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ORIGINAL ARTICLE

Effect Of Intensity And Volume Manipulation On Muscular Strength And Muscularendurance

G. Vasanthi[1] and S. Jayasivarajan[2]

[1]Associate Professor, Department of Physical Education and Sports, Pondicherry University.
[2]PhD Research Scholar, Department of Physical Education and Sports, Pondicherry University.

Abstract:
The main purpose of the study was to assess the effect of manipulating the intensity and volume on muscular strength and muscular endurance. To achieve this purpose, forty-five male students studying at Pandit Jawaharlal Nehru College of Agriculture & Research Institute were randomly selected as subjects. The age of the subjects ranged from 20 to 25 years. The selected subjects were randomly divided into three groups with fifteen subjects in each group (n=15). Group II and III were treated as experimental group and group I was considered as control group. Initial tests were taken on muscular strength and muscular endurance for all the subjects and thus collected data was considered as pre-test data.The experimental groups were given training for the period of 16 weeks. Group II was given resistance training with high intensity low volume. Group III performed resistance training with low intensity high volume.

Group I acted as control group. The subjects will be tested on selected criterion variables immediately after the sixteen weeks of training programme as post tests respectively. The results of pre and post test were statistically treated by using analysis of co-variance (ANCOVA). When intensity and volume was manipulated high intensity with low volume group was better in muscular strength when compared to low intensity wit high volume group and control. In case of muscular endurance low intensity with high volume showed better result when compared to its counterparts..

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KEY WORDS: Resistance training, Intensity, Volume, Muscular strength Muscular endurance and ANCOVA

INTRODUCTION

Today through training, as in ancient times, the athlete prepares himself/herself for a definite goal. In physiological terms, the goal is to improve the body's systems and functions in order to optimize athletic performance. In order to elevate athletic performance, the main scope of training centres around increasing the athlete's working capacity and skill capabilities as well as developing strong psychological traits. Training is planned and organized by a coach, whose role among many others, is that of an educator whose task is very complex since he/she deals with many physiological, psychological and sociological variables. Training above everything is a systematic athletic activity of long duration, progressively and individually

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graded, aiming at modelling the human's physiological and psychological functions to meet demanding task. Sports training are a planned and controlled process in which, for achieving a goal, change in complex sports motor performance ability to act and behaviours are made through measures of content, methods and organization. Sports training is a pedagogical process, based on scientific principles, aiming at preparing sportsmen for higher performances in sports competitions. The basic method of training has not changed much but it is developed on more intelligent science based systems that involve higher quality and regular and prolonged application. Volume, intensity and density mainly affect the demand of athlete's encounter in training. Although these three components may complement each other, an increased emphasis on one may cause an increased demand on the athletes. The coach needs to forecast how this new situation will affect the volume or density of training. The planning and direction in training is a function of the three main components. The coach must guide the evolution of the curve of these components, especially volume and intensity, in direct relationship with the athlete's index of adaptation, phase of training, and the competition schedule. Furthermore, in the science of knitting the training components may facilitates a correct peaking for the main competition.

METHODOLOGY

The purpose of the study was to find out the effect of different intensity and volume of resistance training on muscular strength and muscular endurance. To achieve this purpose of the study forty five male students studying at Pandit Jawaharlal Nehru College of Agriculture & Research Institute were randomly selected and their age ranged from 20 to 25 years. The selected subjects were randomly divided into three groups of fifteen each (n=15). Group II and III were treated as experimental group and group I was considered as control group. The subjects were tested on muscular strength using push ups test and muscular endurance using Bent knee sit-ups test and thus collected data was considered as pre-test data. Group II was given resistance training with high intensity low volume. Group III performed resistance training with low intensity high volume. Group I acted as control group which did not underwent any training. The experimental groups were given training for the period of 16 weeks. For the first eight weeks the subjects were trained for three days per week and for the next 8 weeks the subjects were trained on alternate days. The subjects were tested on selected criterion variables immediately after the sixteenth weeks of the training programme for post tests data. The results of pre and post test were statistically treated by using analysis of co-variance.

RESULTS AND INTERPRATATION

TABLE-I
ANALYSIS OF COVARIANCE ON MUSCULAR STRENGTH AND MUSCULAR ENDURANCE BETWEEN THE CONTROL GROUP AND EXPERIMENTAL GROUPS

Variables	Test		Control group	Exp I	Exp II	SOV	Sum of Square	df	Mean Square	F ratio
	Pre-test	Mean	14.47	13.60	13.80	B	6.178	2	3.09	0.37
		S.D	1.92	1.50	1.78	W	127.73	42	3.04	
Muscular	Post test	Mean	14.87	20.20	17.67	B	213.5	2	106.75	34.63*
Strength		S.D	1.92	1.57	1.76	W	129.46	42	3.08	
	Adjusted		14.40	20.52	17.80	B	269.30	2	134.65	214.89*
	Post test	Mean				W	25.69	41	0.63	
	Pre-test	Mean	16.80	17.47	17.66	B	6.18	2	3.09	1.16
		S.D	1.521	1.30	1.98	W	111.46	42	2.65	
Strength	Post test	Mean	16.33	20.73	21.53	B	235.20	2	117.6	29.4*
Endurance		S.D	1.29	1.27	2.94	W	168.0	42	4.00	
	Adjusted		16.75	20.60	21.24	B	167.74	2	83.87	37.04*
	Post test	Mean				W	92.83	41	2.26	

*Significant at 0.05 level.
The table value required for significant at 0.05 level of confidence with degree of freedom 2 & 42; 2 and 41 are 3.22 and 3.23 respectively.

The pre test means of the control and experimental groups on muscular strength is 14.47±1.92, 13.60+1.50 & 13.80+1.78 and the F ratio is 0.371. The post test means of the control and experimental groups is

14.87+1.92, 20.20+1.57 & 17.67+1.76 and the F ratio is 34.63. The adjusted post test means of the control and experimental groups is14.40, 20.52 and 17.80 and the F ratio is 214.89. The result of the study indicates that there is a significant difference between the control and experimental groups on muscular strength.

The pre test means of the control and experimental groups on muscular endurance is 16.80+1.52, 17.47+1.30 & 17.66+1.98 and the F ratio is 1.164. The post test means of the control and experimental groups is 16.33+1.29, 20.73+1.27 & 21.53+2.94 and the F ratio is 37.041. The adjusted post test means of the control and experimental groups is 16.75, 20.60 and 21.24 and the F ratio is 37.041. The result of the study indicates that there is a significant difference between the control and experimental groups on muscular endurance.

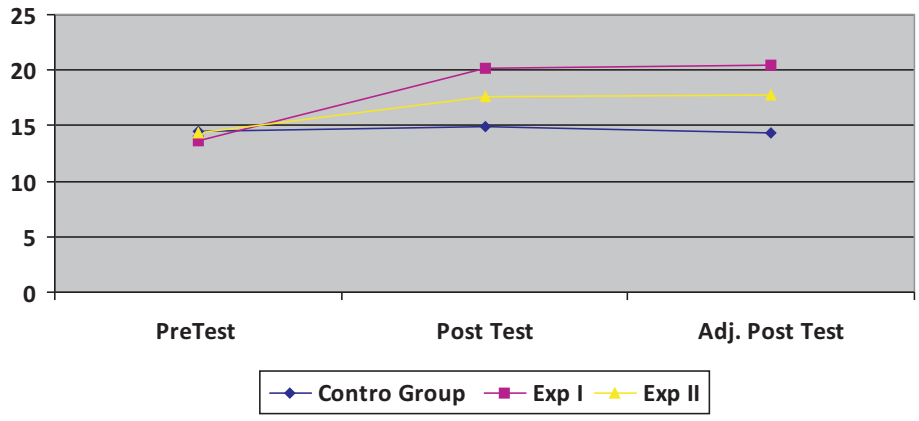
ADJUSTED MEANS ON MUSCULAR STRENGTH AND MUSCULAR ENDURANCE AND DIFFERENCE BETWEEN MEANS FOR EXPERIMENTAL GROUPS AND CONTROL GROUP

Variable	Control group	Exp I	Exp II	Mean Diff	CI
Muscular	14.40	20.52		6.12*	0.74
Strength	14.40		17.80	3.4*	0.74
		20.52	17.80	2.72*	0.74
Muscular	16.75	20.60		3.85*	1.37
Endurance	16.75		21.24	4.49*	1.37
		20.60	21.24	0.64	1.37

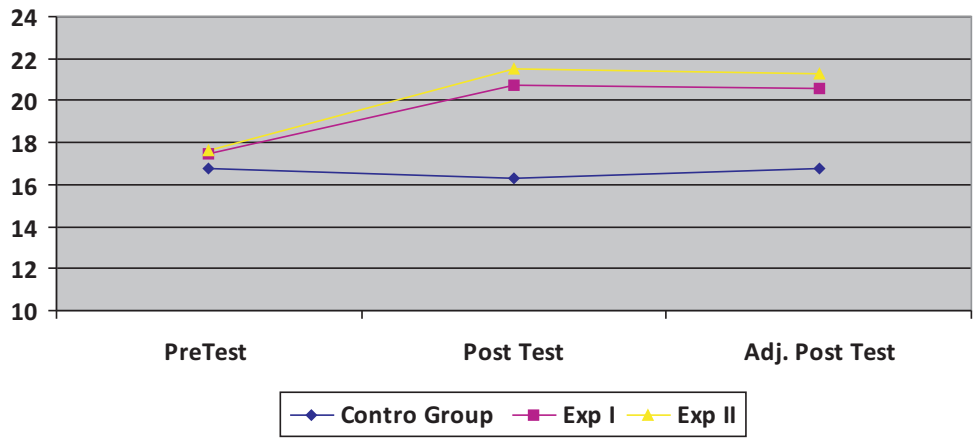
The table shows that the Scheffe's post-hoc method of testing the significance for the differences between the paired means following a significant analysis of co variance for control group, experimental group I and experimental group II. The muscular strength means in order of magnitude and the difference between the means for the control and experimental groups is given in the table. The mean difference between the experimental group I and control groups is 6.12, which is significant at 0.05 level of confidence interval. In the comparison between the experimental group II and control group the difference is 3.4, which is significant at 0.05 level of confidence interval. This indicates that the muscular strength of both the experimental groups group had improved when compared to control group The mean differences between the experimental group I and experimental group II is 2.72, which is also significant at 0.05 level of confidence interval.. This indicates that the muscular strength of high intensity low volume group had better improvement when compared to other two groups. The difference in means of experimental and control group is presented in fig. 1.

The table shows that the Scheffe's post-hoc method of testing the significance for the differences between the paired means following a significant analysis of co variance for control group, experimental group I and experimental group II s. The muscular endurance means in order of magnitude and the difference between the means for the control and experimental groups is given in the table. The mean differences between the experimental group I and control groups 3.85, is significant at 0.05 level of confidence interval. In the comparison between the experimental group II and control group the difference is 4.49, which is significant at 0.05 level of confidence interval. This indicates that the muscular endurance of both the experimental groups has improved when compared to control group The mean differences between the experimental group I and experimental group II is 0.64, which is not significant at 0.05 level of confidence interval. The difference in means of experimental and control group is presented in fig. 2.

MEAN DIFFERENCES AMONG EXPERIMENTAL GROUPS AND CONTROL GROUP ON MUSCULAR STRENGTH



MEAN DIFFERENCES AMONG EXPERIMENTAL GROUPS AND CONTROL GROUP ON MUSCULAR ENDURANCE



DISCUSSION:

The study was framed to analyze the effect of intensity and volume manipulation on muscular strength and muscular endurance of college men. The results of this study reveal that resistance training improves both muscular strength and muscular endurance.

When it comes to intensity and volume manipulation high intensity with low volume group is better in muscular strength when compared to other two groups. In case of muscular endurance for low intensity with high volume group showed significant improvement when compared to its counterparts..

The result of the study is in consonance with the findings of the following studies by Baker, Wilson and Carlyon (1994); Faigenbaum, et. al., (1999); Stone and coulter (1994) and Hagerman, et. al., (2000).

CONCLUSION

It was observed from the pre test results, that there is no significant difference among control and experimental groups. When the post test results of control and experimental groups were analyzed statistically revealed that, there is a significant difference among the three groups. The training program has influenced the experimental groups where as there is no effect in the control group.

In the analysis of co-variance on muscular strength and muscular endurance of control and two experimental groups, a significant difference was seen which implies that application of resistance training manipulation was more effective. From the statistical analysis it is clear that both the training programmes

namely high intensity low volume group and low intensity high volume group had its own effects.

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