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RELATIONSHIP OF BODY COMPOSITION ON SHOULDER FLEXOR OF VOLLEY BALL PLAYERS

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Abstract: **Objective:** The study aimed to investigate the relationship between body composition and shoulder flexor strength in male volleyball players. **Methods**: Twenty male volleyball players were selected to assess body composition and shoulder flexor strength. The study utilized the human kinetic isokinetic machine and skinfold caliper for accurate measurements. Statistical analysis included descriptive statistics and Pearson's product moment correlation to determine the relationship between body composition and shoulder flexor strength. **Conclusion:** The study found no significant relationship between body composition and shoulder flexor strength in volleyball players. However, it revealed that shoulder extensor strength was significantly stronger than shoulder flexor strength. This suggests that training programs should focus on enhancing shoulder extensor strength, which plays a crucial role in spiking and serving in volleyball. Maintaining ideal body composition may also contribute to improved playing performance. The findings emphasize the importance of considering specific muscle groups and body composition in training programs to enhance player performance in volleyball.

Keywords: Volley Ball, Shoulder Flexor, Body Composition.

I. INTRODUCTION

Volleyball is a game of intermittent physical exertion in which participants must undertake short bursts of high-intensity activity followed by intervals of low-intensity activity (Kuenstlinger et al., 1987, Viitasalo et al., 1987). As a result, the players must have both great aerobic and anaerobic power. Volleyball players must have strong muscles, power, endurance, speed, agility, and flexibility (She 1999; Hakkinen 1993). The current volleyball sport is evolving toward greater versatility and quickness. The term "versatility" refers to athletes that are not only well-prepared for their respective position, but also have strong all-around skills in serving, setting, spiking, blocking, and defense. "Speediness" necessitates athletes' ability to move swiftly to the best position on the court.

Body composition, the relative proportions of fat and lean tissue in the body, significantly influences the performance of volleyball players, particularly in relation to the shoulder flexor and extensor muscles, which are crucial for movements like spiking, serving, and blocking. Research has indicated that muscle mass is positively correlated with the strength and power of these muscles (Chelly et al., 2010). Players with higher muscle mass tend to generate more power and speed, contributing to their overall performance and endurance on the court.

Conversely, excess fat mass can hinder agility and speed, affecting a player's ability to perform quick and explosive movements (Silva et al., 2018). Maintaining a balanced body composition is crucial for enhancing performance and minimizing injury risk in volleyball players. Understanding the relationship between body composition and shoulder muscle strength can help coaches and athletes tailor training programs to enhance performance effectively.

II. MATERIAL AND METHOD

i. Selection of Subjects

Twenty college-level players aged 18 to 25 years were selected for the study. The study's objectives were clearly communicated to the participants, who were then asked to actively cooperate with the researcher.

Table 1 Criterion Measure

S.No.	Components	Equipment	Unit
1	Shoulder's Strength	Humac Norm Isokinetic Dynamometry	Newton
2	Skinfold Measurement of: • Biceps skin fold • Triceps skin fold • Sub Scapular skin fold • Supra iliac skin fold	Harpenden Skinfold Caliper	Millimeter

ii. Statistical techniques

After data collection, data of Body Composition and shoulder Flexor and shoulder Extensor of 20 male college level players of volley ball, was compared and analyzed by using, Descriptive statistics, Product Moment Correlation and Regression to test the Significance of the results at .05 level with SPSS 21.0 software.

III. RESULTS

Table 2. shows the descriptive statics volleyball players of Body Composition=20, M=16.8670, SD=4.95245 SE= 1.08 , Shoulder Extensor M=38.000, SD=10.45794 SE=33.15, Shoulder Flexor M=24.8000, SD=6.62213, SE=1.52. **Table 4** shows Pearson correlations among Body Composition, Shoulder Extensor Strength, and Shoulder Flexor Strength in 20 volleyball players aged 18-25. Body Composition and Shoulder Extensor Strength had a significant negative correlation ($r = -0.760$, $p < 0.001$, $DF = 18$), leading to the rejection of the null hypothesis that no significant relationship exists between these variables. Conversely, Body Composition and Shoulder Flexor Strength showed no significant correlation ($r = 0.567$, $p > 0.05$), supporting the null hypothesis. The correlation between Shoulder Extensor Strength and Shoulder Flexor Strength was positive ($r = 1.0$), indicating a strong relationship.

Table 5 depicts the value of R is .760 and value of R^2 is .578 which tells that Body Composition can influence 57.8% of the Strength of shoulder Extensors. There might be many factors that can explain this variation but our model, which includes only Body Composition, can influence approximately 57 % of it. This means that 42 % of the variation in Strength of the shoulder Extensors cannot be explained by Body Composition alone. The table no-4 shows, F is 24.623, which is significant at $p < .001$. Therefore, it can be concluded that Regression Model results significantly better prediction of Strength of Shoulder Extensors. The table no5 depicted the value of .298 and value of R2 is .089 which tells that Body Composition can influence 8.9% of the Strength of shoulder Flexor. There might be many factors that can explain this variation but our model, which includes only Body Composition, can influence approximately 8.9 % of it. This means that 91 % of the variation in Strength of the Shoulder Flexors cannot be explained by Body Composition alone. The table no-6 shows, F is 1.750, which is not significant at $p > .05$. Therefore, it can be concluded that Regression Model results is not good prediction of Strength of Shoulder Flexors.

Table 2 Descriptive Statistics

Measurement	Mean	Std. Deviation	Bias	Std. Error	95% Confidence		N
					Lower	Upper	
Body Composition	16.87	4.95	-0.13	1.08	14.71	19.03	20
Shoulder Extensor	38.00	10.46	0.04	2.32	33.15	42.25	20
Shoulder Flexor	24.80	6.62	0.01	1.52	21.85	27.90	20

Table 3 Pearson Correlations

	Body Composition	Shoulder Extensor	Shoulder Flexor
Body Composition	1	-.760-	0.
Shoulder Extensor	-.760"	1	1.
Shoulder Flexor	0.	.567-	1

Table 4 Model Summary

Model	R	R^2	Adjusted R Square	0Std. Error of the Estimate
1	.760[a]	.578	.554	6.98236
a. Predictors: (Constant), Body Composition				

Table 4 ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	1200.439	1	1200.439	24.623	.000b
Residual	877.561	18	48.753		
Total	2078	19			
a. Dependent Variable: Shoulder Extensor					
b. Predictors: (Constant), Body Composition					

Table 5 Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.298[a]	.089	.038	6.49522
a. Predictors: (Constant), Body Composition			

Table 6 ANOVA[a]

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	73.818	1	73.818	1.750	.202
Residual	759.382	18	42.188		
Total	833.200	19			

IV. DISCUSSION OF FINDINGS AND CONCLUSION

The present study aimed to evaluate the relationship between body composition and the strength of shoulder flexor and extensor muscles in volleyball players aged 18 to 24 years from the Lakshmibai National Institute of Physical Education. Using skinfold calipers to assess body composition and a human norms isokinetic machine to measure muscle strength at a 60-degree angle, the study found a significant relationship between body composition and shoulder extensor strength, while the relationship between body composition and shoulder flexor strength was insignificant. Statistical analysis via SPSS version 20 software supported these findings.

Similar findings of, Singh Th. Nandalal's research on the muscular strength, flexibility, and body composition of state and national level football, volleyball, and handball players found no significant difference among the sports in terms of muscular strength and body composition ($p < 0.05$).

Conclusion

The study demonstrates that body composition significantly influences the strength of shoulder extensor muscles, explaining approximately 57.8% of the variance. This suggests that better body composition correlates with stronger shoulder extensors, which can enhance a player's performance. Conversely, body composition does not significantly affect shoulder flexor strength, indicating other factors may be more influential in this regard. This conclusion underscores the importance of tailored training focusing on body composition to optimize shoulder extensor strength in volleyball players.

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