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COMPARATIVE STUDY ON THE EFFECT OF PLYOMETRIC TRAINING WITH AND WITHOUT SANDBAG TRAINING ON VO_2 MAX AMONG SCHOOL VOLLEYBALL ATHLETES

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Abstract:

The purpose of this study was to examine the influence of plyometric training, both with and without sandbag integration, on the improvement of VO_2 max among volleyball players. A pre- and post-test randomized group design was adopted, involving forty-five volleyball players who were randomly divided into three groups of fifteen each. Group I served as the Plyometric Training with Sandbag Training Group (PTWSBTG, n = 15), Group II functioned as the Plyometric Training without Sandbag Training Group (PTWOSBTG, n = 15), and Group III acted as the Control Group (CG, n = 15).VO_2 max was assessed before and after a twelve-week training period. The data were analyzed using Analysis of Covariance (ANCOVA), and Scheffé's post-hoc test was employed to determine differences between paired means. A significance level of 0.05 was set as the criterion for statistical acceptance. The findings revealed that plyometric training combined with sandbag exercises produced greater improvements in VO_2 max compared to plyometric training alone and the control group.

Key Words: Plyometric Training, Sand Bag Training, Vo2 Max, Volleyball.

Introduction:

Volleyball is a fast-moving, high-energy sport characterized by brief bursts of intense activity followed by comparatively longer recovery periods (Sheppard et al., 2007). Plyometric training, which involves rapidly stretching and contracting muscles, utilizes muscular strength, elasticity, and neural activation to enhance performance outcomes such as higher jumps, faster sprints, stronger throws, and more powerful hits. These exercises are widely recognized for improving the speed and force of muscular contractions, thereby increasing explosive power for sport-specific skills. Research consistently shows that plyometrics benefit athletes across many disciplines, contributing to improved power output, sprint ability, and injury prevention. Both upper- and lower-body strength can be enhanced through plyometric routines. The sandbag is a highly functional and adaptable training tool that allows athletes to transition quickly between movements and planes of motion. It is especially effective for developing multi-planar strength, offering significant benefits for many players (Polglaze & Dawson, 1992).

Methodology:

The purpose of the study was to find out the effect of plyometric training with and without sand bag training on the development of vo2 max among volleyball players. The study was formulated as a pre and post-test random group design, in which forty-five volleyball players were randomly assigned into three equal groups and each group consisting of 15 subjects. Group I acted as plyometric training with sand bag training group (PTWSBTG, n = 15), Group II acted as plyometric training without sand bag training group (PTWOSBTG, n = 15) and Group III acted as control group (CG, n = 15). Pre - test and post test was conducted before and after twelve weeks on vo2 max. Analysis of covariance (ANCOVA) and Scheffe's post-hoc test was administered to find out the paired means difference. To test the obtained results on variables, level of significance 0.05 was chosen and considered as sufficient for the study.

Results:

Table 1: Computation of Analysis of Covariance of Experimental and Control Groups on VO_2 Max

	PTWSBTG	PTWOSBTG	CG	Source of Variance	Sum of Squares	df	Means Squares	F-Ratio
Pre-Test Means	44.06	44.2	44.66	BG	2.97	2	1.48	1.14
				WG	54.66	42	1.3	
Post-Test Means	46.33	48.33	44.86	BG	90.84	2	45.42	30.57*
				WG	62.4	42	1.48	
Adjusted Post-Test Means	46.34	48.33	44.84	BG	89.85	2	44.92	29.59*
				WG	62.23	41	1.51	

An examination of table - I indicated that the pre test means of plyometric training with sand bag training, plyometric training without sand bag training and control group were 44.06, 44.20 and 44.66 respectively. The obtained F-ratio for the pre-test was 1.14 and the table F-ratio was 3.22. Hence the pre-test mean F-ratio was insignificant at 0.05 level of confidence for the degree of freedom 2 and 42. This proved that there were no significant difference between the experimental and control group indicating that the process of randomization of the groups was perfect while assigning the subjects to groups. The post-test means of the plyometric training with sand bag training, plyometric training without sand bag training and control group were

46.33, 48.33and 44.86 respectively. The obtained F-ratio for the post-test was 30.57 and the table F-ratio was 3.22. Hence the post-test mean F-ratio was significant at 0.05 level of confidence for the degree of freedom 2 and 42. This proved that the differences between the post test means of the subjects were significant. The adjusted post-test means of the plyometric training with sand bag training, plyometric training without sand bag training and control group were 46.34, 48.33 and 44.84 respectively. The obtained F-ratio for the adjusted post-test means was 29.59 and the table F-ratio was 3.23. Hence the adjusted post-test mean F-ratio was significant at 0.05 level of confidence for the degree of freedom 2 and 41. This proved that there was a significant difference among the means due to the experimental trainings on vo2 max. Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in table 2.

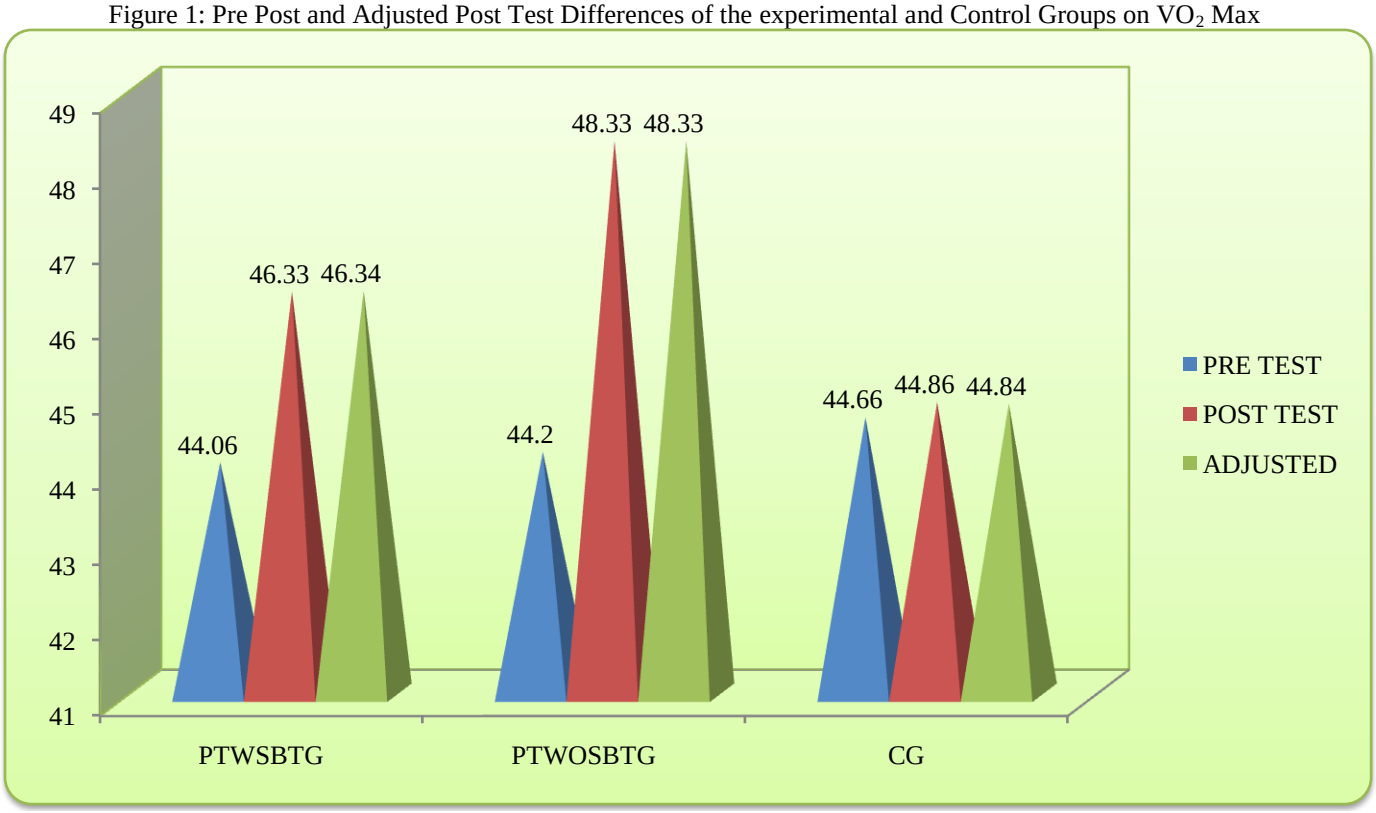
Table 2: The Scheffe's Test for the Differences between the Adjusted Post Test Paired Means on VO_2 Max

Adjusted Post-test means			**Mean Difference**	**Required CI**
PTWSBTG	**PTWOSBTG**	**CG**		
46.34	48.33	---	1.99*	1.13
46.34	---	44.84	1.50*	
---	48.33	44.84	3.49*	

* Significant at 0.05 level of confidence

The multiple comparisons showed in Table II proved that there existed significant differences between the adjusted means of plyometric training with sang bag training and plyometric training without sand bag training (1.99), plyometric training with sang bag training and control group (1.50), plyometric training without sand bag training and control group (3.49) at 0.05 level of confidence with the confidence interval value of 1.13. The pre, post and adjusted means on vo2 max were presented through bar diagram for better understanding of the results of this study in figure 1.

Figure 1: Pre Post and Adjusted Post Test Differences of the experimental and Control Groups on VO_2 Max



Conclusions:

From the analysis of the data, the following conclusions were drawn:

- The plyometric training with sand bag training improved the vo2 max among volleyball players.
- The plyometric training without sand bag training improved the vo2 max among volleyball players.
- The plyometric training with sand bag training improved better than plyometric training without sand bag training and control groups on vo2 max among volleyball players.

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