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Original Research Article

A Case Control Assessment of Lipid Profiles Mainly Triglycerides in Diabetic Patients in Bihar Region

Chandra Shekhar Das[1], Rajeshwer Kumar Ranjan[2], Chirag Agrawal[3]

[1]Senior Resident, Department of General Medicine, Nalanda Medical College & Hospital, Patna, Bihar, India
[2]Assistant Professor, Department of General Medicine, Medini Rai Medical College and Hospital, Palamu, Jharkhand, India
[3]Junior Resident, Department of General Medicine, Nalanda Medical College & Hospital, Patna, Bihar, India

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Corresponding author: Dr. Rajeshwer Kumar Ranjan
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Abstract

Background: Dyslipidemia is one of the common disorders which is seen in most of the diabetes patients, which causes cardiovascular disorders.

Objective: To detect the lipid abnormality in diabetic patients.

Methods: The present study was planned in Department of General Medicine, Nalanda Medical College & Hospital, Patna over a period of 5 months. For the present study total 100 patients were selected and a total of 50 patients were enrolled in the group A as diabetic group and remaining 50 patients were enrolled in group B as normal patients.

Results: The biochemical parameters like Fating glucose level, Glycated haemoglobin (HbA1c), Total cholesterol, Triglycerides, High Density Lipid, and Low-Density Lipid were estimated.

Conclusion: Diabetes has now become a global endemic in both developing and developed countries. Hence it is the need of the hour for early detection and prevention of this non-communicable disease.

Keywords: Serum Triglyceride, Diabetes, LDL, HDL.

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]

Lipid abnormalities in patients with diabetes, often termed “diabetic dyslipidemia”, are typically characterized by high total cholesterol (T-Chol), high triglycerides (Tg), low high density lipoprotein cholesterol (HDL-C) and increased levels of small dense LDL particles. Low density lipoprotein cholesterol (LDL-C) levels may be moderately increased or normal. Lipid abnormalities are common in people with T2DM and prediabetes [4, 5] but the pattern of the different lipids may vary between ethnic groups, economic levels, and access to health care [6, 7]. A recently published meta-analysis reported that abnormal levels of the above-mentioned lipid parameters reflect, to some extent, the risk of T2DM [8]. Furthermore, studies in people with T2DM have found an increased association between CAD and high Tg and low HDL-C combined, compared to the two lipid parameters assessed separately [9,10].

In the human body, high levels of triglycerides in the bloodstream have been linked to atherosclerosis, heart disease and stroke. However, the relative negative impact of raised levels of triglycerides compared to that of LDL: HDL ratios is as yet unknown. The risk can be partly accounted for by a strong inverse relationship between triglyceride level and HDL-cholesterol level. But the risk is also due to high triglyceride levels increasing the quantity of small, dense LDL particles. [11]

Current recommendations for cholesterol testing come from the Adult Treatment Panel (ATP) III guidelines, and are based on many large clinical studies, such as the Framingham Heart Study. For healthy adults with no cardiovascular risk factors, the ATP III guidelines recommend screening once every five years. [12]

The prevalence of dyslipidemia in diabetes mellitus is 95%.[13] The dyslipidemia is a major risk factor for Coronary Heart Disease (CHD).[14] 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%.[15, 16]

A lipid profile may also be ordered at regular intervals to evaluate the success of lipid-lowering drugs such as statins. In the pediatric and adolescent population, lipid testing is not routinely performed. However, the American Academy of Pediatrics and NHLBI now recommend that children aged 9–11 be screened once for severe cholesterol abnormalities. [17]

Glycated haemoglobin (HbA1c) is a routinely used marker for long-term glycemic control. Apart from functioning as an indicator for the mean blood glucose level, HbA1c also predicts the risk for the development of diabetic complications in diabetes patients. [18] Many studies have proposed HbA1c to be used as a biomarker of both glycemic control and dyslipidemia in type 2 diabetes mellitus. [19-21]

Dyslipidemia are disorders of lipoprotein metabolism, including lipoprotein overproduction or deficiency. It is a preventable risk factor which is mostly observed in diabetes patients and that may precipitate the cardiovascular disorders. Therefore, this study aims to detect the lipid abnormality in diabetic patients.

Materials and Methods:

The present study was planned in Department of General Medicine, Nalanda Medical

College & Hospital, Patna over a period of 5 months.

Inclusion criteria: Type 2 diabetes mellitus patients in the age range of 20-65 years.

Exclusion criteria: Patients with concomitant diseases or conditions affecting lipid levels like chronic liver disease and hypothyroidism. Patients on drugs like oral contraceptive pills, steroids and diuretics. Smokers, alcoholics, patients with history of liver and renal impairment were excluded from the study.

For the present study total 100 patients were selected and a total of 50 patients were enrolled in the group A as diabetic group and remaining 50 patients were enrolled in group B as normal patients.

Results:

For the present study total 60 patients were selected. Out of 100 patients total 50 patients were enrolled in the group A as diabetic group and remaining 30 patients were enrolled in group B as normal patients. (Table 1) The biochemical parameters like Fasting glucose level, Glycated haemoglobin (HbA1c), Total cholesterol, Triglycerides, High Density Lipid, and Low Density Lipid were estimated.

The biochemical parameters like Fating glucose level, Glycated haemoglobin (HbA1c), Total cholesterol, Triglycerides, High Density Lipid, and Low Density Lipid were estimated. (Table 2)

Table 1: Comparison of General Parameter

Group	**Group A**	**Group B**
Type of Patients	Diabetic patients	Controlled study patients
No. of Patients	50	50
Age Group	20 – 65 years	20 – 65 years
Males	33	27
Females	17	23

Table 2: Comparison of Biochemical Parameter

Group	**Group A**	**Group B**
Type of Patients	Diabetic patients	Controlled studypatients
No. of Patients	50	50
Bio Chemical Parameter	Observation	
Triglycerides (mg %)	193.28 ± 27.3	171.6 ± 21.4
Fasting glucose level (mg %)	167.6 ± 9.2	92.7 ± 5.8
Glycated haemoglobin		
(HbA1c) (%)	7.5 ± 1.4	6.1 ± 1.0
Total cholesterol (mg %)	172 ± 14.8	17.6 ± 12.6
High Density Lipid (mg %)	38.2 ± 6.8	53.7 ± 7.9
Low Density Lipid (mg %)	126.1 ± 18.5	96.2 ± 21.7

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. [22] 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. [23]

Lipid profile and diabetes have been shown to be the important predictors for metabolic disturbances including dyslipidemia, hypertension and cardiovascular diseases [24].For the interpretation of serum lipid reference values, the guidelines of National Cholesterol Education Programme (NCEP) Adult Treatment Panel III (ATP III) were followed. According to NCEP-ATPIII guidelines, hypercholesterolemia is defined as TC > 200 mg/dl, high LDL-C when value > 100 mg/dl, hypertriglyceridemia as TAG > 150 mg/dl and low HDL-C when value is < 40 mg/dl. Dyslipidemia was defined by presence of one or more than one abnormal serum lipid concentration. [24]

In an insulin-resistant state, hypertriglyceridemia is primarily due to an increased hepatic production of very low density lipoprotein (VLDL) particles, postprandial hyperlipidemia, and low lipoprotein lipase (LPL) levels. This hypertriglyceridemia enhances the CETP mediated interchange of Tg from Tg-rich lipoproteins to HDL-L/HDL-VL and the subsequent Tg-enrichment of HDL-C. Hepatic lipase has greater activity against Tg and will, thus, convert large HDL particles to small HDL particles, which are also cleared more rapidly from the circulation by the kidney, consequently reducing the concentration of HDL particles (HDL-P). [25, 26]

Senthilkumar et al [27], conducted a perspective study on 162 type 2 diabetes mellitus patients in Tamil Nadu. They found no significant correlation of HbA1c with TC, LDL, HDL and TG.

Jayesh et al [28] conducted a prospective study on western Indian population that comprised of 430 type 2 diabetes mellitus patients and 501 non diabetic control subjects. They found significant correlation of HbA1c with TC and LDL.

Eglal et al [29] a study on 50 type 2 diabetes mellitus patients in Khartoum Sudan, they found significant correlation of HbA1c with TG. Diabetic patients have many complications which include elevated levels of LDL-C and triacylglycerol's, low levels of HDL-C and a preponderance of abnormalities in the composition of the smaller, dense particles [30]. Similar findings found in study done by Idogun, et al. [31] and Albrki, et al. [32] and observed that lipoprotein profiles of the diabetics were found higher than normal reference values.

Conclusion:

The diabetic patients had elevated serum total cholesterol, elevated triglyceride. The slightly elevated low density lipoprotein (LDL-C) and reduced levels of high density lipoprotein (HDL-C) indicating that diabetic patients were more prone to cardiovascular diseases. Diabetes has now become a global endemic in both developing and developed countries. Hence it is the need of the hour for early detection and prevention of this non-communicable disease.

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