

EFFECT OF VARIED INTENSITY CIRCUIT TRAINING ON CARDIOVASCULAR ENDURANCE AMONG FEMALE COLLEGE STUDENTS

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ABSTRACT

The purpose of the present study was to find out the effect of varied intensity circuit training on cardiovascular endurance among undergraduate girls students. To achieve the purpose forty five female students ($n = 45$) were selected at random as subjects. Their age ranged between 17 and 21 years. They were randomly divided into three different groups of fifteen ($n = 15$) each in strength, and the groups were named as Low Intensity Circuit Training Group (LCTG), Medium Intensity Circuit Training Group (MCTG) and the Control Group (CG). Group I and Group II underwent low and moderate intensity circuit training programs. The third Group acted as a control group, and they did not engage any activity apart from their regular programme. The criterion variable selected for the present study was Cardiovascular Endurance and it is measured by 1000m run/walk test. The experimental groups participated in their respective training for a period of twelve weeks and three sessions in a week. The data were collected on cardiovascular endurance of training groups and the control group before and after the training duration. The collected data were analysed statistically by using analysis of covariance (ANCOVA) and Scheffe's post-hoc test was used to test the paired mean differences. The level of confidence was fixed at 0.05 levels in all cases. The result of the study pointed out that the low and medium training groups were showing significant improvement ($p \leq 0.05$) in the selected criterion variable as compared with the control group and there was no significant difference ($p \geq 0.05$) in between the training groups.

Key Words: Cardiovascular Endurance, circuit training, varied intensities, college students

INTRODUCTION

Circuit training is a form of body conditioning or resistance training using high-intensity aerobics. It targets strength building and muscular endurance. An exercise "circuit" is one completion of all prescribed exercises in the program. When one circuit is complete, one begins the first exercise again for the next circuit. Traditionally, the time between exercises in circuit training is short, often with rapid movement of the next exercise. The program was developed by R.E. Morgan and G.T. Anderson in 1957 at the University of Leeds in England (Kraviz, 1996). Circuit training is simply defined as a series of physical, resistance-based and aerobic activities, separated by a short defined time period to complete each section. Equipment may be used for selected exercises to complement the exercise or to increase the resistance.

Cardio-respiratory endurance is the ability of the lungs and heart to take in and transport adequate amounts of oxygen to working muscles which allow activities involving large muscle groups to be sustained for a long period of time (Edward and Donald, 1974). It is the ability of the heart and lungs to work at optimal efficiency during continuous exercise. Cardio respiratory endurance is a distinguished characteristic and is measured by the ability of the circulatory system to withstand the strain of heavy and prolonged muscular activity. Endurance helps on to do physical work at a constant high rate without onset of fatigue (Robert *et al.* & Mathew *et al.*, 1972).

MATERIALS AND METHODS

For the purpose of the present study, forty five females ($n = 45$) students were studying a bachelor degree in the department of Physical Education and Sports Sciences, Annamalai University with age group of 17 to 21 years, were selected as subjects. They were divided into three equal groups of fifteen each in strength and named as Low Intensity Circuit Training Group (LCTG), Medium Intensity Circuit Training Group (MCTG) and the Control Group (CG). The training groups were underwent twelve weeks of training package for three sessions in a week. The researcher were changed the intensity of the training as per the principle of load and adaptation. The criterion variable was used to measure cardiovascular endurance and the test was used to measure it, 1000m run or walk test. The duration of the activity was taken as a data for the study. The statistical procedure was used for the present study was ANCOVA and Scheffe's test was used as a post-hoc test. The level of significance was fixed at 0.05 in all aspects. These are the exercises made to the stations of circuit training Pull ups, Dips, Incline press ups, Crunches, Leg raises, Squats, Step ups, Burpees, Sit ups and skipping.

RESULTS AND DISCUSSION

Table -1

Analysis of Covariance on Cardiovascular Endurance of Training Groups and the Control Group

Test		LCTG	MCTG	CG	SOV	SS	df	MS	F
Pre test	Mean	5.24	5.34	5.28	B	0.076	2	0.038	0.54
	SD	0.29	0.16	0.31	W	2.69	42	0.07	
Post test	Mean	5.09	5.05	5.33	B	1863.9	2	931.9	4.91*
	SD	0.29	0.32	0.16	W	0.70	42	0.350	
Adjusted Post test	Mean	5.10	5.03	5.33	B	0.75	2	0.374	5.68*
					W	2.69	41	0.066	

*Significant $F = (df 2, 42) (0.05) = 3.22$; ($P \leq 0.05$) $F = (df 2, 41) (0.05) = 3.23$; ($P \leq 0.05$)

The analysis of covariance on cardiovascular endurance of the pre, post and adjusted post test mean scores of experimental groups and control group have been analyzed and presented in Table 1. The above table indicates that the pre test 'F' value on cardiovascular endurance was 0.54 which was lesser than the table value of 3.22 at 0.05 level of confidence. Hence there was no significant difference in the pre test data of experimental and control groups. The analysis of the post and adjusted post test mean data reveals that 'F' value of 4.91 and 5.68 respectively, which was higher than the table 'F', hence there exist difference in cardiovascular endurance among the experimental and control groups. Further to determine which of the paired means has a significant improvement, Scheffe's test applied as a post hoc test.

Table - II

Scheffe's Test for the difference between the Adjusted Post Test Mean of Cardiovascular Endurance

Adjusted Post Test Mean			MD	CI
LCTG	MCTG	CG		
5.10	5.03	-	0.07	0.23
5.10	-	5.33	0.23*	
-	5.03	5.33	0.30*	

*Significant at 0.05 level of Confidence

Table II shows that, the adjusted post-test mean difference in cardiovascular endurance between low interval training group and the control group was 0.23 and it was same as the confident interval, so there was a significant improvement between the LICTG and the CG. There was no significant difference between the LCTG and the MCTG. If the mean difference of MCTG and the CG was 0.30, it was greater than the confidence interval of 0.23. Hence there was a significant difference between MCTG and CG in cardiovascular endurance. It further concludes from the table that, the medium intensity circuit training program results better than the low intensity circuit training. The pre, post and adjusted post mean values of the experimental groups and the control group of cardiovascular endurance were graphically represented in the Figure 1.

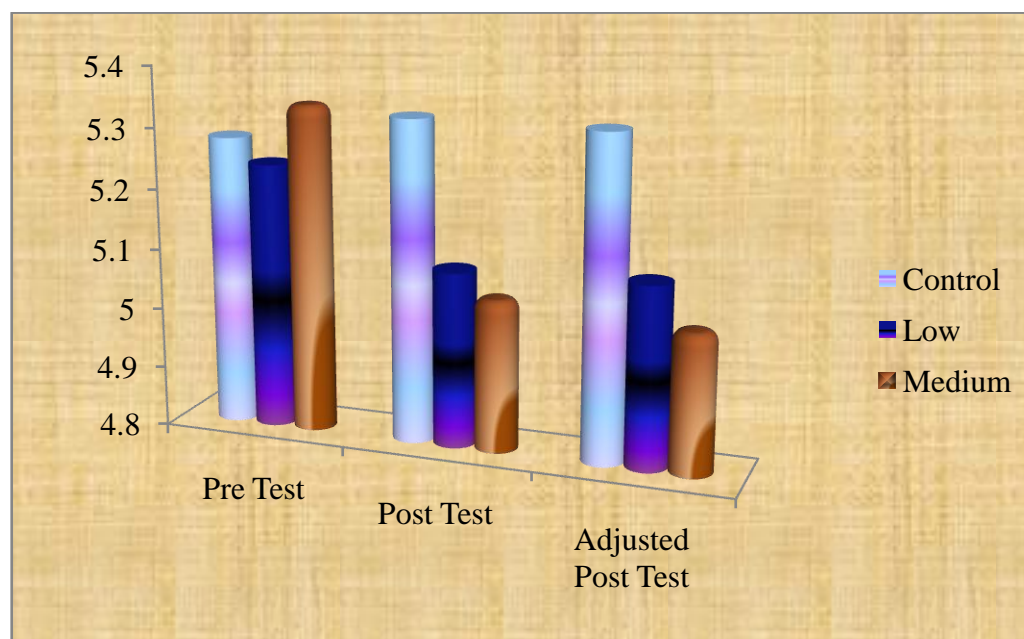


Figure 1: The pre, post and adjusted post test mean values of experimental groups and the control group of Cardiovascular Endurance

The aim of the present study was to analyse the varied intensity circuit training and its effects on cardiovascular endurance among college female students. Regular physical training, has sustained beneficial effects on cardio respiratory endurance (Bartlett *et al.*, 2011). The study of the Fastier

(2012) describes that the varied intensity of circuit training was improves the cardiovascular endurance of the cancer patients. Daniel *et al.* (2013) was conducted the study in school children and found that the circuit training was improving the cardiovascular efficiency of the selected subjects. Paul (2013) conducted his study among high school boys and the result also supportive of the present study. Louisa *et al.* (2013) tried to find out the result of the circuit training to heart patients and got a positive result to him about the cardiac function of the patients. **Antonio *et al.* (3013) conducted varied intensity of circuit training to** middle-aged, overweight men and concluded improvement in physiological functions of the selected subjects. The studies of the Brook *et al.* (2012), Chittibabu and Akilan (2013), Atul, Matthew and Najeeb (2013) are also supportive result of the present study for the improvement of the cardiovascular efficiency of selected subjects. Our study concludes from the results that the varied intensity of circuit training improves the cardiovascular efficiency of the female college students in respective training duration.

CONCLUSION

It was concluded that the low intensity circuit training and the medium intensity circuit training have significant improvement as compared with the control group of cardiovascular endurance. There was no significant difference in between the low and medium circuit training groups. From the tabulated values, it was further concluded that the medium intensity circuit training is provides comparatively better result than the low intensity circuit training on cardiovascular endurance among selected subjects.

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