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Aerobic plyometric circuit training and aerobic physical circuit training on vertical jump performance of volleyball players

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Abstract
The researchers of this study aims to know about the role of effect of aerobic plyometric circuit and aerobic physical circuit training on vertical jump performance of volleyball players. To obtain data, the investigators had selected sixty male inter school male volleyball players of 16 to 19 years of age to act as subjects. The purposive sampling technique was used to select the subjects. All the subjects, after having been informed about the objective and protocol of the study, gave their consent and volunteered to participate in this study. To measure the level of explosive power of the subjects, it was tested by using the sergeant jump test; the subjects were expected to perform standing jump reach up maximum. The one way Analysis of Variance (ANOVA) was employed to find out the intra-group differences. Where F values were found significant, Post-hoc test was applied to find out the direction and degree of difference. For testing the hypotheses, the level of significance was set at 0.05. The results revealed significant difference have been notice among the experimental groups as compared to the control group after the completion of the training period. While analyzing the paired group the aerobic plyometric exercises group having the high significant difference. It may be you to maximum force that a muscle can develop is attained to the eccentric contraction when a contraction occurs immediately following the eccentric contraction then the force generated can be dramatically increase. To express this greater force the muscle must contract within the shortest time possible.

Keywords: explosive power, plyometric circuit and aerobic physical circuit training and volleyball players.

1. Introduction

The high level performance needs the highly technical training methods in almost all area in sports. The meaning of highly technical training method is to prepare or make the player for the right work for the right time to expose their high level performance**.** Kasabalis *et al*., (2005) stated that the anaerobic power of elite male volleyball players, using the Wingate Anaerobic Test to examine the relationship between the anaerobic powers and jumping performance. These results indicated that vertical jump may predict the maximal anaerobic power and could be used by coaches as a practical and easy – to- apply field Screening test for evaluation in volleyball training. Maffiuletti *et al*., (2002) investigated the influence of a 4-week combined electro myostimulation and plyometric training program on the vertical jump performance of 10 volleyball players. The results at week 2, maximal voluntary contraction significantly increased (+20/- knee extensors,+13/- plantar flexors) as compared to baseline (< 0.05). After the 4 week training program, different vertical jumps considered were also significantly higher compared to pre training (<0.001), and relative gains were comprised between 8-10% (spike counter movement jump and 21% (squat jump). The significant increases in maximal strength and explosive strength produced by the present training program were subsequently maintained after an additional 2 week of volleyball l training. (Coleman 1993; Huang, Liu *et al*. 2005) The mean vertical velocity of the center of gravity at takeoff for back row spikers was reported to be 3.59 m/s and the height of the jump was 62 cm**.** (Coleman 2005) The mean horizontal velocity at takeoff was found to be 3.23 m/s. In a related study of the jump serve the mean horizontal and vertical velocities for the center of mass at takeoff were reported to be somewhat less at 2.76 and 2.77 m/s respectively. Coleman (1993) The mean values for the top servers in the present study were horizontal velocities of 4.20 m/s at right foot plant, and 3.65 m/s vertical velocity at takeoff. The center of mass velocity values at ball impact ranged from -0.33 to 2.76 m/s, indicating that some servers hit the ball on the way down and others on the way up, fact an also front row spiking. Spurrs *et al*., (2002) examined whether changes in running performance resulting from plyometric training were related to alterations, in lower leg musculotendinous stiffness. The results clearly demondtrated that a 6 week plyometric programme led to improvements in 3km running performance. It is postulated that the increase in MTS resulted improved RWE. We speculate that the improved RE led to changes in 3km running performance, as there were corresponding alterations in VO2max.

2. Objectives of the present study

The following are the objectives of the study:

To improving vertical jump height, vertical power, and anaerobic power.

To improving lactate tolerance and reduce fatigue from jumping during the matches.

To strengthening the muscles used in vertical jumping and to increase the neurological and strength in those muscles.

To develop the Aerobic fitness/ endurance specific to a particular sport may help prevent injury in terms of delaying fatigue and improving the tendons and ligaments.

3. Methodology

3.1 Selection of subject

Selection of subject to achieve the purpose of the study to execute this investigation, the research scholar employed random sampling method and sixty inter school male volleyball players selected as subjects from Govt Boys Hr Secondary School, Erode. Their age ranging from sixteen to nineteen years. The pre and post – test design employing analysis of covariance technique was adopted.

3.2 Selection of Variables

The research scholar reviewed the available scientific literature pertaining to the explosive power from World Wide Web site, books, journals magazines and research papers.

3.2.1Dependent Variables

Vertical jump performance. It was tested by using the sergeant jump test; the Subjects were expected to perform standing jump reach up maximum.

3.2.2 Independent variables

Explosive Power.

3.3Experimental Design

The study was formulated has pre and post test random group design. In which 60 subject were divided in to three equal groups. The experimental group I Aerobic Circuit Plyometric Exercises, the experimental group II Aerobic Circuit Physical Exercises and group III Control Group but it didn't practice any specific training.

3.3.1 Testing Protocols

The testing session involved performing a battery of selected skill related test and performance related warm- up10 minutes was given and stretching was also given before and after conducting of test. Group I was asked to involve only selected aerobic circuit Plyometric exercises for 30 minutes on every day (except Sunday). Group II was asked to involve only selected aerobic circuit Physical exercises for 30 minutes on every day (except Sunday). Group III was treated as control group. Both groups I &II were involved aerobic circuit training for 30 minutes every day (except Sunday). Each exercise given for 30sec in one station between the stations no test was given. The players tested one by one. Chalks the end of the players fingers tips and stands side onto the wall, keeping both feet remaining on the ground, reaches up as high as possible with one hand and marks the wall with the tips of the fingers (M1) from a static position jumps as high as possible and marks the wall with the chalk on his finger tips (M2). Then measured the distance in cm from M1to M2. The test can be performed as many times as the subject's wishes. The subjects allowed flexing their knees of their wishes. Scoring: after the second jump, the assistant measures the difference between the M1 and M2 in cms with the help of the score sheet and record it in the same. The readings thus obtained were put to statistical analysis to find the vertical jump performance.

3.3.2 Training Protocols

The subjects asked to jog to the next station without any rest. Three number circuits were given with three minutes rest interval. The both groups were well acquainted with their allotted techniques, the experimental groups involving their experimental variables for a period of 6 weeks wee under the personal supervision of the research scholar. When the training period was over the final readings were recorded.

Aerobic Plyometric and Aerobic Physical Circuit Training Schedule for six weeks.

Weeks	Intensity	Exercise Work	No Of Circuits	Rest Interval
1	60%	20 Seconds	2	3 minutes
2	60%	30 Seconds	2	3 minutes
3	65%	30 Seconds	3	3 minutes
4	70%	30 Seconds	3	3 minutes
5	70%	30 Seconds	3	3 minutes
6	70%	30 Seconds	3	3 minutes

4 Statically Analysis

In the present was to determine the increase of mean in each variable from base line to post treatment, the statistical tool used for these are 'T' ratio was used, analysis of co - variance was applied to determine deference between groups the scheffe's post hoc test was used to find out which treatment used in the present study was the source for the significance of adjusted post test means.

Analysis of covariance of data on vertical jump performance between pre- test and post –test of plyometric and physical exercises and control group

	Group I Aerobic Plyometric Exercises	Group II Aerobic Physical Exercises	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	F-atio
Pre test Means	40.5	40.5	39.65	B:	7.25	2	3.75	0.075
				W:	2834.0	57	49.71	
Post Test Means	43.7	41.0	40.1	B:	534	2	267	7.59
				W:	3071.4	57	35.14	
Adjusted Post Means	17.15	1.60	20.03	B:	1.2	2	15.6	6.87
				W:	27.2	56	2.27	

*significant at 0.05 levels for df 2 and 57.2 and 56 is 3.15

The post – test means were 43.7 for experimental group I, 41.0 for experimental group, and 40.1 for the control group respectively. The obtained 'F' ratio for post was 7.59 table 'F; value for the degrees of freedom 2 and 57 was 3.15. When it was compared to the obtained 'F' ratio of 7.59 it was found to be significant at 0.05 level of confidence.

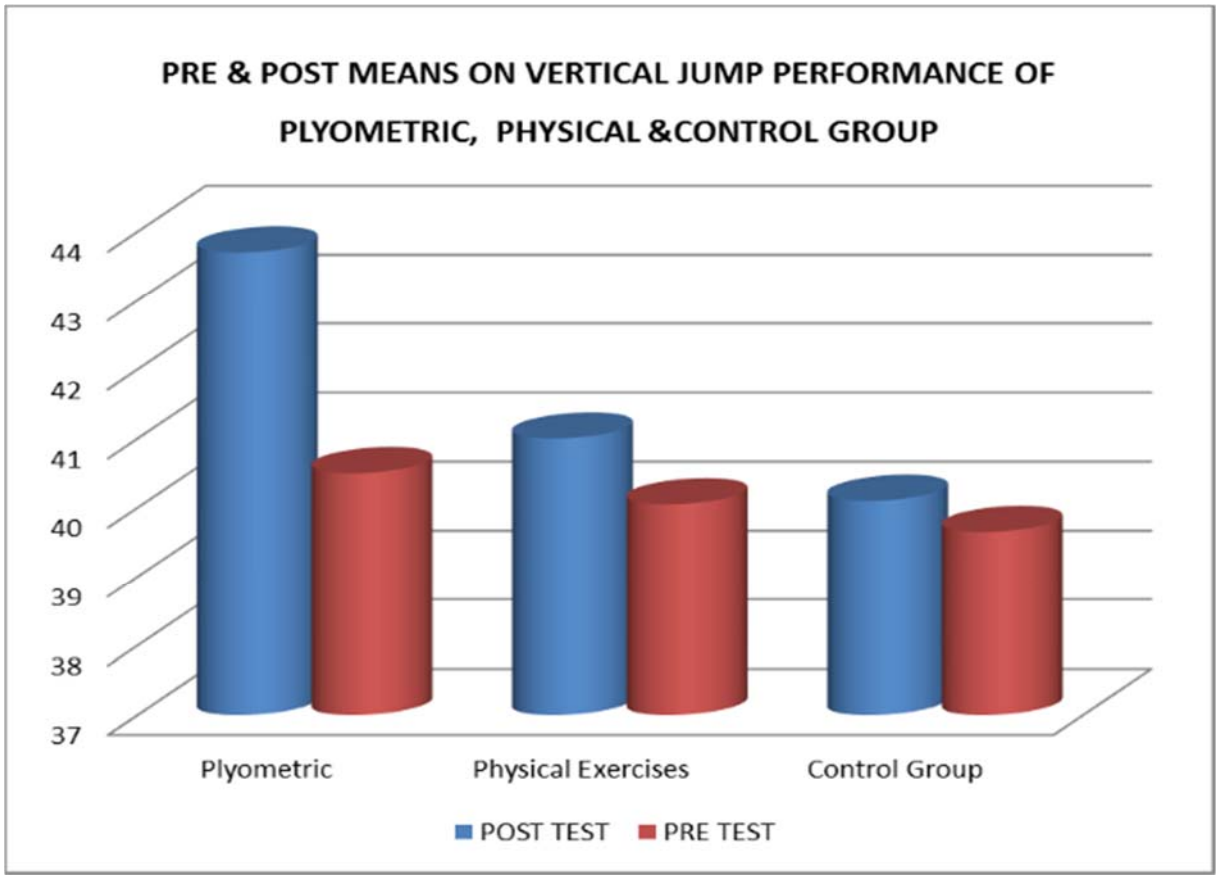
Scheffe's test for the difference between the adjusted post- tests paired means of vertical jump performance.

Group I Aerobic Plyometric Exercises	Group II Aerobic Physical Exercises	Control Group	Mean Difference	F – ratio
17.15	1.60	-	15.55	38.0
17.15	-	20.03	2.88	1.30
	1.60	20.03	18.43	339.60

*significant at 0.05 levels. F ratio was 6.32

The adjusted posttest means were 17.15 for the experimental group I, 1.60 for the experimental group II, and20.03 for the control group respectively. The calculated 'F' ratio was 6.87. The table F ratio for the degrees of freedom 2 and 56 was 3.15 when the calculated F ratio was compared with the table F ratio it was found be significant at 0.05 level of confidence.

The obtained F ratio of the above three comparisons were 38.01, 1.30, 339.6 respectively; the necessary F ratio was 6.32. Hence, the first and third comparisons were significant and second comparison was insignificant of the three groups. In the three groups experimental group I (Plyometrric Group) was found better improvement in vertical jump performance.



4.1 Results of the Study

The experimental group I Aerobic Plyometric Exercises would significantly improved vertical jumping performance.

The experimental group II Aerobic Physical Exercises would significantly improved vertical jumping performance.

The experimental group I Aerobic Plyometric Exercises better than the experimental group II Aerobic Physical Exercises significantly improved vertical jumping performance.

The experimental group II Aerobic Physical Exercises better than control Group significantly improved vertical jumping performance.

The experimental group I Aerobic Plyometric Exercises better than Physical Exercises and control Group significantly improved jumping performance.

5. Conclusion

Vertical jump may predict the maximal anaerobic power and could be used by coaches as a practical and easy –to- apply field Screening test for evaluation in volleyball training. The mean vertical velocity of the center of gravity at takeoff for back row spikers was reported to be 3.59 m/s and the height of the jump was 62 cm**.** The horizontal velocity at takeoff was found to be 3.23 m/s. In a related study of the jump serve the mean horizontal and vertical velocities for the center of mass at takeoff were reported to be somewhat less at 2.76 and 2.77 m/s respectively. The strengthening the muscles used in vertical jumping and to increase the neurological and strength in those muscles.

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