Efficacy of Physical Conditioning Exercises on Selected Biochemical Variables among Male Students

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Abstract

The objective of this study was to investigate the efficacy of physical conditioning exercises on selected biochemical variables among male students. For this purpose, fifteen untrained men students from Annamalai University in the age group of eighteen to twenty four years were recruited, with their consent. The selected subjects were healthy and normal, and they were physically fit enough to undergo the physical conditioning programme. The selected dependent variables namely Total Cholesterol, High Density Lipoprotein Cholesterol (HDL-C), Low Density Lipoprotein Cholesterol (LDL-C) and Triglycerides were assessed using standard tests and procedures, prior to and immediately after the training protocol. Estimation of lipoprotein variables was done with the help of a Biochemist and laboratory technicians. The physical conditioning programme was conducted for a period of twelve weeks. The result of the study indicated a positive change in total cholesterol and low-density lipoprotein cholesterol level in case of male students.

Keywords: Physical Conditioning Exercises, Bio Chemical and Lipid profiles.

Introduction

Cholesterol and triglycerides are two forms of lipid, or fat. Both cholesterol and triglycerides are necessary for life itself. Cholesterol is necessary, among other things, for building cell membranes and for making several essential hormones. Triglycerides, which are chains of high-energy fatty acids, provide much of the energy needed for cells to function.

Lipid profile is the pattern of lipids in the blood. A lipid profile usually includes the total cholesterol, high density lipoprotein (HDL) cholesterol, triglycerides, and the calculated low density lipoprotein (LDL) cholesterol. “Lipid” is a medical term used to describe fats in the bloodstream, more commonly referred to as cholesterol and triglycerides. The body needs cholesterol for digesting dietary fats, making hormones, building cell walls, and other important processes.

There are two sources for these lipids: diet and "endogenous" sources (that is, those manufactured within the body). Dietary cholesterol and

triglycerides mainly come from eating meats and dairy products. These dietary lipids are absorbed through the gut, and then are delivered through the bloodstream to the liver, where they are processed.

One of the main jobs of the liver is to make sure all the tissues of the body receive the cholesterol and triglycerides they need to function. Whenever possible (that is, for about 8 hours after a meal), the liver takes up dietary cholesterol and triglycerides from bloodstream. LDL stands for "low density lipoprotein," and HDL for "high density lipoprotein." In the bloodstream, "bad" cholesterol is carried in LDL, and "good" cholesterol is carried in HDL. Most cholesterol in the blood is packaged as LDL. Only a relatively small proportion is from HDL cholesterol. Thus, the total cholesterol level in the blood usually reflects mainly the amount of LDL cholesterol that is present.

Elevated levels of LDL cholesterol have been strongly associated with an increased risk of heart attack and stroke. It appears that when LDL cholesterol levels are too high, the LDL lipoprotein tends to stick the lining of the blood vessels, which helps to stimulate atherosclerosis. So, an elevated LDL cholesterol level is a major risk factor for heart disease and stroke. This is why LDL cholesterol has been called "bad" cholesterol. Much evidence now suggests that higher HDL cholesterol levels are associated with a lower risk of heart disease, and that low HDL cholesterol levels are associated with an in creased risk of heart disease. Thus, HDL cholesterol appears to be "good."

While the association between triglycerides and the risk of heart disease has not been as clear as it is for cholesterol, in recent years, several studies have been established that people with elevated levels of triglycerides are indeed at increased risk. Also, elevated triglyceride levels are very often strongly associated with other important risk factors, including low levels of HDH cholesterol, obesity, insulin resistance, diabetes, and a tendency toward excessive blood clotting.

Exercise means excessive use of body muscles for a specific time regularly. There are different types of exercises. Exercise is very important for health and fitness. It has multiple beneficial effects on our body. Exercise increases parasympathetic activity with a minor decrease in sympathetic activity, so resting heart rate decreases. There is more time for filling ventricles with blood and for delivery of oxygen and nutrients to the body and heart muscles. Exercise reduces blood level of norepinephrine and sympathetic activity which decreases vasoconstriction of arterioles to decrease blood pressure. In exercising individuals body uses fat more efficiently for the same sub maximal task due to increased mitochondrial activity. Exercise boosts the immune system by increasing the levels of interleukin1and interferon, so less chances of infection are there. Bone density is more in exercising people due to

overactive osteoblastic activity. Exercise decreases stress, anxiety, depression, etc. by increasing oxygen supply to brain tissue and by increasing dopamine, serotonin, norepinephrine and acetylcholine. Most important effect of exercise on human body is on metabolic system specially lipids. Lipid and lipoprotein are risk factors for coronary heart disease.

The aim of physical conditioning exercises is to condition the athlete to move at high velocity, employing maximal power when needed. In order to do this, the neuromuscular system must be conditioned to very fast movements and training need to be very specific, with a very high anaerobic component (Martin & Coe, 1991). Physical conditioning exercises is an effective training method designed to elicit enhancements in biochemical, fitness and physiological parameters. It has vastly different training effects depending upon the intensity and duration of the work and rest period. More research is required concerning the variation in different methods of physical conditioning and their effect. The applicability of this method of training to develop biochemical parameters is not yet completely known. Hence, we decided to take-up the study on the effect of physical conditioning on lipid profiles among male students.

Methodology

Subjects and Variables

For the purpose of this study, thirty untrained men students from various faculties of Annamalai University in the age group of eighteen to twenty four years were recruited, with their consent. The subjects who were not involved in any regular physical exercises were only considered in this study. The selected subjects were healthy and normal, and they were physically fit enough to undergo the physical conditioning exercises programme. The selected dependent variables namely Total Cholesterol, High Density Lipoprotein Cholesterol (HDL-C), Low Density Lipoprotein Cholesterol (LDL-C) and Triglycerides were assessed using standard tests and procedures, prior to and immediately after the training protocol. Estimation of lipoprotein variables was done with the help of a Biochemist and laboratory technicians. The subjects were asked to report early morning before the commencement of training program for the collection of blood sample (pre test) and the Post test blood samples was drawn 48 hours after the last training session. The test was conducted by drawing 10 ml of blood from the vein near the antecubital fosse and the level of lipoprotein in the blood sample is determined.

Training Protocol

The physical conditioning programme was scheduled for one session a day. During the training period the experimental group underwent the aerobic training programme six days per week for twelve weeks in addition to their regular activities. Prior to every training session the subjects of experimental group had ten to fifteen minutes of warm-up exercise involving jogging, calisthenics and stretching exercises.

In this present investigation continuous running was given to the subjects as aerobic training. The subjects performed continuous running for proposed repetitions and sets, alternating with active recovery between repetition and complete rest between set based on work-rest ratio. The subject's training zone was computed using Karvonen formula and it was fixed at 65%HRmax to 90%HRmax. The training intensity was progressively increased once in two weeks. The work rest ratio of 1:3 between sets and 1:1 between repetitions was given. The duration of training was one hour approximately, which included warming up and limbering down. All training sessions were conducted only in the morning.

Statistical Procedures

The selected variables for which data were collected from two groups prior to and after experimentation on selected lipid profiles were statistically examined for significant difference, if any, by applying the analysis of covariance (ANCOVA) with the help of SPSS package. The level of significance was accepted at $P < 0.05$.

Results

The subjects averaged 21.7 ± 0.5 years of age, 169.3 ± 2.5 cm in height, and 62.4 ± 2.8 kg in weight. The data collected on selected lipid profiles before and after the twelve weeks of physical conditioning exercises is statistically analyzed and it is presented in table 1.

Table –I

Analysis of Covariance on Selected Lipid Profiles of Physical Conditioning Exercises and Control Groups

Variables	Groups	Adjusted Mean	SoV	Sum of Squares	df	Mean Square	'F' ratio
Total Cholesterol	Physical Conditioning Exercises	206.677	B	335.695	1	335.695	7.456*
	Control	213.389	W	1215.652	27	45.024	
High Density Lipoprotein Cholesterol	Physical Conditioning Exercises	44.175	B	53.891	1	53.891	0.902
	Control	41.492	W	1612.514	27	59.723	
Low Density Lipoprotein Cholesterol	Physical Conditioning Exercises	134.124	B	616.431	1	616.431	4.965*
	Control	143.209	W	3352.136	27	124.153	
Triglycerides	Physical Conditioning Exercises	143.373	B	3.461	1	3.461	0.006
	Control	142.693	W	15830.769	27	586.325	

Required table value for significance at 0.05 level of confidence for df of 1 and 27 is 4.21
** Significant at 0.05 level.*

The obtained 'f ' value of 7.456 and 4.965 for adjusted posttest mean on Total Cholesterol and low density lipoprotein cholesterol is greater than the required table value of 4.21 for significance at 0.05 level of confidence with degree of freedom 1 and 27. The result of the study showed that there is significant difference between physical conditioning exercises and control

groups on Total Cholesterol and low density lipoprotein cholesterol. It is concluded from the result of the study that there was significant decrease in Total Cholesterol and low density lipoprotein cholesterol due to the effect of physical conditioning exercises.

The obtained 'f 'value of 0.902 and 0.006 for adjusted posttest mean on High Density Lipoprotein Cholesterol and Triglycerides is less than the required table value of 4.21 for significance at 0.05 level of confidence with degree of freedom 1 and 27.The result of the study showed that there is no significant difference between physical conditioning exercises and control group on High Density Lipoprotein Cholesterol and Triglycerides. It is concluded from the result that there was a slight increase in High Density Lipoprotein Cholesterol and slight decrease in Triglycerides due to the effect of physical conditioning exercises.

Discussion

These findings are consistent with the result of the previous studies. Mann, Beedie and Jimenez (2014) confirmed the beneficial effects of regular activity on cholesterol levels and describe the impacts of differing volumes and intensities of exercise upon different types of cholesterol. Hamid et al., (2014) investigated the effect of 12 weeks of aerobic training on homocysteine, lipoprotein A and lipid profile levels in sedentary middle age men, they found that significant decrease in homocysteine, lipoprotein A, TG, cholesterol and LDL and significant increase in HDL. Mann, Beedie and Jimenez (2014) confirmed the beneficial effects of regular activity on cholesterol levels and describe the impacts of differing volumes and intensities of exercise upon different types of cholesterol. Kiyici (2014) noted beneficial changes in cardiac parameters and serum lipid profile at a greater extent in the subjects performing aerobic exercise than in the subjects performing aerobic exercise with weightlifting. He suggested that light but continuous exercise is sufficient to achieve health benefits.

Many previous studies have shown that aerobic exercise is beneficial and increases the HDL level (Hata & Nakajima 2000; Marti et al., 1990 and Dragusha et al., 2010). Hence, it is concluded from the result of the previous studies that, aerobic training increase HDL-C with mild hypertension. Rahimi et al., (2013) suggested that aerobics exercise program (*walking in water and in land*) increase HDL-C or decrease LDL-C, TC and TG. Navan (2013) examined the effectiveness of 8-week aerobic exercises on some of cardiovascular risk taking factors in men with hypertension. They found meaningful decrease in

the amount of cholesterol (TC), triglyceride (TG), blood light lipoprotein (LDL), and systole blood pressure (SBP), and blood heaven lipoprotein (HDL) had meaningful increasing. Moreover, the amount of diastole blood pressure (DBP) decreased but these were not meaningful changes. They recommended that, using aerobic exercises have desirable effects on decreasing risk taking factors.

Conclusions

On the basis of the findings of the study, the following conclusions may be drawn.

The physical conditioning exercises programme conducted for a period of twelve weeks in the study indicated a positive change in total cholesterol and low-density lipoprotein cholesterol level in case of men students. The physical conditioning exercises programme has shown positive but insignificant changes in, HDL-C and Triglycerides. The findings of the study indicate that Total Cholesterol, High Density Lipoprotein Cholesterol (HDL-C), Low Density Lipoprotein Cholesterol (LDL-C) and Triglycerides increased by 9.98%, 7.11%, 3.90% and 8.83% respectively due to twelve weeks of physical conditioning exercises. These results suggest that the physical conditioning exercise is an effective means for bringing out significant changes in lipid profiles.

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