Effect Of Plyometric Training And Core Training On Shoulder Strength Among Tennis Players

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ABSTRACT

Shoulder strength plays a crucial role in tennis performance, particularly for generating power in serves and overhead strokes. This study investigated the effect of plyometric and core training on shoulder strength among forty-five male intercollegiate tennis players aged 18–21 years, who were randomly assigned into three groups: plyometric training (n=15), core training (n=15), and control (n=15). The experimental groups underwent 12 weeks of training, three sessions per week, while the control group continued routine practice. Pre-test analysis revealed no significant differences among groups (Core: 31.10, Plyometric: 31.97, Control: 29.63; F = 1.34, $p > 0.05$). Post-test results showed significant improvements in both experimental groups compared to the control (Core: 36.80, Plyometric: 36.07, Control: 30.40; F = 12.99, $p < 0.05$), with adjusted post-test means further confirming these differences (Core: 36.63, Plyometric: 35.15, Control: 31.49; F = 38.88, $p < 0.05$). Post hoc analysis indicated that core training produced the greatest gains in shoulder strength (MD vs Control = 5.14; MD vs Plyometric = 1.49), while plyometric training also outperformed the control group (MD = 3.66). The findings conclude that both plyometric and core training significantly enhance shoulder strength, with core training proving more effective, suggesting that incorporating core-based protocols alongside plyometric exercises may optimize performance and reduce injury risk in tennis players.

Key Words: plyometric training , core training , shoulder strength and tennis players

INTRODUCTION

Shoulder strength is central to performance and durability in tennis because the serve, forehand, and overhead strokes depend on efficient force transfer along the kinetic chain—from the lower limbs and trunk to the glenohumeral joint and racket. Two training avenues can target this chain: plyometric training (to enhance rapid force development and neuromuscular power through the stretch–shortening cycle) and core training (to improve proximal stability and trunk stiffness, enabling greater distal force output with reduced compensations at the shoulder).

Emerging tennis-specific evidence indicates that upper-limb plyometric work (e.g., medicine-ball throws, elastic-band plyometrics) can improve upper-limb strength and power alongside serve outcomes, suggesting transferable gains in shoulder function. Concurrently, core-focused programs have shown

benefits for rotator-cuff strength, core endurance, and clinical outcomes in tennis players with shoulder issues—supporting the concept that trunk stability augments shoulder loading mechanics. Recent meta-analytic work in tennis further underscores that neuromuscular approaches (plyometric, resistance, and core elements) improve key performance markers, while contemporary clinical and biomechanical studies describe shoulder risk factors, asymmetries, and stability profiles that these trainings aim to address.

Taken together, a program that integrates plyometric and core training is theoretically positioned to enhance shoulder strength in tennis players by improving both the rate of force development and the proximal stability required for efficient, repeatable overhead actions.

METHODOLOGY

SELECTION OF SUBJECTS

The purpose of the study is to find out the effect of plyometric training and core training on shoulder strength among tennis players . For these purpose intercollegiate level male Tennis Players who participated at inter-collegiate level competitions were selected. 45 players in the age group of 18 to 21 were randomly selected as subjects for this study. The subjects were randomly selected into three groups, namely, experimental group I, experimental group II and control group consisting of 15 in each.

The subjects were oriented for the purpose of the study and all the subjects volunteered to undergo the treatments as the research would further enhance their abilities and contribute for the training methods.

SELECTION OF THE VARIABLES

Dependent Variables

Shoulder Strength

Independent Variables

1. 12 Weeks Plyometric Training
2. 12 Weeks Core Training

EXPERIMENTAL DESIGN

Find out the study effect of Plyometric training and Core training on explosive power among Tennis Players .The study was formulated as a true random group design consisting of a pre-test and post test. The subjects (N=45) were randomly assigned to three equal groups of fifteen . The selected subjects were divided into three groups randomly. Experimental Group I was considered as plyometric Training group, experimental group II was core Training group and control group was not involved in any special

treatment. Pre test was conducted for experimental Groups I and II and the control group on explosive power . Experimental groups underwent the respective training for 12 weeks. Immediately after the completion of 12 weeks training, all the subjects were measured of their post test scores on the selected criterion variable. The difference between the initial and final scores was considered the effect of respective treatments. To find out statistical significance of the results obtained, the data were subjected to statistical treatment using ANCOVA. In all cases 0.05 level was fixed to test the significance of the study.

RESULTS ON SHOULDER STRENGTH

Table 1

ANCOVA RESULTS ON EFFECT OF CORE TRAINING AND PLYOMETRIC TRAINING COMPARED WITH CONTROLS ON SHOULDER STRENGTH

	CORE TRAINING	PLYOMETRIC TRAINING	CONTROL GROUP	SOURCE OF VARIANCE	SUM OF SQUARES	df	MEAN SQUARES	OBTAINED F
Pre Test Mean	31.10	31.97	29.63	Between	83.47	2	41.73	1.34
				Within	2714.63	87	31.20	
Post Test Mean	36.80	36.07	30.40	Between	736.09	2	368.04	12.99*
				Within	2465.87	87	28.34	
Adjusted Post Test Mean	36.63	35.15	31.49	Between	411.90	2	205.95	38.88*
				Within	455.57	86	5.30	
Mean Diff	5.70	4.10	0.77					

Table F-ratio at 0.05 level of confidence for 2 and 87 (df) =3.10, 2 and 86 (df) =3.10.

*Significant

As shown in Table 1, the obtained pre test means on Shoulder Strength on Core training group was 31.10, Plyometric training group was 31.97 and control group was 29.63. The obtained pre test F value was 1.34 and the required table F value was 3.10, which proved that there was no significant difference among initial scores of the subjects.

The obtained post test means on Shoulder Strength on Core training group was 36.80, Plyometric training group was 36.07 and control group was 30.40. The obtained post test F value was 12.99 and the required table F value was 3.10, which proved that there was significant difference among post test scores of the subjects.

Taking into consideration of the pre test means and post test means adjusted post test means were determined and analysis of covariance was done and the obtained F value 38.88 was greater than the required value of 3.10 and hence it was accepted that there was significant differences among the treated groups.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table 2.

Table 2

Multiple Comparisons of Paired Adjusted Means and Scheffe's Confidence Interval Test Results on Shoulder Strength

MEANS				Required . C I
Core training Group	Plyometric training Group	Control Group	Mean Difference	
36.63	35.15		1.49*	1.48
36.63		31.49	5.14*	1.48
	35.15	31.49	3.66*	1.48

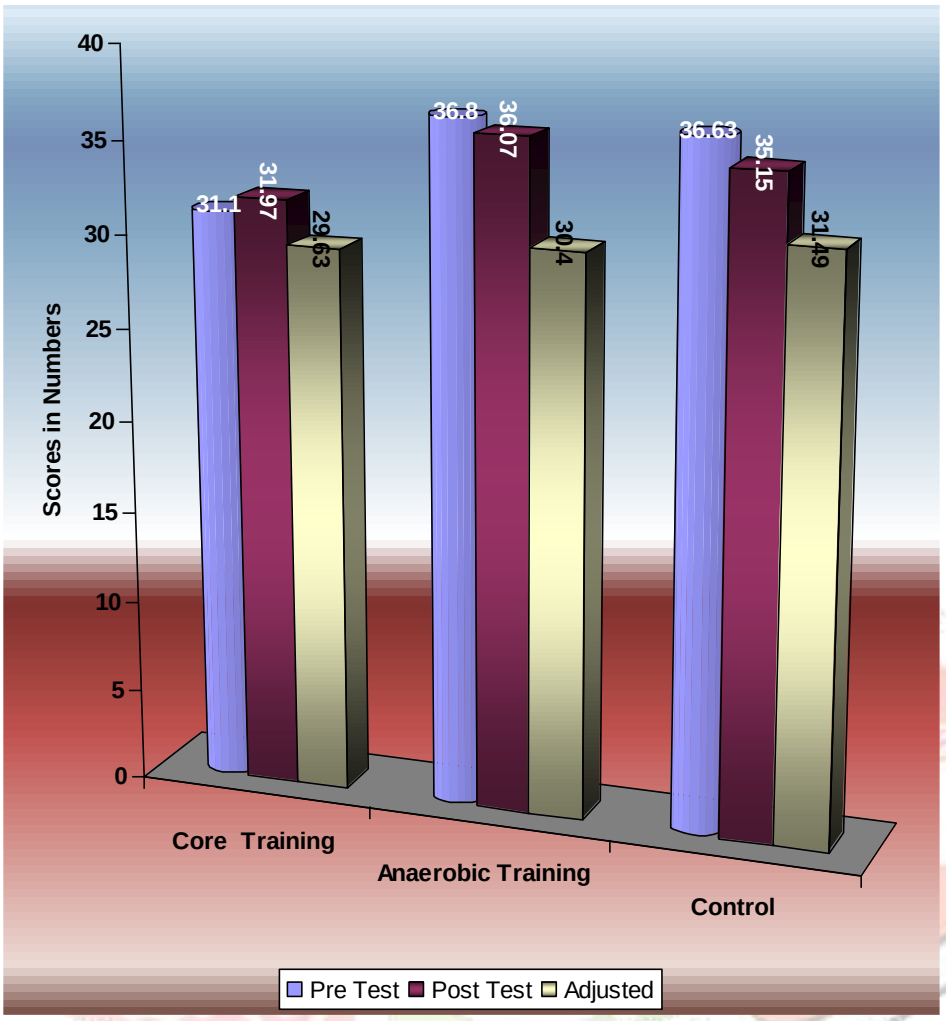
***** Significant

The post hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between Core training group and control group (MD: 5.14). There was significant difference between Plyometric training group and control group (MD: 3.66). There was significant difference between treatment groups, namely,Core training group and Plyometric training exercises group. (MD: 1.49).

The ordered adjusted means were presented through bar diagram for better understanding of the results of this study in Figure I.

Figure I

BAR DIAGRAM SHOWING PRE TEST, POST TEST AND ORDERED ADJUSTED MEANS ON SHOULDER STRENGTH



DISCUSSIONS ON FINDINGS ON SHOULDER STRENGTH

In order to find out the effect of Core training and Plyometric training group on Shoulder Strength the obtained pre and post test means were subjected to ANCOVA and post hoc analysis through Scheffe's confidence interval test.

The effect of Core training and Plyometric training compared with control group on Shoulder Strength is presented in Table 1. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 38.88 was greater than the required table F value to be significant at 0.05 level.

Since significant F value was obtained, the results were further subjected to post hoc analysis and the results presented in Table 2 proved that there was significant difference between Core training group and control group (MD: 5.14) and Plyometric training group and control group (MD: 3.66). Comparing

between the treatment groups, it was found that there was significant difference between Core training and Plyometric training group among tennis players

Thus, it was found that Plyometric training was significantly better than Core training and control group in improving Shoulder Strength of tennis player

CONCLUSIONS

1. It was concluded that 12 weeks core training and plyometric training significantly improved shoulder strength compared to control group. And it was also found that comparing between treatment groups, it was found that core strength training was significantly better than anaerobic training in improving shoulder strength of tennis players

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