

Influence of Aerobic and Circuit Strength Training on Cardiorespiratory Endurance and Flexibility in Sedentary Men

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Abstract

The purpose of the study was to determine the influence of aerobic and circuit strength training on cardiorespiratory endurance and flexibility in Sedentary Men. To achieve the purpose of the study, sixty Sedentary Men were selected from Chennai. The selected subject's age groups were ranging from twenty one and twenty eight years. The subjects were randomly divided into three groups and each group consists of twenty subjects. Group one acted as experimental group I and Group two acted as experimental group II and group III acted as control group. The experimental groups underwent their respective training programme namely; aerobic training and circuit strength training for three days per week for a period of 12 weeks and control group underwent their routine work. The dependent variables were cardiorespiratory endurance and flexibility. The obtained pre and post data were statistically analyzed using ANACOVA. In all cases the level of significance fixed was 0.05. The results proved that there was a significant improvement due to 12 weeks aerobic and circuit strength training on cardiorespiratory endurance and flexibility in Sedentary Men.

Keywords: Cardiorespiratory Endurance, Flexibility and Sedentary Men.

Introduction

Physical fitness is an essential and critical component of readiness. Fitness is much more than the absence of disease. It is a state of being that includes strong, flexible muscles and an efficient system for getting oxygen and nutrients to the body.

Cardiovascular fitness is the results of doing activities that exercise make stronger the heart, lungs and blood vessels. The type activity you need to achieve cardiovascular fitness is aerobic, which uses large muscle groups at an intensity that can be sustained for a long period of time (Buck, 1998).

A well-rounded physical activity program includes aerobic exercise and strength training exercise, but not necessarily in the same session. This blend helps maintain or improve cardiorespiratory and muscular fitness and overall health and function.

Regular resistance training can decrease the risk of heart disease by lowering body fat, decreasing blood pressure, improving cholesterol, and lowering the stress placed on the heart while lifting a particular load. Improving muscular fitness is very important for enhancing quality of life (Byeong Kwon Lim, 2014).

Both aerobic endurance exercise and resistance training can promote substantial benefits in physical fitness and health-related factors (Pollock and

Vincent, 1996). Aerobic endurance training reflect on higher in the development of maximum oxygen uptake (VO₂max) and associated cardiopulmonary variables, and it more effectively modifies cardiovascular risk factors associated with the development of coronary artery disease. Resistance training offers greater development of muscular strength, endurance, and mass. It also assists in the maintenance of basal metabolic rate, promotes independence, and helps to prevent falls in the elderly (Pratley, 1994).

Statement of the Problem

The purpose of this study was to examine the influence of aerobic and circuit strength training on cardiorespiratory endurance and flexibility in Sedentary Men.

Hypothesis

It was hypothesized that there would be a significant improvement on cardiorespiratory endurance and flexibility in Sedentary Men due to aerobic and circuit strength training.

It was hypothesized that aerobic training significantly better than circuit strength training in improving cardiorespiratory endurance and flexibility in Sedentary Men.

Reviews of Related Literature

Radmila Kostic, et al., (2006) investigated on the cardiovascular fitness and body composition of 46 women aged 20 to 25. The experimental group was made up 26 female subjects, and the control group numbered 20 subjects. The experimental program of the aerobic dance lasted for a period of three months, with sixty-minute training sessions three times a week. The aerobic dance part of each workout lasted for 40 minutes, and involved high, low and moderate impact segments. The cardiovascular fitness was evaluated by means of the following parameters: resting heart rate, heart rate under strain, systolic arterial blood pressure (mmHg), diastolic arterial blood pressure (mmHg), the absolute value of maximal oxygen uptake (l/min) and the relative value of maximal oxygen uptake (ml/kg/min). Body composition was evaluated by means of the following measurements: body height (cm), body weight (cm), average thorax volume (cm), girth (cm), back skinfold (mm), abdominal skinfold (mm). The basic descriptive statistics coefficients were calculated for all the data from the initial and final measuring, along with the Student t-test and multivariate and univariate covariance analysis (MANCOVA and ANCOVA). There is a statistically significant difference in the variables for cardiovascular fitness and body composition between the initial and final measuring in the experimental group and between the experimental and control group at the final measuring. This study confirmed previous conclusions about significant positive influence of the aerobic dance trainings on the changes in the cardiovascular endurance and body composition parameters in young adult women.

Nobuo Takeshima, et al., (2004), determined the physiological effects of a programmed accommodating circuit exercise (PACE) program consisting of aerobic exercise and hydraulic-resistance exercise (HRE) on fitness in older adults. Thirty-five volunteers were randomly divided into two groups [PACE group (PG) 8 men and 10 women, 68.3 (4.9) years, and non-exercise control group (CG) 7 men and 10 women, 68.0 (3.4) years]. PACE increased ($P < 0.05$) oxygen uptake (V_{O_2}) at lactate threshold [PG, pre 0.79 (0.20) l min⁻¹, post 1.02 (0.22) l min⁻¹, 29%; CG, pre 0.87 (0.14) l min⁻¹, post 0.85 (0.15) l min⁻¹, 2%] and at peak V_{O_2} [PG, pre 1.36 (0.24) l min⁻¹, post 1.56 (0.28) l min⁻¹, 15%; CG, pre 1.32 (0.29) l min⁻¹, post 1.37 (0.37) l min⁻¹, 4%] in PG measured using an incremental cycle ergometer. Muscular strength evaluated by a HRE machine increased at low to high resistance dial settings for knee extension (9-52%), knee flexion (14-76%), back extension (18-92%) and flexion (50-70%), chest pull (6-28%) and press (3-17%), shoulder press (18-31%) and pull (26-85%), and leg press (21%). Body fat (sum of three skinfolds) decreased (16%), and high-density lipoprotein cholesterol (HDL-C) increased (10.9 mg dl⁻¹) for PG. There were no changes in any variables for CG. These results indicate that PACE training incorporating aerobic exercise and HRE elicits significant improvements in cardiorespiratory fitness, muscular strength, body composition, and HDL-C for older adults. Therefore, PACE training is an effective well-rounded exercise program that can be utilized as a means to improve health-related components of fitness in older adults.

Methodology

To achieve the purpose of the study sixty sedentary men were randomly selected from Chennai district. The subject's age groups were ranged between 21-28 years. They divided into three equal groups and each group contains twenty subjects. Group one acted as experimental group one underwent aerobic training and two acted as experimental group- two underwent circuit strength training for a period of 12 weeks for three days per week and group -three acted as control group. The dependent variables selected for this study were such as cardiorespiratory endurance and flexibility. The above selected variables were tested through cooper's 12 minutes run/walk test and sit and reach test. Data were collected prior and immediately after experimental period. The collected data were statistically analyzed with analysis of covariance (ANACOVA), whenever the "F" ratio for adjusted post test means was found to be significant; the scheffe's test was applied as post hoc test to determine the paired mean differences. The level of confidence was fixed at 0.05 levels for all cases.

Results on Cardiorespiratory Endurance

The cardiorespiratory endurance was measured through Cooper's 12 minutes run/walk test. The results on the influence of aerobic and circuit strength training is presented table I.

Table-I
Computation of Analysis of Covariance on
Cardiorespiratory Endurance
(Scores in Meters)

Means	Exp. Group-I	Exp. Group-II	Control Group	S V	SS	df	MS	F
Pre test	1841.2	1819.2	1878.0	B	35240.8	2	17620.4	1.44
	5	5	0	W	696027.5	57	12211.0	
Post Test	2303.5	2262.3	1869.2	B	2298626.6	2	1149313.3	85.86*
	0	5	5	W	763037.3	57	13386.6	
Adjusted Test	2306.2	2277.6	1851.1	B	2495992.6	2	1247996.3	129.79*
	9	4	7	W	538471.8	56	9615.6	
Mean Diff	462.25	443.1	8.75					

*significant at 0.05 level of confidence for 2 and 57 (df) =3.16, 2 and 56(df) =3.16

Table I shows that the pretest mean scores on cardiorespiratory endurance of aerobic exercise group was 1841.25 meters, Circuit training group was 1819.25 meters and control group was 1878.00. The post test mean showed improvement over the pre test scores due to twelve weeks of aerobic training group, circuit training group and control group values recorded were 2303.50 meters, 2262.35 meters and 1869.25 meters respectively.

The obtained F value on pre test scores 1.44 was less than required F value of 3.16 to be significant at 0.05 level. This proved that there was no significant difference among the groups at initial stage and the randomization at the initial stage was equal.

The post test scores analysis proved that there was significant difference among the groups as the obtained F value 85.86 was greater than the required F value of 3.16 this proved that there was significant difference among the post test means of the subjects.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value 129.79 was greater than the required table F value of 3.17. This proved that there significant difference among the means due to 12 weeks of aerobic exercise and circuit strength training on cardiorespiratory endurance.

Since significant improvements were recorded, the results were subjected to post hoc analysis using post hoc analysis using Scheffe's Confidence Interval test. The results were presented in the table II.

Table-II

**Scheffe's Confidence Interval Test Scores on
Cardiorespiratory Endurance
(Scores in Meters)**

Means			Mean Difference	Required C I
Exp. Group-I	Exp. Group- II	Control Group		
2306.29	2277.64	-	28.65	78.81
2306.29	-	1851.17	455.12*	78.81
	2277.64	1851.17	426.47*	78.81

*Significant

The mean comparisons shown in table II proved that there existed significant difference between the adjusted means of aerobics and control group, circuit strength training group and control group. There was no significant difference between aerobics and circuit strength training group.

The ordered adjusted means on cardiorespiratory endurance were presented through bar diagram for better understanding on the results of this study figure 1.

Results on Flexibility

The fitness variable, flexibility was measured through sit and reach test. The results on the influence of twelve weeks of aerobic and circuit strength training is presented table III.

Table III shows that the pretest means scores of flexibility of aerobic training was 23.85, circuit strength training group was 23.30 and control group was 23.95. The post test mean showed improvement over the pre test scores due to 12 weeks of aerobic training, circuit strength training group and control group values recorded were 26.58, 25.80 and 24.28 respectively.

Table-III

**Computation of Analysis of Covariance on Flexibility
(Scores in Centimeters)**

Means	Exp. Group-I	Exp. Group-II	Contro 1 Group	SV	SS	df	MS	F
Pre test Mean	23.85	23.30	23.95	B	4.9	2	2.45	1.84
				W	75.7	57	1.33	
Post Test	26.58	25.80	24.28	B	54.93	2	27.46	25.11*
				W	62.33	57	1.09	
Adjusted Test	26.47	26.08	24.10	B	63.83	2	31.92	72.60*
				W	24.62	56	0.44	
Mean Diff	2.735	2.5	0.33					

*Significant at 0.05 level of confidence for 2 and 57 (df) =3.16, 2 and 56(df) =3.17

The obtained F value on pre test scores 1.84 was lesser than required F value of 3.16 to be significant at 0.05 level. This proved that there was no significant difference among the groups at initial stage and the randomization assignment of the subjects into three groups were successful.

The post test scores analysis proved that there was significant difference among the groups as the obtained F value 25.11 was greater than the required F value of 3.16 this proved that there was significant difference among the post test means of the subjects.

Taking into consideration the pre and post test scores among the groups were calculated and subjected to statistical treatment. The obtained F value 72.60 was greater than the required table F value of 3.16. This proved that there was significant improvement among the groups due to 12 weeks of aerobic and circuit strength training on flexibility.

Since significant improvements were recorded, the results were subjected to post hoc analysis using post hoc analysis using Scheffe's Confidence Interval test. The results were presented in the table IV.

Table-IV

**Scheffe's Confidence Interval Test Scores on Flexibility
(Scores in Centimeters)**

Exp. Group-I	Means		Mean Difference	Required C I
	Exp. Group-II	Control Group		
26.48	26.08	-	0.40	0.53
26.48	-	24.10	2.38*	0.53
	26.08	24.10	1.98*	0.53

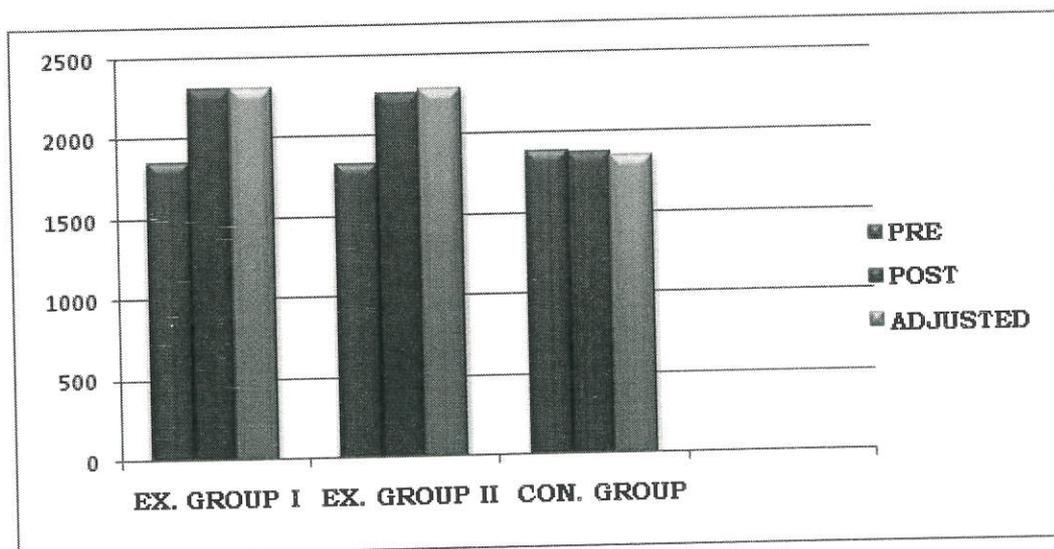
*Significant

The multiple mean comparisons shown in table IV proved that there existed significant difference between the adjusted means of aerobic training group and control group, circuit strength training group and control group. There was no significant difference between aerobic training group and circuit strength training group.

The ordered adjusted means on flexibility were presented through bar diagram for better understanding on the results of this study is presented in figure 2.

Figure-1

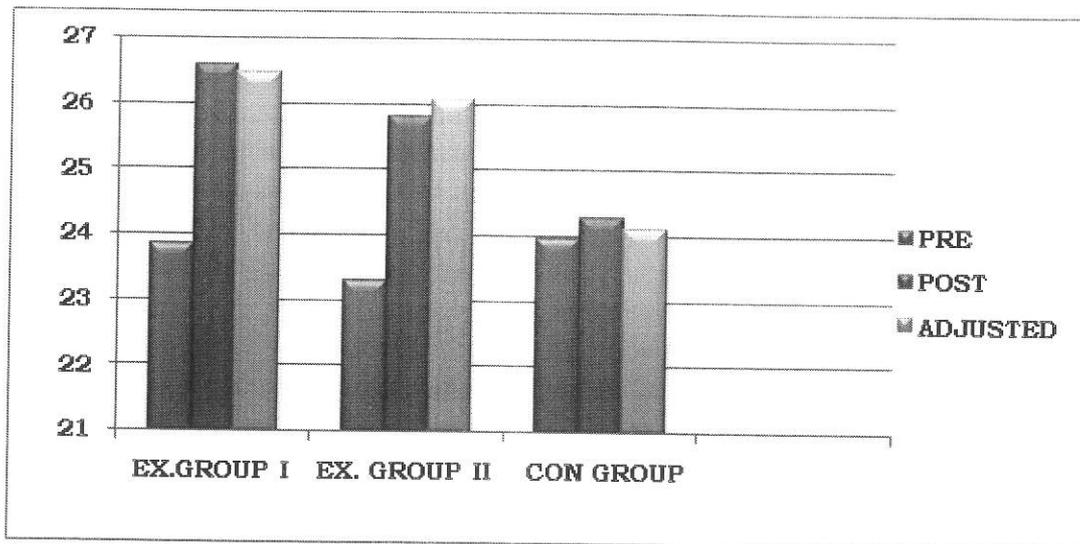
**Bar Diagram Showing the Pre, Post and Adjusted Post Test Means of Cardiorespiratory Endurance
(Scores in Meters)**



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Figure-2

Bar Diagram Showing the Pre, Post and Adjusted Post Test Means of Flexibility (Scores in Centimeters)



Discussion on Findings

Regular physical activity leads to significant changes in terms of increased health-related fitness, and can reduce risk factors for developing a range of disabling medical conditions which occur in inactive people (Carol, et al., 1992). In general, exercise is beneficial for health and physical fitness, while a sedentary lifestyle has a negative effect on a person's well-being. The present study investigated the influence of Aerobic and circuit strength training on cardiorespiratory endurance and flexibility of the Sedentary Men.

The result presented in table I & II proved that both the training significantly improved the cardiorespiratory endurance and flexibility in Sedentary Men. When compared between the experimental groups there was no significant difference between the groups.

Conclusion

The result of the study proved that Aerobic and circuit strength training significantly improved cardiorespiratory endurance and flexibility of the Sedentary Men. There was no significant difference between aerobic and circuit strength training groups.

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