

A STUDY OF SERUM LIPID PROFILE IN YOUNG ADULTS WITH ISCHEMIC HEART DISEASE

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Abstract

Introduction: The incidence of coronary artery disease is on the rise in younger age groups due to early development atherosclerosis in coronary arteries. Coronary arteries tend to develop atheromatous plaques due to change in dynamics of blood flow which is greater in diastole as compared to systole when the plaques become unstable acute coronary syndromes like myocardial infarction occur.

Methods: This cross-sectional study was performed in Prathima Institute of Medical Sciences, Nagunur, Karimnagar for the patients admitted to ICCU. A total of n=50 patients with established acute myocardial infarction in the age group of < 40 years and age and sex-matched controls of similar numbers were used for comparison. Inclusion criteria were all the patients who have ischemic chest discomfort and are diagnosed as acute coronary syndrome based on electrocardiograph, serum biomarkers, and echocardiography.

Results: The mean age of the study group was 36.1 yrs. ranging from 25 - 40 yrs. The mean level of triglycerides in the study group was 177.6 mg/dl and the control group was 128 mg/dl. The mean total serum cholesterol of the study group was 206 mg/dl and that of control was 178mg/dl. There is a significant increase in the incidence of patients with increased LDL cholesterol in the study group as compared to the control group the values were also found to be significant. The mean level of HDL cholesterol in the study group was 39.4 mg/dl and the control group was 45 mg/dl. The lowest value of HDL cholesterol in the patients of the study group was 28 mg/dl and in the control group was 35 mg/dl.

Conclusion: the levels of serum Total Cholesterol, Low-Density Lipoprotein Cholesterol, Triglycerides are elevated in young AMI patients and the levels of High-Density Lipoprotein Cholesterol are decreased compared to matched controls. There is a significant incidence of risk factors like obesity, smoking, sedentary lifestyle, family history of coronary artery disease in the study population compared to matched controls. Therefore the presence of risk factors along with family history and existence of dyslipidemia must alert physicians regarding high chances of coronary artery diseases in young adults.

Keywords: Serum Lipid Profile, Young Adults, Ischemic Heart Disease

Introduction

Ischemic heart disease is a condition in which there is an inadequate supply of blood and oxygen to a portion of the myocardium. Coronary heart disease has been defined as the impairment of heart function due to inadequate blood flow to the heart compared to its needs caused by obstructive changes in the coronary circulation to the heart. Myocardial infarction is the result of acute massive myocardial ischemia due to the total interruption of blood supply leading to the death of cardiac muscle cells[1]. Although Ischemic heart disease mainly occurs in patients older than 40 years, young men and women less than 40 years can also have ischemic heart disease. The disease carries significant morbidity, psychological effects and financial constraints for the person and the family when it occurs at a young age. The protection offered by a young age has been slowly taken away by the increased prevalence of risk factors for coronary heart disease in adolescence such as dyslipidemia, smoking, obesity and lack of physical activity. Most epidemiological data have strongly linked untreated hypertension, smoking, elevated total and low density lipoprotein and cholesterol levels to subsequent development of coronary heart disease. Strong evidence that dyslipidemia is associated with an increased incidence of coronary heart disease is provided by several studies [2-6]. Evidence supporting the relation between blood cholesterol and coronary heart disease has been strengthened by numerous animal studies showing progression and regression of atherosclerotic lesion as cholesterol levels rise and fall by natural history studies and genetic hypercholesterolemias in which marked cholesterol elevation caused premature atherosclerosis even in the absence of other risk factors[7].

Material and Methods

This cross-sectional study was performed in Prathima Institute of Medical Sciences, Nagunur, Karimnagar for the patients admitted to ICCU. Institutional Ethical committee permission was obtained for the study. Written consent was obtained from all the participants of the study. A total of n=50 patients with established acute myocardial infarction in the age group of < 40 years and age and sex-matched controls were used. Inclusion criteria were all the patients who have ischemic chest discomfort and are diagnosed as acute coronary syndrome based on electrocardiograph, serum biomarkers, and echocardiography. Patients in the study group should be less than 40 years of age irrespective of sex or being Smokers or Hypertensives or Diabetics or Obese or Sedentary. Controls are the people who are below 40 years of age and do not have ischemic heart disease and other obstructive vascular disorders and are not Smokers or Hypertensives or Diabetics or Obese or Sedentary. Exclusion criteria were Ischemic complaints due to primary valvular heart diseases like aortic stenosis, mitral valve prolapsed and patients who are already on lipid-lowering drugs. A detailed history was taken from all the patients. A comprehensive clinical examination was performed in all the patients of the study. The following investigations were done for all patients' urine for the presence of albumin, sugar, casts blood was investigated for sugar, urea, creatinine, fasting lipid profile, Creatine kinase –MB followed by 12 lead Chest Electrocardiography.

Localization OF AMI FROM ECG

1. V1 – V4 - Anteroseptal myocardial infarction
2. V1 – V6 - Anterolateral myocardial infarction
3. V1 -V6, aVL, I - Extensive anterior myocardial infarction
4. V5, V6 -Apical myocardial infarction
5. II, III, aVF - Inferior myocardial infarction
6. V3R, V4R - Right ventricle myocardial infarction

Echocardiography was done for all patients to assess ventricular function, regional wall motion abnormalities, thrombus, and pericardial effusion. A chest X-ray was done to detect cardiomegaly, pulmonary edema, and pleural effusion. The lipid profile was done with standard procedure. Blood was drawn in the morning before breakfast (Fasting 12 hrs). Anticoagulant was not used. The lipid fractions were done in the following methods[8]. The serums TC, HDL-C, VLDL-C were determined by a fully automated biochemistry analyzer. All the data was recorded in the MS Excel spreadsheet and analyzed using SPSS version 17 for significance.

Results

The mean age of the study group was 36.1yrs. ranging from 25-40 yrs. Most of the patients were in the age group of 31-40 years. The lowest age was 25 years and the highest age was 40 years. The mean age of the control group was 30.5 yrs. from 20 – 40 yrs. The pattern of distribution is shown in table 1

Table 1: Age-wise and group-wise distribution of cases in the study

Age in years	Study group	percentage	Control group	Percentage
<20	0	0	0	0
21-25	1	2	2	4
26-30	8	16	10	20
31-35	10	20	10	20
36 - 40	31	62	30	60
Total	50	100	50	100

Among the study group n= 50 patients, n=45 were males and n=5 were females. The male to female ratio was 9:1. Similar numbers of control patients were taken in the control group shown in table 2.

Table 2: Sex wise distribution of cases and controls in the study

Sex	Study group	Percentage	Control group	Percentage
Males	45	90	45	90
Females	5	10	5	10

The mean level of triglycerides in the study group was 177.6 mg/dl and the control group was 128 mg/dl. The highest value of total serum triglycerides in the patients of the study group was 324 mg/dl and in the control group was 186 mg/dl. The p values were found to be significant. The mean total serum cholesterol of the study group was 206 mg/dl and that of control was 178mg/dl. The highest value of total serum cholesterol in the patients of the study group was 351 mg/dl and in the control group was 223 mg/dl. The p values were found to be significant. There is a significant increase in the incidence of patients with increased LDL cholesterol in the study group as compared to the control group the values were also found to be significant. The mean level of HDL cholesterol in the study group was 39.4 mg/dl and the control group was 45 mg/dl. The lowest value of HDL cholesterol in the patients of the study group was 28 mg/dl and in the control group was 35 mg/dl. However, the values were not found to be significant.

Table 3: The mean lipid parameters of the patients involved in the study

Lipid Parameters	Study group	Control group	P values
Serum Triglycerides (mg/dl)	177.6 ± 53.0	128 ± 36.0	< 0.05*
Serum Total Cholesterol (mg/dl)	206.0 ± 58.8	178 ± 35.0	<0.03*
LDL-C (mg/dl)	129.2 ± 57.4	84 ± 20.0	<0.01*
HDL-C (mg/dl)	39.4 ± 9.0	45 ± 8.0	0.31

* Significant

The mean height of our study cases was 162 cm and weight 75 kg. The mean height of the control group was 168 cm and weight was 67 kg. The mean Body Mass Index of study cases was 29 kg/m² and of controls was 23kg/m². There were about 22 patients who had a BMI of > 30 kg/m². Highest BMI in the study group was 34.3 kg/m². There were n=24(48%) smokers in the study population. There were n=6(12%) cases of established hypertension among the study cases who were undergoing treatment for the same. There were n=9(18%) cases with a family history of CAD in the study group. There were no cases of diabetes mellitus in the study group and the control group. The mean value of parameters compared between these groups significant association between smoking and CAD and family history of CAD and incidence of CAD. No significant association was found with the incidence of obesity and hypertension with CAD given in table 4.

Table 4: The lipid parameters based on the Etiological factors for IHD

Lipid parameters based on Etiology	Number of patients	Total cholesterol	LDL-C mg/dl	HDL-C	TG mg/dl	P values
Smoking						
Smokers	24	204.1	129.3	38.3	181.7	0.044*
Non – smokers	26	188.5	103.4	42.5	170.1	
Controls (Non-smokers)	50	178.2	84.1	45.0	128.0	
Obesity						
Obese patients	22	216.5	139.0	36.9	196.5	0.158 NS
Non obese	28	199.5	110.5	39.5	188.5	
Controls (Non-obese)	50	178.0	84.5	45.3	128.8	
Hypertension						
With hypertension	6	223.2	136.7	41.5	198.8	0.122 NS
Non hypertensive	44	199.3	115.5	36.5	188.6	
Controls (Non Hypertensive)	50	178.03	84.5	45.3	128.8	
Family history of CAD						
With Family History	9	222.2	148.7	35.7	179.8	0.03*
Without Family History	41	202.2	145.5	36.5	180.5	
Controls (No family history)	50	178.8	84.9	45.4	128.6	

* Significant

Inferior wall MI was diagnosed in n=21(42%) of patients followed by anteroseptal MI was found in n=20(40%) Extensive anterior wall myocardial infarction was found in n=6(12%) and anterolateral MI was found in n=3(6%) of patients shown in table 5.

Table 5:Anatomical location of myocardial infarction

Area involved	No. of pts.	% of patients
Extensive anterior wall myocardial infarction(EAWMI)	6	12%
Anteroseptal myocardial infarction (ASMI)	20	40%
Anterolateral myocardial infarction (ALMI)	3	6%
Inferior wall myocardial infarction (IWMI)	21	42%
Inferior wall with Right ventricle myocardial infarction	0	0
True posterior wall myocardial infarction	0	0
Anterior and inferior wall myocardial infarction	0	0

Discussion

The present study aimed to determine the role of dyslipidemia in the cause of CAD among young adults in our study population. The study shows that there is a significant increase in dyslipidemia in the study group. The maximum incidence of AMI was between 36 to 40 yrs with a mean age of 36.1 years. The study conducted by KN Pradeep et al; [9] in their study showed a mean age of detection of CAD among young patients was 36.8 years and similarly, S. Tewari et al; [10] study showed the mean age group as 37.4 years. The sex incidence showed male preponderance with 90% and only 10% were females in this study. The results were comparable to other similar studies conducted in India by Chandurkar SN et al; [11] and BL Agarwal et al; [12] study showed males upto 93.5% and S. Tewari et al; [10] study showed CAD in males was 92%. The mean serum total cholesterol was significantly elevated in the study group (206mg/dl) when compared to controls (178 mg/dl). These values are comparable to studies conducted by J.K. Mishra et al; [13] and Santanu Guha et al; [14] Nevas et al; [15] and Corvilan B et al; [16]. In this study, we found there is a significant incidence of hypercholesterolemia in the study group 48%. It was comparable to R Gupta et al; [17] have shown an incidence of 49% hypercholesterolemia and S Tewari et al; [10] have shown an incidence of 40%. The mean level of LDL cholesterol in the study group was 129.1 mg/dl which is significantly elevated than the control group, which was 84 mg/dl. This increased level of LDL cholesterol was comparable to other studies conducted by JV Jose et al; [18] and S. Tewari et al; [10] they also have shown that increased level LDL cholesterol is atherogenic. The mean level of Triglycerides was significantly elevated in study group (177.6mg/dl) compared to the control group (128 mg/dl), these results are comparable to studies conducted by Issar et al; [19] Jacob V Jose et al; [18] G. Morgan [20] and Zimmermann FH et al; [21].

The level of HDL cholesterol less than 40 mg/dl is a definite risk factor for atherosclerosis as seen in studies of Issar et al; [19] S. Tewari et al; [10]. There is a significant increase in the incidence of low HDL cholesterol levels in this study was found in 48% of patients. The results are comparable to the studies conducted by S. Tewari et al; [10] and Osula S et al; [22]. There were no cases of Diabetes Mellitus in the study group. Studies are done previously on young adults with IHD by R Bhardwaj et al; [23] shows 20% and Ravishankar et al; [24] showed 22% incidence of the disease in this patient group. There were six cases (12%) of hypertension in the study group. The number of smokers in the study group was 24 (48%) Gurupar Singh et al; [25] in 2002 showed 40% of smokers in their study and KN. Pradeep et al; [9] showed 30% of cases with a history of smoking respectively in their study. In the present study, the family history of CAD was found in 18% of cases. The results are comparable to the study conducted by Issar et al; [19] showed 24% of cases with a family history of CAD. There is an increased incidence of hypertriglyceridemia, an increased level of LDL-C comparable to a study conducted by Rodney GB et al; [26] on lipid profile in sedentary university students. The pattern of the anatomical distribution of myocardial infarction in the present study shows most cases involving septum and inferior wall. CVN Murthy et al; [27] show the STEMI incidence of 93% in their study. In the present study, no patients died.

Conclusion

Within the limitations of the present study, it can be concluded that the levels of serum Total Cholesterol, Low-Density Lipoprotein Cholesterol, Triglycerides are elevated in young AMI patients and the levels of High-Density Lipoprotein Cholesterol are decreased compared to matched controls. There is a significant incidence of risk factors like obesity, smoking, sedentary lifestyle, family history of coronary artery disease in the study population compared to matched controls. Therefore the presence of risk factors along with family history and existence of dyslipidemia must alert physicians regarding high chances of coronary artery diseases in young adults.

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