



## Effect of Circuit Training and Package Training on Cardio Respiratory Endurance Parameter Among School Boys

### KEYWORDS

Circuit training, Package training and Cardio respiratory endurance.

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**ABSTRACT** The purpose of the present study was to investigate the Effect of circuit training and package of training on cardio respiratory endurance parameter among school boys. To achieve the purpose of the study sixty boys were selected from Govt.Hr.Sec.School, parthibanur, Ramanathapuram District, Tamil Nadu, during the year 2015-16. The subject's age ranges from 15 to 17 years. The selected players were divided into three equal groups consists of 20 men players each namely experimental group-I, experimental group-II and control group. The experimental group-I underwent circuit training and experimental group-II underwent package training (combination of circuit and Plyometric training) for twelve weeks. The control group was not taking part in any exercise during the course of the study. Cardio-respiratory endurance was taken as criterion variables in this study. Pre-test was taken before the exercise period and post- test was measured immediately after the twelve weeks exercise period. The data collected from the three groups were statistically analyzed for significance, the analysis of covariance (ANCOVA) was used and the F ratio was found out. The Scheffe's test is applied as post-hoc test to determine the paired mean differences. The level of significance will be fixed at .05 level of confidence for all the cases. All the statistical operations were done through SPSS software. After statistical calculation results were interpreted, analyzed and discussed.

### INTRODUCTION

Cardio respiratory fitness is the ability of the heart and lungs to supply oxygen-rich blood to the working muscle tissues and the ability of the muscles to use oxygen to produce energy for movement. This type of fitness is a health-related component of physical fitness that is brought about by sustained physical activity. A person's ability to deliver oxygen to the working muscles is affected by many physiological parameters, including heart rate, stroke volume, cardiac output, and maximal oxygen consumption. Understanding the relationship between cardio respiratory endurance training and other categories of conditioning requires a review of changes that occur with increased aerobic or anaerobic capacity. As aerobic/ anaerobic capacity increases, general metabolism rises, muscle metabolism is enhanced, hemoglobin rises, buffers in the bloodstream increase, venous return is improved, stroke volume is improved, and the blood bed becomes more able to adapt readily to varying demands. Each of these results of cardiovascular fitness/cardio respiratory conditioning will have a direct positive effect on muscular endurance, and an indirect effect on strength and flexibility. To facilitate optimal delivery of oxygen to the working muscles, the person needs to train or participate in activities that will build up the energy stores needed for sport. This is referred to as metabolic training. Metabolic training is generally divided into two types: aerobic and anaerobic.

### Circuit and Plyometric training

Circuit training is a workout routine that combines cardiovascular fitness and resistance training. It was first proposed in the late 1950s as a method to develop general fitness. The initial routines were arranged in a circle, alternating between different muscle groups (hence the name circuit training). By allowing only a short rest interval of 30-90 seconds between stations, cardiovascular fitness is gained along with the benefits of resistance training.

Plyometric refers to exercises that allow the muscle to contract eccentrically before explosive contraction which

enable the muscle to reach maximum explosive strength in a shortest period of time. The training aims at linking strength with speed to produce power. In this training the body weight of an athlete is used as resistance. All the forms of jumping exercises, wall bar exercises, pull-ups, skipping, rope climbing, sit-ups, etc. are the various forms of plyometric exercises. Since plyometric put great stress on the muscular-skeletal system, it is better to practice after developing the basic strength through weight training.

### METHODOLOGY

The purpose of this study to find out the Effect of circuit training and package training on cardio respiratory endurance among school boys. To achieve the purpose of this study 60 school boys are selected from Govt.Higher secondary school, Parthibanur, Ramanathapuram district from Tamil Nadu, are selected randomly as subject and their age group between 15 to 17 years. The selected subjects (N=60) were divided into three groups equally and randomly. Of which Experimental Group I underwent Circuit training, Experimental Group II underwent package training and Group III acted as Control Group. The Group I circuit training group were treated with their respective training for one and half hour per day for three days a week for a period of twelve weeks. Group II package training group (circuit and Plyometric training) were treated with their respective training for one and half hour per day for six days a week for a period of twelve weeks.

**Table.1.**

**Circuit and package Training schedule for 12 weeks**

Exercise Name	Intensity	Repetitions	Set	Rest period
Experimental group I –Circuit Training				
Press up, Prone trunk extensions, Sit-ups , Abdominal crunch, Skipping, Squat jump, High knee sprints and Burpees	60%	10 times	5	30 seconds
	70%	8 times	6	
	80%	6 times	7	

Experimental group II –Combined Training(Circuit& Plyometric Training)				
<b>Circuit training</b> - Press up, Prone trunk extensions, Sit-ups , Abdominal crunch, Skipping, Squat jump, High knee sprints and Burpees	40%	10 times	5	30 seconds
	50%	8 times	6	
	60%	6 times	7	
<b>Plyometric training</b> -bounds, hurdle hopping, single leg hopping, box jump, depth jump, power drop, two legged hop, Inclined Pushups and Skipping	40%	12 times	5	30 seconds
	50%	10 times	6	
	60%	8 times	7	

The subjects of all the three groups were tested on cardio respiratory endurance prior to and after the training period.

To ascertain cardio respiratory endurance of the subjects was used and accordingly Cooper's 12 Minutes run / Walk Test was administered mean value count by meters.

**STATISTICAL TECHNIQUES**

The data collected from the three groups were statistically analyzed for significance, the analysis of covariance (ANCOVA) was used and the F ratio was found out. The Scheffe's test is applied as post-hoc test to determine the paired mean differences. The level of significance will be fixed at .05 level of confidence for all the cases. All the statistical operations were done through SPSS software.

**RESULTS AND DISCUSSION**

**Table No.2.**

**Analysis of Covariance for the pre and post-test data on cardio respiratory endurance of Circuit trainings group, Package trainings group and control group (Cooper 12 min run/walk means count by meters)**

Test	Circuit training	Package training	Control group	Source of variance	Sum of square	df	Mean square	'F' ratio
Pre test Mean	2041.0	2048	2035.5	Between	1570	2	785	0.027
				Within	1650795	57	28961.31	
SD	196.76	157.66	152.67	Between	246903.333	2	123451.667	6.33*
				Within	1112395	57	19515.702	
Post test Mean	2132.5	2178	2025	Between	220810.236	2	110435.118	21.65*
				Within	285679.406	56	5101.418	
SD	155.35	95.12	95.12	Between	220810.236	2	110435.118	21.65*
				Within	285679.406	56	5101.418	
Adjusted post test mean	2133	2173	2029	Between	220810.236	2	110435.118	21.65*
				Within	285679.406	56	5101.418	

**\*Significance at 0.05 levels**

B.M.-Between Means W.G. - Within Groups B.S. Between sets W.S.-Within Sets (Cooper 12 min run/walk means count by meters)

Table value required for significant at 0.05 level with df 2 and 57 and 2 and 56 are 3.15 and 3.16 respectively.

The statistical analysis from the table shows that the pre-test means of Circuit trainings group, Package training and control group are 2041.0, 2048 and 2035.5 respectively. The obtained F ratio .027 for pre-test is lesser than the table value of 3.15 for df 2 and 57 required for significance at 0.05 level. The post-test means of Circuit trainings group, Package training and control group are found 2132.5, 2178 and 2025 respectively. The obtained F ratio 6.326\* for post-test is greater than the table value of 3.15 for df 2 and 57 required for significance at 0.05 level. The adjusted post-test means of Circuit trainings group, Package training group and control group are 2133, 2173 and 2029 respectively. The F ratio obtained for adjusted post-test 21.65\* is also greater than the table value of 3.16 for df 2 and 56 required for significance at 0.05 level.

**Table.3.**  
**Scheffe's test for the differences between the adjusted post-test paired means on cardio respiratory endurance**

**(Cooper 12 min run/walk means count by meters)**

Circuit trainings group	Package trainings group	Control group	Mean difference	C.I value
2133	2173	-	40	46.126
2133	-	2029	104	
-	2173	2029	144	

**\*Significance at 0.05 level**

In the above table, the results of Scheffe's Post hoc test are presented. From the table it can be seen that the mean difference between Circuit training group and Package training group was 40 (P<0.05) and the calculated C.I value is 46.126 (P>0.05). The mean difference between Circuit training group and the control group is 104 (P>0.05) and the calculated C.I value was 46.126 (P< 0.05). The mean difference between the Package trainings group and the control group was 144 (P>0.05) and the calculated C.I value is 46.126 (P< 0.05). From that it can be clearly noticed that package training group responded to the

training with more positive influences of Resting heart rate when compared with the circuit training group and control group. The circuit training group responded better when compared with the control group.

## DISCUSSION AND CONCLUSION

The results of the study indicate that the experimental groups namely circuit training group and Package training group has significantly differed from the selected dependent variable namely cardio respiratory endurance when compared to the control group. It is also found that the improvement caused by package trainings was greater when compared to the effects caused by the Circuit training group.

**Romero-Arenas S,et.al.(2013)** Hence, it seems reasonable to identify the most effective combination of intensity, volume, work to rest ratio, weekly frequency and exercise sequence to promote neuromuscular, cardio respiratory endurance and body composition adaptations in the elderly. Thus, the purpose of this review was to summarize and update knowledge about the effects of circuit training and Plyometric training in adults, as a starting point for developing future interventions that maintain a higher quality of cardio respiratory endurance performance throughout the training methods.

After completion of all work following conclusions were draw by the researcher:

Combined training group was possessed greater cardio respiratory endurance than the circuit training group and control group.

Circuit training group was possessed greater cardio respiratory endurance than the control group.

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