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Research Article

Lipid profile of patients with diabetes mellitus: a cross sectional study

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ABSTRACT

Background: Dyslipidemia is one of the common disorders which is seen in most of the diabetes patients, which causes cardio vascular disorders. Objective: To detect the lipid abnormality in diabetic patients.
Methods: The study was carried out at Medicine Department, K.J. Mehta hospital, Amargadh, Bhavnagar during period from September 2014 to August 2015. The lipid profiles and the fasting blood sugar values of 100 type-1 diabetic patients, 100 type-2 diabetic patients and 50 healthy subjects were studied after taking informed consent. Their serum samples were assessed for fasting blood glucose (FBG), total cholesterol (TC), triglycerides (TG), low density lipoprotein cholesterol (LDL) and high density lipoprotein cholesterol (HDL) by using standard biochemical methods. The data was collected by predesign, pretested proforma and analyzed using SPSS 17.0 (Trial version).
Results: Maximum Number of patients (37% and 44%) were from age group of 20-29 years in type-1 DM & 50-59 years in type-2 DM respectively. 53% cases of type-1 DM and 70 % cases of type-2 DM had less than 140 mg/dl level of Fasting Blood Sugar (FBS. 49 % patients of type-1 DM and 30% of type-2 showed more than 200 mg/dl level of Post Prandial Blood Sugar (PPBS). Majority of type 2 DM patients (72%) showed high serum cholesterol level, while only 12% of the type1 DM patients showed high serum cholesterol level. 95% of type 1 DM patients showed normal (10-190 mg/dl) serum triglyceride level, while only 26% of type 2 DM subjects showed normal level. Serum LDL level was high (>160 mg/dl) in 78% of type 2 DM patients, while only 19% of type 1 DM patients showed higher value. All patients of type 2 had normal serum HDL level.
Conclusions: The frequencies of the high cholesterol, high TG and high LDL levels were higher in the diabetic group, thus indicating that diabetic patients were more prone for dyslipidemia, which could cause cardiovascular disorders.

Keywords: Lipid profile, Dyslipidemia, Diabetes, Serum cholesterol, Serum triglyceride, Serum LDL

INTRODUCTION

Diabetes Mellitus (DM) is a group of metabolic diseases characterized by increase blood glucose level resulting from defects in insulin secretion, insulin action, or both.[1] The prevalence of diabetes is on the rise, more alarmingly in the developing nations. The number of diabetic patients in the world has been estimated more than 175 million. Diabetes mellitus is ranked 7th among leading causes of death & has been rated 3rd when all its fatal complications are taken in to account. Patients with type-2 diabetes have increased risk of cardiovascular disease associated with atherogenic dyslipidemia. Coronary artery disease, especially myocardial infarction is the leading cause of morbidity and mortality worldwide.[2] Hyperglycemia and atherosclerosis are related in type-2 diabetes.[3] Besides multiplying the risks of coronary artery diseases, diabetes enhances incidences of cerebrovascular

strokes. Moreover, it is the leading cause of acquired blindness & accounts for more than 25% cases with end stage renal diseases as well as 50 % non-traumatic lower limb amputations. Being a pan metabolic disorder, diabetes is characterized by alteration in lipid profile, both quantitative & qualitative. Persistent hyperglycemia causes glycosylation of all proteins, especially collagen cross linking and matrix proteins of arterial wall. This eventually causes endothelial cell dysfunction, contributing further to atherosclerosis. The prevalence of dyslipidemia in diabetes mellitus is 95%.[4] The dyslipidemia is a major risk factor for Coronary Heart Disease (CHD).[5] The cardiovascular disease is a cause of morbidity and mortality in patients with diabetes mellitus because of disturbance in lipoproteins i.e. serum triglycerides (TC) 69%, serum cholesterol 56.6%, Low-Density Lipoprotein cholesterol (LDL) 77% and High Density Lipoprotein cholesterol (HDL) 71%.[6,7]

In uncontrolled diabetes, serum triglycerides, Very Low Density Lipoproteins (VLDL), cholesterol are raised both at fasting & following fixed meal. In post mixed meal Chylomicrons remnants & Low Density Lipoproteins (LDL) remain high for longer period than normal. Total cholesterol & LDL are mild to moderate high in 1/3 patients. On other end HDL remain significantly low particularly in type-2 diabetes patients with central obesity. Among changes in composition of Lipoproteins high proportion of small, dense triglyceride rich LDL & glycoxidation products of LDL are considered to be most atherogenic. Age adjusted incidence of coronary artery diseases is 3 to 5 times higher in both male & female diabetics compare to general population. Individuals with diabetes may have several forms of dyslipidemia leading to additive cardiovascular risk of hyperglycemia. So lipid abnormalities should be aggressively detected & treated as a part of comprehensive diabetic care. The rationale of this study was to detect the lipid abnormality in diabetic patients.

METHODS

The study was carried out at Medicine Department, K.J. Mehta hospital, Amargadh, Bhavnagar during period from September 2014 to August 2015. Total two hundred patients of diabetes Mellitus were selected from diabetic clinic, outdoor patient department, in door admissions for this study, amongst which, one hundred patients were of type-1 DM with age group of 13-56 years and another one hundred patients were of type-2 DM with age group of 35 -74 years. 50 normal healthy volunteers between age group of 13-75 years were selected for control study. The detail history was taken; relevant clinical examination and all routine investigations were performed. An informed consent was taken from every patient after full explanation of procedure. Every patient was advise for at least 12-14 hours overnight fasting and the 5ml venous blood sample were collected in a disposable syringe on next morning (before breakfast) for the serum lipid profile and fasting blood sugar (for the assessment of blood glucose level). The lipid profiles were evaluated. The known cases of type 2 diabetes mellitus will also be evaluated for their blood sugar (control or un-control) by advising the HbA1C level. The data was collected by predesign, pretested proforma and analyzed using SPSS 17.0 (Trial version).

RESULTS

Maximum number of patients (37% and 44%) were from age group of 20-29 years in type-1 DM & 50-59 years in type-2 DM respectively. Mean age in type 1 DM group was 32.6 years & in type 2 DM group was 53.2 years. Majority of cases (40%) of type 2 DM showed positive family history, in contrast only 13% type 1 DM cases showed of positive family history. Majority of the type 2 DM patients (16%) were diagnosed within 5 years and majority of the type 1 DM patients (43%) were diagnosed more than 10 years. 68% of the patients of type 2 DM were obese, in contrast only 11% of the patients of type-1 DM were obese. 53% cases of type-1 DM and 70 % cases of type-2 DM had less than 140 mg/dl level of Fasting Blood Sugar (FBS. 49 % patients of type-1 DM and 30% of type-2 showed more than 200 mg/dl level of Post Prandial Blood Sugar (PPBS).

Majority of type 2 DM patients (72%) showed high serum cholesterol level, while only 12% of the type1 DM patients showed high serum cholesterol level. In control group all persons had normal serum cholesterol level (Table 1). 95% of type 1 DM patients showed normal (10-190 mg/dl) serum triglyceride level, while only 26% of type 2 DM subjects showed normal level (Table 2). Serum LDL level was high (>160 mg/dl) in 78% of type 2 DM patients, while only 19% of type 1 DM patients showed higher value (Table 3). In type 1 DM patients 95% of them showed normal (<40 mg/dl) serum HDL value and 5% showed higher value. All patients of type 2 had normal serum HDL level (Table 4). In type 1 DM patients, all the mean values of lipid profile were in normal limit in both sexes. Female have shown slight higher mean level of S. cholesterol, S. triglyceride, S. LDL and S. HDL level as compared to male (Table 5). In type 2 DM patients, both the sexes have shown higher value, but in female S. cholesterol, S. triglyceride, S. LDL and S. HDL were higher as compared to male (Table 6).

Table 1: Distribution of the controls and patients according to their serum cholesterol level.

Serum cholesterol level (mg/dl)	Control group	Type 1 DM	Type 2 DM
<150	00	03	00
151-250	50	85	28
251-300	00	12	45
301-350	00	00	18
351-400	00	00	09
Total	50	100	100

Table 2: Distribution of the controls and patients according to their serum triglyceride level.

Serum triglyceride level (mg.%)	Control group	Type 1 DM	Type 2 DM
<150	50	94	26
150-199	00	04	26
200-499	00	02	34
≥500	00	00	14
Total	50	100	100

Table 3: Distribution of the controls and patients according to their serum LDL level.

Serum LDL	Control	Type I DM	Type 2 DM
<130	24	23	03
130-159	26	58	19
>160	00	19	78
Total	50	100	100

Table 4: Distribution of the controls and patients according to their serum HDL level.

Serum HDL (mg/dl)	Control	Type I DM	Type 2 DM
<40	48	95	100
≥60	02	05	00
Total	50	100	100

Table 5: Gender wise distribution of lipid profile of type-1 DM patients (Mean values).

Sex	Serum cholesterol mg% mean	Serum triglyceride mg% mean	S. HDL mg% mean	S. LDL mg% mean
Female	205	139.07	52.11	126.99
Male	199.88	125.77	48.19	125.25

Table 6: Gender wise distribution of lipid profile of type-2 DM patients (Mean values).

Sex	Serum cholesterol mg% mean	Serum triglyceride mg% mean	S. HDL mg% mean	S. LDL mg% mean
Female	284	253.25	39.03	195.95
Male	277	246.17	36.88	189.03

DISCUSSION

Diabetes is associated with a greater risk of mortality from cardiovascular disease (CVD) which is well known as dyslipidemia, which is characterized by raised triglycerides, low high density lipoprotein and high small dense low density lipoprotein particles. It may be present at the diagnosis of type 2 Diabetes mellitus and is a component of the metabolic syndrome. Abnormal serum lipids are likely to contribute to the risk of coronary artery disease in diabetic patients.[8] Lipid abnormalities are common in diabetics and frequently seen in type-2 diabetics. Dyslipidemias make diabetics prone to develop coronary heart diseases (CHD and other complications of atherosclerosis. In our study majority of type 2 DM patients (72%) showed high serum cholesterol level, while only 12% of the type1 DM patients showed high serum cholesterol level. According to the CDC, 97% of adults with diabetes have one or more lipid abnormalities while the prevalence of diabetic dyslipidemia varies from 25% to 60% in other studies.[9] This variation in prevalence may be due to differences in BMI and possibly genetic variation. A study conducted in Nishtar Hospital, Multan by Ahmad et al. showed that 21% patients with type-2 diabetes had raised serum cholesterol (>200 mg/dl) and 34. 2% patients have raised triglycerides in serum (>150 mg/dl).[10] In our study serum TG was raised in 48 % of the type 2 DM patients. The values of serum TG in our study are consistent with above mentioned study. The reason for difference in serum cholesterol values may be due to difference in the dietary habits of the people. Another study conducted at Hazara division Pakistan on "Frequency of dyslipidaemia in type 2 diabetes mellitus in patients of hazara division" showed that serum triglyceride was raised in 59%.[11] In Singapore, fasting serum TG levels, but not HDL and LDL concentrations, were found to be higher among persons with type 2 DM than those of nondiabetics.[12]

High TG levels cause increased transfer of cholesteryl esters from HDLC and LDLC to very VLDLC via cholesteryl ester transfer protein, thus forming cholesteryl ester depleted, small dense LDLC particles.[13] These small dense lipoprotein particles are taken up by arterial wall macrophages, resulting in atherogenesis.[14]

HDL acts by enhancing the removal of cholesterol from peripheral tissues and so reduces the body's cholesterol pool. Type 2 DM was usually associated with low plasma levels of HDL-C.[15] In our study, all patients of type 2 had normal or low serum HDL level. Low HDL-C concentrations are often accompanied by elevated triglyceride levels as seen in this study and others,[16] and this combination has been strongly associated with an increase in risk of Coronary Heart Disease (CHD).[17-19]

CONCLUSION

Hyperlipidemia is the commonest complication of diabetes mellitus and it predisposes them to premature atherosclerosis and macrovascular complications. Common lipid abnormalities in diabetes are raised triglycerides, raised serum LDL, raised serum cholesterol and low serum HDL. The important impact of dyslipidemia on cardio vascular complications requires undivided attention throughout the course of disease.

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Ethical approval: The study was approved by the institutional ethics committee

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