

Examining the effect of an aerobic exercise program on stress and triglycerides level in sedentary students - A pilot study

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ABSTRACT

Background: Stress is a risk factor for developing hypertension and cardiovascular diseases. The increased risk of cardiovascular diseases from chronic stress has been linked to increased plaque build-up as a result of elevated cholesterol, hardening of the arteries, change in the blood pressure, and abnormal working rhythm of the heart. The primary aim of this study was to examine the effects of Aerobic Exercise on stress and triglycerides.

Methods: This study is a Pre-experimental Study - One Group Pre-test Post-test Design. A group of 17 sedentary male students whose age ranged between 19-28 years was enrolled in the study. The respondents were free of any type of smoking habit, consumptions of alcohol and drugs before the study. The study respondents participated in Aerobic Exercise Training program which was conducted for six weeks, four days a week and 45 minutes in a day. The pre-test and post-test were conducted before and after the intervention.

Results: The mean age, height and weight of the Sedentary Students were 24.34 years, 172.31 cm and 69.22 kg respectively.

Before an aerobic exercise program, 52.94% sedentary students reported mild stress, 29.41 % reported moderate stress and 17.64 % reported severe stress. Whereas, after aerobic exercise program, 58.82% sedentary students reported mild stress, 23.52 % reported moderate stress and only 11.64 % reported severe stress. The Pre-test mean score of Triglycerides was 147.649 mg/dl and the post test was 113.483 mg/dl.

Conclusion: An aerobic exercise program may reduce stress and triglycerides levels in sedentary students. This research provides a platform for further research in this field with higher power and precision.

Key words: Aerobic, Stress, Sedentary, Triglycerides

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Introduction

A sedentary lifestyle is one of the major causes of lifestyle disease around the world. Approximately two million deaths every year are attributable to sedentary lifestyle.¹ The World Health Organization (WHO) study on risk factors and Mayo Clinic article suggest that sedentary lifestyle is one of the ten leading causes of death and disability in the world.^{2,3} Physical inactivity increases the risk of mortality, doubles the risk of hyper and hypotension, cardiac related diseases, diabetes and obesity.^{4,5} The sedentary lifestyle is a

type of lifestyle with no irregular physical activity. Individuals working without any physical activity and they are sitting down all the time and usually, they only get up when its break time, meal time and going to the comfort room. They are always sitting down the whole day while doing their work. The sedentary life style (physical inactivity) is a seriously growing health problem in India.⁶ An epidemiological study has shown that sedentary lifestyle will contribute to the early onset and progression of life style diseases such as cardiovascular disease, hypertension, diabetes and obesity.⁷ Stress is a contributing risk factor for developing cardiovascular diseases (CVD). The increased risk of CVD from chronic stress has been linked to increased plaque build-up as a result of elevated cholesterol, hardening of the arteries, change in the blood pressure, and abnormal working rhythm of the heart.⁸ Triglyceride is an ester derived

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from glycerol and three fatty acids.⁹ Triglyceride is constituents of body fat in human's bodies and other animals.¹⁰ Triglycerides are present in the blood to enable the bidirectional transference of adipose fat and blood glucose from the liver.¹¹ Triglycerides are fat in the blood, and a high triglyceride level can increase the risk of heart related disease. In the human body, high levels of triglycerides in the bloodstream have been linked to atherosclerosis and, by extension, the risk of heart disease (Boston scientists) and stroke.^{12,13} There is a scarcity of research reports on stress and triglycerides of sedentary students and require a very extensive effort. The effort made by the investigator can prove very useful for reducing stress and triglycerides.

Methods

In this study, the researchers followed the ethical guidelines, principles, and standards for studies conducted with human beings. The study included safeguards for protecting humans, which involve three major ethical principles: beneficence, respect for human dignity, and human justice.

Only one group was targeted as an intervention group, there was no control group. The 17 male sedentary students from SRTM University participated in the study and their age ranged between 19-28 years. This study is a Pre-experimental Study - One Group Pre-test Post-test Design. For assessment of Academic Stress, the Student-life Stress Inventory (SSI) was used.¹⁴ The inventory reflected students' life stress experiences. In addition, the blood sample collected from veins to measure Triglyceride (a type of lipid) by the technician of Sahyog Pathology lab Vishnupuri Nanded. This study involves an experiment of sedentary students on quasi-experimental research design. The data was collected through respondents in the form of different descriptive tests. The demographic information about, age, height, weight, daily smoking etc. was obtained before seeking responses. The National Cholesterol Education Program has set guidelines for triglyceride levels.⁶

Level		Interpretation
(mg/dL)	(mmol/L)	
< 150	< 1.70	Normal range – low risk
150–199	1.70–2.25	Slightly above normal
200–499	2.26–5.65	Some risk
500 or higher	> 5.65	Very high – high risk

These levels are tested after fasting 8 to 12 hours.

For this study, the students studying in the Academic year 2016-2017 of Swami Ramanand Treeth Marathwada University's (NAAC 'A' Grade Government University) were selected as the study respondents. The study respondents participated in an aerobic exercise training program which was conducted for six weeks and four days in a week and 30 minutes in a day. Before exercise pre-test was done by the departmental fitness centre. Triglycerides (TD) were measured in Sahyog pathological laboratory. After the pre-test was over, all the selected subject were exposed to six week Exercise intervention program followed by post-test done by the departmental fitness centre. The program consisted of the following exercises; jogging, skipping, front-side-back running, floor push-ups, pull-ups, sit-ups, back extension, squat etc.

Data processing

The data was checked for accuracy and completeness and was coded and put up into the Statistical Package for Social Sciences Descriptive statistics for all studied variables, percentage, mean, standard deviation (SD) and t-test was performed and were considered statistically significant at 0.05 level.

Results

The results concerning this study were presented in the form of tables and suitable figures below.

Table 1: Morphological characteristic of sedentary students

S.No.	Morphological Characteristics	Student	
		Mean	Standard Deviation
	Age (Year)	24.34	3.60
	Weight (Kg)	69.22	4.76
	Height (Cm)	172.31	15.14

The mean age of Sedentary Student was 24.34 + 3.60, mean weight as 69.22 + 4.76 kg, and the mean height was 172.31 + 15.14 cm.

The result revealed that 82.35% sedentary students used internet on regular basis. Similarly, 11.76% sedentary students reported that they have smoked / drunk in the past.

Figure 1. shows the pre and post-test of rate of overall level of stress to sedentary students. Result revealed that before an aerobic exercise intervention, 52.94% sedentary students reported mild stress, 29.41% sedentary students reported moderate stress and 17.64% sedentary students reported severe stress.

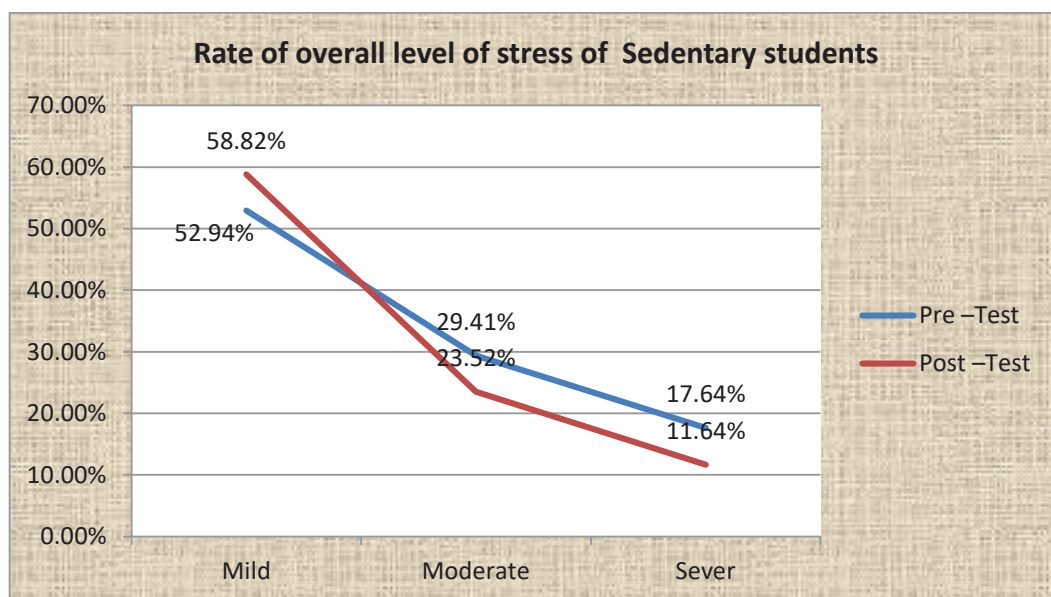


Figure 1: Rate of overall level of stress of sedentary students

Table 2: Pre and post-test of blood Pressure in Sedentary students

Blood pressure	Stages	No.	Mean Scores	Standard Deviations	T-test	P - Value
Systolic Blood Pressure	Pre Test	17	127.67	8.60	1.78NS	2.02
	Post Test	17	122.56	7.95		
Diastolic Blood Pressure	Pre Test	17	83.56	6.43	1.23NS	2.02
	Post Test	17	81.67	6.12		

Table 3: Pre and post-test of Triglycerides in sedentary students

Components	Test	No.	Mean	Std. Deviation	T-value	P Value
Triglycerides	Pre-test	17	147.649	15.67	6.921*	2.02
	Post-test	17	113.483	12.34		

Whereas, after aerobic exercise intervention, 58.82% sedentary students reported mild stress, 23.52% sedentary students reported moderate stress and only 11.64% sedentary students reported severe stress.

The Pre-test mean score of Systolic Blood Pressure (SBP) was 127.67mmHg and the post test was 122.56 mmHg respectively for sedentary students. Furthermore, the Pre-test mean score of Diastolic Blood Pressure (DBP) was 83.56 mmHg and the post test was 81.67 mmHg respectively for sedentary students.

The Pre-test mean score of Triglycerides was 147.649 mg/dl and the post test was 113.483mg/dl obtained respectively of sedentary students. The findings of the study revealed that the mean values and SDs of Triglycerides decreased following an aerobic exercise intervention in sedentary students.

Discussion

The findings of the study indicates that though the mild stress level increased, the moderate and severe level stress of sedentary students have decreased after six weeks of an aerobic exercise intervention programme. Preliminary evidence suggests that physically active people have lower rates of stress and anxiety. Economos, Hildebrandt and Hyatt, (2008), investigated that engaging in more physical activity improves psychosocial health and decreases stress.¹⁵ The several research have also shown that physical activity is an effective means of reducing anxiety and various indices of stress among adults.^{16,17} Exercise and other physical activity produce endorphins—chemicals in the brain that act as natural painkillers—and also improve the ability to sleep, which in turn reduces stress (Anxiety and depression association of America). Furthermore, the findings of the study revealed that the mean

values and SDs of SBP and DBP have decreased, but there were no significant effects of aerobic exercise intervention program on SBP and DBP of sedentary students. The findings of the study revealed that aerobic exercises training intervention reduce triglycerides. Regular participation in physical activity as well as an exercise can positively alter cholesterol metabolism. Exercise is involved in increasing the production and action of several enzymes that function to enhance the reverse cholesterol transport system. Exercise has been shown to maintain blood pressure, lower the risk of cardiovascular heart disease and lowers Triglycerides.¹⁸ Most important effect of exercise on human body is on metabolic system specially lipids. Lipid and lipoprotein are risk factors for coronary heart diseases.¹⁸ Exercise favourably changes serum lipid lipoprotein-cholesterol concentration. The hormone cortisol is released in response to stress. Studies suggest that the high levels of cortisol from long-term stress can increase blood cholesterol, triglycerides, and blood pressure. These are common risk factors for heart diseases. This stress can also cause changes that promote the build-up of plaque deposits in the arteries.¹⁸⁻²⁰ Even minor stress can trigger heart problems like poor blood flow to the heart muscle. This is a condition in which the heart doesn't get enough blood or oxygen. And, long-term stress can affect how the blood clots. This makes the blood stickier and increases the risk of stroke. An aerobic exercise

program may reduce stress and triglycerides levels in sedentary students. This research provides a platform for further research in this field with higher power and precision.

Limitation of the research

Results of this study are limited by a relatively small preliminary experimental group rather than a study of actual behaviour, which would be very difficult to achieve. A limitation of this study is that it reflects the findings of one institution; the data was collected in one institution, hence, the results may not be generalized to other institutions. Future research is warranted on estimating the level of stress by psychometric instruments and large number of sample.

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