

Enhancement of Speed Endurance through Low, Moderate and High Intensity Resistance Training Programmes among College Women Athletes

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Abstract

The purpose of the study was to find out enhancement of speed endurance through low moderate and high intensity resistance training programmes among college women athletes. For this purpose, Sixty (N=60) women athletes who had participated in inter polytechnic athletic meet were randomly selected as subjects. They were divided randomly into four groups of fifteen each i.e., (n=15) Group-I underwent Low Intensity Resistance Training (LIRT), Group-II underwent Medium Intensity Resistance Training (MIRT), Group-III underwent High Intensity Resistance Training (HIRT) and Group-IV acted as Control(CG). The experimental groups underwent respective training period for three days per week for twelve weeks. The dependent variables selected for this study was Speed Endurance. Speed Endurance was assessed by 150 Meters Run Test. All the subjects were tested prior to and immediately after the experimental period on the selected dependent variables. The data obtained from the experimental groups before and after the experimental period were statistically analyzed with dependent 't'-test and Analysis of covariance (ANCOVA). Whenever the 'F' ratio for adjusted post assessment means was found to be significant, the Scheffe's Post hoc test was applied to determine the paired mean differences. The level of confidence was fixed at 0.05 level for all the cases. The Medium Intensity Resistance Training group(MIRT) has been found to be better than the Low Intensity Resistance Training group(LIRT), High Intensity Resistance Training group(HIRT) and Control group(CG) in developing speed endurance.

Keywords: Resistance Training, Intensity, Low Intensity, Medium Intensity, High Intensity, Speed Endurance

INTRODUCTION

The ability of a particular muscle, or set of muscles, to produce muscle strength under particular circumstances is referred to as resistance training. Resistance exercise has also been shown to boost maximum muscle strength, accelerating the development of strength (Suchomel et al., 2016).

Resistance training programs have traditionally focused on developing maximal strength in individual muscles, emphasizing one plane of motion. Because all muscles function eccentrically, isometrically, and concentrically in all three planes of motion at different speeds, training programs should be designed using a progressive approach that emphasizes the appropriate exercise selection, all muscle actions, and repetition tempos (Alagudurai and Sivagnanam, 2019).

Resistance training, often known as strength training, involves using tools like dumbbells, barbells, and other equipment to enhance one's physical attractiveness, athletic performance, and/or health. Resistance training is used by athletes in a variety of sports as part of their preparation. You can reach training goals like increased muscle strength with the correct amount of exercise, which will also improve your body's structure and athletic performance (Suresh and Pravin Raj).

Resistance training should be a part of all exercise plans, whether they are geared toward strength and power sports or cardiovascular health. Resistance training must take precedence for athletes that compete in sports that need strength and power, such as weightlifting, bodybuilding, and sprinting. Many other athletes, especially those who participate in sports that require a high level of physical stamina, can benefit from strength training (Homman, 2002).

The amount of energy used during exercise is referred to as intensity. Every individual experiences intensity differently. It has been discovered that exercise intensity affects the type of post-exercise adaptations the body generates as well as the fuel the body uses. The amount of physical power the body uses to complete an activity is its intensity, which is measured as a percentage of its maximum oxygen intake. Exercise intensity, for instance, determines how hard the body must work to walk a mile in 20 minutes (Vehrs, 2011).

METHODOLOGY

The present study was to find out the effect of low, moderate and high intensity resistance training on Speed Endurance among college women athletes. For this purpose, Sixty (N=60) inter polytechnic athletic meet were selected randomly as subjects. They were divided randomly into four groups of fifteen each i.e., (n=15) Group-I underwent Low Intensity Resistance Training (LIRT), Group-II underwent Medium Intensity Resistance Training (MIRT), Group-III underwent High Intensity Resistance Training (HIRT) and Group-IV acted as Control. The Experimental groups underwent respective training period for three days per week for ten weeks. The dependent variable selected for this study was Speed Endurance only. Speed Endurance was assessed by 150 Meters Run Test. All the subjects were tested prior to and immediately after the experimental period on the selected dependent variable. All the subjects of the three groups were tested on selected criterion variables at prior to and immediately after the training programme.

ANALYSIS OF THE DATA

The data collected from the experimental groups and control group on prior and after experimentation on selected variables were statistically examined by analysis of covariance (ANCOVA) was used to determine differences, if any among the adjusted post test means on selected criterion variables separately. Whenever they obtained f-ratio value in the simple effect was significant the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. In all the cases 0.05 level of significance was fixed.

In order to examine the significance differences among Low Intensity Resistance Training group (LIRT), Medium Intensity Resistance Training group (MIRT), High Intensity Resistance Training group (HIRT) and Control group of selected variables dependent t- test was applied and it was presented in the Table-1.

Table -1

Distribution Mean values and Dependent t-test values for Pre-Assessment and Post- Assessment on Speed Endurance among Different Groups

Test	Low Intensity Resistance Training group (LIRT)	Medium Intensity Resistance Training group (MIRT)	High Intensity Resistance Training group (HIRT)	Control group
Pre- Assessment	19.87	20.00	19.93	19.87
Post- Assessment	18.04	18.13	17.77	19.73
't'-test	2.26*	2.30*	2.80*	0.15

* Significant at 0.05 level.

(Table value required for significance at .05 level for 't'-test with df 14 is 2.15)

The table-1 shows that the pre-assessment mean of Speed Endurance for Low Intensity Resistance Training group (LIRT), Medium Intensity Resistance Training group (MIRT), High Intensity Resistance Training group (HIRT) and Control group are 19.87, 20.00, 19.93 and 19.87 respectively. The post- assessment mean are 18.04, 18.13, 17.77 and 19.73 respectively. The obtained dependent t-ratio values between the pre and post assessment means on Speed Endurance of Low Intensity Resistance Training group (LIRT), Medium Intensity Resistance Training group (MIRT), High Intensity Resistance Training group (HIRT) and Control group are 2.26, 2.30, 2.80 and 0.15 respectively.

The table value required for significant difference with df 14 at 0.05 level is 2.15. It was concluded that Experimental groups such as Low Intensity Resistance Training group (LIRT), Medium Intensity Resistance Training group (MIRT) and High Intensity Resistance Training group (HIRT) had registered significant improvement in Speed Endurance.

The pre and post assessment mean values of Low Intensity Resistance Training group (LIRT), Medium Intensity Resistance Training group (MIRT), High Intensity Resistance Training group (HIRT) and Control group on Speed Endurance are graphically represented in the figure -1.

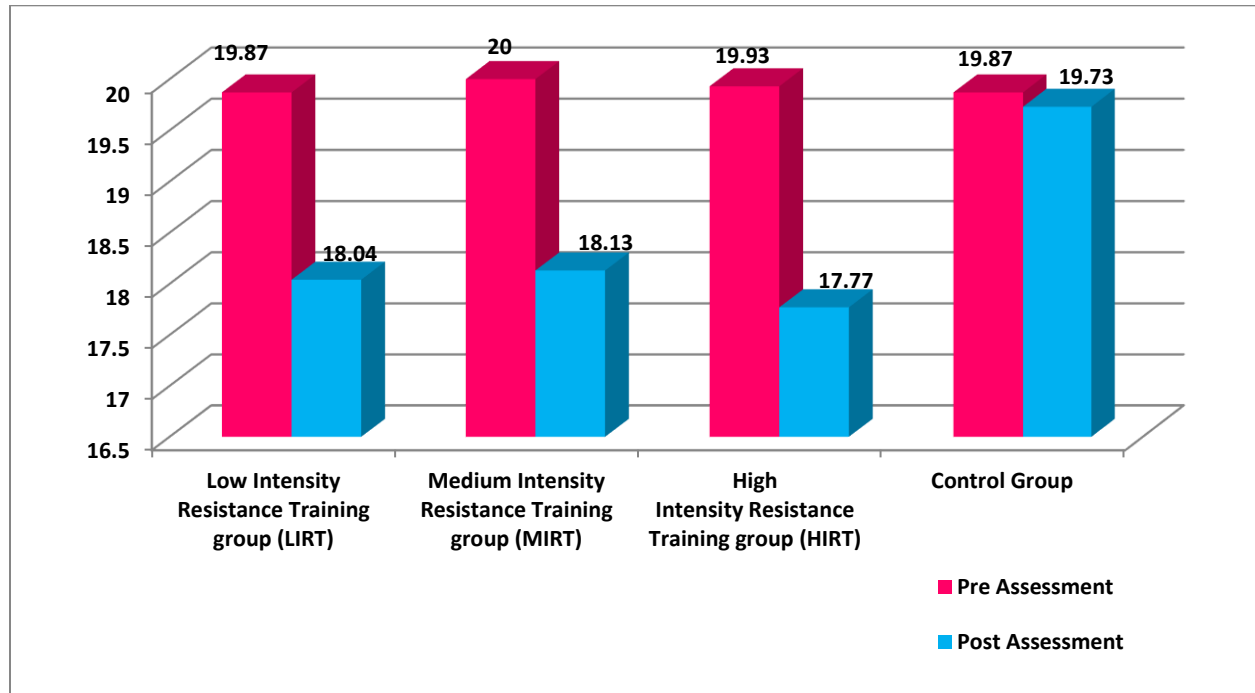


Figure: 1 Pre- Assessment and Post- Assessment on Speed Endurance among Different Groups (In Seconds)

In order to examine the significance improvement among Low Intensity Resistance Training group (LIRT), Medium Intensity Resistance Training group (MIRT), High Intensity Resistance Training group (HIRT) and Control group of selected variables analysis of covariance (ANCOVA) was applied. Whenever the 'F' ratio for adjusted post test means was found to be significant, Scheffe's test was followed as a post hoc test to determine which of the paired means difference was significant.

Table – 2
**Computation of Analysis of Covariance of Experimental Groups
 and Control Group on Speed Endurance**

Test	Low Intensity Resistance Training group (LIRT)	Medium Intensity Resistance Training group (MIRT)	High Intensity Resistance Training group (HIRT)	Control group	Source of Variance	Sum of Squares	df	Mean Squares	F ratio
Pre Assessment Mean	19.87	20.00	19.93	19.87	Between	0.18	3	0.06	0.04
					Within	94.40	56	1.69	
Post Assessment Mean	18.04	18.13	17.77	19.73	Between	36.71	3	11.90	8.85*
					Within	75.28	56	1.34	
Adjusted Post Assessment Mean	18.08	18.07	17.75	19.77	Between	37.77	3	12.59	47.53*
					Within	14.57	55	0.26	

* Significant at 0.05 level of confidence
 (Speed Endurance Scores in Numbers)

Table value for df (3, 56) at 0.05 level = 2.76 Table value for df (3, 55) at 0.05 level = 2.78

The table-2 shows that the pre assessment mean values on Speed Endurance of Low Intensity Resistance Training group (LIRT), Medium Intensity Resistance Training group (MIRT), High Intensity Resistance Training group (HIRT) and Control group are 19.87, 20.00, 19.93 and 19.87 respectively. The obtained 'F' ratio of 0.04 for pre assessment scores was lesser than the table value of 2.76 for degrees of freedom 3 and 56 required for significance at 0.05 level of confidence on Speed Endurance.

The post assessment mean values on Speed Endurance of Low Intensity Resistance Training group (LIRT), Medium Intensity Resistance Training group (MIRT), High Intensity Resistance Training group (HIRT) and Control group are 18.04, 18.13, 17.77 and 19.73 respectively. The obtained 'F' ratio of 8.85 for post- assessment scores was higher than the table value of 2.76 for degrees of freedom 3 and 56 required for significance at 0.05 level of confidence on Speed Endurance.

The adjusted post-assessment means on Speed Endurance of Low Intensity Resistance Training group (LIRT), Medium Intensity Resistance Training groups (MIRT), High Intensity Resistance Training group (HIRT) and Control group are 18.08, 18.07, 17.75 and 19.77 respectively. The obtained 'F' ratio of 47.53 for adjusted post-assessment scores was higher than the table value of 2.78 for degrees of freedom 3 and 55 required for significance at 0.05 level of confidence on Speed Endurance.

The results of the study indicate that there are significant differences among the adjusted post assessment means of Low Intensity Resistance Training group (LIRT), Medium Intensity Resistance Training group (MIRT), High Intensity Resistance Training group (HIRT) and Control group in Speed Endurance performance.

To determine which of the paired means have a significant difference, the Scheffe's test is applied as Post hoc test and the results are presented in Table – 3.

Table – 3
The Scheffe's test for the differences between the adjusted post test paired means on Speed Endurance

Adjusted Post-test Means				Mean Difference	Confidence Interval
Low Intensity Resistance Training group (LIRT)	Medium Intensity Resistance Training group (MIRT)	High Intensity Resistance Training group (HIRT)	Control Group (IV)		
18.08	18.07			0.01	0.54
18.08		17.75		0.32	0.54
18.08			19.77	1.70*	0.54
	18.07	17.75		0.31	0.54
	18.07		19.77	1.71*	0.54
		17.75	19.77	2.02*	0.54

* Significant at 0.05 level of confidence

The above shows that the adjusted post assessment mean differences on Speed Endurance between Low Intensity Resistance Training group and Control group, Medium Intensity Resistance Training and Control group, High Intensity Resistance Training and Control group are 1.70, 1.71 and 2.02 respectively, which are greater than the confidence interval value of 0.54 at 0.05 level of confidence.

Further the above shows that the adjusted post assessment mean differences on Speed Endurance between Low Intensity Resistance Training group and Medium Intensity Resistance Training group, Low Intensity Resistance Training group and High Intensity Resistance Training group, Medium Intensity Resistance Training group and High Intensity Resistance Training group are 0.01, 0.32 and 0.31 respectively, which are less than the confidence interval value of 0.54 at 0.05 level of confidence.

The results of the study showed that there was a significant difference between Low Intensity Resistance Training group and Control group, Medium Intensity Resistance Training and Control group, High Intensity Resistance Training and Control group on Speed Endurance.

Further the results of the study showed that there was no significant difference between Low Intensity Resistance Training group and Medium Intensity Resistance Training group, Low Intensity Resistance Training group and High Intensity Resistance Training group, Medium Intensity Resistance Training group and High Intensity Resistance Training group on Speed Endurance.

The above data also reveal that Medium Intensity Resistance Training group had shown better performance than Low Intensity Resistance Training group, High Intensity Resistance Training group and Control group in Speed Endurance.

The adjusted post assessment mean values of Low Intensity Resistance Training group (LIRT), Medium Intensity Resistance Training group (MIRT), High Intensity Resistance Training group (HIRT) and Control group on Speed Endurance are graphically represented in the Figure –2.

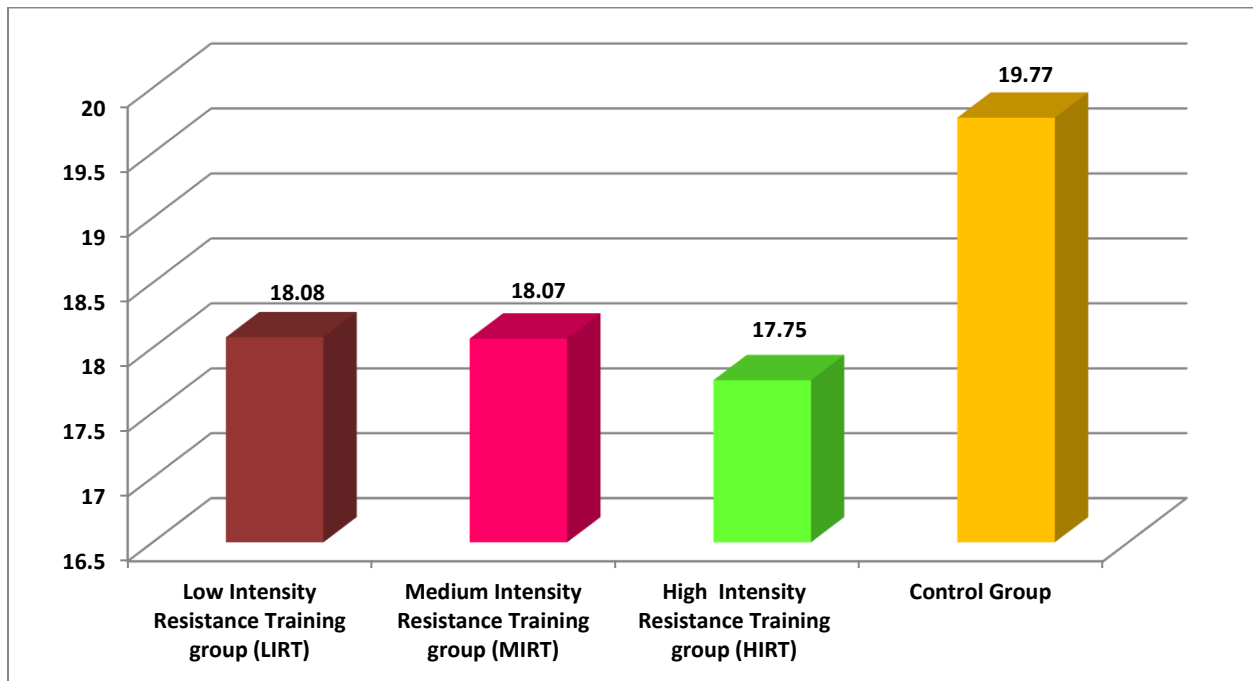


Figure: 2 Adjusted Assessment on Speed Endurance among Different Groups (In Seconds)

CONCLUSIONS

From the analysis of the data, the following conclusions were drawn.

1. The Low Intensity Resistance Training group (LIRT), Medium Intensity Resistance Training group (MIRT) and High Intensity Resistance Training group (HIRT) programme had registered significant improvement on Speed Endurance.
2. When the experimental groups were compared with each other, the Medium Intensity Resistance Training (MIRT) programme was found to be greater than the Low Intensity Resistance Training (LIRT) programme, High Intensity Resistance Training (HIRT) programme and Control group on the increase of selected criterion variable namely Speed Endurance .

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