Serum Lipid Profile in Ischemic Heart Disease:
A Cross-Sectional Analytical Study

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ABSTRACT

Risk of coronary heart disease and other forms of atherosclerotic vascular diseases, rises with plasma cholesterol concentration and in particular with the rise of ratio of total cholesterol to high density lipoprotein (HDL-C) cholesterol. A much weaker correlation also exists with plasma triglyceride concentration. Extensive large-scale randomized trials have shown that lowering total cholesterol and LDL-C concentrations reduces the risk of cardiovascular events including death, myocardial infarction and stroke and reduces the need for revascularisation.This cross-sectional analytical study was designed to observe association between lipid profile level with chronic ischaemic heart disease and the study was conducted in the Department of Biochemistry, Dhaka Medical College, Dhaka from July 2010 to June 2011. A total of 50 cases were selected purposively according to the selection criteria from the patients admitted in the Department of Cardiology, Dhaka Medical College Hospital with chronic ischaemic heart disease (IHD). Diagnosed IHD patients were taken as cases and 50 age- & sex- matched healthy subjects were taken as controls. Serum TC, TG, LDL-C & HDL-C were measured in all study subjects.The mean$\pm$SD of serum TC, TG, HDL-C and LDL-C concentration in cases were 314.54$\pm$73.72 mg/dl, 288.04$\pm$60.45 mg/dl, 36.02$\pm$4.12 mg/dl, and 178.62$\pm$22.7 mg/dl respectively and in controls were 174.64$\pm$18.97 mg/dl, 119.42$\pm$12.47 mg/dl, 43.04$\pm$2.58 mg/dl & 126.28$\pm$11.45 mg/dl respectively. Serum Total Cholesterol, TG & LDL-C were found to be significantly higher in cases than that of controls. Serum HDL-C was found to be significantly lower in cases than that of controls. The present study reveals that the patients with chronic ischemic heart disease is accociated with significantly higher levels of serum TC, TG and LDL-C whereas HDL-C was found to be lower in IHD patients.

Key words: Myocardial infarction, total cholesterol (TC), triacylglycerol, high density lipoprotein (HDL-C) cholesterol, low density lipoprotein (LDL-C) cholesterol.

Introduction

Atherosclerosis is a progressive inflammatory disorder of the arterial wall that is characterized by focal lipid-rich deposits of atheroma. Atherosclerosis begins early in life. Abnormalities of arterial function have been detected among high-risk children and adolescents, such as cigarette smokers and those with familial hyperlipidemia or hypertension[1]. In the recent past there has been an addition of several molecular markers to the well established risk factors of smoking, family history, hypertension, diabetes and high levels of LDL cholesterol[2]. In current strategies of coronary risk assessment, lipid testing in the blood routinely recommended[3]. Because of critical importance of LDL-C in atherogenesis, LDL-C is the focus for the determination of the risk of coronary disease[4].

Materials and Methods

The study was carried out in the Department of Biochemistry, Dhaka Medical College, Dhaka during the period of July 2010 to June 2011. The patients were taken from the Department of Cardiology, Dhaka Medical College Hospital. Fifty diagnosed chronic IHD patients of both sexes with age range of 30-65 years were taken as cases and 50 age and sex matched healthy volunteers were taken as controls. Cases were the diagnosed (positive ECG findings) chronic IHD patients of both sexes admitted in the hospital during the study period. Of the cases 31 were males and 19 were females and in controls 28 were males and 22 were females. Fasting lipid profile was measured in all study subjects using standard laboratory method. All statistical analyses were done by SPSS, version 17.0. Results were expressed as mean±SD. Student's 't' test was done to see the difference between groups and $P < 0.05$ was considered as significant.

Results

Sex distribution of the study subjects are presented in Table-I. Cases included 31 males and 19 females of chronic IHD patients of age range 30-65 years. In healthy controls 28 were males and 22 were females with an age range 30-65 years.

Table-I: Sex distribution of the study subjects

Sex	Cases (n=50)	Controls (n=50)
Male	31 (62.0)	28 (56.0)
Female	19 (38.0)	22 (44.0)

Figures in parentheses indicate percentages

Table-II shows the lipid profile in different groups. Mean±SD of serum TC, TG, HDL-C and LDL-C in cases were 314.54±73.72 mg/dl, 288.04±60.45 mg/dl, 36.02±4.12 mg/dl and 178.62±22.7 mg/dl respectively and in controls were 174.64±18.97 mg/dl, 119.42±12.47 mg/dl, 43.04±2.58 mg/dl and 126.28±11.45 mg/dl respectively. It showed that mean (±SD) of TC, TG, LDL-C were significantly higher in cases than that of controls and mean (±SD) HDL-C was significantly lower in cases than that of controls.

Table-II: Lipid profile of the study subjects

Parameters	Cases (n=50)	Controls (n=50)	t value	p value
TC (mg/dl)				
Mean±SD	314.54±73.72	174.64±18.97	12.995	0.0001*
Range	160.00 -440.00	130.00 -210.00		
TG (mg/dl)				
Mean±SD	288.04±60.45	119.42±12.47	19.316	0.0001*
Range	171.00 -370.00	90.00 -150.00		
LDL c (mg/dl)				
Mean±SD	178.62±22.70	126.28±11.45	14.557	0.0001*
Range	150.00 -230.00	104.00 -150.00		
HDL c (mg/dl)				
Mean±SD	36.02±4.12	43.04±2.58	10.207	0.0001*
Range	20.00 -40.00	40.00 -48.00		

p value reached from unpaired student's 't' test.
* indicates significance.

Discussion

In atherosclerosis, fatty streaks tend to occur at sites of altered arterial shear stress such as bifurcations and are associated with abnormal endothelial function. They develop when inflammatory cells, predominantly monocytes, bind to receptors expressed by endothelial cells, migrate into the intima, take up oxidized low-density lipoprotein (LDL) from the plasma and become lipid laden foam cells or macrophages. Extra-cellular lipid pools appear in the intimal space when these foam cells die and release their contents. Smooth muscle cells then migrate from the media of the arterial wall into the intima, in response to cytokines and growth factors produced by the activated macrophages, change from a contractile to a repair phenotype in an attempt to stabilise the atherosclerotic lesion. If they are successful, the lipid core will be covered by smooth muscle cells and matrix, producing a stable atherosclerotic plaque that will remain asymptomatic until it becomes large enough to obstruct arterial flow[1]. Jelovesk (1997) has categorically proposed hypercholesterolemia and hyperlipidemia as risk factors for vascular disease[5]. The present study has revealed the

mean$\pm$SD of serum TC, TG, HDL-C and LDL-C in cases were 314.54$\pm$73.72 mg/dl, 288.04$\pm$60.45 mg/dl, 36.02$\pm$4.12 mg/dl and 178.62$\pm$22.7 mg/dl respectively and that in controls were 174.64$\pm$18.97 mg/dl, 119.42$\pm$12.47 mg/dl, 43.04$\pm$2.58 mg/dl and 126.28$\pm$11.45 mg/dl respectively. In our study TC, TG and LDL-C values were found to be significantly higher and HDL-C value was found to be significantly lower in cases compared to that of controls. These findings are in agreement with that of other studies[6-8]. Growing evidences support that atherosclerosis is an inflammatory process initiated by vascular injury, oxidized LDL, reactive oxygen species, diabetes mellitus and infections. Several plasma markers of inflammation have been evaluated as potential tools for the prediction of the coronary events[9]. To predict the patients at risk of progression to an acute vascular event there has been an addition of several molecular markers in recent past to well established risk factors like smoking, family history, life style, hypertension, diabetes & high level of LDL cholesterol[3]. Cholesterol screening has been used as a tool to identify individuals who are at increased risk of developing future coronary events[10]. A number of predisposing factors affect the development of ischemic heart disease (IHD) and to date more than 246 risk factors have been identified including dyslipidemia, a major risk factor for development of atherosclerosis[11]. This study suggests that even in modern era, lipid profile still is a promising predictive biomarker of coronary risk assessment.

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