STAR
Research Journal

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PHYSICAL EDUCATION

OUTCOMES OF CROSSFIT AND RESISTANCE TRAINING ON SELECTED SPORTS RELATED FITNESS VARIABLES AMONG BASKETBALL PLAYERS

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Abstract

The purpose of the study is to find out the outcomes of CrossFit and Resistance training on selected sports related fitness variables among basketball players. The CrossFit and Resistance training will be selected as independent variables. Muscular Strength and Agility (sports related fitness variables) variables will be selected as dependent variables. To facilitate the study, 45 male basketball players will be randomly selected from various colleges affiliated to the University of Madras. The age group of subjects ranged from 17 to 25 years. The selected subjects are divided into three groups' namely experimental group I, experimental group II, and control group. The group I will undergo CrossFit training, group II will undergo Resistance training, and control group will not undergo any training. The training period is limited for 12 weeks per week except Sunday; per day per session is maximum 60 minutes. The selected dependent variable is measured by standardized tests. The sports related fitness variables are Muscular Strength-Pull ups, Agility-Hexogon test. The data will be collected from the experimental groups I, II and control group before and after the training period. Analysis of Co-variances (ANCOVA) will be used to find out the significant difference, if any among the groups. Scheffe's post hoc test will be used to find out the mean difference on selected dependent variable among the groups.

Keywords: Basketball, CrossFit, Resistance, Independent variables, Dependent variables.

INTRODUCTION

Sports science emphasizes on developing new techniques and training methods to train athletes or teams for enhancing performance at high level. India needs to reinforce this trend in all fields of sports and this can only be possible through scientific, systematic and planned sports training programme. Training is the total process of preparation of a sportsman, through different means and forms for better performance. Training aims at improving the fitness of persons. It is a programme of exercise designed to improve the skill and increase the energy capacities of an athlete for a particular event (Edward 1984). CrossFit itself is defined as that which optimizes fitness (constantly varied functional movements performed at relatively high intensity). CrossFit is also the community that spontaneously arises when people do these workouts together. CrossFit is the principal strength and conditioning program for Hundreds of other elite and professional athletes worldwide. (https://www.crossfit.com/what-is-crossfit). Resistance training is a form of exercise for the development of strength and size of skeletal muscles. Resistance training, also known as weight training or strength training, is for everyone. When one does it properly it can provide significant functional benefits and improvement in overall health and well-being. In one common training method the teaching involves lifting progressively increasing amount of weight and uses a variety of exercises as type of equipment to target specific muscle group **(Fleck & Kraemer, 1997)**.

OBJECTIVES OF THE STUDY

1. To find out the outcomes of CrossFit and Resistance training on muscular strength among basketball players.
2. To find out the training outcomes of CrossFit and Resistance training on agility among basketball players.

HYPOTHESES

1. It was hypothesized that there would be significant improvement on selected muscular strength and agility due to the twelve weeks of CrossFit training and Resistance training when compared with the control group.
2. It was hypothesized that there would be significant improvement differences between the CrossFit training and Resistance training group on selected muscular strength and agility.

METHODOLOGY

EXPERIMENTAL DESIGN & STATISTICAL TECHNIQUE

The purpose of the present study is to analyze the outcomes of CrossFit and Resistance training on muscular strength and agility among basketball players. To achieve the purpose of the study was forty five men inter collegiate level basketball players (N = 45) were randomly selected from various colleges affiliated to the University of Madras. The age of the subject ranged from 17 to 25 years. The investigator selected the independent variables namely CrossFit training and Resistance training for the analysis. The dependent variables selected for this study sports related fitness variables namely muscular strength and agility. The pre-test and post-test random group design was used as experimental design in which forty five male basketball players were divided into three groups of fifteen subjects in each group. Group I crossfit training, Group II resistance training and Group III acted as Control Group. The subjects were tested on the selected criterion variables prior to before and after the training program. The data collected from the three groups prior to before and after the training programs on the selected criterion variables were statistically analyzed with analysis of covariance (ANCOVA). Whenever the 'F' – ratio for adjusting post test means were found to be significant, Scheffe's test was followed as a post hoc test to determine which of the paired mean differences were significant. In all the cases 0.05 level of confidence was fixed as the level of confidence to test the hypothesis (Clarke 1972).

TABLE I
ANALYSIS OF COVARIANCE FOR THE PRE, POST AND ADJUSTED POST TEST ON MUSCULAR STRENGTH OF EXPERIMENTAL GROUPS AND CONTROL GROUP
(Scores in Numbers)

Test	Exp Gr I	Exp Gr II	Control Gr	SV	SS	DF	MS	F
Pre test	11.53	11.64	10.93	between	2.978	2	1.489	.468
				within	125.600	42	2.990	
Post test	14.60	19.00	10.93	between	489.378	2	244.609	52.829*
				within	194.533	42	4.632	
Adjusted	14.60	18.97	10.95	between	474.010	2	237.005	50.094*
				within	193.980	41	4.731	

**Significant at 0.05 level of confidence.*

The table I show that the pre-test mean values on muscular strength of crossfit training group, resistance training group and control groups are 11.07, 11.53 and 10.93 respectively. The obtained 'F' ratio .498 for the pre-test score was lesser than the table value 3.22 for 2 and 42 degree of freedom at 0.05 level of confidence on muscular strength. There is no significant difference between the experimental and the control groups on muscular strength. The post-test mean values on muscular strength of crossfit training group, resistance training group and control groups are 14.60, 19.00 and 10.93 respectively. The obtained 'F' ratio 52.829 for post-test scores was greater than the table value 3.22 for degree of freedom 2 and 42 required for significance at 0.05 level of confidence on muscular strength. The adjusted post-test means of on muscular strength of crossfit training group, resistance training group and control groups are 14.60, 18.97 and 10.95 respectively. The obtained 'F' ratio of 50.094 for adjusted post-test means was greater than the table value of 3.22 for degree of freedom 2 and 42 required for significance at 0.05 level of confidence on muscular strength. The results of the study indicated that there was a significant difference among the adjusted post-test means of crossfit training group, resistance training group on muscular strength. Since the obtained 'F' ratio value was significant further to find out the paired mean difference, the scheffe's test was employed and presented in table II.

TABLE II
ANALYSIS OF COVARIANCE FOR THE PRE, POST AND ADJUSTED POST TEST ON MUSCULAR STRENGTH OF EXPERIMENTAL GROUPS AND CONTROL GROUP
(Scores in Numbers)

Experimental Group I (Crossfit training group)	Experimental Group II (Progressive resistance training group)	Control Group	MD	CI
14.60	18.97	-	4.37	9.64
14.60	-	10.95	3.65	
	18.97	10.95	8.02	

The table II shows that the Sheffe's post –hoc method of testing the significance for the differences between the paired means the following analysis of co-variance for crossfit training group, resistance training group and control group. The mean differences between the crossfit training group and resistance training group is 4.37 which is significant at 0.05 level of confidence interval. The mean differences between the crossfit group and control group is 3.65 which is significant at 0.05 level of confidence interval. The comparison between resistance training group and control group the mean difference 8.02 is significant at 0.05 level of confidence interval. This indicates that the muscular strength was significantly improved in both experimental groups than the control group. There is significant difference between crossfit training group and resistance training group, but when comparing the mean difference the resistance training group is more effective in muscular strength.

TABLE III
ANALYSIS OF COVARIANCE FOR THE PRE, POST AND ADJUSTED POST TEST ON AGILITY OF EXPERIMENTAL AND CONTROL GROUPS
(Scores in Seconds)

Test	Exp gr I	Exp gr II	Control gr	SV	SS	Df	MS	F
Pre test	12.00	12.74	12.14	between	4.648	2	2.324	1.712
				within	57.226	42	1.358	
Post test	9.74	12.54	12.59	between	79.396	2	39.698	30.301
				within	54.309	42	1.310	
Adjusted	9.71	12.58	12.57	between	79.396	2	39.724	30.721
				within	53.715	41	1.293	

**Significant at 0.05 level of confidence.*

The table III show that the pre-test mean values on agility of crossfit training group, resistance training group and control groups are 12.00, 12.74 and 12.14 respectively. The obtained 'F' ratio 1.712 for the pre-test score was lesser than the table value 3.22 for 2 and 42 degree of freedom at 0.05 level of confidence on agility. There is no significant difference between the experimental and the control groups on agility. The post-test mean values on agility of crossfit training group, resistance training group and control groups are 9.74, 12.54 and 12.59 respectively. The obtained 'F' ratio 30.301 for post-test scores was greater than the table value 3.22 for degree of freedom 2 and 42 required for significance at 0.05 level of confidence on agility. The adjusted post-test means of on agility of crossfit training group, resistance training group and control groups are 9.71, 12.58 and 12.57 respectively. The obtained 'F' ratio of 30.721 for adjusted post-test means was greater than the table value of 3.22 for degree of freedom 2 and 42 required for significance at 0.05 level of confidence on muscular strength. The results of the study indicated that there was a significant difference among the adjusted post-test means of crossfit training group, resistance training group on agility. Since the obtained 'F' ratio value was significant further to find out the paired mean difference, the scheffe's test was employed and presented in table IV.

TABLE IV
ANALYSIS OF COVARIANCE FOR THE PRE, POST AND ADJUSTED POST TEST ON AGILITY OF EXPERIMENTAL AND CONTROL GROUPS
(Scores in Seconds)

Experimental Group I (Crossfit training group)	Experimental Group II (Progressive Resistance Training group)	Control Group	MD	CI
9.71	12.58	-	2.87	3.39
9.71	-	12.57	2.86	
	12.58	12.57	0.01	

The table IV shows that the Sheffe's post –hoc method of testing the significance for the differences between the paired means the following analysis of co-variance for crossfit training group, resistance training group and control group. The mean differences between the crossfit training group and resistance training group is 2.87 which is significant at 0.05 level of confidence interval. The mean differences between the crossfit group and control group is 2.86 which is significant at 0.05 level of confidence interval. The comparison between resistance training group and control group the mean difference 0.01 is significant at 0.05 level of confidence interval. This indicates that the agility was significantly improved in both experimental groups than the control group. There is significant difference between crossfit training group and resistance training group, but when comparing the mean difference the crossfit training group is more effective in agility.

CONCLUSION

The results of the study indicated that the experimental groups namely crossfit and resistance group had significantly influenced on the selected variables such as muscular strength and agility as both experimental groups had undergone systematic training over 12 weeks duration. At the same time when the two experimental groups were compared, crossfit group showed significant improvement in agility than the other variable. The resistance training group showed significant improvement in muscular strength than the other variable. The control group had not shown significant improvement on any of the selected variables as they have not subjected to any of the specific training / conditioning similar to that of experimental groups. So, the training impact of twelve week crossfit training was much greater than that of progressive resistance training among basketball players on agility, the training impact of twelve week progressive resistance training was much greater than that of crossfit training among basketball players on muscular strength. The same method of training may recommended for other purpose to improve the physiological and psychological variables. This study will help to enhance the performance of sports, games.

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