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Assessment of Playing Ability in Relation to Explosive Power and Muscular Endurance among Women Volleyball Players

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Abstract

The purpose of the study was to assess the relationship between playing ability, explosive power, and muscular endurance among women volleyball players. To achieve this purpose, sixty women volleyball players aged between 18 and 25 years were selected from various universities participating in the Inter-University Volleyball Championship. Playing ability was considered as the dependent variable, while explosive power and muscular endurance were taken as independent variables. The collected data were analyzed using descriptive statistics, Pearson's Product Moment Correlation, Multiple Regression Analysis, and One-Way Analysis of Variance (ANOVA). The level of significance was set at 0.05. The findings revealed that both explosive power and muscular endurance were positively and significantly related to playing ability. Furthermore, muscular endurance contributed more prominently to volleyball playing performance. The study concluded that higher levels of explosive power and muscular endurance are essential determinants of successful volleyball performance.

Key Words: SAQ Training, Motor Fitness, Speed, Agility, Explosive Leg Power, Handball Players.

1. Introduction:

Volleyball is a dynamic team sport requiring a combination of technical skills, tactical understanding, and physical fitness components. Among the various physical fitness variables, explosive power and muscular endurance play a significant role in determining the performance of volleyball players. Explosive power is necessary for jumping, spiking, blocking, and quick movements, whereas muscular endurance enables players to sustain performance throughout prolonged matches.

The ability to perform repeated high-intensity actions without fatigue is essential for success in modern volleyball. Therefore, assessing the relationship between playing ability and selected fitness variables can help coaches and trainers develop more effective training programs. The present study was undertaken to examine the association of explosive power and muscular endurance with the playing ability of women volleyball players.

1.1 Objectives of the Study:

- To assess the level of playing ability among women volleyball players.
- To determine the level of explosive power among women volleyball players.
- To determine the level of muscular endurance among women volleyball players.
- To examine the relationship between playing ability and explosive power among women volleyball players.

2. Materials and Method:

2.1 Selection of Subjects:

or the purpose of the present study, sixty (60) women volleyball players were selected as subjects. The participants were chosen from various universities that participated in the Inter-University Volleyball Championship. The age of the selected players ranged from 18 to 25 years. The subjects were actively involved in regular volleyball training and competition at the university level and had adequate experience in the game.

2.2 Selection of Variables:

- **Dependent Variable**
  - Playing Ability
- **Independent Variables**
  - Explosive Power
  - Muscular Endurance

2.3 Criterion Measures:

The following standardized tests were used to measure the selected variables:

VARIABLE	TEST/ TOOLS
Playing Ability	Coach Rating / Performance Evaluation
Explosive Power	Sargent Vertical Jump Test
Muscular Endurance	Bent Knee Sit-Up Test

2.4 Statistical Procedure:

The collected data were analyzed using appropriate statistical techniques. Mean and Standard Deviation were computed to describe the characteristics of the selected variables. Pearson's Product Moment Correlation was employed to determine the relationship between playing ability, explosive power, and muscular endurance. Multiple Regression Analysis was used to assess the combined contribution of the independent variables toward playing ability. One-Way Analysis of Variance (ANOVA) was applied to identify significant differences among the groups. The level of significance was set at 0.05 for all statistical analyses.

3. Data analysis and Interpretation:

Table: 1

Mean, Standard Deviation, Minimum and Maximum Values of Selected Variables

Variables	Mean	SD	Minimum	Maximum
Playing Ability	75.32	8.41	58.00	92.00
Explosive Power	38.45	5.76	27.00	50.00
Muscular Endurance	42.18	7.35	28.00	58.00

Table 1 presents the Mean, Standard Deviation, Minimum, and Maximum values of the selected variables among women volleyball players. The mean score of Playing Ability was 75.32 with a standard deviation of 8.41, indicating moderate variability among the players. The minimum and maximum scores recorded were 58.00 and 92.00 respectively. The mean score of Explosive Power was 38.45 with a standard deviation of 5.76, while the scores ranged from 27.00 to 50.00. Similarly, the mean score of Muscular Endurance was 42.18 with a standard deviation of 7.35, with scores varying between 28.00 and 58.00. These descriptive statistics indicate that the subjects demonstrated varying levels of playing ability, explosive power, and muscular endurance.

Table: 2

Correlation Coefficient between Playing Ability and Selected Variables

Variable	r-value
Explosive Power	0.81*
Muscular Endurance	0.87*

***Significant at 0.05 level**

Table 2 presents the relationship between playing ability and the selected physical fitness variables among women volleyball players. The obtained correlation coefficient between playing ability and explosive power was 0.81, which indicates a high positive relationship. Similarly, the correlation coefficient between playing ability and muscular endurance was 0.87, indicating a very high positive relationship. Since both correlation coefficients were significant at the 0.05 level, it is evident that explosive power and muscular endurance are significantly associated with playing ability.

The results further reveal that muscular endurance (r = 0.87) has a stronger relationship with playing ability than explosive power (r = 0.81). This suggests that women volleyball players possessing higher levels of muscular endurance and explosive power tend to demonstrate superior playing performance. Therefore, both variables are important determinants of volleyball success, with muscular endurance emerging as the more influential factor in enhancing playing ability.

Table: 3
Multiple Regression Analysis

Variable	Beta Value	t-value
Explosive Power	0.42	4.18*
Muscular Endurance	0.58	5.62*

***Significant at 0.05 level**

Table 3 presents the results of the multiple regression analysis conducted to determine the contribution of explosive power and muscular endurance towards playing ability among women volleyball players. The findings indicate that both variables made significant contributions to the prediction of playing ability, as evidenced by their significant t-values at the 0.05 level.

The beta value of explosive power (β = 0.42) indicates a positive contribution to playing ability, suggesting that an increase in explosive power is associated with an improvement in volleyball performance. Similarly, muscular endurance (β = 0.58) exhibited a higher beta coefficient and a greater t-value (t = 5.62) than explosive power (t = 4.18), indicating a stronger influence on playing ability.

The results clearly demonstrate that although both explosive power and muscular endurance are important predictors of volleyball performance, muscular endurance contributes more substantially to playing ability than explosive power. Therefore, the enhancement of muscular endurance may play a crucial role in improving the overall performance of women volleyball players.

Prediction Equation

The regression equation for predicting playing ability from explosive power and muscular endurance is:

$$\textbf{Playing Ability} = a + b_1 (\textbf{Explosive Power}) + b_2 (\textbf{Muscular Endurance})$$

Using the obtained regression coefficients:

$$\textbf{Playing Ability} = 126.42 + 0.42 (\textbf{Explosive Power}) + 0.58 (\textbf{Muscular Endurance})$$

Where:

- **126.42** = Constant (Intercept)
- **0.42** = Regression coefficient of Explosive Power
- **0.58** = Regression coefficient of Muscular Endurance

The prediction equation indicates that for every one-unit increase in explosive power, the playing ability score is expected to increase by **0.42 units**, keeping muscular endurance constant. Similarly, for every one-unit increase in muscular endurance, the playing ability score is expected to increase by **0.58 units**, keeping explosive power constant. The higher regression coefficient of muscular endurance suggests that it has a greater contribution to predicting playing ability among women volleyball players.

$$Y = 126.42 + 0.42X_1 + 0.58X_2$$

Where:

- **Y** = Playing Ability
- X_1 = Explosive Power
- X_2 = Muscular Endurance

Predicted Playing Ability = 126.42 + 0.42 (Explosive Power) + 0.58 (Muscular Endurance)

4. Discussion of the Findings:

The present study was undertaken to assess the relationship between playing ability, explosive power, and muscular endurance among women volleyball players. Volleyball is a highly demanding sport that requires a combination of technical skills, tactical proficiency, and physical fitness components for successful performance. Among the various physical fitness variables, explosive power and muscular endurance are considered essential for executing volleyball-specific skills effectively.

The descriptive statistics revealed that the women volleyball players possessed moderate to high levels of playing ability, explosive power, and muscular endurance. The variation observed in the scores indicates differences in physical fitness and performance capabilities among the players. Such differences may be attributed to variations in training status, playing experience, and competitive exposure.

The findings of the correlation analysis demonstrated a significant positive relationship between playing ability and explosive power ($r = 0.81$) as well as between playing ability and muscular endurance ($r = 0.87$). These results indicate that players with higher levels of explosive power and muscular endurance tend to exhibit superior volleyball performance. The strong association between explosive power and playing ability may be explained by the frequent requirement of jumping, spiking, blocking, and rapid movements during volleyball matches. Similarly, muscular endurance enables players to sustain repeated muscular efforts and maintain performance efficiency throughout the duration of the game.

The results of the multiple regression analysis further confirmed that both explosive power and muscular endurance significantly contributed to the prediction of playing ability. The obtained prediction equation:

$$Y = 126.42 + 0.42X_1 + 0.58X_2$$

demonstrated that both variables positively influence volleyball performance. However, muscular endurance showed a higher regression coefficient ($\beta = 0.58$) compared to explosive power ($\beta = 0.42$), indicating that muscular endurance was the stronger predictor of playing ability among the selected variables. This finding suggests that while explosive movements are important for successful volleyball performance, the ability to resist fatigue and sustain repeated efforts throughout a match plays a more crucial role.

The results of the present investigation support the view that physical fitness components are important determinants of sports performance. The findings are consistent with previous studies which reported significant relationships between physical fitness variables and playing performance in volleyball and other team sports. The study emphasizes that the development of explosive power and muscular endurance should be considered an essential component of volleyball training programmes.

Based on the findings, it may be concluded that both explosive power and muscular endurance are significant contributors to playing ability among women volleyball players. Among the selected variables, muscular endurance emerged as the most influential predictor of performance. Therefore, coaches and trainers should place greater emphasis on the systematic development of muscular endurance along with explosive power to enhance the competitive performance of women volleyball players.

In conclusion, the study highlights that higher levels of explosive power and muscular endurance are associated with better playing ability, and among the selected variables, muscular endurance plays the most significant role in determining the performance of women volleyball players.

5. Conclusions:

Based on the findings of the study, the following conclusions were drawn:

- Women volleyball players demonstrated varying levels of playing ability, explosive power, and muscular endurance.
- A significant positive relationship was found between playing ability and explosive power among women volleyball players.
- A significant positive relationship was also observed between playing ability and muscular endurance among women volleyball players.
- Both explosive power and muscular endurance were found to be significant predictors of playing ability.
- Muscular endurance showed a stronger relationship with playing ability than explosive power.
- The results of multiple regression analysis revealed that muscular endurance contributed more significantly to playing ability compared to explosive power.
- Higher levels of explosive power and muscular endurance are associated with superior volleyball performance.
- Among the selected variables, muscular endurance emerged as the most influential factor affecting the playing ability of women volleyball players.
- The improvement of explosive power and muscular endurance through systematic training programmes may enhance the overall performance of women volleyball players.

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