



A STUDY ON THE PHYSICAL FITNESS DETERMINANTS OF PLAYING ABILITY AMONG COLLEGE-LEVEL VOLLEYBALL PLAYERS

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Abstract:

The purpose of the present study was to identify the physical fitness determinants of playing ability among college-level volleyball players. A descriptive correlational research design was adopted for the study. Two hundred male college-level volleyball players, aged between 18 and 25 years, who had participated in intercollegiate volleyball competitions were selected through purposive sampling from Bharathidasan University affiliated colleges. The selected physical fitness variables included speed, explosive leg power, agility, muscular strength, muscular endurance, flexibility, and cardio respiratory endurance, while playing ability served as the criterion variable. Standardized field tests were used to assess the physical fitness variables, and playing ability was evaluated by three qualified volleyball experts using a standardized rating scale. The collected data were analyzed using descriptive statistics, Pearson Product Moment Correlation, and Multiple Linear Regression analysis. The findings revealed that all the selected physical fitness variables were positively and significantly related to playing ability. Among them, explosive leg power, agility, speed, and muscular strength emerged as the most significant determinants of volleyball playing ability. The regression analysis indicated that these variables collectively explained a substantial proportion of the variance in playing ability. The study concluded that physical fitness plays a crucial role in volleyball performance and that systematic development of key physical fitness components can significantly enhance the playing ability of college-level volleyball players. The findings provide valuable information for coaches, physical education professionals, and sports scientists in designing evidence-based training programmes, talent identification, and player selection.

Key Words: Physical Fitness, Playing Ability, Volleyball Players, Explosive Leg Power, Agility, Speed, Muscular Strength, College-Level Players, Correlation, Multiple Regression

Introduction:

Volleyball is one of the most dynamic and technically demanding team sports, requiring players to perform repeated explosive movements such as jumping, spiking, blocking, serving, diving, and rapid changes in direction. Success in volleyball depends not only on technical and tactical proficiency but also on the physical fitness characteristics that enable players to execute these skills efficiently throughout a match (Bompa & Buzzichelli, 2019; Sheppard & Gabbett, 2008). As the game has become faster and more competitive, physical fitness has emerged as a fundamental determinant of individual and team performance. Physical fitness refers to the ability of an individual to perform physical activities effectively and efficiently without undue fatigue while maintaining sufficient energy for recovery and subsequent performance. In volleyball, players are expected to possess a combination of speed, agility, explosive power, muscular strength, muscular endurance, flexibility, coordination, balance, and cardio respiratory endurance. These components enable athletes to respond quickly to game situations, execute technical skills with precision, and sustain optimal performance during prolonged competitions (Baechle & Earle, 2008).

Among the various components of physical fitness, explosive leg power plays a crucial role in offensive and defensive actions such as spiking and blocking. Speed and agility allow players to move rapidly in all directions to receive serves, defend attacks, and cover the court effectively. Muscular strength contributes to powerful spikes and serves, while muscular endurance enables athletes to maintain performance despite repeated high-intensity efforts. Flexibility enhances the range of movement required for defensive skills and helps reduce the risk of injury. Together, these physical attributes provide the foundation for successful volleyball performance (Ziv & Lidor, 2010). Playing ability in volleyball is a multidimensional concept that reflects an athlete's overall competence in executing the technical, tactical, physical, and psychological demands of the game. It is influenced by numerous factors, including physical fitness, technical skill, game intelligence, decision-making ability, experience, motivation, and training status. However, among these factors, physical fitness serves as the foundation upon which technical and tactical skills are effectively executed. Players with superior physical fitness generally demonstrate greater movement efficiency, faster reaction time, higher jumping ability, and better consistency in performance (Sheppard et al., 2009).

Despite considerable research on volleyball performance, relatively few studies have comprehensively examined the combined contribution of multiple physical fitness components to overall playing ability among college-level volleyball players.

Most investigations have focused on isolated physical variables or specific performance outcomes, highlighting the need for a broader understanding of the determinants of playing ability. Identifying the most influential physical fitness variables may provide valuable information for talent identification, player development, and scientific training programme design.

Methodology:

Research Design:

The present study aimed to examine the physical fitness determinants of playing ability among college-level volleyball players. By investigating the relationship between selected physical fitness variables and playing ability, the study sought to identify the key physical characteristics that contributed to successful volleyball performance. The findings were expected to provide practical guidance for coaches, physical education. The study adopted a descriptive correlational research design. The design was appropriate because it examined the relationship between selected physical fitness variables and playing ability without manipulating any independent variable. The study also identified the physical fitness variables that significantly predicted volleyball playing ability.

Selection of Subjects:

The subjects for the study consisted of 200 male college-level volleyball players who had represented their respective colleges in intercollegiate volleyball tournaments from Bharathidasan University affiliated colleges. The subjects were selected using the purposive sampling technique.

The age of the subjects ranged between 18 and 25 years. All participants had a minimum of two years of competitive playing experience and were medically fit to participate in the study.

Variables Selected for the Study:

Criterion Variable:

- Playing Ability

Predictor Variables (Physical Fitness Variables):

- Speed
- Explosive Leg Power
- Agility
- Muscular Strength
- Muscular Endurance
- Flexibility
- Cardio Respiratory Endurance

Statistical Design:

Correlation and regression analysis were used.

Results:

Table 1: Correlation of Selected Physical Fitness Variables with Playing Ability among College-Level Volleyball Players

Physical Fitness Variable	Correlation (r)	p Value	Interpretation
Speed	0.68	0.001	Significant
Explosive Leg Power	0.84	0.001	Significant
Agility	0.79	0.001	Significant
Muscular Strength	0.72	0.001	Significant
Muscular Endurance	0.59	0.001	Significant
Flexibility	0.43	0.004	Significant
Cardio Respiratory Endurance	0.51	0.002	Significant

Table 1 shows the relationship between the selected physical fitness variables and playing ability among college-level volleyball players. The results indicated that all the selected physical fitness variables were positively and significantly correlated with playing ability ($p < 0.05$). Among the variables, explosive leg power exhibited the highest correlation ($r = 0.84$), followed by agility ($r = 0.79$), muscular strength ($r = 0.72$), and speed ($r = 0.68$). Muscular endurance, cardio respiratory endurance, and flexibility also demonstrated significant positive relationships with playing ability.

Figure 1

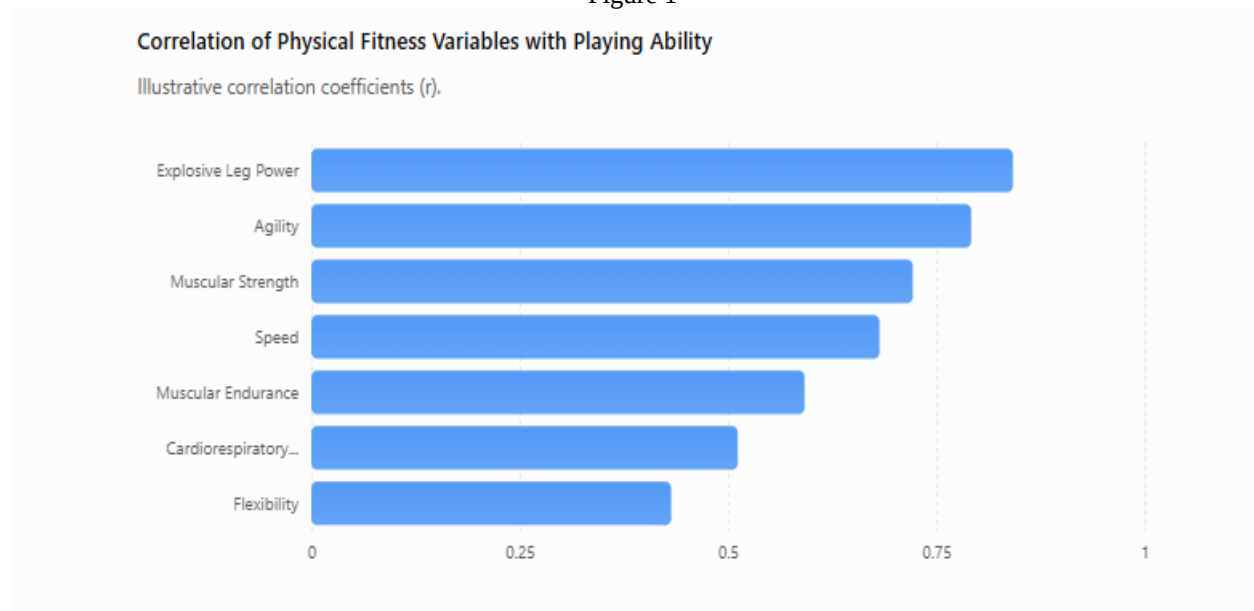


Table 2: Multiple Regression Analysis for Predicting Playing Ability

Predictor Variable	Beta (β)	t-value	p Value
Explosive Leg Power	0.391	6.82	0.001
Agility	0.324	5.47	0.001
Muscular Strength	0.217	4.18	0.001
Speed	0.186	3.62	0.002
Muscular Endurance	0.091	1.84	0.068
Flexibility	0.053	1.29	0.201
Cardio Respiratory Endurance	0.072	1.51	0.133

R	R ²	Adjusted R ²	F-value	p
0.912	0.832	0.826	134.52	0.001

The multiple regression analysis revealed that the regression model was statistically significant ($F = 134.52$, $p < 0.05$). The selected physical fitness variables collectively explained 83.2% of the variance in playing ability ($R^2 = 0.832$). Explosive leg power emerged as the strongest predictor of volleyball playing ability, followed by agility, muscular strength, and speed. Flexibility, muscular endurance, and cardio respiratory endurance did not make statistically significant independent contributions after controlling for the other variables. These results suggest that explosive leg power, agility, muscular strength, and speed are the principal physical fitness determinants of playing ability among college-level volleyball players.

Conclusion:

The present study concluded that selected physical fitness variables were significant determinants of playing ability among college-level volleyball players. Explosive leg power, agility, speed, and muscular strength emerged as the strongest predictors of volleyball performance. The findings indicate that improving these physical fitness components through systematic training can significantly enhance playing ability.

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