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Effects of strength training parallel with plyometric and cross-training on speed

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Abstract
The purpose of the study was to find out the effects of weight training parallel with plyometric and cross training on speed. For this purpose, forty-five Degree men students were randomly selected as subjects from CSSR & SRRM Degree College, Kamalapuram, Kadapa, YSR Dist., Andhra Pradesh, India during the year 2015-2016. They were divided into three equal groups of fifteen each. Group -I and Group- II acted as experimental groups and group -III acted as control group. Speed was selected as dependent variable. Strength training with plyometric training and strength training with cross training were selected as independent variables. The collected data were analyzed statistically by using analysis of covariance to find out the effects of strength training parallel with plyometric training and cross training on speed. Whenever the obtained 'F' ratio was found to be significant, the Scheffe'S test was used as post hoc test to find out the paired mean differences, if any, the results of the study revealed that strength training with plyometric training and weight training with cross training groups significantly improved speed when compared with control group. Among the training strength with cross training is better to developed speed than strength with plyometric training.

Keywords: training parallel, plyometric, cross training

Introduction
Physical activities is an important ingredient in the quality of life because it increase energy and promotes physical, mental and psychological wellbeing in additional to conferring worthy health habits. Physical inactivity is considerably more dangerous than physical activity Bompa, (1996) [1]. Training has been explained a programme of exercise designed to improve the skill and increase energy capacities of an athlete for a particular event. Training has been a part of human life since ancient times. It denotes the process of preparation from some task Dick & Frank. W (1997) [2]. Though systematic training programme one can improve his fitness both physically and mentally Moran, Gay T & co., (1997) [3]. Strength is key to success in modern athletics. It is much easier to improve than techniques. Strength may be defined as the neuro muscular capacity to overcome an external resistance. The basic principles of sports training, in general are specificity, overload and reversibility. Cross training is a powerful training tool to help to gain the competitive edge in the primary sport and avoid two negative consequences of over training and burnout. Cross training programme provides various direct and indirect fitness benefits Riley, (1982) [4].

Methodology
The purpose of the study was to find out the effects of weight training parallel with plyometric and cross training on speed. For this purpose, forty-five Degree men students were Randomly selected as subjects from CSSR & SRRM Degree College, Kamalapuram, Kadapa, YSR Dist., Andhra Pradesh, India during the year 2015-2016. They were divided into three equal groups of fifteen each. Group- I and Group -II acted as experimental groups and group- III acted as control group. Speed was selected as dependent variable. Strength training with plyometric training and strength training with cross training were selected as independent variables. The collected data were analyzed statistically by using Analysis of Covariance to find out the effects of strength training parallel with plyometric training and cross training on speed. Whenever the obtained 'F' ratio was found to be significant, The Scheffe's test was used as post hoc test to find out the paired mean differences, if any.

Training Programme
During the training period the two experimental groups underwent their respective training programme, four days per week for twelve weeks in addition to their regular physical education activity. Group- I underwent strength training and plyometric training in (parallel) alternative sessions. Group- II underwent strength training and cross training in (parallel) alternative sessions. Every day the workout lasted for about 45-60 minutes including warm-up and warm down exercises. Group-III (control group) did not participate in any specific training. However, they perform regular physical education activities.

Load: The intensity variations in twelve weeks training for strength and plyometric and strength and cross training groups are given below.

Table 1

Weeks	Percentage of Intensity			
	Strength and Plyometric training group		Strength and cross training group	
	Weight training	Plyometric training	Weight training	Plyometric training
1,2	70	65	70	65
3,4	75	70	75	70
5,6	80	75	80	75
7,8	85	80	85	80
9,10	90	85	90	85
11 and 12	95	90	95	90

Weight: 5% increase once in two weeks
Plyometric: 5% increase once in two weeks
Cross training: 5% increase once in two weeks

Analysis of the Data

The analysis of covariance on speed of pre and post tests for strength training with plyometric training group, strength training with cross training group and control group was analysed and presented in Table-2.

Table 1: analysis of covariance on speed of pre and post tests for experimental and control groups\

test	Strength with plyometric training group	Strength with Cross training group	Control Group	Source of Variance	Sum of Squares	Df	Mean Squares	Obtained 'F' Ratio
Pre Test								
Mean	7.99	7.92	7.90	Between	0.069	2	0.034	0.650
S.D.	0.24	0.25	0.20	Within	2.23	42	0.053	
Post Test								
Mean	7.43	7.26	7.85	Between	2.73	2	1.36	35.18*****
S.D.	0.21	0.19	0.18	Within	1.63	42	0.038	
Adjusted Post Test								
Mean	7.39	7.27	7.88	Between	3.09	2	1.54	247.15*****
				Within	0.148	41	0.0036	

* Significant at.05 level of confidence.

The table- 2 shows that the adjusted post test means of strength with plyometric training group, strength with cross training group and control group. The obtained 'F' ratio for adjusted post test of 247.15 which was more than the table value of 3.226 with df 2 and 41 required for significance at.05 level.

The results of the study indicated that there was a significant difference on speed among the adjusted post test means of strength with plyometric training group, strength with cross training group and control group. Since, three groups were compared, adjusted post test was found to be significant, the Scheffe's test to find out the paired mean differences and it was presented in Table 3.

Table 3: the scheffe's test for the differences between paired means on speed

Strength and plyometric training group	Strength and Cross training group	Control Group	Mean Differences	Confidence Interval Value
7.39	7.27	-	0.12*****	0.06
7.39	-	7.88	0.49*****	0.06
-	7.27	7.88	0.61*****	0.06

* Significant at.05 level of confidence.

The results of this study showed that there was a significant difference exist between strength with plyometric training group and strength with cross training group, strength with plyometric training group and control group and strength with cross training group and control group on speed.

Results

The strength with plyometric training and also strength with cross training groups showed significant improvement on speed when compared to control group. The improvement on speed was greater for strength and cross training group than strength and plyometric training group.

References

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