STAR
Research Journal

Available online at www.starresearchjournal.com (Star International Journal)
PHYSICAL EDUCATION
UGC Journal No: 63023

EFFECT OF HIGH MEDIUM AND LOW INTENSITIES OF PROGRESSIVE RESISTANCE TRAINING ON SELECTED STRENGTH PARAMETERS

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Abstract

The purpose of the study was to find out the effect of high, medium and low intensity of progressive resistance training on selected strength parameters. To achieve the purpose of the present study, eighty college male students from A.V.V.M Sri Pushpam College, Poondi, Thanjavur District, Tamilnadu were selected as subjects at random and their ages ranged from 18 to 25 years. The subjects were divided into four equal groups of twenty male students each. The study was formulated as a true random group design, consisting of a pre-test and post-test. The subjects (N=80) were randomly assigned to four equal groups of college male students each. The groups were assigned as high intensity progressive resistance training, medium intensity progressive resistance training, low intensity progressive resistance training and control group in an equivalent manner. The group I underwent high intensity progressive resistance training, group II underwent medium intensity progressive resistance training, group III underwent low intensity progressive resistance training and group IV acted as a control group. The three experimental groups were participated the training for a period of twelve weeks to find out the outcome of the training packages and the control group did not participated in any training programme. The variable to be used in the present study was collected from all subjects before they have to treat with the respective treatments. It was assumed as pre-test. After completion of treatment they were tested again as it was in the pre-test on all variables used in the present study. This test was assumed as post-test. The following statistical techniques were adopted to treat the collected data in connection with established hypothesis and objectives of this study. Analysis of covariance (ANCOVA) was applied because the subjects were selected random, but the groups were not equated in relation to the factors to be examined. Hence the difference between means of the three groups in the pre-test had to be taken into account during the analysis of the post-test differences between the means. This was achieved by the application of the analysis of covariance, where the final means were adjusted for differences in the initial means, and the adjusted means were tested for significance. Whenever the adjusted post-test means were found significant, the scheffe's post-hoc test was administer to find out the paired means difference. To test the obtained results on variables, level of significance 0.05 was chosen and considered as sufficient for the study. In comparing the effect of training, from the obtained f-ratios, it was observed that HIPRT showed better performance on increasing muscular strength and strength endurance than the other groups.

Keywords: Resistance, muscular strength, strength endurance.

INTRODUCTION

Resistance training is well established effective methods of exercise for developing muscular fitness. Resistance exercise is a type of exercise that has gained popularity over the last decade. Resistance training is any exercise that causes the muscles to contract against an external resistance with the expectation of increases in strength, tone, mass and endurance. The external resistance can be dumbbells, rubber exercise tubing, own body weight, bricks, bottles of water or any other object that causes the muscles to contract. This training works the muscles of the body and is most beneficial when all the ranges of motion are included. The resistance training is done two to three times a week with an average of 8 to 12 repetitions of a series of different resistance based exercises. Resistance training works by causing microscopic damage or tears to the muscle cells, which in turn are quickly repaired by the body to help the muscles regenerate and grow stronger. Progressive resistance is essential for building muscle and reaching goals, such as rehabilitation. The body adapts to exercise, and it needs to be constantly challenged in order to grow and change. Progressive resistance training is an attempt to induce a wide spectrum of physiological, functional, and psychological health-related adaptations. Progressive resistance training has been established as the choice for inducing skeletal muscle hypertrophy in healthy adults and those with chronic disease (Avery & Faigenbaum, 2007).

METHODOLOGY

The purpose of the study was to find out the effect of high, medium and low intensity of progressive resistance training on selected strength parameters. To achieve the purpose of the present study, eighty college male students from A.V.V.M Sri Pushpam College, Poondi, Thanjavur District, Tamilnadu were selected as

subjects at random and their ages ranged from 18 to 25 years. The subjects were divided into four equal groups of twenty male students each. The study was formulated as a true random group design, consisting of a pre-test and post-test. The subjects (N=80) were randomly assigned to four equal groups of college male students each. The groups were assigned as high intensity progressive resistance training, medium intensity progressive resistance training, low intensity progressive resistance training and control group in an equivalent manner. The group I underwent high intensity progressive resistance training, group II underwent medium intensity progressive resistance training, group III underwent low intensity progressive resistance training and group IV acted as a control group. The three experimental groups were participated the training for a period of twelve weeks to find out the outcome of the training packages and the control group did not participated in any training programme.

The variable to be used in the present study was collected from all subjects before they have to treat with the respective treatments. It was assumed as pre-test. After completion of treatment they were tested again as it was in the pre-test on all variables used in the present study. This test was assumed as post-test. The following statistical techniques were adopted to treat the collected data in connection with established hypothesis and objectives of this study. Analysis of covariance (ANCOVA) was applied because the subjects were selected random, but the groups were not equated in relation to the factors to be examined. Hence the difference between means of the three groups in the pre-test had to be taken into account during the analysis of the post-test differences between the means. This was achieved by the application of the analysis of covariance, where the final means were adjusted for differences in the initial means, and the adjusted means were tested for significance. Whenever the adjusted post-test means were found significant, the scheffe's post-hoc test was administer to find out the paired means difference. To test the obtained results on variables, level of significance 0.05 was chosen and considered as sufficient for the study.

RESULTS

TABLE – I
COMPUTATION OF ANALYSIS OF COVARIANCE OF MEAN OF HIGH, MEDIUM, LOW INTENSITY PROGRESSIVE RESISTANCE TRAINING AND CONTROL GROUPS ON MUSCULAR STRENGTH (HIPRT, MIPRT, LIPRT & CG)

	HIPRT	MIPRT	LIPRT	CG	Source of Variance	Sum of Squares	df	Means Squares	F-ratio
Pre-Test Means	42.98	42.51	42.60	42.16	**BG**	6.82	3	2.27	1.17
					WG	147.47	76	1.94	
Post-Test Means	50.97	49.07	49.08	42.30	**BG**	870.27	3	290.09	367.19*
					WG	60.04	76	0.79	
Adjusted Post-Test Means	50.96	49.07	49.08	42.31	**BG**	835.86	3	278.62	348.31*
					WG	59.99	75	0.80	

Table – I reveals that the indicated that the obtained 'F'-ratio for the pre-test means among the groups on muscular strength were 42.98 for experimental group – I, 42.51 for experimental group – II, 42.60 for experimental group – III and 42.16 for control group. The obtained 'F'-ratio 1.17 was lesser than the table 'F'-ratio 2.72. Hence the pre-test mean 'F'-ratio was insignificant at 0.05 level of confidence for the degree of freedom 3 and 76. The post-test means were 50.97 for experimental group – I, 49.07 for experimental group – II, 49.08 for experimental group – III and 42.30 for control group. The obtained 'F'-ratio 367.19 was higher than the table 'F'-ratio 2.72. Hence the post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 76. The adjusted post-test means were 50.96 for experimental group – I, 49.07 for experimental group – II, 49.08 for experimental group – III and 42.31 for control group. The obtained 'F'-ratio 348.31 was higher than the table 'F'-ratio 2.72. Hence the adjusted post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 75. It was concluded that there was a significant mean difference among high group, medium group, low intensity progressive resistance training group and control group in developing muscular strength of the football players.

FIGURE – I
ADJUSTED POST TEST DIFFERENCES OF THE HIGH, MEDIUM, LOW INTENSITY PROGRESSIVE RESISTANCE TRAINING AND CONTROL GROUPS ON MUSCULAR STRENGTH (HIPRT, MIPRT, LIPRT & CG)

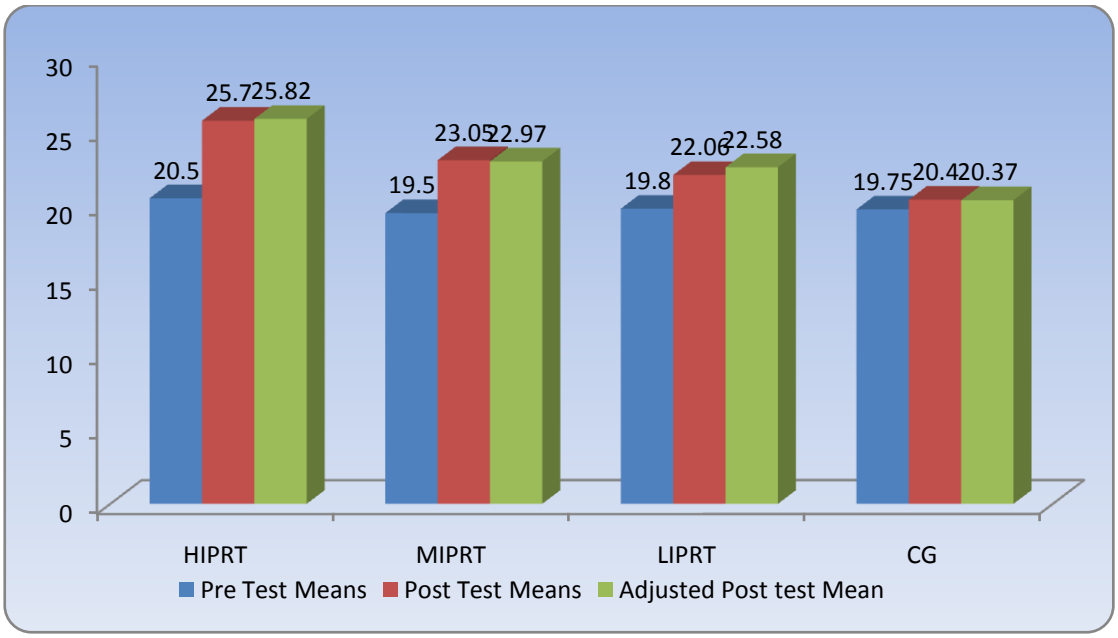

TABLE – II
THE SCHEFFE'S TEST FOR THE DIFFERENCES BETWEEN THE ADJUSTED POST TEST MEANS ON MUSCULAR STRENGTH

Adjusted Post-Test Means				Mean Difference	Confidence Interval
HIPRT	MIPRT	LIPRT	CG		
50.96	49.07	---	---	1.89*	0.66
50.96	---	49.08	---	1.88*	
50.96	---	---	42.31	8.65*	
---	49.07	49.08	---	0.01	
---	49.07	---	42.31	6.76*	
---	---	49.08	42.31	6.77*	

**** Significant at 0.05 level of confidence***

The multiple comparisons showed in table II proved that there existed significant differences between the adjusted means of HIPRT and MIPRT (1.89), HIPRT and LIPRT (1.88), HIPRT and CG (8.65), MIPRT and CG (6.76), LIPRT and CG (6.77). There was no significant difference between MIPRT and LIPRT group (0.01) at 0.05 level of confidence with the confidence interval value of 0.66. The pre, post and adjusted means on muscular strength were presented through bar diagram for better understanding of the results of this study.

TABLE – III
COMPUTATION OF ANALYSIS OF COVARIANCE OF MEAN OF HIGH, MEDIUM, LOW INTENSITY PROGRESSIVE RESISTANCE TRAINING AND CONTROL GROUPS ON STRENGTH ENDURANCE (HIPRT, MIPRT, LIPRT & CG)

	HIPRT	MIPRT	LIPRT	CG	Source of Variance	Sum of Squares	df	Means Squares	F-ratio
Pre-Test Means	20.50	19.50	19.80	19.75	**BG**	11.03	3	3.67	2.82
					WG	98.95	76	1.30	
Post-Test Means	25.70	23.05	22.06	20.40	**BG**	283.93	3	94.64	32.88*
					WG	218.75	76	2.87	
Adjusted Post-Test Means	25.82	22.97	22.58	20.37	**BG**	284.22	3	94.74	33.10*
					WG	214.66	75	2.86	

Table – III reveals that the indicated that the obtained 'F'-ratio for the pre-test means among the groups on strength endurance were 20.50 for experimental group – I, 19.50 for experimental group – II, 19.80 for experimental group – III and 19.75 for control group. The obtained 'F'-ratio 2.82 was lesser than the table 'F'-ratio 2.72. Hence the pre-test mean 'F'-ratio was insignificant at 0.05 level of confidence for the degree of freedom 3 and 76. The post-test means were 25.70 for experimental group – I, 23.05 for experimental group – II, 22.06 for experimental group – III and 20.40 for control group. The obtained 'F'-ratio 1844.26 was higher than the table 'F'-ratio 2.72. Hence the post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 76. The adjusted post-test means were 25.82 for experimental group – I, 22.97 for experimental group – II, 22.58 for experimental group – III and 20.37 for control group. The obtained 'F'-ratio 33.10 was higher than the table 'F'-ratio 2.72. Hence the adjusted post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 75. It was concluded that there was a significant mean difference among high group, medium group, low intensity progressive resistance training group and control group in developing strength endurance.

FIGURE – II
ADJUSTED POST TEST DIFFERENCES OF THE HIGH, MEDIUM, LOW INTENSITY PROGRESSIVE RESISTANCE TRAINING AND CONTROL GROUPS ON STRENGTH ENDURANCE (HIPRT, MIPRT, LIPRT & CG)

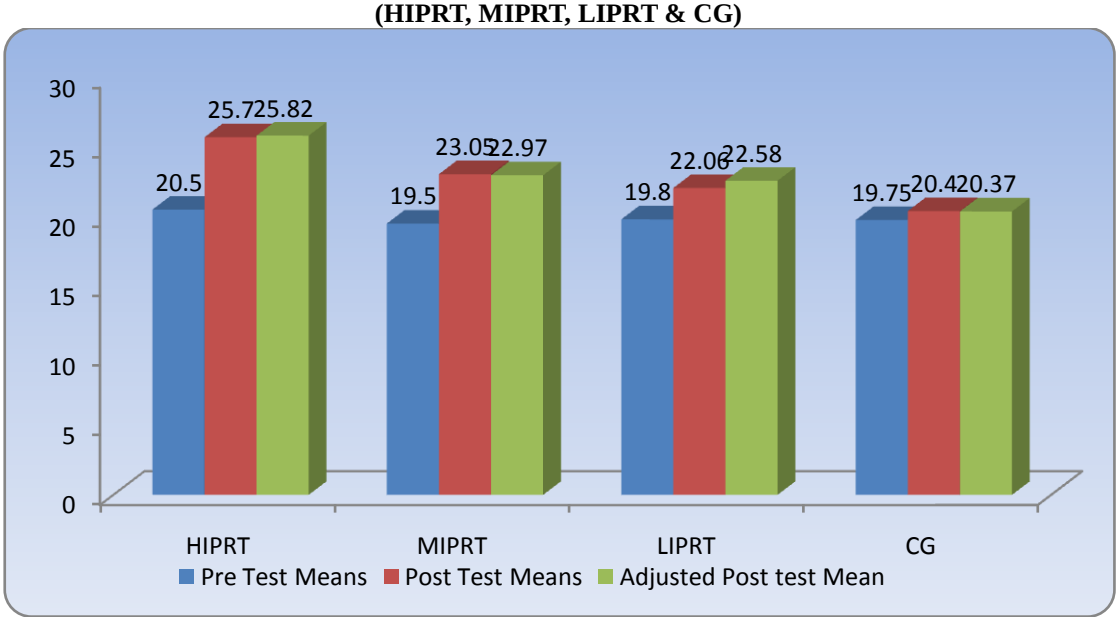

TABLE – IV
THE SCHEFFE'S TEST FOR THE DIFFERENCES BETWEEN THE ADJUSTED POST TEST MEANS ON STRENGTH ENDURANCE

Adjusted Post-Test Means				Mean Difference	Confidence Interval
HIPRT	MIPRT	LIPRT	CG		
25.82	22.97	---	---	2.85*	1.24
25.82	---	22.58	---	3.24*	
25.82	---	---	20.37	5.45*	
---	22.97	22.58	---	0.39	
---	22.97	---	20.37	2.60*	
---	---	22.58	20.37	2.21*	

**** Significant at 0.05 level of confidence***

The multiple comparisons showed in table IV proved that there existed significant differences between the adjusted means of HIPRT and MIPRT (2.85), HIPRT and LIPRT (3.24), HIPRT and CG (5.45), MIPRT and CG (2.60), LIPRT and CG (2.21). There was no significant difference between MIPRT and LIPRT group (0.39) at 0.05 level of confidence with the confidence interval value of 1.24. The pre, post and adjusted means on muscular strength were presented through bar diagram for better understanding of the results of this study.

CONCLUSION

1. The significant mean difference does not exist among all the four groups in the pre test on muscular strength and strength endurance.
2. In testing post test mean difference among the four groups statistically significant on variables of muscular strength and strength endurance. In testing the post adjusted mean among the four groups also predicts the above result.
3. In comparing the effect of training, from the obtained f-ratios, it was observed that HIPRT showed better performance on increasing muscular strength and strength endurance than the other groups.

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