

Original Research Article

Pattern of lipid profile in type 2 diabetes mellitus-a study from north Bihar

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ABSTRACT

Background: Diabetes mellitus refers to a group of common metabolic disorders that share the phenotype of hyperglycemia. Type 2 Diabetes Mellitus (DM) is a heterogeneous group of disorders characterized by variable degree of insulin resistance, impaired insulin secretion, and increased glucose production.

Methods: To study of pattern of lipid profile in type 2 diabetes mellitus, 100 cases of type 2 Diabetes Mellitus attending the tertiary care centre were selected. The result was compared with 25 healthy, non-obese, non-diabetic and non-hypertensive subjects.

Results: Triglyceride (TG) and very low-density lipoprotein (VLDL) were significantly higher whereas high density lipoprotein (HDL) levels lower in diabetics than healthy controls. Total cholesterol (TC) and low-density lipoprotein (LDL) were other fractions which were slightly above optimal levels in diabetics.

Conclusions: From our study, it was concluded that diabetes mellitus has a real impact on lipid metabolism.

Keywords: Diabetes, Lipid Profile, North Bihar

INTRODUCTION

Diabetes mellitus refers to a group of common metabolic disorders that share the phenotype of hyperglycemia. Type 2 Diabetes Mellitus (DM) is a heterogeneous group of disorders characterized by variable degree of insulin resistance, impaired insulin secretion, and increased glucose production.¹ The global burden of DM is enormous with an estimated 366 million people living with DM worldwide (2011).² India accounted for nearly one sixth of global diabetes burden in 2011 with about 62 million of people affected by diabetes which is projected to rise to 101 million by 2030.^{2,3} Type2 DM is the most prevalent form of DM seen in India and constitutes more than 95% of diabetes population. Prevalence of diabetes is on an increase in India. According to National Urban

Diabetes Survey (NUDS), the age standardized prevalence of diabetes and IGT were 12.1% and 14% respectively with no gender difference and that prevalence of diabetes is uniformly high in all urban cities of India (Chennai 13.5%, Bangalore 12.4%, Hyderabad 16.6%, Calcutta 11.7%, Mumbai 9.3%, and New Delhi 11.6%) but higher in southern cities.⁴

It has been observed that Type2 DM in India occurs a decade earlier than in the developed world as shown by NUDS, Daryaganj survey, and CURE study, although the prevalence peaks at an older age.^{4,5,6} The metabolic abnormalities that commonly accompany diabetes are disturbances in the production and clearance of plasma lipoproteins. In India, prevalence of dyslipidemia is 85.5% in male Type2 DM and 97.8% in female Type2

DM.⁷ Individual with DM may have several forms of dyslipidemia. Because of additive cardiovascular risk of hyperglycemia and hyperlipidemia, lipid abnormalities should be assessed aggressively and treated as part of comprehensive diabetic care.

The most common pattern of dyslipidemia is hypertriglyceridemia and reduced HDL cholesterol levels. DM itself does not increase levels of LDL, but the small dense LDL particles found in Type2 DM are more atherogenic because they are more easily glycated and susceptible to oxidation.⁸

The aim of present study is to observe the pattern of lipid profile in type 2 diabetes mellitus in north Bihar.

METHODS

One hundred patients with type 2 DM selected from the out-patient and in-patient department of Sri Krishna Medical College and Hospital, Muzaffarpur. Age and sex matched 25 non-diabetics are taken as controls. The diagnosis of Diabetes is based on Diagnostic Criteria for Diabetes Mellitus of ADA 2011.

Inclusion criteria

- Patients with Type 2 diabetes mellitus of more than 40 years of age,
- Duration of Diabetes more than 4 years,
- The control group consists of non-diabetics more than 40 years, who are normotensive, who do not have concomitant diseases or other conditions or use drugs that affect lipid levels.

Exclusion criteria

- Type -2 diabetes patients with concomitant diseases or condition affecting the lipid levels like hypothyroidism, on lipostatic drugs, thiazides etc.,
- Age below 40 years.

Methods of calculation

- Determination of fasting blood sugar-GOD-POD method,
- Determination of serum Total Cholesterol-CHOD-POD method,
- Determination of serum Triglycerides-GOP-POD method,
- Determination of serum HDL-CHOD-POD method,
- LDL= Total cholesterol-HDL-Serum Triglyceride/5,
- VLDL Cholesterol = plasma triglycerides by 5.

SPSS 19.0 was used for statistical analyses. Patient's ages were described as mean \pm standard deviation. Continuous variables were compared by the t-test and dichotomous variables were compared by Fisher's exact test for two by two comparisons or Pearson χ^2 for greater than two responses.

RESULTS

The following observations are of a case-control study of 100 diabetic subjects and 25 controls where variations in lipid levels are compared amongst the two populations alongside a statistical analysis of the incidence of complications among the diabetic population. The mean blood fasting and post prandial sugar was high 177.30 ± 41.14 mg/dl and 310.50 ± 55.78 mg/dl in diabetic group as compared to control, 92.68 ± 23.22 mg/dl and 138.84 ± 36.47 mg/dl respectively (Table 1).

Table 1: Comparison of sugar parameters in two groups of patients studied.

Sugar parameters	Cases (n=100)	Controls (n=25)	P value
Fasting blood sugar (mg/dl)	177.30 ± 41.14	92.68 ± 23.22	<0.001
Post prandial blood sugar (mg/dl)	310.50 ± 55.78	138.84 ± 36.47	<0.001

Among diabetic group the triglyceride (223.54 ± 46.98 mg/dl) and VLDL (45.18 ± 9.72 mg/dl) were highly raised whereas HDL was low (36.24 ± 4.96 mg/dl). Total cholesterol (209.02 ± 27.15 mg/dl) and LDL (126.82 ± 25.63 mg/dl) was marginally raised. These values were statistically highly significant when compared to control group ($P < 0.001$) (Table 2).

Table 2: Comparison of lipid parameters in two groups of patients studied.

Lipid parameters	Cases (n=100)	Controls (n=25)	P value
Total cholesterol mg/dl	209.02 ± 27.15	182.24 ± 49.03	<0.001
LDL mg/dl	126.82 ± 25.63	106.76 ± 27.29	<0.001
Triglyceride mg/dl	223.54 ± 46.98	151.48 ± 40.12	<0.001
HDL mg/dl	36.24 ± 4.96	41.24 ± 1.55	<0.001
VLDL mg/dl	45.18 ± 9.72	30.2 ± 5.20	<0.001

The microvascular and macrovascular complications more common in diabetic group-Retinopathy (42%), Ischemic heart disease (36%), Neuropathy (34%), Nephropathy (28 %) and stroke (8%) (Table 3).

Table 3: Distribution of complications of patients studied complications.

Complications	No. of cases (100)	%	P value
Retinopathy	42	42	<0.001
Neuropathy	34	34	<0.001
Nephropathy	28	28	<0.001
Ischemic heart disease	36	36	<0.001
Stroke	8	8	

In diabetic group 68 % patients was on oral hypoglycemic agents, 22 % on insulin and 10 % on both (Table 4).

Table 4: Distribution of therapy in cases of patients studied.

Therapy	No. of cases (100)	%
Insulin	22	22
OHA	68	68
Insulin + OHA	10	10
Total	100	100

DISCUSSION

A case control study was conducted among the patients who were admitted to Department of Medicine, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, for diabetic management or for the management of the associated complications of diabetes, who were compared with the control non-diabetic, non-hypertensive population. Dyslipidemia was an obvious feature in the present study among the study group. TG's and VLDL's were significantly raised to the tune of 98% in the study population compared to the control population. HDL levels were reduced among the diabetics when compared to the non-diabetics.

These findings corroborated with the Study conducted by Mazzone et al, where he documented an increase in TG's.⁹ In this study it was observed that apart from an increase in TG's and VLDL and decrease in HDL, total cholesterol also was found to be slightly raised in the study. A study conducted by Otamere HO et al also documented an increase in triglycerides, total cholesterol, LDL and decrease in HDL which was similar to the findings in this study.¹⁰ Studies such as Albrki WM et al also documented increased levels of TG's, VLDL and decreased levels of HDL which was pretty much the picture of our study.¹¹

The commonest complication among the study population was Retinopathy with an incidence of 42% followed by ischemic heart disease (36%) and peripheral neuropathy (34%). According to ADA, the incidence of retinopathy at 10 years of diabetes is around 60%.¹²

The incidence of Peripheral Neuropathy in the study was around 34% which was close to that observed by A Ramachandran in their study which was around 27.5%.¹³ Siva Prabodh V et al conducted a study and documented elevated levels of TG's, TC, LDL and depressed levels of HDL, similar to that observed in this study.¹⁴ Bijlaani PK et al and Barr et al found that HDL levels were depressed in diabetics which was one of the finding in this study as well with mean HDL level of (36.24±4.96mg/dl) among the diabetic population compared to HDL level of (41.24±1.55mg/dl) among non-diabetics.¹⁵ Among the diabetic population 68% were on oral hypoglycemic agents, 22% on Insulin and the rest 10% were on a

combination of Insulin and oral hypoglycemic agents. The study did not reveal any correlation between the type of therapy and its influence on the alteration in lipid profile which is somewhat similar to Karlander et al study in which the combination of bedtime insulin plus daytime sulphonylurea show similar lipid effects to those seen with insulin therapy alone-a decrease in triglyceride, an increase in HDL (20%) and no change in LDL or LP (a) levels.¹⁶

CONCLUSION

The Lipid profile of hundred Type 2 Diabetes Mellitus patients above 40 years of age was compared to 25 control subjects who were non-diabetics, non-hypertensives and were not on any drugs affecting lipid profile.

All of the diabetics under survey were on therapy for diabetes. 48 patients were on oral hypoglycemic drugs, 32 were taking both oral hypoglycemic and insulin, 20 were on only insulin. TG and VLDL were significantly higher and HDL levels lower in diabetics than healthy controls. TC and LDL were other fractions which were slightly above optimal levels in diabetics. Among the complications, diabetic retinopathy was the commonest complication (42%), followed by Ischaemic heart disease (36%) followed by neuropathy (34%), then nephropathy (28%) and cerebrovascular accident (8%). This study laid emphasis on the fact that diabetes mellitus influences lipid metabolism in a significant way.

This was evident by the fact that certain lipid fractions such as triglycerides and very low-density lipoproteins were elevated, and HDL was depressed in diabetics when compared to healthy controls. So, hyperlipidemia is quite common in diabetes and hypertriglyceridemia is the most common abnormality. Diabetic Retinopathy was among the commonest complication seen among the diabetic patients followed by ischemic heart disease, peripheral neuropathy, nephropathy and stroke in the decreasing order of frequency.

This suggests that there appears to be some relation between the genesis of various vascular complications (micro vascular and macro vascular) and the presence of lipid abnormality. Hence control of diabetes could help keep the lipid levels in the near normal range, thereby playing a role in the postponement of complications that may occur due to altered lipid metabolism.

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