

Assessment of the Association between Serum Lipid Profile and Blood Glucose in Newly Diagnosed Type 2 Diabetic Patients: A Cross-Sectional Study

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Abstract

Aim: To research association between serum lipid profile and blood glucose, hypothesizing that early detection and treatment of lipid abnormalities can minimize the risk for atherogenic cardiovascular disorder and cerebrovascular accident in patients with type 2 diabetes mellitus.

Material & Method: The present study will be undertaken in the Department of General medicine, Gouri Devi Institute of Medical Sciences and Hospital, Durgapur, India for 1 year.

Results: 21.3% had borderline high levels (150-199mg/dl), 14% had high levels (200-499 mg/dl) and 2.6% participants had very high triglycerides (≥ 500 mg/dl). 59.33% participants had low HDL and 40.6% participants had normal HDL.

Conclusion: The study showed widespread lipid abnormalities in the course of diabetes triggered dyslipidemia as hypercholesterolemia, hypertriglyceridemia, elevated LDL and decreased HDL. This study proposes the predominance of hyperlipidemia over increased prevalence of diabetic dyslipidemia.

Keywords: Cardiovascular disease, Hypertriglyceridemia, Type 2 diabetes, Lipid profile

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Introduction

Diabetes mellitus is a common metabolic disorder characterized by absolute or relative deficiencies in insulin secretion and/or insulin action associated with chronic hyperglycemia and disturbances of carbohydrate, lipid and protein metabolism. [1] Several previous studies have attempted to correlate blood glucose levels with serum lipid profile parameters. [2, 3] Research findings show that mainly body fat is responsible for increase in prevalence of this disease among the body composition components. [4, 5]

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 [6, 7] but the pattern of the different lipids may vary

between ethnic groups, economic levels, and access to health care [8, 9].

One of the important cardiovascular risk factors in type 2 diabetes is dyslipidemia. The composition of lipids in diabetic dyslipidemia is more atherogenic than in dyslipidemia in general. The term diabetic dyslipidemia comprises a triad of raised triglycerides, reduced high density lipoprotein (HDL) and excess of small, dense low density lipoprotein.[10]Every one of these dyslipidemic features are associated with an increased risk of cardiovascular disease.

Increased hepatic secretion of large triglyceride-rich VLDL and impaired clearance of VLDL is central to the pathophysiology of this dyslipidemia.[11] The contribution of triglycerides to CVD risk has been much debated in the past, with many important prospective studies observing an association. between elevated triglycerides levels and CVD risk.[12]This independent association with long term all-cause mortality supports the idea that serum triglycerides could play a role in type 2 diabetic patients mortality risk. [13]

This study aims to research association between serum lipid profile and blood glucose, hypothesizing that early detection and treatment of lipid abnormalities can minimize the risk for atherogenic cardiovascular disorder and cerebrovascular accident in patients with type 2 diabetes mellitus.

Material & Method:

The present study will be undertaken in the Department of General medicine, Gouri Devi Institute of Medical Sciences and Hospital, Durgapur, India for 1 year.

Inclusion criteria

- All patients who have been diagnosed as having type 2 diabetes mellitus within the last 6 months using the ADA (American Diabetes Association) criteria

- Patients of either sex

Exclusion criteria

- Type 1 Diabetics
- Patients on antipsychotic medications
- Patients with active hypothyroidism
- Patients with Cushing's syndrome were excluded from the study.

All procedures and interventions have been established only after obtaining adequate/ appropriate consent in a prescribed form.

Ethical clearance has been obtained from the Ethical clearance committee of the hospital. Upon enrolment in the study, written consent was obtained and duly signed by the patients in a prescribed format.

After inclusion in the study in each case a thorough history was taken followed by a detailed examination and the observations were recorded.

Results:

The maximum number of patients belonged to the age group of 40-50 years (60%) and the least number belonged to the age group 20-30 years (3.3%).

The Table 2 shows the gender distribution of the participants of our study. Among the total participants, 50(33.3%) were males, and 100(66.6%) were females.

Table 3 shows that 21.3% had borderline high levels (150-199mg/dl), 14% had high levels (200-499 mg/dl) and 2.6% participants had very high triglycerides (≥ 500 mg/dl).

Table 4 illustrates 59.33% participants had low HDL and 40.6% participants had normal HDL.

Table 5 shows among the 150 participants, 90 (60%) participants had desirable total Cholesterol levels of < 200 mg/dl, 45 (30%) had borderline high levels of 200-239mg/dl and 15 (10%) had high total cholesterol levels of ≥ 240 mg/dl.

Table 6 shows 25.3% participants had an optimal level of LDL of which 17 participants were males and 21 were females. 37.3% had near optimal levels of LDL and 16 participants were males and

40 were females. 19.33% had borderline high levels of LDL, 16% had high levels of LDL and 2% participants had very high levels LDL.

Table 1: Gender distribution among the participants

Gender	N=150	Percentage
Male	50	33.33
Female	100	66.67

Table 2: Age distribution among the participants

Age	N=150	Percentage
Below 30	5	3.33
30-40	25	16.67
40-50	90	60
Above 50	30	20

Table 3: Serum Triglycerides

Serum Triglycerides	Male N=50	Female N=100	Total	Percentage
Normal (<150mg/dl)	22	70	92	61.33
Borderline high (150-199 mg/dl)	13	19	32	21.33
High (200- 499mg/dl)	10	11	21	14
Very high (≥500 mg/dl)	2	2	4	2.667

Table 4: Serum HDL – distribution

Serum HDL	Male N=50	Female N=100	Total	Percentage
Normal	28	33	61	40.67
Low HDL	24	65	89	59.33

Table 5: Serum cholesterol levels distribution

Serum cholesterol levels	Male N=50	Female N=100	Total	Percentage
Normal	25	65	90	60
Border line	15	30	45	30
High	9	6	15	10

Table 6: LDL levels- Distribution

LDL levels	Male N=50	Female N=100	Total	Percentage
Optimal levels	17	21	38	25.33
Near optimal levels	16	40	56	37.33
Borderline high	12	17	29	19.33
High	6	18	24	16
Very high	1	1	3	2

Discussion:

Low HDL-C levels are also common in South Asians of whom about one third has been found to have low HDL-C levels, but our result shows a prevalence that is almost three times as high. However, the cardiovascular protection of HDL-C in South Asians appears to be smaller compared to other ethnic groups [15].

The Strong Heart study aimed at investigating if combined high Tg and low HDL-C status, also known as “atherogenic dyslipidemia”, were more likely to be present in T2DM individuals [16]. This study, based on a prospective cohort, showed that high fasting Tg level in combination with a low

HDL-C level were associated with increased risks of CAD and ischemic stroke, particularly in those with diabetes. It was further shown that 60% of the participants with combined high TG and low HDL levels had T2DM, whereas the corresponding figure for non-diabetics was 30%. In our study, high Tg was also strongly associated with T2DM even when HDL-C was normal. Participants with combined high Tg and low HDL-C levels had an estimated 13-fold greater odds of T2DM and estimated five-fold greater odds of prediabetes than those with normal Tg and normal HDL-C levels.

A study done by Nahar et al involving 200 participants also showed majority of

participants in the between 40-50 years.[17]

High Cholesterol levels is one of the risk factors for developing cardiovascular complications and such elevated levels are seen even in newly detected type 2 diabetics as seen in our study. Our study also showed that 71% of participants had desirable levels of total cholesterol of (<200mg/dl) while 29% had raised levels.

A study done by Joshi et al in India regarding the prevalence of dyslipidemia has shown 13.9% of their subjects had hypercholesterolemia and Tamil Nadu has the highest rates of hypercholesterolemia .[18]

A systematic review and meta-analysis of randomized controlled trials (RCTs) have clearly shown that T2DM patients benefit more from treatment with lipid lowering drugs than do non-diabetic patients [19]. Therefore, early screening and correction of lipid disorders are highly recommended for the primary and secondary care prevention of T2DM. [20]

Conclusion:

The study showed widespread lipid abnormalities in the course of diabetes triggered dyslipidemia as hypercholesterolemia, hypertriglyceridemia, elevated LDL and decreased HDL. This study proposes the predominance of hyperlipidemia over increased prevalence of diabetic dyslipidemia.

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