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Original Research Article

A STUDY OF EFFECT OF REGULAR PHYSICAL EXERCISE ON SERUM HDL-C & LDL-C LEVEL AMONG STUDENTS OF JORHAT MEDICAL COLLEGE

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Abstract

Background: Physical inactivity and the associated health problems pose a current and growing threat to public health. World health organization (WHO) reports that approximately 60% of the global population don't meet the recommended daily minimum physical activity. Exercise influences both anatomy and physiology of the brain by increasing cerebral vessels, blood flow and synapses. This leads to better cognitive performance, memory retention, reaction time and mood regulation. High density lipoprotein- cholesterol (HDL-C) concentration is found to be increased with regular endurance exercise, and therefore can contribute to a lower risk of coronary artery disease. It has also been found in many researches that exercise lowers Low density lipo-protein cholesterol (LDL-C) which is known as bad cholesterol for health. **Materials and Methods:** The present study is a cross sectional study of HDL and LDL among medical students studying in JMCH, Assam in relation to physical exercise. A total no of 70 male subjects were taken, out of which 35 were taken as study group and 35 as control group. All subjects were in the age group of 20-24 years and didn't have any chronic illness. Sample collections and tests were done in college central research laboratory and results were recorded in a standard proforma. **Result:** Importance is given to find out whether there is any significant differences of HDL-C and LDL-C between study and control groups. For this purpose, unpaired student "t" test has been applied and significant differences were found as p <0.05. **Conclusion:** Regular exercise can lower cholesterol, reducing the risk of adverse health outcomes.

INTRODUCTION

In recent days coronary artery disease is found to be one of the worldwide leading cause of death. It is one of the major socioeconomic burden on public health system. Coronary artery diseases are mostly associated with elevated blood concentrations of total cholesterol (TC), low density lipoprotein (LDL) and triglycerides (TG). Patients having high serum LDL -cholesterol (LDL-C) are at increased risk for Atherosclerotic Cardiovascular disease e.g. Myocardial infarction.[1]

Plasma lipoproteins are lipids and proteins complexes which are essential for transport of cholesterol, Triglycerides (TGs) and fat soluble vitamins in the blood. Lipoproteins are classified as Chylomicrons, Very low density lipoproteins (VLDLs), Intermediate density lipoproteins (IDLs) and High Density lipoproteins (HDLs) according to their size and density.[1]

Evidence suggested that HDL-C (High density lipoprotein- cholesterol) is an independent, strong and consistent predictor of cardiovascular mortality where as high LDL-C concentration is equally associated with vascular death resulting from myocardial infarction. It is found that lower HDL-C are strongly associated with higher risk of cardiovascular and non-cardiovascular mortality compared with individuals having higher level of HDL-C.[2]

Regular physical exercise is known to have an effect in raising HDL-C level and conversely, lack of physical activity is often associated with low HDL-C levels. On the other hand increased physical activity usually have some effect in raising HDL-C.[1]

Inspite of having little impact on reducing plasma LDL-C level, regular aerobic exercises have independent benefits over cardiovascular morbidities.[1]

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Various studies suggested that higher HDL-C and lower LDL-C levels are associated with moderate physical activities in regular basis.[3] Although medication like hypolipidemic drugs are effective in reducing blood cholesterol, researches have revealed that modification of dietary habits and physical exercise is the essential approach in prevention and management of dyslipidaemia and cardiovascular morbidities.

The aim of our present study is designed to reveal the effect of regular physical exercise on serum HDL-C & LDL-C levels in the students of Jorhat Medical College & Hospital.

Objectives
a) To find out serum HDL-C& LDL-C values of students.
b) To find out the effect of exercise on HDL-C & LDL-C levels.

MATERIALS AND METHODS

After getting the approval from Institutional Ethics Committee (H), Jorhat Medical College, Assam the present study was conducted during the period July/2019 to December/2019 on 70 male students studying in Jorhat Medical College & Hospital, Assam which is a cross-sectional cohort study. Subjects were carefully assessed prior to conducting this study and only the subjects who were co-operative considered. As per standard proforma history and clinical examinations of all the subjects were done properly before starting the study.

The standard proforma contains particulars of the subjects including age, height, weight and history of any chronic illnesses.

Method of Sample Collection: The blood samples from each participants were collected in between 8—9 am in empty stomach after 12 hours of fasting. 3ml blood were collected in clot activator vial. All the samples were analysed in Semi Auto Analyser (Star 21) machine in the Central Research Laboratory of JMCH.

Inclusion Criteria
Study Group: 35 healthy male students of JMCH doing regular exercise for more than 1 year.
Age: 20—24 years.
Control Group: Control group comprises of 35 male students of JMCH, who don't perform any type of regular physical exercises.
Age: 20—24 years.
Exclusion Criteria
Female students were not taken. Students having history of any chronic illnesses were not considered too.
Parameters Recorded
Age
Height
Weight
BMI (Body Mass Index)
Serum HDL-C
Serum LDL—C
Laboratory

Central Research Laboratory (CRL), JMCH
Recording of Weight: Weight was measured with a bathroom type weighing machine. After placing the on a flat surface the pointer was corrected to zero mark before each measurement. While taking the readings the subjects were wearing minimal light clothing and were on bare feet. The weight were recorded in Kgs after asking the subjects to look straight horizontally.

Recording of Height: An anthropometer was used to record the height in centimetre. It consists of a foldable vertical rod which is graduated 0-200 centimetre (cm) and a horizontal adjustable graduated bar (1-25 cm). The subject stood erect on a flat floor bare footed against the vertical rod keeping feet parallel with heels in such a way that his buttocks, shoulders and occiput touching the vertical rod. After holding the head in erect posture eyes and ears were held horizontally and vertically respectively. The vertical rod holding the horizontal rod at a right angle was placed firmly on the head touching the top most point of the vertex. From the graduations of the vertical rod the height was measured in centimetres.

Serum Analysis: In Semi Auto Analyser machine (Star 21) of Central Research Laboratory (CRL), JMCH Serum HDL-C and Serum LDL-C were analysed.

Statistical Analysis: Student t-test (unpaired t-test) was used to find out the significance of difference in mean values. The significance of the difference of the mean was calculated by

The formula for student t-test is given by

$$ t = \frac{(X_1 - X_2)}{\sqrt{\frac{(S_1)^2}{n_1} + \frac{(S_2)^2}{n_2}}} $$

Where,
X1 = mean of the study group
X2 = mean of the control group
S1 = standard deviation of the study group
S2 = standard deviation of control group
n1= number of subjects of the study group
n2 = number of subjects of the control group
't' value was compared with the table value with (n1 + n2 – 2) degree of freedom, taking p <0.05 level of significance.

RESULTS

Present study was comprised of 70 male students studying in Jorhat Medical College. The study group consists of 35 students who used to do regular physical exercise for last 1year and the control group consists of other 35 students those who don't do any regular physical exercise, taken as the control group.
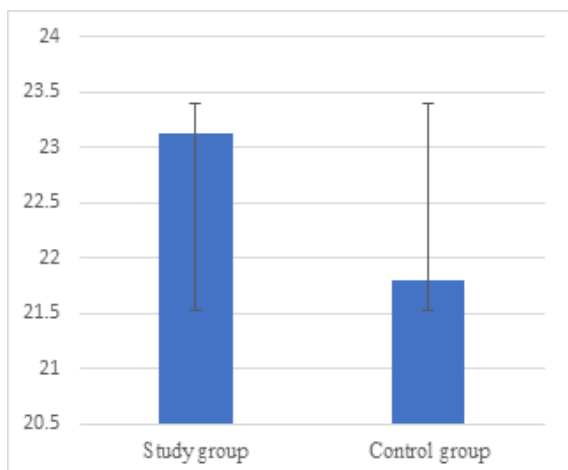
Figure 1: Bar diagram showing Mean and SD values of BMI of the Study and Control group

Interpretation: On statistical analysis applying unpaired student "t" test the differences in mean value of BMI among the Study and Control group shown in table 3 is found insignificant as "t" =0.58. Since 't' is < 2.06 so p >0.05. So, the influence of BMI was excluded.

On the other hand, as shown in table 5, significant differences were found in parameters HDL-C and LDL-C among Study group and Control group as t >2.06 (degree of freedom = 68), so p<0.05.

Table 1: Distributions of subjects in study group and control group.

Group	No	%
Study	35	50%
Control	35	50%
Total	70	100%

Table 2: Mean and Standard deviation (SD) of BMI among the study and control group

BMI	Mean	SD
Study group	23.12	2.31
Control group	21.8	2.26

Table 3: Mean ± SD of BMI among the Study group and Control group and their 't' value

Group	Study group	Control group	't' value
BMI	23.12 ± 2.31	21.8 ± 2.26	0.58

Table 4: Mean and SD values of HDL-C among study group and control group

HDL-C	Mean	SD
Study	43.82	9.3
Control	36.42	8.01

Table 5: Mean and SD values of LDL-C among study group and control group

LDL-C	Mean	SD
Study	66.88	6.70
Control	80.8	16.91

Table 6: Mean± SD of HDL-C & LDL-C in the Study and Control group "t" values

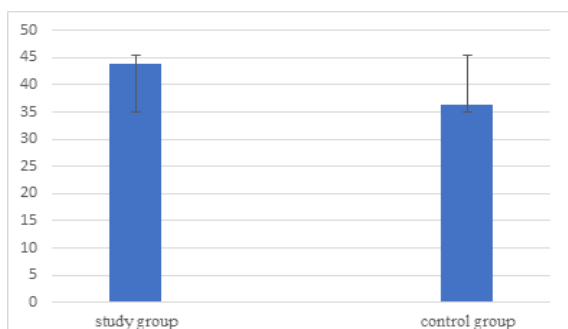| Parameters	Study group Mean± SD	Control group Mean± SD	Degree of freedom	T values
HDL-C	43.82±9.3	36.42±8.014	68	3.56
LDL-C	66.88±6.70	80.8± 16.91	68	4.52

Figure 2: Bar diagram showing Mean ± SD of HDL-C values of the Study and Control group
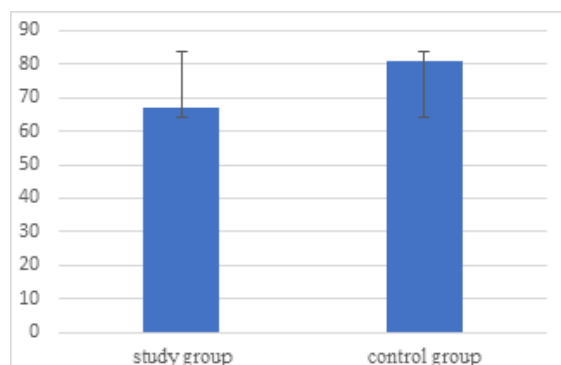

Figure3: Bar diagram showing Mean ± SD values of LDL-C in the study and control group

DISCUSSION

Our study was carried out to reveal the effect of exercise on serum HDL-C & LDL-C level on students of JMCH. By applying unpaired student "t" test for statistical analysis the variation in BMI among Study and Control group is found to be insignificant as "t" =0.58, so p>0.05.

Whereas significant differences were found in HDL-C and LDL-C parameters in the Study group and Control group as t>2.06 (degree of freedom = 68) so p<0.05. Our study shows that there is significant increase in mean serum HDL-C level in the study group than the control group and also it was also seen that LDL-C level is significantly lower in the study group than control group.

Uma Maheshwari Kannan et al conducted a study on 'Effect of Exercise Intensity on lipid profile in Sedentary Obese Adults" in the Department of Physiology at Indira Gandhi Medical College Puducherry during the period from September 2011 to June 2012. In their study they have found that there was significant reduction in the LDL-C and diastolic blood pressure in high intensity exercise group.[4] Similarly our study also showed significant reduction in serum LDL-C level in students performing regular physical exercise.

In an another study by Wang et al explain that physical activity, especially aerobic exercise increases lipoprotein lipase enzyme activity and Lecithin Cholesterol Acyltransferase (LCAT).[5] The enzymes Lipoprotein lipase and Lecithin Cholesterol Acyltransferase lower triglyceride, LDL-C, and total cholesterol while it increase HDL-C level. Moreover, aerobic exercise increases utilization of cholesterol thereby decrease serum LDL-C and subsequently prevent cardiovascular morbidity.

Many Researchers have established that regular exercise stimulates Hepatic lipoprotein lipase enzyme which helps to move LDL-C from the blood to the liver. From there, the cholesterol is converted into bile and excreted. It is also found that exercise increases the size of the protein particles that carry cholesterol through the blood.[6] The small, dense particles like LDL-C are more dangerous than the big, fluffy ones because the smaller ones can easily squeeze into the linings of blood vessels leading to atherosclerosis.

Strength and Limitations: The present study was undertaken to determine the effect of exercise on serum HDL-C & LDL-C levels on students of Jorhat Medical College . In this study we exclude the risk factor of obesity with these values based on Body Mass Index (BMI) as subjects in the Study and the Control group were properly matched in terms of age, height and weight.

Limitation of our study is that we used only BMI as an indicator of obesity. BMI is a global measure of body mass that includes both fat and lean body mass and take no account of differences in fat distribution. This might not be the standard measure because it doesn't distinguish fat mass from fat free mass (FFM).

Besides we did not categorize the intensity of exercise in our study.

We have another limitation in our study is that we didn't include all the parameters of Lipid profile as our study was only limited to serum HDL-C & LDL-C levels.

Although data collection was limited to students from a single medical college, it represents the students from different communities and geographical areas of India.

In our study female students were excluded to nullify the physiological effects of estrogen on serum lipid profile.

However, in spite of all the constraints and limitations, sincere efforts were applied during this study to bring out the effect of exercise on serum HDL-C & LDL-C values among medical students of Jorhat Medical College.

CONCLUSION

From our study it has been observed that there is significant increase in mean serum level of HDL-C in the study group than the control group. We also found that mean serum LDL-C level is significantly lower in the study group than the control group. Regular physical exercise has significant role in lowering blood cholesterol by reducing the risk of adverse health outcome.

Our study was conducted among students studying in Jorhat Medical College & Hospital, Jorhat Assam. The results of the present study should be considered as preliminary study. Further detailed study and statistical analysis with a larger sample size to be done for better conclusive result.

Now it can be concluded that regular exercise has significant effect on lowering serum LDL-C and increasing serum HDL-C level, thereby preventing Coronary artery disease.

Medical students have very little time to do regular physical exercise due to their busy daily schedule. So appropriate measures should be adopted in medical colleges so that students can spare at least 1-2 hours for regular physical exercise to adopt a healthy lifestyle.

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