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RESEARCH ARTICLE OPEN ACCESS

INFLUENCE OF DIFFERENT INTENSITIES OF AEROBIC EXERCISE ON SELECTED BLOOD LIPIDS AMONG DIABETIC PATIENTS

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ABSTRACT

The aim of this study is to find out the effect of different intensities of aerobic exercises on selected blood lipids among diabetic patients. Randomly selected 60 (N=60) diabetic patients whose blood glucose levels were more than 140 mmHg and who were undergoing treatment for diabetics in Government General Hospital, Nagercoil were treated as subjects for this study. They were randomly assigned into four groups consisting of 15 in each group. Group I was considered as low intensity aerobic exercises group (LIAE), group II was considered as medium intensity aerobic exercises group (MIAE), group III was considered as high intensity aerobic exercises group (HIAE) and the fourth group served as control group. Pre and post test scores on blood glucose and LDL were collected and statistically analysed. The results of the study proved that varied intensities of aerobic exercises is significantly altered blood glucose and LDL than control group. It was concluded that varied intensities of aerobic exercises beneficially altered blood glucose and LDL of diabetic patients in managing diabetics.

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INTRODUCTION

The major benefits of aerobic exercises are stronger and more efficiently operating heart and lungs, more energy, physical flexibility, conditioned muscles, proper use of fats and effective burning of calories. The increased oxygen flow gained through aerobics re-energies by giving anyone more energy and a "re-awakening" of his senses. And aerobic training will produce an increased capacity for pumping larger volumes of blood to accommodate the need for extra energy and extra oxygen (Kolata, Gina 2002). Exercise physiologists agree that the physiological and biochemical changes associated with training occur at about two percent of the individual's maximal aerobic capacity where as intensity less than 60 percent are not nearly sufficient. The same experts have also warned adults exceeding 90 percent of their maximal aerobic capacity even during peak exercise effort. They recommend 60 percent and 80 percent of their maximal capacity for state effective training. These levels can be estimated by using heart rate as guidelines.

Different activities can be carried out with different intensities which may have different effect in organism. (Bompa, 1999)

In India the diabetic population was rapidly increasing with 30 million diabetic patients, the largest in the world. Forty percent of all diabetic admissions to hospitals in India is due to food problems. And among the remaining, physical inactivity is considered most important. Diabetes has long been recognized to be an independent risk factor for Cardiovascular Disease (CVD). The adverse influence of diabetes extends to all components of the cardiovascular system: the microvasculature, the larger arteries, and the heart, as well as the kidneys. The public health impact of cardiovascular disease (CVD) in patients with diabetes is already enormous and is increasing. Several explanations are behind this increase. First, the incidence of diabetes rises with advancing age. Second, insulin treatment for persons with type 1 diabetes has prolonged their lives significantly, and with each year of additional life comes an increased risk for CVD complications.

Tab 1. Descriptive Statistics on Blood Lipids, Blood Glucose and Low Density Lipoprotein (LDL) due to Low intensity aerobic training (LIAE), Medium intensity aerobic training (MIAE), High intensity aerobic training (HIAE) and Control Groups (CG)

Groups	Test	Mean	Standard Deviation	RANGE	
				Min	Max
BLOOD GLUCOSE					
Low intensity aerobic training	Initial	230.87	9.22	212.00	241.00
	Final	222.87	9.22	204.00	233.00
	Adjusted Mean	219.44			
Medium intensity aerobic training	Initial	227.00	7.56	215.00	241.00
	Final	220.33	7.55	209.00	234.00
	Adjusted Mean	220.47			
High intensity aerobic training	Initial	225.27	7.92	212.00	236.00
	Final	216.47	6.69	206.00	227.00
	Adjusted Mean	218.20			
Control Group	Initial	225.47	7.71	209.00	234.00
	Final	224.93	6.86	209.00	232.00
	Adjusted Mean	226.48			
LOW DENSITY LIPOPROTEIN (LDL)					
Low intensity aerobic training	Initial	101.45	10.21	90.00	125.00
	Final	97.69	8.82	85.00	115.00
	Adjusted Mean	97.79			
Medium intensity aerobic training	Initial	101.11	8.13	95.00	120.00
	Final	96.36	7.19	88.00	110.00
	Adjusted Mean	96.73			
High intensity aerobic training	Initial	101.07	11.04	90.00	125.00
	Final	94.96	10.09	88.00	120.00
	Adjusted Mean	95.36			
Control Group	Initial	102.67	9.23	90.00	120.00
	Final	101.00	7.86	88.00	115.00
	Adjusted Mean	100.12			

Tab 2. ANCOVA Results on Blood Glucose and LDL comparing effects of LIAE, MIAE, HIAE and CG

	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
BLOOD GLUCOSE					
Pre Test Mean	Between	303.25	3	101.08	
	Within	3700.40	56	66.08	1.53
Post Test Mean	Between	597.92	3	199.31	
	Within	3271.73	56	58.42	3.41*
Adjusted Post Test Mean	Between	602.65	3	200.88	
	Within	128.73	55	2.34	85.83*
LOW DENSITY LIPOPROTEIN					
Pre Test Mean	Between	25.23	3	8.41	0.09
	Within	5285.43	56	94.38	
Post Test Mean	Between	301.02	3	100.34	1.37
	Within	4104.81	56	73.30	
Adjusted Post Test Mean	Between	180.48	3	60.16	5.07*
	Within	653.22	55	11.88	

Required $F_{(0.05),\,(df\,3,75)}$ =2.77 * Significant at 0.05 level of confidence

Tab 3. Multiple paired means comparisons among LIAE, MIAE, HIAE and CG on blood lipids blood glucose and LDL

Low intensity aerobic training Group	Medium intensity aerobic training Group	High intensity aerobic training Group	Control Group	MEAN DIFF	C.I
BLOOG GLUCOSE					
219.44	220.47			1.03	1.61
219.44		218.20		1.24	1.61
219.44			226.48	7.04*	1.61
	220.47	218.20		2.27*	1.61
	220.47		226.48	6.01*	1.61
		218.20	226.48	8.28*	1.61
LOW DENSITY LIPOPROTEIN					
97.79	96.73			1.06	3.63
97.79		95.36		2.43	3.63
97.79			100.12	2.32	3.63
	96.73	95.36		1.36	3.63
	96.73		100.12	3.39	3.63
		95.36	100.12	4.75*	3.63

***** Significant at 0.05 level

Third, type 2 diabetes occurs at an earlier age in obese and overweight persons, and the prevalence of obesity is rising. The risk for diabetes in overweight persons is heightened by physical inactivity. All of these factors will lead to an absolute increase in the number of patients who will require medical intervention to prevent the complications of diabetes. (Girish and Sridhar, 2007). Effect of aerobic training on diabetic nephropathy in a rat model of type 2 diabetes mellitus was constructed by Chiasera (2000) and found exercise intervention lowered the body weight ($P<0.05$) reduced the percentage of glycated hemoglobin ($P<0.05$) and diminished the urine albumin concentration ($P<0.05$), compared to the obese sedentary controls. Exercise intervention did not significantly affect morphometric indices of renal ultra structure. This study shows that aerobic exercise intervention significantly improved metabolic control and reduced albuminuria in a rat model of type 2 diabetes. Aerobic exercise and the lipid profile in type 1 diabetic men a randomized controlled trial was constructed by Laksonen, DE. (2000).

The results proved that The exercise program brought about improvements in the HDL/LDL and apo A-1/apo B ratios and apo B and triglycerido levels when comparing the relative changes in trained versus control group. Fructosamine in blood serum-binding and degradation of DSJ-insulin by erythrocyte receptors in young persons with type I diabetes effect of physical exercise was constructed by Rychlewski, and Szezesniak (1996). The results proved that regular aerobic exercise contributed to the growth of physical efficiency expressed by the vo2 max value, reduction in fractosamine level in blood serum, increase in insulin sensitivity of erythrocyte receptor and improved effort tolerance related to glycemia. This paper attempts to address the research questions, such as, what kind of aerobic exercise is more effective to alter selected blood lipids blood glucose and low density lipoprotein (LDL)? What intensity of aerobic exercise would be better in influencing the selected biochemical variables? Hence, the investigator was interested to find out the effect of varied intensities of aerobic exercises on selected blood lipids among diabetic patients.

METHODOLOGY

Randomly selected 60 (N=60) diabetic patients whose blood glucose levels were more than 140 mmHg and who were undergoing treatment for diabetics in Government General Hospital, Nagercoil were treated as subjects for this study. They were randomly assigned into four groups consisting of 15 in each group. Group I was considered as low intensity aerobic exercises group (LIAE), group II was considered as medium intensity aerobic exercises group (MIAE), group III was considered as high intensity aerobic exercises group (HIAE) and the fourth group served as control group. Prior to the experimental treatments all the subjects were measured of selected blood lipids, namely, blood glucose and LDL which formed the initial scores of the subjects. The subjects were treated in respective experimental treatment for 12 weeks and immediately on completion of the experimental treatments, all the subjects were tested on the criterion measures which formed the final scores of the study. The difference between initial and final scores was considered as the effect of different intensities of aerobic exercises. To ascertain the statistical significance of the differences in means, statistical tool ANCOVA was employed. In all cases 0.05 level was fixed to test the hypothesis of the study.

RESULTS

The descriptive statistics on selected blood lipids, blood glucose and LDL proved that there existed mean differences due varied intensities of aerobic training and to test statistical significance, ANCOVA were computed and the results presented in Table 2.
The results proved that obtained F values of 85.83 and 5.07 on adjusted means were greater than the required F value to be significant at 0.05 level. Hence, post hoc analysis was made and results presented in Table 3.

DISCUSSION

The descriptive statistics on blood glucose and ANCOVA results showed the obtained F value 85.83 was greater than the required value of 2.77 and proved that the experimental treatments significantly reduced blood glucose of the diabetic patients as they could reduce blood glucose due to different intensities of aerobic training. And the post hoc analysis of obtained ordered adjusted means proved that due to twelve weeks low, medium and high intensity aerobic training was significantly better than control group in reducing blood glucose. The results further proved that high intensity group was significantly better than medium intensity group in reducing blood glucose of the diabetic patients. Similarly the descriptive statistics on low density lipoprotein and ANCOVA results proved that the obtained F value 5.07 was greater than the required value of 2.77 and proved that the experimental treatments significantly reduced low density lipoprotein of the diabetic patients as they could reduce low density lipoprotein due to different intensities of aerobic training. The post hoc analysis of obtained ordered adjusted means proved that due to twelve weeks high intensity aerobic training significantly reduced LDL than control group while low and medium intensities of aerobic training failed to significantly alter. The results further proved that there was no significant difference between treatment groups in altering LDL among diabetic patients. The findings of this study were in agreement with the findings of Laksonen, DE.(2000) who found that aerobic exercise programme brought about improvements in the HDL/LDL and apo A-1/apo B ratios and apo B and triglycerido levels when comparing the relative changes in trained versus control group.

Conclusion

It was concluded t hat varied intensities of aerobic exercises beneficially altered selected lipid profiles, blood glucose and low density lipoprotein of diabetic patients.

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