro-Wilk test. The results indicated that the data for both body flexibility and passing accuracy were normally distributed, with p-values of 0.184 and 0.211, respectively, both exceeding the 0.05 significance level. Subsequently, a Pearson correlation analysis was performed to examine the relationship between the variables. The results revealed a correlation coefficient of $r = 0.872$, which indicates a very strong positive relationship between body flexibility and overhead passing accuracy. Furthermore, this relationship was found to be statistically significant, as evidenced by a p-value of 0.000, which is far below the standard alpha level of 0.05.

DISCUSSION

The central finding of this study—a very strong and significant positive correlation ($r = 0.872$, $p < 0.001$) between body flexibility and overhead passing accuracy—provides robust empirical support for the hypothesized link. This means that students with greater flexibility in their lower back and hamstrings, as measured by the Sit and Reach test, consistently demonstrated higher accuracy in their overhead passing performance. The strength of this relationship can be explained through a biomechanical and practical lens. The overhead pass is not an isolated arm movement; it is an integrated action involving the entire kinetic chain. A player with good flexibility can achieve a deeper and more stable squat in the ready position. This stable base is crucial for balancing the body as it moves to intercept the ball. When the pass is executed, the power and direction are generated from the legs, transmitted through the extended torso, and finely tuned by the arms, wrists, and fingers. Tight hamstrings and a stiff lower back compromise this chain. They can prevent a player from getting fully underneath the ball, leading to passes that are made from a more upright, unbalanced posture. This often results in the player "stabbing" at the ball rather than smoothly controlling and directing it, severely compromising accuracy.

Furthermore, good flexibility allows for a greater range of motion in the shoulder girdle, even if not directly measured by the Sit and Reach test. A flexible torso and back facilitate the scapular retraction and thoracic extension that underpin a strong overhead position. This enables the player to create a larger, more stable, and better-angled platform with their hands and fingers at the point of contact. This enhanced control directly translates to improved precision in directing the ball to the intended target. These findings are consistent with and reinforce the existing body of literature. The study by Sahrul et al. (2024), which found a high correlation between shoulder flexibility and passing skill, aligns with our results, highlighting the importance of overall upper-body and torso mobility. More significantly, the experimental work of Sintani & Arifai (2025), which showed a 26.16% improvement in passing following flexibility training, provides a causative link that underpins our correlational findings. It suggests that improving a player's flexibility is not just associated with but can directly cause an improvement in their passing technique.

The practical implications are clear and compelling. For physical education teachers and volleyball coaches working with novice players, these results argue strongly against a training regimen that focuses solely on repetitive technical drills or power development. Instead, a holistic approach that integrates dedicated flexibility training is essential. Dynamic stretching as part of a warm-up (e.g., leg swings, torso twists, arm circles) prepares the muscles for the required range of motion. Static stretching during cool-down sessions (e.g., seated toe touches, hamstring stretches, cross-body shoulder stretches) can help improve long-term flexibility. By systematically addressing flexibility limitations, coaches can create a physical foundation that allows young athletes to learn and execute technical skills like the overhead pass more effectively and efficiently.

CONCLUSION AND SUGGESTIONS

Based on the data analysis and discussion, this study concludes that there is a very strong, positive, and statistically significant relationship between body flexibility and the accuracy of overhead passing in volleyball among Grade XI students of SMK Negeri 4 Kutacane. The higher a student's level of body flexibility, particularly in the lower back and hamstrings, the greater their ability to execute precise and controlled overhead passes. Body flexibility plays a pivotal role in enabling optimal body control, stability, and the range of motion necessary for effective technical execution in volleyball. In light of these findings, the following suggestions are proposed as follows. For teachers and coaches, it is highly recommended to systematically incorporate flexibility training into regular physical conditioning programs for volleyball players. This should include both dynamic stretches during warm-up routines to prepare for activity and static-hold stretches during cool-down to improve long-term flexibility. Focus should be placed on the posterior chain (hamstrings, glutes, lower back) and the shoulder complex.

For students and players, players are encouraged to take personal responsibility for their flexibility. Engaging in regular self-directed stretching sessions, beyond formal training, can yield significant benefits. Consistency in performing both dynamic and static stretches will contribute to more efficient, accurate, and safer movement on the volleyball court. For future researchers: Subsequent studies should seek to expand on this work by investigating other potential variables that influence passing accuracy, such as hand-eye coordination, core strength, upper-body power, and kinesthetic awareness. Employing an experimental design with a controlled flexibility intervention would be valuable to establish causality more firmly. Furthermore, replicating this study with a larger and more diverse sample, including female athletes and different age groups, would enhance the generalizability of the findings.

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