

Comparison of Lipid Profile Levels in AMI Patients With and Without Diabetes Mellitus

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Abstract

Present study was aimed to assess lipid profile in diabetic and non-diabetic patients with history of myocardial infarction. *Methods:* Study conducted in the Department of Biochemistry, Indian Institute of Medical Science and Research, Warudi, Tq. Badnapur, District Jalna (M.S.) in collaboration with Hedgewar hospital during period of 2015-17. Biochemical investigations include fasting blood sugar, postprandial blood sugar and lipid profile (total cholesterol, triglyceride, LDL-cholesterol, HDL-cholesterol and VLDL). *Results:* Present study shows significant increase in the levels of triglyceride, LDL-cholesterol, while cholesterol level increases non-significantly. HDL-cholesterol levels decreased significantly in patients of myocardial infarction (MI) with diabetes mellitus compared to non-diabetic patients with history of myocardial infarction. *Conclusion:* Diabetic patients with history of myocardial infarction were having significantly deranged lipid parameters and higher risk of dyslipidemic complications as compared to nondiabetic patients with history of myocardial infarction.

Keywords: AMI (Acute Myocardial Infarction); HDL (High Density Lipoprotein); LDL (Low Density Lipoprotein); Diabetic & Non-Diabetic.

Introduction

Diabetes mellitus is a group of metabolic disease characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both [1]. Hyperlipidemia and altered lipid metabolism is seen in diabetes. The chronic hyperglycemia is associated with hyperlipidemia which leads to vascular complications. Patients with type II Diabetes mellitus are on higher risk of cardiovascular disease associated with atherogenic abnormalities and dyslipidemia [2]. This dyslipidemia is characterized by increased plasma triglyceride concentration, increased cholesterol concentration increased LDL-cholesterol concentration while decreased concentration of HDL-cholesterol [3].

Cardiovascular disease is defined as "impairment of heart function due to inadequate flow of blood to the heart compared to its need caused by obstructive changes in the coronary artery disease especially MI is the leading cause of morbidity and mortality worldwide [4].

There are several risk factors for MI such as hypertension, smoking, family history of obesity. Independently of the presence or absence of other risk factors DM add to the risk for CVD.

Materials and Methods

This study was conducted in the Department of Biochemistry, Indian Institute of Medical Science and Research, Warudi, Tq. Badnapur, District Jalna (M.S.) and in collaboration with Hedgewar hospital, Aurangabad (M.S.) during period of 2015-17. The study was clearance from Institutional ethical committees.

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Total 60 patients were included in this study. Patients were divided into two groups. Group I consists of 30 patients suffering from myocardial infarction without diabetes mellitus and Group II consists of 30 patients suffering from myocardial infarction with diabetes mellitus. The diagnosis of myocardial infarction was based on a history of prolonged chest pain, ECG changes and elevated CK-MB level within 12 hours after the onset of chest pain. The patient with other complications like liver disease, bone disease, kidney disease and inflammatory disease were excluded from the study. Biochemical investigations include fasting blood sugar (FBS), postprandial blood sugar (PPBS), CK-MB and lipid profile (total cholesterol, triglyceride, LDL-cholesterol, HDL-cholesterol and VLDL) were carried out.

Statistical Analysis

Statistical analysis were carried out by SPSS software and p values were obtained.

Results

Data from investigations of all patients were tabulated in the MS-Excel sheet for their mean \pm SD and following observations were made

Table 1: Biochemical marker in myocardial patients with and without diabetes (Group I AMI without DM, Group II AMI with DM)

Parameters	Group I	Group II	'p' value
CK-MB (IU/L)	102.0 \pm 19.69	152.0 \pm 27.6	<0.001
FBS (mg%)	99.23 \pm 6.68	180.6 \pm 89.4	0.000
PPM (mg%)	130.4 \pm 34.2	224.0 \pm 114.0	0.000
Total cholesterol (mg%)	168.0 \pm 32.1	185.0 \pm 51.5	0.092
LDL-C (mg%)	111.1 \pm 32.3	131.6 \pm 31.2	0.009
HDL (mg%)	37.5 \pm 13.7	40.3 \pm 13.8	0.401
TG (mg%)	131.7 \pm 60.0	168.2 \pm 66.4	0.019
VLDL (mg%)	26.3 \pm 12.0	30.6 \pm 15.1	0.037

Above table 1 shows the levels of CK-MB ($p < 0.001$), triglyceride ($p = 0.019$), LDL-C ($p = 0.009$) & VLDL ($p = 0.037$) was significantly increased in patients of myocardial infarction with diabetes mellitus while cholesterol level increased in patients of myocardial infarction with diabetes mellitus and HDL cholesterol level decreased in patients of myocardial infarction with diabetes mellitus compared to non-diabetic MI patients.

Discussion

Findings of our study were similar to previous studies [6,7,9]. Cholesterol level in AMI patients

with diabetes mellitus as compared to patients of AMI without diabetes mellitus.

It has been hypothesized that hyperplasia of diabetes induces increased activity of HMG-CoA reductase of the intestine resulting in increased synthesis of cholesterol leading to raised levels in plasma. Dietary cholesterol also adds upto total cholesterol by increased absorption [2,8].

LDL-C our study shows significant increase in LDL-C level in patients of AMI with diabetes mellitus than in patients of AMI without diabetes mellitus. Other previous research studies showed more or less similar findings [9,10]. Small dense LDL particles appear to arise from the intravascular processing of specific larger VLDL precursors through a series of steps, including lipolysis. Further triglyceride enrichment of the lipolytic products through the action of cholesteryl ester transfer protein together with hydrolysis of TG and phospholipids by hepatic lipase leads to increase production of small dense LDL particles [10,11]. (lipids and lipoproteins in patients with type II DM Ronald M. Krauss American Diabetes Association Diabetes Care).

In our study HDL-C level in AMI patients with diabetes mellitus is not statistically significant but it shows decreased HDL level in AMI patients with diabetes mellitus than that of in AMI patients without diabetes mellitus. The findings of our study were correlate with the previous studies [3-5,7]. Lower HDL-C in diabetes may be due to reduced lipoprotein lipase activity [2,13,14].

Our study shows significant increase in level of triglyceride in AMI patients with diabetes mellitus. Similar findings were shown by previous studies [1,3,9,15]. Hypertriglyceridemia may be due to higher rates of production of triglyceride rich VLDL by liver and to decreased removal of triglyceride by peripheral tissue, primary adipose tissue and muscle [2,15,16]. Insulin deficiency leads to high triglyceride production and subsequent high packaging in VLDL.

Our study showed increase in VLDL level in AMI with diabetes mellitus than in non-diabetic AMI patients but increase is not significant. Similar findings were also noted by previous studies [4,5,12,17]. Lipid metabolism in type II diabetes is modulated by series of factors among which the degree of glycemic control and the presence of insulin resistance are two most important player. One major consequence of insulin resistance of lipid metabolism is the loss of the suppressive effect

of insulin ob fat mobilization from adipose tissue. As a result there is an increase in free fatty acids flux owing to reduced suppression of lipolysis. The failure of suppress FFA in the postprandial period, due to the decreased activity of lipoprotein lipase and the rise in plasma FFA due to increased adipocyte lipolysis are key reasons behind increased VLDL.

Conclusion

Diabetic patients with history of myocardial infarction were having significantly deranged lipid parameters and higher risk of dyslipidemic complications as compared to nondiabetic patients with history of myocardial infarction.

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