Effect of Different Intensities of Plyometric Training on Speed and Cardio Respiratory Endurance among Soccer Players

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Abstract

The purpose of the study was to find out the effect of different intensities of plyometric training on speed and cardio respiratory endurance among soccer players. To achieve these purposes sixty male soccer players were selected as subjects randomly from Annamalai University, Chidambaram. The selected subjects were divided into four equal groups of fifteen subjects each, namely low, moderate and high intensity plyometric training groups and control group. Experimental groups were trained for three alternative days in a week for twelve weeks with 50 – 65%, 65 – 80% and 80 – 95% of intensity for low, moderate and high intensity plyometric training groups. Speed and cardio respiratory endurance were selected as criterion variables and they were tested prior to and immediately after the training programme by using 50 meters dash and cooper's 12 minutes run / walk test respectively. The ANCOVA was applied to find out the significant difference in each criterion variables, if any, among the groups. Since, four groups were compared, whenever the obtained 'F' ratio for the adjusted post test means was found to be significant, the Scheffe's post hoc test was applied to determine the paired mean differences, if any, was used. The results of the study revealed that there was a significant improvement on speed and cardio respiratory performance due to low, moderate and high intensity plyometric training groups as compared to control group.

Key words: Intensity, Plyometric training, Speed, Cardio respiratory endurance.

Introduction

Soccer is the most popular and aggressive sport on the planet. Soccer is complex and demanding game requiring sophisticated training. Plyometric training is one of the training very commonly used among the soccer players for the development of motor fitness. Plyometric exercises are especially useful in sports that require speed-strength. Intensity is the effort involved in performing a given task. In plyometrics, intensity is controlled by the type of exercise performed. Plyometrics ranges from simple tasks to highly complex and stressful exercises. An activity can be carried out with different intensities, which will have different effect on the organism. The role of varied intensities of plyometric training needs further research to clarify the dispute in its effect on soccer players.

The purpose of the study was to find out the effect of different intensities of plyometric training on speed and cardio respiratory endurance among soccer players. The investigation framed the following hypotheses: there may be significant improvement on speed and cardio respiratory performance due to twelve weeks of low, moderate and high intensity plyometric training as compared to control group and also there may be a significant difference on speed and cardio respiratory endurance among low, moderate and high intensity plyometric training groups.

Methodology

To achieve this purpose of the study, sixty male soccer players from Annamalai University, Chidambaram were selected as subjects at random. The age of the subjects ranged from 18 to 25 years. The selected subjects were divided into four equal groups of fifteen subjects each. Group I underwent low intensity plyometric training (50-65%), Group II underwent moderate intensity plyometric training (65-80%), Group III underwent high intensity plyometric training (80-95%) and Group IV acted as control group. The training programmes three days per week (alternate days) for twelve weeks, 5% of intensity was increased once in three weeks. The plyometric training such as jumps, hopping, box drills, medicine ball exercises were given to three groups at various levels. Speed and cardio respiratory endurance were selected as criterion variables were assessed by using 50 meters dash and cooper's 12 minutes run/walk test respectively. The experimental design was used for the present study was random group design. The analysis of covariance was used to analyse the significant difference in each criterion variables among the groups. Since, four groups were compared, whenever the obtained 'F' ratio for adjusted post-test means was found to be significant, the Scheffe's test to find out the paired mean differences, if any, was used. The level of significance to test the 'F' ratio obtained by the analysis of covariance was 0.05, which was considered appropriate.

Results

The data collected prior to and after the experimental period on speed and cardio respiratory endurance of low intensity plyometric training group, moderate intensity plyometric training group, high intensity plyometric training group and control group were analysed and presented in Table-I. Table I shows that the obtained "F" ratio value 333.33 for adjusted post test mean values on speed which was greater than the required table value of 2.775 for significance with df 3 and 55. The results of the study showed that there was a significant difference among four groups on speed.

Table-I

Analysis of Covariance of Data on Speed and Cardio Respiratory Endurance Between Pre and Post Test of Low Intensity Plyometric Training Group, Moderate, Intensity Plyometric Training Group, High Intensity Plyometric Training Group and Control Group

	Test	Low intensity plyometric training group	Moderate intensity plyometric training group	High intensity plyometric training group	Control group	Source of variances	Sum of squares	df	Mean squares	Obtained 'F' Ratio
Speed	**Pre-test**									
	Mean	7.61	7.63	7.62	7.64	Between	0.01	3	0.003	1.50
	SD	0.04	0.03	0.07	0.03	Within	0.11	56	0.002	
	Post-test									
	Mean	7.24	7.17	7.02	7.64	Between	3.20	3	1.07	356.67*
	SD	0.07	0.06	0.06	0.04	Within	0.19	56	0.003	
	Adjusted Post-test									
	Mean	7.24	7.16	7.02	7.63	Between	2.99	3	1.00	333.33*
						Within	0.17	55	0.003	
Cardio respiratory endurance	**Pre-test**									
	Mean	2449.67	2446.00	2448.67	2450.00	Between	147.92	3	49.31	0.11
	SD	10.60	28.98	17.16	23.76	Within	25356.67	56	56452.80	
	Post-test									
	Mean	2841.67	3036.33	2735.67	2468.67	Between	2520731.25	3	840243.75	358.85*
	SD	53.47	46.85	53.28	38.38	Within	131123.33	56	2341.49	
	Adjusted Post-test									
	Mean	2841.88	3035.83	2735.68	2468.94	Between	2505168.87	3	835056.29	352.84*
						Within	130167.40	55	2366.68	

* Significant at .05 level of confidence.

The table value required for significance at .05 level with df 1 and 56 & 1 and 55 are 2.772 and 2.775 respectively.

Table I also shows that the obtained "F" ratio value 352.84 for adjusted post test mean values on cardio respiratory endurance which was greater than the required table value of 2.775 for significance with df 3 and 55. The results of the study showed that there was a significant difference among four groups on cardio respiratory endurance. Since four groups were involved, the Scheffe's post hoc test was applied to find out the paired mean differences, if any, and it is presented in the Table - II.

Table-II
Scheffe's Post Hoc Test for the Difference between Six Paired Adjusted Post Test Means of Speed and Cardio Respiratory Endurance

	S. No.	Low intensity plyometric training group	Moderate intensity plyometric training group	High intensity plyometric training group	Control group	Mean difference	Confidence interval
Speed	1.	7.24	7.16	-	-	0.08*	0.059
	2.	7.24	-	7.02	-	0.22*	0.059
	3.	7.24	-	-	7.63	0.39*	0.059
	4.	-	7.16	7.02	-	0.14*	0.059
	5.	-	7.16	-	7.63	0.47*	0.059
	6.	-	-	7.02	7.63	0.61*	0.059
Cardio respiratory endurance	1.	2841.88	3035.83	-	-	193.95*	51.25
	2.	2841.88	-	2735.68	-	106.20*	51.25
	3.	2841.88	-	-	2468.94	372.94*	51.25
	4.	-	3035.83	2735.68	-	300.15*	51.25
	5.	-	3035.83	-	2468.94	566.89*	51.25
	6.	-	-	2735.68	2468.94	266.74*	51.25

*Significant at 0.05 level of confidence.

Table II shows that the adjusted post test mean difference between low intensity plyometric training group and moderate intensity plyometric training group, low intensity plyometric training group and high intensity plyometric training group, low intensity plyometric training group and control group, moderate intensity plyometric training group and high intensity plyometric training group, moderate intensity plyometric training group and control group and high intensity plyometric training group and control group were 0.08, 0.22, 0.39, 0.14, 0.47 and 0.61 for speed and 193.95, 106.20, 372.94, 300.15, 566.89 and 266.74 for cardio respiratory endurance respectively. They were greater than the confidence interval value of 0.059 and 51.25 at .05 levels which indicates that there was a significant difference among above said six paired groups on speed and cardio respiratory endurance.

Discussion

The result of the study indicates the low, moderate and high intensity plyometric training had significantly improved on speed and cardio respiratory endurance. The result of the study in consonance with the findings of Brown et al. (1986) conducted a study to find out the effect of plyometric exercise on 15 year old subjects in which plyometric group experienced significant gain in speed. Bompa (1996) experimented and suggested that plyometric exercise can often yield a significant gain in starting power and accelerating power during sprinting involving countermovement and loaded jump-squat training may be more effective for enhancing sport speed in elite players. DuPont, et al. (2004) high-intensity interval training

has shown decreased maximal aerobic endurance. Hoff (2005) heart's stroke volume is the element in the oxygen chair that mainly improved aerobic endurance performance. Spurrs and Others (2003) plyometric programme lead to improvements in 3 km endurance performance. These studies are positively related with result of the present study.

Conclusion

1. There was a significant improvement on speed and cardio respiratory endurance due to 12 weeks of low, moderate and high intensity plyometric training.
2. High intensity plyometric training significantly improved speed as compared to low intensity plyometric training and moderate intensity plyometric training.
3. Moderate intensity plyometric training significantly improved cardio respiratory endurance as compared to low intensity plyometric training and high intensity plyometric training.

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