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Effects of Aerobic Exercise Programme with Different Intensities on Blood Pressure and Low Density Lipoproteins

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Abstract

The purpose of the present study was to find out the effect of aerobic exercise programme with different intensities on blood pressure and low density lipoproteins among middle aged women. For this purpose, thirty middle aged women residing at various places around Kannur Town, Kerala, were selected as subjects. The age of the subjects were ranged from 35 to 45 years. They were divided into three equal groups, each group consisted of ten subjects, in which experimental group - I underwent aerobic training (brisk walking) with low intensity, experimental group - II underwent aerobic training (brisk walking) with moderate intensity and group - III acted as control that did not participate in any special activities apart from their regular day-to-day activities. The training period for the study was five days (Monday to Friday) in a week for twelve weeks. Prior and after the experimental period, the subjects were tested on systolic and diastolic blood pressure and low density lipoprotein. Systolic and diastolic blood pressure was assessed by using sphygmomanometer. Low density lipoproteins was tested after taking 5 ml of blood samples by venous puncture method, using CHOD – PAP method recommended by Lopes –Virella et al [1977]. The Analysis of Covariance (ANCOVA) was applied to find out any significant difference between the experimental groups and control group on selected criterion variables. The result of the study shows that the brisk walking on low intensity group and brisk walking on moderate intensity group were decreased the blood pressure and low density lipoproteins significantly. It was concluded from the results of the study that low intensity aerobic training and moderate intensity aerobic training has bring positive changes in systolic and diastolic blood pressure and low density lipoproteins as compare to the control group. Moreover it was also concluded that there was no significant difference was found between the experimental groups in all criterion variables.

Keywords: Aerobic training with low intensity and high intensity, blood pressure (systolic and diastolic) low density lipoproteins, ANCOVA.

Introduction

Aerobic exercise is a kind of physical exercise which improves the efficiency of the cardiovascular system in absorbing and transporting oxygen. Aerobic means, relating to, involving or requiring free oxygen [Cooper, Kenneth H. (1997)] and it also refers the use of oxygen to adequately meet energy demands during exercise through aerobic metabolism.[McArdle; Katch and Katch (2006)]. The most available and simplest aerobic exercise is walking. Everyone can walk almost anywhere such as outdoors or indoors like malls, treadmill etc. This makes walking easy to continue throughout the year. The first and good choice for starting any exercise programme is walking. Walking is good for the muscles because all the muscles in our body contract at the time of walking. We might feel a little pain when we start off because our body is not in the habit of exercising.[Meghna Mukerjee, "The Many Benefits of Walking", [2014]] Regular walking of a moderate to vigorous intensity has been shown to benefit both cardiovascular and psychological health.[Morgan A, Tobar D and Snyder L, (2010)] Psychological benefits include improved sense of well-being, more positive (i.e., vigor) and less negative (i.e., tension, depression) feelings and mood states and enhanced self-esteem.[Barton J, Hine R and Pretty J, (2009), Biddle S and Mutrie N, (2008)].

Hypertension is a major health problem. Elevated systolic and diastolic blood pressure levels are associated with a higher risk of developing coronary heart disease (CHD), congestive heart failure, stroke and kidney failure. There is a one-fold increase in developing these diseases when blood pressure is 140/90 millimeters of mercury (mm Hg).[Bouchard C and Despres JP, [1995)]. Aerobic exercise can reduce the amount of fat in the body. According to the National Federation of Personal Trainers Endurance Specialist Manual, 65 % to 95% of the calories from the body's fat stores, can burn during the aerobic exercise.

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Methodology

Thirty middle aged women from various places around Kannur town, Kerala were selected as subjects. The age of the subjects were ranged from 35 to 45 years. The selected subjects were divided into three equal groups, each group consisted of ten subjects, in which group - I (n = 10) underwent low intensity aerobic training (brisk walking), experimental group - II (n = 10) underwent moderate intensity aerobic training (brisk walking) and group - III (n = 10) acted as control, which did not participate in any special activities apart from their regular day to day activities. The two different training programmes were conducted five days (Monday to Friday) per week for twelve weeks. The researcher consulted with the physical education experts and selected the following variables as criterion variables: 1. Systolic blood pressure, 2. Diastolic blood pressure and 3. Low density lipoprotein. Systolic and diastolic blood pressure was assessed by using sphygmomanometer and low density lipoproteins was estimated by using using CHOD – PAP method recommended by Lopes –Virella et al [1977]. For the purpose of collection of data, the subjects were asked to report at early morning, one day prior and one day after experimental period, in fasting condition. 5 ml of blood was collected from each subject by venous puncture method and the blood thus collected was stored in small bottles for pre and post-test for measuring the low density lipoprotein. Analysis of covariance (ANCOVA) was applied to find out the significant difference if any, among the experimental groups and control group on selected criterion variables separately. In all the cases, .05 level of confidence was fixed to test the significance, which was considered as appropriate.

Results

The data collected on systolic blood pressure and low density lipoproteins among experimental and control groups were analyses and the results were presented in Table 1.

Table 1

Analysis of covariance on selected criterion variables among exercise groups and control group

Variable Name	Group Name	Low Intensity Aerobic Training Group	Moderate Intensity Aerobic Training Group	Control Group	'F' Ratio
Systolic Blood Pressure (mmHg)	Pre-test Mean ± S.D	132.2± 5.22	131.1 ± 6.49	133.8± 5.11	1.813
	Post-test Mean ± S.D.	130.9 ± 5.51	130.1 ± 5.86	133.3 ± 5.36	5.51*
	Adj. Post-test Mean	130.90	130.062	133.338	12.71*
Diastolic Blood Pressure (mmHg)	Pre-test Mean ± S.D	89.9 ± 2.13	89.1 ± 4.18	89.9 ± 3.32	0.271
	Post-test Mean ± S.D.	87.8 ± 2.29	87.0 ± 4.41	90.81 ± 3.14	5.42*
	Adj. Post-test Mean	87.59	86.13	90.18	12.41*
Low Density lipoproteins (mg/dl)	Pre-test Mean ± S.D	121.51 ± 14.12	118.46 ± 9.19	119.69 ± 4.54	1.01
	Post-test Mean ± S.D.	116.72 ± 13.45	113.15 ± 8.54	120.87 ± 17.0	5.635*
	Adj. Post-test Mean	118.396	116.318	121.883	29.15*

*Significant .05 level of confidence. (The table values required for significance at .05 level of confidence with df 2 and 42 and 2 and 41 were 3.22 and 3.21 respectively).

Table 1 shows that pre test mean 'f ratio of low intensity aerobic training group, moderate intensity aerobic training group and control group on systolic blood pressure were 1.813 which was insignificant at 0.05 level of confidence. The post and adjusted post test means 'f' ratio value of experimental groups and control group were 5.51 and 12.71, which was significant at 0.05 level of confidence. The pre test mean 'f ratio of low

intensity aerobic training group, moderate intensity aerobic training group on diastolic blood pressure was 0.271, which was insignificant at 0.05 level of confidence. The post and adjusted post-test means 'f' ratio value of experimental group and control group were 5.42 and 12.41, which was significant at 0.05 level of confidence. The pre test mean 'f ratio of low intensity aerobic training group, moderate intensity aerobic training group and control group on low density lipoproteins was 1.01, which was insignificant at 0.05 level of confidence. The post and adjusted post test mean 'f' ratio value of experimental groups and control group was 5.635 and 29.15, which was significant at 0.05 level of confidence. Further which of the paired Further to determine which of the paired means has a significant difference among the groups, the Scheffé *S* test was applied.

Table 2
Scheffẽ S Test for the Difference Between the Adjusted Post-Test Mean of Selected Criterion Variables

Low Intensity Aerobic Training Group	Moderate Intensity Aerobic Training Group	Control Group	Mean Difference	Confidence interval at .05 level
Adjusted Post-test Mean on Systolic Blood Pressure				
130.90		133.338	2.438*	1.856
130.90	130.062		0.838	1.856
	130.062	133.338	3.276*	1.856
Adjusted Post-test Mean on Diastolic Blood Pressure				
87.59		90.18	2.59*	2.083
87.59	86.13		1.46	2.083
	86.13	90.18	4.05*	2.083
Adjusted Post-test Mean on Low Density Lipoprotein				
118.396		121.883	3.487*	2.991
118.396	116.318		2.078	2.991
	116.318	121.883	5.565*	2.991

* Significant at .05 level of confidence.

Table 2 shows that the Scheffẽ *S* Test for the difference between adjusted post-test mean on systolic blood pressure of low intensity aerobic training group and control group (2.438) and moderate intensity aerobic training group and control group (3.276), which were significant at .05 level of confidence. There was a significant difference on diastolic blood pressure between low intensity aerobic training group and control group (2.59) and moderate intensity aerobic training group and control group (4.05) and also there was a significant difference on low density lipoproteins between low intensity aerobic training group and control group (3.487) and moderate intensity aerobic training group and control group (5.565) which was significant at 0.05 level of confidence after the respective training programme. Moreover the result of the study shows that there was no significant difference between the training groups on selected criterion variables.

Results & Discussion

1. There was a significant reduction in blood pressure for low intensity aerobic training group and moderate intensity aerobic training group when compared with the control group. The result of the study also shows that there was no significant difference between the training groups on blood pressure. Sohn, Hasnain and Sinacore (2007) found that walking with extra 30 minutes has reduced the blood pressure in hypertension patients after six months of trial. Stewart, *et al* (2006) found that there was a significant decrease in SBP and DBP after the aerobic exercise and resistance training.
2. In the present study, it was found that there was a significant reduction in low density lipoproteins for both the training groups when compared with the control group. Arazi, Farzaneh and Gholamian (2012) found that there was a significant change in TC, TGL, HDL and LDL in overweight sedentary females after the morning aerobic training. Rahimi *et al* (2013) found that there was a significant decrease in TC, TGL and LDL and a significant increase in HDL after the six weeks of walking on water and land among middle aged women.

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