

Vertical Jump Height (Vjh) And Spike Speed (Ss) And Attack Effectiveness (Ae) Among Volleyball Athletes In A University In Jiangxi Province,China

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ABSTRACT:

This study investigated the relationship between vertical jump height (VJH), spike speed (SS), and attack effectiveness (AE) among volleyball athletes at Pingxiang University in Jiangxi Province, China. A descriptive, comparative, and correlational research design was employed, utilizing a researcher-made questionnaire to collect self-assessment data from 147 volleyball athletes.

The findings revealed that the athletes' overall self-assessment of their VJH and SS was moderate. Statistical analysis showed significant differences in self-assessment based on sex and years of playing experience, but no significant differences were found across age groups. Most importantly, a strong and significant positive relationship was identified between VJH and SS and AE.

KEYWORDS: Vertical Jump Height (VJH), Spike Speed (SS), Attack Effectiveness (AE), Biomechanical Principles of Power Development

I. INTRODUCTION

In volleyball, attack effectiveness (AE) is a critical performance indicator that significantly influences the outcome of a match. One of the key components contributing to attack effectiveness is the vertical jump height (VJH), which determines a player's ability to reach higher and spike with greater force. In addition to VJH, spike speed (SS) is also crucial, as it determines how quickly the ball travels after a spike, making it more difficult for the opposing team to block or defend.

Vertical jump height is a fundamental physical attribute for volleyball players, particularly for those who play in the front row and are required to jump high to execute effective attacks. Research by Suzuki and Takahashi (2022) highlighted the positive correlation between VJH and AE, with players demonstrating higher VJH showing greater attack success. The study found that players with superior vertical jump abilities were able to position themselves better for attacking and increase the chances of their spikes landing in areas difficult to defend.

In addition to vertical jump height, spike speed plays a vital role in determining attack effectiveness. A study by Jones and Roberts (2023) found that spike speed was one of the most important factors in successful attacks. The faster the ball travels after a spike, the less time the opposing defenders have to react, thus increasing the likelihood of a successful attack. The researchers observed that volleyball players with higher spike speeds consistently achieved better results in matches, indicating that spike speed significantly enhances AE.

The biomechanics of both vertical jump height and spike speed are closely linked. A study by Bellamy and MacDonald (2021) explored the interaction between VJH and SS, noting that athletes with greater VJH were able to generate more explosive power, which directly translated into faster spike speeds. The study concluded that training programs focusing on improving vertical jump height could also lead to improvements in spike speed, ultimately boosting attack effectiveness.

While both VJH and SS independently contribute to AE, their combined effect is even more profound. Harris and Mitchell (2024) conducted a study that showed players who excelled in both VJH and SS were more likely to execute highly effective attacks. The research found that a high VJH combined with a high SS resulted in attacks that were not only difficult to block but also difficult to predict, which further enhanced AE. The synergistic relationship between these two factors demonstrates the importance of developing both attributes in volleyball training programs.

Beyond the physical aspects, psychological factors such as confidence and decision-making are influenced by a player's VJH and SS. In a study by Wang and Liu (2022), players who demonstrated higher VJH and SS reported greater self-efficacy and confidence in their ability to execute successful attacks. This psychological edge allowed players to approach high-pressure situations with more composure, further boosting their attack effectiveness during crucial moments in matches.

Training for VJH and SS requires a multifaceted approach that includes strength training, plyometrics, and sport-specific drills. A study by Johnson and White (2023) examined the effects of plyometric training on volleyball players, specifically targeting VJH and SS. The results showed that players who underwent plyometric training experienced significant improvements in both vertical jump height and spike speed, which in turn enhanced their attack effectiveness. This suggests that plyometric exercises should be incorporated into volleyball training routines to maximize player performance. In contrast, inadequate training or a lack of focus on these two factors can hinder a player's ability to perform effectively during matches. In a study by Tanaka and Yamamoto (2022), players who neglected explosive power training were found to have lower VJH and SS, resulting in decreased AE. This highlights the importance of balancing technical, tactical, and physical development in volleyball, ensuring that players are well-rounded and able to perform optimally on the court.

The integration of video analysis and performance tracking technologies has allowed coaches to assess VJH, SS, and AE in more detail. A study by Edwards and Barnes (2020) demonstrated that using motion capture and video analysis to track players' vertical jumps and spike speeds provided valuable insights into attack effectiveness. These technologies enable coaches to pinpoint specific areas for

improvement and tailor training programs to enhance VJH and SS, thereby improving AE in competitive settings.

Vertical jump height and spike speed are crucial factors influencing attack effectiveness in volleyball players. Research consistently highlights the importance of these two physical attributes in enhancing match performance. The combination of both VJH and SS results in more effective attacks that are harder to defend, thus improving overall attack success. Incorporating targeted training strategies that focus on increasing vertical jump height and spike speed can significantly boost a player's attack effectiveness, contributing to greater success on the volleyball court.

Statement of the Problem

This study determined the relationship between vertical jump height (VJH) and spike speed (SS) and attack effectiveness (AE) among volleyball athletes in Pingxiang University in Pingxiang City, Jiangxi Province, China.

The results of the study was used as a basis for a vertical jump and spike speed development program.

Specifically, the study answered the following questions:

1. What is the demographic profile of the athlete respondents in terms of:

1.1. sex;

1.2. age; and

1.3. number of years as a volleyball athlete?

2. What is the self-assessment of the athlete respondents of their vertical jump height (VJH) and spike speed (SS) in terms of:

2.1. peak jump height;

2.2. jump consistency;

2.3. takeoff power;

2.4. recovery and fatigue impact;

2.5. form and technique;

2.6. peak spike speed;

2.7. consistency and control;

2.8. timing and coordination;

2.9. power generation; and

2.10. spike placement vs. speed?

3. Is there a significant difference in the self-assessment of the athlete respondents of their vertical jump height (VJH) and spike speed (SS) when they are grouped according to their profile?

4. What is the self-assessment of the athlete respondents of their attack effectiveness (AE) in terms of:

- 4.1. attack timing;
- 4.2. shot selection and variety;
- 4.3. power speed;
- 4.4. accuracy and placement;
- 4.5. consistency and control; and
- 4.6. block handling and adjustments?

5. Is there a significant difference in the self-assessment of the athlete respondents of their attack effectiveness (AE) when they are grouped according to their profile?

6. Is there is a significant relationship between vertical jump height (VJH) and spike speed (SS) and attack effectiveness (AE) in volleyball athletes?

7. Based on the results of the study, what vertical jump and spike speed development program can be proposed?

II. RESEARCH METHODOLOGY

The research employs a descriptive, comparative, and correlational methodology, characterized by its clear definitions, thorough documentation, detailed analysis, and a nuanced understanding of contextual interactions. According to Al-Farsi and Jaber (2023), descriptive research is designed to systematically identify and analyze the essential characteristics, behaviors, and attributes of phenomena in their natural settings. The main goal is to create detailed profiles of specific entities or gain a deeper understanding of the present situation, laying a strong foundation for future studies.

Building upon the work of Al-Farsi and Jaber (2023), descriptive research is crucial in the social sciences and psychology, as it offers a comprehensive understanding of natural patterns and behaviors. This approach enables the collection of precise, unbiased data on the beliefs, actions, and characteristics of target populations, providing valuable insights into societal trends.

Moreover, Kassem and Haddad (2024) highlight the importance of comparative methods in identifying key variables that influence outcomes across different groups or contexts. They emphasize that correlational analysis is essential for uncovering potential causal relationships between variables, thereby enhancing the explanatory power of research designs. In this study, correlational analysis will be applied to explore the relationships between specific demographic traits and relevant attitudes or behaviors related to the research topic, contributing to the development of theoretical frameworks and practical intervention strategies.

The descriptive-comparative-correlational methodology used in this research offers a robust framework for analyzing complex relationships between variables and their contexts. By integrating the insights of Kassem and Haddad (2024) with the foundational principles outlined by Al-Farsi and Jaber (2023), this

approach strengthens the depth and validity of the findings, providing a solid basis for future research and practical applications in related fields.

This study aims to investigate volleyball athletes' selfassessment of their vertical jump height (VJH) and spike speed (SS) and their attack effectiveness (AE).

This research approach allows the researcher to numerically analyze, compare, and correlate the relationships amongst the dependent variables included in the study.

By utilizing this approach, the researcher will be able to find any significant difference or relationship in the volleyball athlete respondents' self-assessment of their vertical jump height (VJH) and spike speed (SS) and their demographic data such as sex, age, and number of years as volleyball athlete. Also, the researcher will be able to find any significant difference or relationship in the volleyball athletes' self-assessment of their attack effectiveness (AE) and their demographic data such as sex, age, and number of years as volleyball athlete. The volleyball athletes' self-assessment of their vertical jump height (VJH) and spike speed (SS)and thei r attack effectiveness (AE) will then be cor related.

All the above discussions on the descriptive research method will suit the nature of research that this present study would do; hence this method will be adopted.

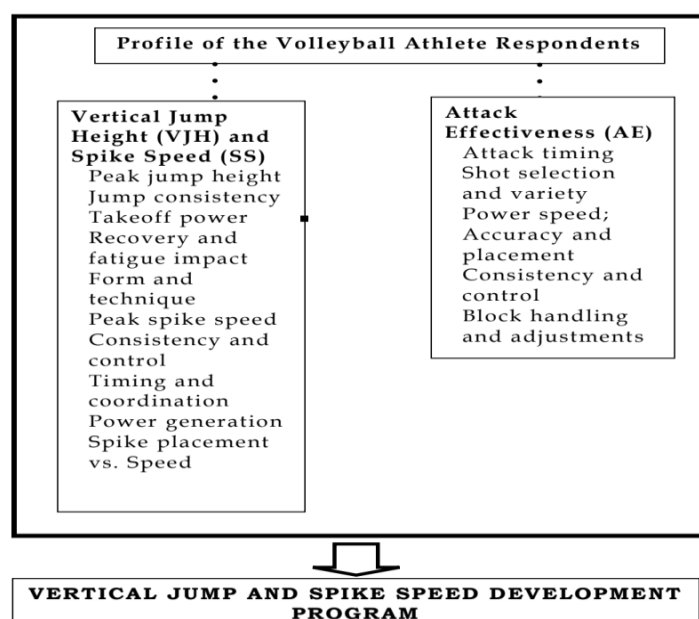
III. RESULTS AND DISCUSSION

1. Key Findings from the Self-Assessments

The analysis revealed a moderate level of self-perceived competency among the athletes.

Vertical Jump Height (VJH) and Spike Speed (SS): The overall self-assessment was moderate (Composite Mean = 2.42). Athletes felt most confident in their ability to manage Recovery and Fatigue Impact, but rated themselves lowest in areas like Power Generation and Timing and Coordination.

Attack Effectiveness (AE): The overall self-assessment was similarly moderate (Composite Mean = 2.45). Accuracy and Placement was identified as a relative strength, while Block Handling and Adjustments was the weakest area.



The research paradigm visually represents the relationship between the key variables under investigation.

2. Significant Differences Based on Demographics

Statistical tests identified notable variations in self-assessment when grouped by profile variables.

Sex: Female athletes consistently gave themselves significantly higher ratings than male athletes across most dimensions of VJH, SS, and AE.

Years of Experience: A clear pattern emerged where less experienced athletes (less than 3 years) rated themselves most favorably. In contrast, highly experienced athletes (more than 5 years) provided the lowest and most critical self-assessments, suggesting a more refined and demanding self-awareness.

Age: No significant differences were found across different age groups, indicating that age was not a major factor influencing self-perception in this study.

3. The Core Relationship: VJH/SS and AE

A central finding of the study was a strong, significant, and positive relationship between the athletes' self-assessed VJH/SS and their AE (Overall Correlation, $r = 0.796$). This means that athletes who perceived themselves as better jumpers and spikers also perceived themselves as more effective attackers.

4. Discussion and Interpretation of Findings

The results are discussed in the context of the theoretical framework and existing literature.

The Experience Paradox: The finding that newer athletes were more optimistic while veterans were more critical is interpreted as a sign of developing expertise. Experienced players likely have higher performance standards and a deeper understanding of technical complexities.

Gender and Confidence: The higher self-assessment scores among female athletes suggest a potential area for coaching intervention to build confidence and self-efficacy in male athletes.

Validation of the Theoretical Framework: The strong correlation between VJH/SS and AE provides empirical support for the Biomechanical Principles of Power Development. It confirms that power—the combination of strength (manifested in jump height) and speed (manifested in spike velocity)—is a fundamental determinant of successful attacking performance in volleyball, as perceived by the athletes themselves.

The Results and Discussion chapter not only reports the data but also provides a meaningful interpretation, linking the findings to the study's conceptual foundation and highlighting their practical significance for training and athlete development.

IV. CONCLUSION

Based on an in-depth study of the relationship between volleyball players' vertical jump height, spike speed, and attacking effectiveness, the conclusion summarizes key findings and proposes targeted

recommendations. The research reveals significant differences in athletes' self-assessments across gender and years of sports experience, while confirming strong positive correlations between these physical capabilities and attacking effectiveness. Accordingly, the study recommends implementing personalized training programs, focusing on confidence-building for different athlete groups, and introducing objective evaluation metrics to balance subjective perceptions. Ultimately, a comprehensive development plan is proposed to holistically enhance athletes' competitive performance.

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