



## EFFECTS OF MEDIUM INTENSITY RESISTANCE TRAINING FOLLOWED BY DIFFERENT METHOD OF ENDURANCE TRAININGS ON LEG STRENGTH

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### Abstract

*The purpose of the study was to find out the effects of medium intensity resistance training followed by different method of endurance trainings on selected strength and cardio respiratory endurance variables. To achieve this purpose of the study, sixty men students studying Bachelor's Degree in the Department of Physical Education and Sports Sciences, Annamalai University, Annamalai Nagar, Tamil Nadu, India. The selected subjects were divided into four equal groups of fifteen subjects each at random. Group I underwent medium intensity resistance training followed by slow continuous running, Group II underwent medium intensity resistance training followed by fartlek training, Group III underwent medium intensity resistance training followed by interval running and Group IV acted as control. All groups underwent their respective training programmes for three days per week for twelve weeks and Group IV acted as control, which did not undergo any special training programme apart from their regular physical education programme of the curriculum. The selected criterion variable namely leg strength was assessed before and after the training period. The data collected from experimental group I, group II, group III and group IV prior to and after the completion of the training period were statistically analysed for significant difference if any, by applying Analysis of covariance (ANCOVA). Whenever, the obtained 'F' ratio for the adjusted post test mean was found to be significant, the Scheffé's test was applied as post hoc test to determine the paired mean differences, if any. The .05 level of confidence was fixed to test the level of significance which was considered as an appropriate.*

**Keywords:** Resistance Training, Leg Strength, Endurance Training.

### INTRODUCTION

In the last few decades, sports gained tremendous popularity all over the globe. The popularity of sports is still increasing at a faster pace. Sports have become an important social and cultural activity of the modern world, which is being given the right place it deserves by the nations and societies of the world. A sport contribute towards the all-round development of personality and enhances the horizons of awareness among competing sportsmen. Performance sports aim at higher sports performance and for that the physical and psychological capacities of sportsmen are developed to extreme limits.

Strength is a high power efforts typically involve high movement velocities that are coupled with brief contraction time. In rapid movement there is a little kinesthetic feedback to the individual regarding the amount of force generated. It is possible that many athletes who train with weights become conditioned to make their best efforts. Resistance training or weight training as an anaerobic form of exercise is useful form of training made in general. Many of these training programme are used to enhance the ability of the body to perform at very high force and power outputs for a very short period of time and repeated bouts of maximal activity.

Continuous training is the one which an athlete exercises in a steady aerobic way. This can be broken down into the following sub-divisions, which has slightly

different effects upon the energy pathways. "Fartlek is a Swedish word which means speed play". This method has become very popular with distance runners. In Fartlek, the change of pace or speed is not pre planned. The sportsman changes his pace and activity according to his/her desire and the place and surface on which he/she is running. Eventhough it is very strenuous, it is more appealing to the sportsman because, at first nothing is imposed on him/her and secondly because it is done on a terrain which is more natural and pleasing, For instances, golf courses, forest and so on. The terrain or route selected should be a natural one with enough variations. All the types of training may be combined in various ways in speed play when carried out properly. This type of training is not only developing physiological factors such as aerobic, anaerobic and speed but also develop psychological factors which are essential for performance and training. The heart rate fluctuate between 140-180 beats per minutes. There are continuous training runs at relatively slow speed (HP of 150 BPM) used to produce aerobic endurance. They increase the hearts stroke volume and improve the network in the muscles. The distance can be covered within 8 to 20 minutes. Interval training is an exercise technique, which involves the use of set 'interval' that dictate the intensity of training. These intervals are measured in many different ways, by periods of time,

distance or heart rates. The basic principle of interval training is that an athlete's exercise at a high intensity for the required distance or length of time and then lower the intensity briefly so that he/she can recover, before returning to the high interval again.

The entire interval training session involves three main parts. Firstly, the warm up. This is a light intensity period to prepare the body for exercise. Next is the interval phase, split between the high intensity interval and the recovery where athletes are resting their body and training at a lighter intensity in preparation for the next interval. The final stage is the Cool Down where athletes slowly reduce the intensity of the training to reduce the heart rate and timing back to normal level. Interval training seeks to improve the performance. The majority of people, who do this type of training, usually use it a few weeks before a race or a period competition. The goal of interval training is to help in meeting one's time and pace objectives to get one's body accustomed to the high performance required when competing.

## METHODOLOGY

The purpose of the study was to find out the effects of medium intensity resistance training followed by different method of endurance trainings on selected strength and cardio respiratory endurance variables. To achieve this purpose of the study, sixty men students studying Bachelor's Degree in the Department of Physical Education and Sports Sciences, Annamalai University, Annamalai Nagar, Tamil Nadu, India. The selected subjects were divided into four equal groups of fifteen subjects each at random. Group I underwent medium intensity resistance training followed by slow continuous running, Group II underwent medium intensity resistance training followed by fartlek training,

Group III underwent medium intensity resistance training followed by interval running and Group IV acted as control. All groups underwent their respective training programmes for three days per week for twelve weeks and Group IV acted as control, which did not undergo any special training programme apart from their regular physical education programme of the curriculum. The selected criterion variable namely leg strength was assessed before and after the training period by leg lift dynamometer. The data collected from experimental group I, group II, group III and group IV prior to and after the completion of the training period were statistically analysed for significant difference if any, by applying Analysis of covariance (ANCOVA). Whenever, the obtained 'F' ratio for the adjusted post test mean was found to be significant, the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. The .05 level of confidence was fixed to test the level of significance which was considered as an appropriate.

## ANALYSIS OF THE DATA

The influence of medium intensity resistance training followed by slow continuous running, fartlek training and interval running on each criterion variables were analysed separately and the results are presented below.

## LEG STRENGTH

The analysis of covariance on leg strength for the pre and post test scores of medium intensity resistance training followed by slow continuous running group, fartlek training group, interval running group and control group have been analyzed and the results are presented in Table I.

**TABLE I**  
**ANALYSIS OF COVARIANCE OF THE DATA ON LEG STRENGTH OF PRE AND POST TESTS SCORES OF MEDIUM INTENSITY RESISTANCE TRAINING FOLLOWED BY SLOW CONTINUOUS RUNNING, FARTLEK TRAINING, INTERVAL RUNNING AND CONTROL GROUPS**

Test	Medium Intensity Resistance Training			Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' Ratio
	Slow Continuous Running Group	Fartlek Training Group	Interval Running Group						
Pre Test									
Mean	93.80	93.53	93.53	93.26	Between	3.12	3	1.04	0.879
S.D.	1.14	1.17	1.16	1.21	Within	66.2	56	1.182	
Post Test									
Mean	95.33	95.73	95.00	93.40	Between	47.1	3	15.70	12.87*
S.D.	0.99	0.98	1.01	1.22	Within	68.4	56	1.22	
Adjusted Post Test									
Mean	95.04	95.39	95.14	93.59	Between	35.3	3	11.77	47.65*
					Within	13.58	55	0.247	

\* Significant at .05 level of confidence.

(The table values required for significance at .05 level of confidence for 3 and 56 and 3 and 55 are 2.776 and 2.78 respectively)

The table III shows that the pre-test mean values on leg strength of medium intensity resistance training followed by slow continuous running group, fartlek training group, interval running group and control group are 93.80, 93.53, 93.53 and 93.26 respectively. The obtained 'F' ratio of 0.879 for pre-test scores is less than the table value of 2.776 for df 3 and 56 required for significance at .05 level of confidence on leg strength. The post-test mean values on leg strength of medium intensity resistance training followed by slow continuous running group, fartlek training group, interval running group and control group are 95.33, 95.73, 95.00 and 93.40 respectively. The obtained "F" ratio of 12.87 for post-test scores is more than the table value of 2.776 for df 3 and 56 required for significance at .05 level of confidence on leg strength.

The adjusted post-test means of medium intensity resistance training followed by slow continuous

running group, fartlek training group, interval running group and control group on leg strength are 95.04, 95.39, 95.14 and 93.59 respectively. The obtained "F" ratio of 47.65 for adjusted post-test means is greater than the table value of 2.78 for df 3 and 55 required for significance at .05 level of confidence on leg strength. The results of the study indicated that there was a significant difference between the adjusted post-test means of medium intensity resistance training followed by slow continuous running group, fartlek training group, interval running group and control group on leg strength. Since, the obtained 'F' ratio for the adjusted post test mean was found to be significant, the Scheffe's test was applied to find out the paired mean differences, if any among the groups and the results are presented in Table II.

**TABLE II**  
**THE SCHEFFE'S TEST FOR THE DIFFERENCES BETWEEN PAIRED MEANS ON LEG STRENGTH**

Medium Intensity Resistance Training			Control Group	Mean Differences	Confidence Interval Value
Slow Continuous Running Group	Fartlek Training Group	Interval Running Group			
95.04	95.39	-	-	0.35	0.44
95.04	-	95.14	-	0.10	0.44
95.04	-	-	93.69	1.35*	0.44
-	95.39	95.14	-	0.25	0.44
-	95.39	-	93.69	1.70*	0.44
-	-	95.14	93.69	1.45*	0.44

\* Significant at .05 level of confidence.

The table II shows that the medium intensity resistance training followed by slow continuous running group, fartlek training group and interval running were compared with control group resulted with mean differences of 1.35, 1.70 and 1.45 respectively on leg strength respectively which were greater than the required confidence interval value 0.44 required for significance. They were found to be significant at .05 level of confidence. Among the experimental groups, medium intensity resistance training followed by slow continuous running group and fartlek training group, slow continuous running group and interval running group and fartlek training group and interval running

group resulted with mean differences of 0.35, 0.10 and 0.25 which were lesser than the required confidence interval value 0.44 for significance on leg strength respectively. The results of the study clearly indicated that there was no significant difference on leg strength between the experimental groups. It is inferred that leg strength can be increased by all the three training methods. However, no training is superior than the other in developing leg strength. The adjusted post-test mean values of medium intensity resistance training followed by slow continuous running group, fartlek training group, interval running group and control group on leg strength were graphically represented in figure I.

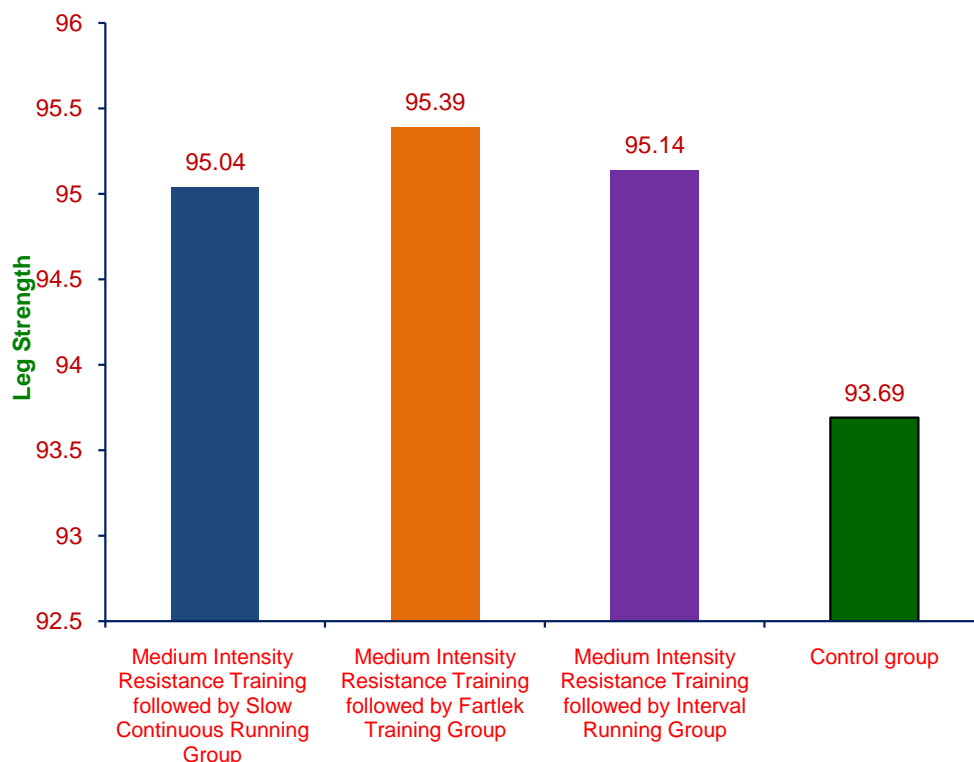


FIGURE I

**THE ADJUSTED POST-TEST MEAN VALUES OF MEDIUM INTENSITY RESISTANCE TRAINING FOLLOWED BY SLOW CONTINUOUS RUNNING GROUP, FARTLEK TRAINING GROUP, INTERVAL RUNNING GROUP AND CONTROL GROUP ON LEG STRENGTH**

**CONCLUSION**

There was a significant difference among medium intensity resistance training followed by slow continuous running group, fartlek training group, interval running group and control group on leg strength. The improvement on leg strength as a result of medium intensity resistance training followed by fartlek training was better than other two experimental groups namely medium intensity resistance training followed by slow continuous running group and interval running group. Out of these two training medium intensity resistance training followed by interval running group was better than medium intensity resistance training followed by slow continuous running group.

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