



Effect of plyometric training and weight training on speed and cardio vascular endurance of volleyball players

Sathuluri Raju, Kunche Usharani

Assistant Physical Director, Chaitanya Bharathi Institute of Technology, Hyderabad, Telangana, India

Abstract

The Present study find out the effect of plyometric training and weight training on speed and cardio vascular endurance of volleyball players the research design of the study was random group design. 60 Volleyball players (N=60) who represented in Inter Engineering Tournament in Telangana State were selected at random. The selected subjects were randomly divided into three groups and assigned into plyometric training group (Group-I), weight training group (Group-II) and control group. Each group consisted of 20 subjects. The training period was 12 weeks and three sessions a week on alternative days. Prior to experimental treatments all the subjects were measured of the criterion variables selected for this study. After the completion of the experimental period, the all the subjects were again measured of the criterion variables selected. The differences between the initial and final means on criterion variables were considered as the effect of respective treatment among the subjects. To test statistical significance of the difference, the obtained data were analysed using ANCOVA. In all cases 0.05 level was fixed to test the hypothesis.

Keywords: speed, cardio vascular endurance

Introduction

Sports that are subjectively judged are distinct from other judged activities such as beauty pageants and bodybuilding shows, because in the former the *activity* performed is the primary focus of evaluation, rather than the physical attributes of the contestant as in the latter although "presentation" or "presence" may also be judged in both activities.

Statement of the Problem

The purpose of the study was to find out effect of plyometric training, and weight training on speed and cardio vascular endurance of Volleyball players.

Delimitations

1. Sixty Volleyball men players who represented in Inter Engineering Tournament in Telangana State were selected at random.
2. Their age ranged between 18 and 25 years.
3. The selected 60 subjects were divided into plyometric, weight training and control groups, each group consisted of 20 subjects.
4. The training was given on alternative days of a week for a period of 12 weeks.

Limitations

1. The diet of the subjects was not restricted with strict observation.
2. The socio-economic background of the subjects was not considered for the purpose of the study.
3. The heredity and the environment of the subjects were not considered in this study.
4. The psychological stresses and other factors, which affect the metabolic functions, were not taken into consideration.

5. The other extraneous factors which would have influenced the results of the study were not controlled.

Methodology

In this chapter, the selection of subjects, selection of variables, selection of tests, pilot study, reliability of the instruments, reliability of the data, competence of tester, orientation to the subjects, training programme, collection of the data, tests administration, experimental design and statistical procedures have been explained.

The purpose of the study was to find out effect of plyometric training, and weight training on selected strength and endurance parameters among Volleyball players.

Selection of Subjects

To achieve the purpose of the study, 60 men Volleyball players who represented in Inter Engineering Tournament in Telangana State were selected at random. The age of the subjects ranged between 18 and 25 years. The selected subjects were fit to undergo the experimental training and gave their written consent to participate in the study.

Selection of Variables

Based on the available scientific literatures pertaining to plyometric training and weight training and in consultation with experts, the following dependent variables were selected for this study.

Dependent Variables

1. Speed
2. Cardiovascular Endurance

Independent Variables

1. Plyometric training for 12 weeks
2. Weight training for 12 weeks

Research Design

The research design of the study was random group design. 60 Volleyball players (N=60) who represented in Inter Engineering Tournament in Telangana State were selected at random. The selected subjects were randomly divided into three groups and assigned into plyometric training group (Group-I), weight training group (Group-II) and control group. Each group consisted of 20 subjects. The training period was 12 weeks and three sessions a week on alternative days. Prior to experimental treatments all the subjects were measured of the criterion variables selected for this study. After the completion of the experimental period, the all the subjects were again measured of the criterion variables selected. The differences between the initial and final means on criterion variables were considered as the effect of respective treatment among the subjects. To test statistical significance of the difference, the obtained data were analysed using ANCOVA. In all cases 0.05 level was fixed to test the hypothesis.

Showing Plyometric Exercises

Table 1

S. No	Exercises	Rest Between Sets
1	Squat Jumps	90 Seconds
2	Jump to Box	90 Seconds
3	Lateral Jump to Box	90 Seconds
4	Bounding	90 Seconds
5	Bounding with Rings	90 Seconds
6	Depth Jump	90 Seconds
7	Medicine Ball Chest Pass	90 Seconds
8	Box Drill with rings	90 Seconds
9	Medicine Ball Standing throw	90 Seconds
10	Lateral Hurdle Jump	90 Seconds

Showing Plyometric Training Programme Design

Table 2

Design	1-4 Week	5 – 8 Week	8 – 12 Week
Intensity	80 foot contacts	160 foot contacts	240 foot contacts
Repetitions	8	8	8
Set	1	2	3
Rest	90 seconds between set	90 seconds between set	90 seconds between set

Weight Training

This group consisted of twenty subjects. Three training sessions in a week for a period of twelve weeks were given. This group was directed to do 10 repetitions of each exercise and was also asked to do 3 sets in the beginning. The load was increased by increasing the repetitions or sets after each week according to the ability of an individual. They were asked to do the exercises in pairs when one subject was doing exercises, the other subject was asked to help him. After completing one set, the next person was asked to do the same exercises.

The subjects were given equal amount of time to relax after each exercise. This programme consisted of the following eight exercises.

- a. Military press
- b. Barbell curls
- c. Bench press
- d. Lying Triceps Extension
- e. Barbell Rows
- f. Squats
- g. Standing calf Raises
- h. Leg Press

Table 3: Work load schedule for Weight Training Group

S. No	Weight Training Exercises	Repetitions and Sets							
		I – III Weeks		IV – V Weeks		VI – VIII Weeks		IX –XII Weeks	
		Reps	Sets	Reps	Sets	Reps	Sets	Reps	Sets
1	Military Press	10	3	10	4	15	4	20	4
2	Barbell Curls	10	3	10	4	15	4	20	4
3	Bench Press	10	3	10	4	15	4	20	4
4	Lying Triceps Extension	10	3	10	4	15	4	20	4
5	Barbell Rows	10	3	10	4	15	4	20	4
6	Squats	10	3	10	4	15	4	20	4
7	Standing Calf Raises	10	3	10	4	15	4	20	4
8	Leg Press	10	3	10	4	15	4	20	4

Table 4: Ancova Results On Effect of Plyometric Training and Weight Training Compared With Controls on Speed

	Plyometric Training	Weight Training	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Pre Test Mean	7.37	7.30	7.47	Between	0.30	2	0.15	1.24
				Within	6.98	57	0.12	
Post Test Mean	6.92	6.97	7.50	Between	4.11	2	2.05	17.16*
				Within	6.82	57	0.12	
Adjusted Post Test Mean	6.93	7.05	7.42	Between	2.55	2	1.28	57.66*
				Within	1.24	56	0.02	
Mean Diff	-0.46	-0.33	0.02					

Table F - ratio at 0.05 level of confidence for 2 and 57 (df) = 3.16, 2 and 56 (df) = 3.16.

*Significant

As shown in Table IV the obtained pre test means on Speed on Plyometric Training group was 7.37, Weight Training group was 7.30 was and control group was 7.47. The obtained pre test F value was 1.24 and the required table F

value was 3.16, which proved that there was no significant difference among initial scores of the subjects. The obtained post test means on Speed on Plyometric Training group was 6.92, Weight Training group was 6.97

was and control group was 7.50. The obtained post test F value was 17.16 and the required table F value was 3.16, 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

57.66 was greater than the required value of 3.16 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 V.

Table 5: Multiple Comparisons of Paired Adjusted Means and Scheffe's Confidence Interval Test Results on Speed

Means				Required. C I
Plyometric Training Group	Weight Training Group	Control Group	Mean Difference	
6.93	7.05		0.12*	0.12
6.93		7.42	0.49*	0.12
	7.05	7.42	0.37*	0.12

* Significant

The post hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between Plyometric Training group and control group (MD: 0.49). There was significant difference between Weight Training group and control group (MD: 0.37). There was significant difference between treatment groups, namely,

Plyometric Training group and Weight Training group. (MD: 0.12).

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

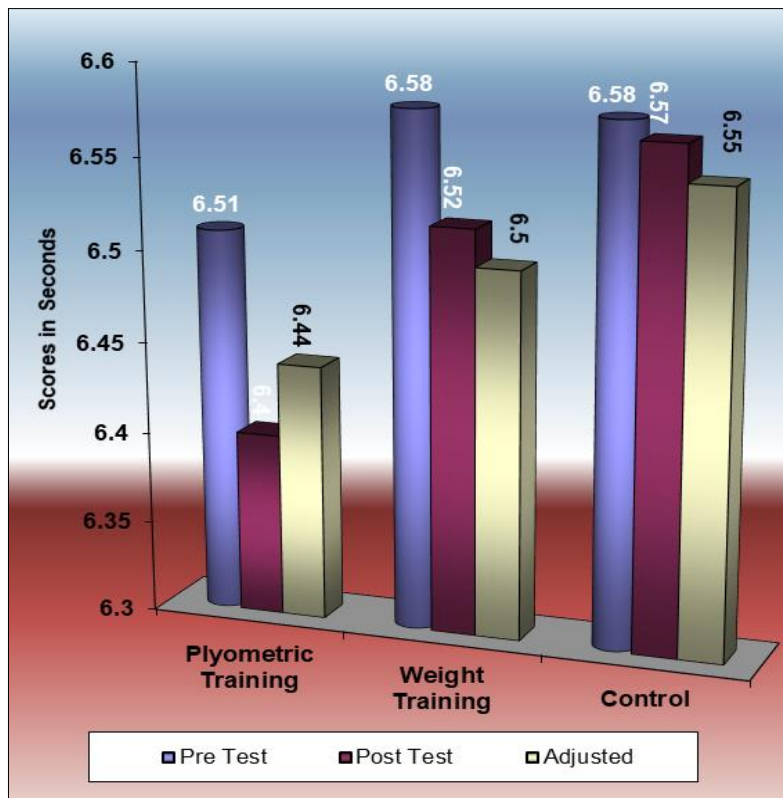


Fig 1: Bar Diagram Showing Pre Test, Post Test and Ordered Adjusted Means on Speed

Discussions on Findings on Speed

In order to find out the effect of plyometric training and weight training on speed parameter Speed the obtained pre and post test means were subjected to ANCOVA and post hoc analysis through Scheffe's confidence interval test.

The effect of Plyometric Training and Weight Training on Speed is presented in Table The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 57.66 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 VIII proved that there was significant difference between Plyometric Training group and control group (MD: 0.49) and Weight Training group and control group (MD: 0.37). Comparing between the treatment groups, it was found that there was significant difference between Plyometric Training and Weight Training group among inter university Volleyballplayers.

Thus, it was found that Plyometric Training was significantly better than Weight Training and control group in reducing the time and thereby improve Speed of Volleyball players.

Table 6: Ancova Results On Effect of Plyometric Training and Weight Training Compared With Controls on Cardiovascular Endurance

	Plyometric Training	Weight Training	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Pre Test Mean	70.32	72.55	73.37	Between	99.72	2	49.86	1.52
				Within	1872.10	57	32.84	
Post Test Mean	76.04	77.46	73.55	Between	156.80	2	78.40	2.93
				Within	1526.15	57	26.77	
Adjusted Post Test Mean	77.35	77.11	72.59	Between	279.86	2	139.93	15.73*
				Within	498.25	56	8.90	
Mean Diff	5.72	4.91	0.17					

Table F - ratio at 0.05 level of confidence for 2 and 57 (df) = 3.16, 2 and 56 (df) = 3.16.

*Significant

As shown in Table VI the obtained pre test means on Cardiovascular endurance on Plyometric Training group was 70.32, Weight Training group was 72.55 and control group was 73.37. The obtained pre test F value was 1.52 and the required table F value was 3.16, which proved that there was no significant difference among initial scores of the subjects.

The obtained post test means on Cardiovascular endurance on Plyometric Training group was 76.04, Weight Training group was 77.46 and control group was 73.55. The obtained post test F value was 2.93 and the required table F

value was 3.16, which proved that there was no 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 15.73 was greater than the required value of 3.16 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 7.

Table 7: Multiple Comparisons of Paired Adjusted Means and Scheffe’s Confidence Interval Test Results on Cardiovascular endurance

Means				Required. C I
Plyometric Training Group	Weight Training Group	Control Group	Mean Difference	
77.35	77.11		0.23	2.37
77.35		72.59	4.76*	2.37
	77.11	72.59	4.52*	2.37

* Significant

The post hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between Plyometric Training group and control group (MD: 4.76). There was significant difference between Weight Training group and control group (MD: 4.52). There was no significant difference between treatment groups, namely,

Plyometric Training group and Weight Training group. (MD: 0.23).

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

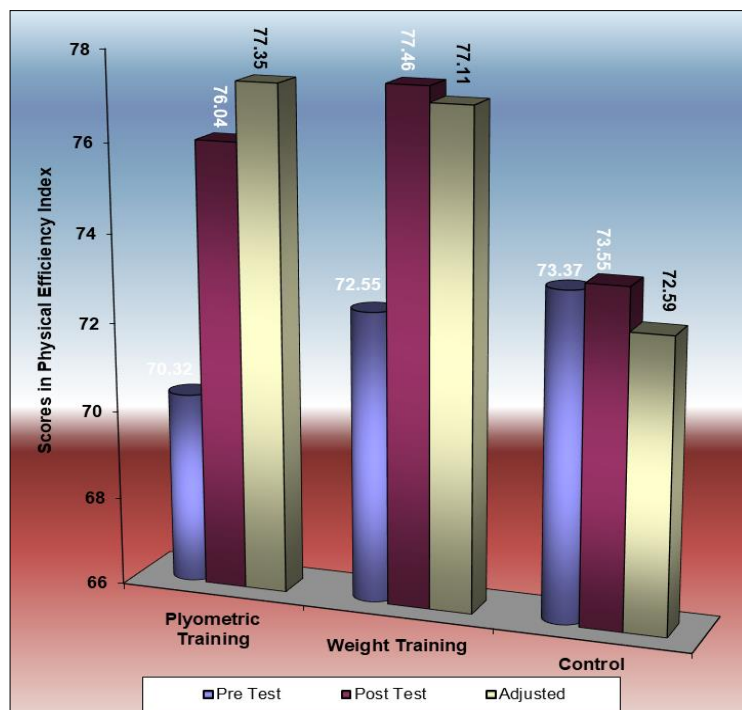


Fig 2: Bar Diagram Showing Pre Test, Post Test and Ordered Adjusted Means on Cardiovascular Endurance

Discussions on Findings on Cardiovascular Endurance

In order to find out the effect of plyometric training and weight training on speed parameter Cardiovascular endurance the obtained pre and post test means were subjected to ANCOVA and post hoc analysis through Scheffe's confidence interval test.

The effect of Plyometric Training and Weight Training on Cardiovascular endurance is presented in Table. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 15.73 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 proved that there was significant difference between Plyometric Training group and control group (MD: 4.76) and Weight Training group and control group (MD: 4.52). Comparing between the treatment groups, it was found that there was no significant difference between Plyometric Training and Weight Training group among inter university Volleyballplayers.

Thus, it was found that Plyometric Training and weight training were significantly better than control group in improving Cardiovascular endurance of the Volleyball players.

Conclusions

Within the limitations and delimitations of this study, the following conclusions were drawn.

1. It was concluded that plyometric training and weight training protocols significantly improved sprinting speed of Volleyball players compared to control group. Comparing between treatment groups, it was found plyometric training was significantly better than weight training group.
2. It was concluded that plyometric training and weight training protocols significantly improved cardiovascular endurance of Volleyball players compared to control group. Comparing between treatment groups, it was found there was no significant difference between plyometric training and weight training groups.

References

1. Clifford lee Brownell, Patricia Hagman E. Physical Education - Foundations and principle, New York: Mc graw -hill Book Company, 1951, 182.
2. Dintinman George B. Sports Speed Second Edition, New York: Leisure Press, Published, 1988.
3. Gordon Jackson. A Family Guide to Fitness Exercise, London: Salamander Book Limited, 1985, 102.
4. Hardayal Singh S. Sports Training and Coaching, Patiala: Nethaji Subash National Institute of Sports Publications, 1984, 3.
5. Hardayal Singh. Sports Training: General Theory and Method (Patiala: Netaji Subas National Institute of Sports), 1984, 148.
6. Hardayal Singh. Science of Sports Training, New Delhi: D.V.S. Publications, 1991, 13.
7. Harold M Barrow, Rose Mary Mc Gee. A practical approach to measurement in physical education (2nd cell) Philadelphia: Lea and Febiger, 1979, 25.
8. Harrison H Clarke, Davil H Clarke. Application of measurement to physical education, Englewood Cliffs, N. J. Prentice hall, Inc, 1978, 243, 244, 315.

9. Parton Mc, BA, Fitness for Sports, London: G. Bell and Sons ltd, 1957, 10.
10. Strukic PJ. Basic Physiology, New York: Spring Ervellong Inc, 1981, 23.