

A Descriptive Cross-Sectional Assessment of Lipid Profiles Primarily Triglycerides in Diabetes Patients

Barun Kumar Kundu¹, Rajnish Kumar², Shashi Kant Kumar³

¹Senior resident, Department of General Medicine, Madhubani Medical College and Hospital, Madhubani, Bihar, India

²Senior resident, Department of Skin & VD, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India

³Assistant Professor, Department of Pathology, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India.

Received: 18-06-2021 / Revised: 27-06-2021 / Accepted: 29-07-2021

Corresponding author: Dr. Barun Kumar Kundu

Conflict of interest: Nil

Abstract

Aim: The aim of this study was the assessment of lipid profiles mainly triglycerides in diabetic patients from bihar region

Methods: This was a cross-sectional study was done in the Department of General Medicine, Madhubani Medical College and Hospital, Madhubani, Bihar, India from November 2019 to November 2020. A total of 100 newly diagnosed type 2 diabetes mellitus within the last 3 months using the ADA (American Diabetes Association) criteria and both males and females were including in this study for determine the lipid profile levels.

Results: Among 100, 38 (38%) were males, and 62(62%) were females. The maximum number of patients belonged to the age group of 40-50 years (54%) and the least number belonged to the age group 20-30 years (3%). According to ATP III classification 46 (46%) participants had normal serum triglycerides levels which is <150 mg/dl whereas 54(54%) participants had an abnormal level of serum triglycerides. Among the 54 (54%) participants with abnormal triglycerides, 32% had borderline high levels (150-199mg/dl), 22% had high levels (200-499 mg/dl). 53% participants had low HDL and 47% participants had normal HDL. The Gender distribution showed that 20 male participants (37.74%) and 33 female participants (62.26%) had low HDL. Among the 100 participants, 69(69%) participants had desirable total Cholesterol levels of <200mg/dl, 25(25%) had borderline high levels of 200- 239mg/dl and 6 (6%) had high total cholesterol levels of \geq 240mg/dl. 30 (30%) participants had an optimal level of LDL of which 12 (40%) participants were males and 18 (60%) were females. 35 (35%) had near optimal levels of LDL and 14(40%) participants were males and 21(60%) were females. 21 (21%) had borderline high levels of LDL out of which 7 (33.33%) participants were males and 14(66.67%) were females. 12(12%) had high levels of LDL of which 4 (41.67%) were males and 8 (58.33%) were females. 2 (2%) participants had very high levels of LDL of which 1 (50%) was male and (50%) was female.

Conclusions: Hyperlipidemia is the commonest complication of the diabetes mellitus, and it can predispose patients to premature atherosclerosis and microvascular complications. Good glycemic control can prevent the development and progression of common lipid abnormalities in diabetes like raised triglycerides, LDL, serum cholesterol and low HDL.

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. Research findings show that mainly body fat is responsible for increase in prevalence of this disease among the body composition components[2,3]. India, a developing Asian country with fast industrialization and a modern lifestyle is facing a great problem in having the largest number of people with diabetes[4]. The literature on Indian studies showed a threefold rise in the diabetic prevalence in rural as well as urban areas[5,6].

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[7]. The term diabetic dyslipidemia comprises a triad of raised triglycerides, reduced high density lipoprotein (HDL) and excess of small, dense low-density lipoprotein[8]. 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[9]. 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[10]. 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[11]. In the

present study, we have aimed to study the lipid profile abnormalities in newly diagnosed type 2 diabetics; as such an assessment will enable earlier detection and treatment of these lipid profile derangements thereby minimizing the cardiovascular morbidity and mortality that these can ensue.

Material and methods

This was a cross-sectional study was done in the Department of General Medicine, Madhubani Medical College and Hospital, Madhubani, Bihar, India, from November 2019 to November 2020, after taking the approval of the protocol review committee and institutional ethics committee. After taking informed consent detailed history was taken from the patient. A total of 100 newly diagnosed type 2 diabetes mellitus within the last 3 months using the ADA (American Diabetes Association) criteria and both males and females were include in this study for determine the lipid profile levels. Patients with type 1 diabetics, Patients on antipsychotic medications, Patients with active hypothyroidism and 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. 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 Table 1 shows the gender distribution of the participants of our study. Among the total participants, 38 (38%) were males, and 62(62%) were females. Table 2 shows the age distribution of the participants in the study. The maximum number of patients belonged to the age group of 40-50 years (54%) and the least number belonged to the age group 20-30 years (3%).

Table 1: Gender distribution among the participants.

Gender	No.=100	Percentage
Male	38	38
Female	62	62

Table 2: Age distribution among the participants.

Age	No. of patients n=100	Percentage
Below 30	3	3
30-40	20	20
40-50	54	54
Above 50	23	23

According to ATP III classification 46 (46%) participants had normal serum triglycerides levels which is <150 mg/dl whereas 54(54%) participants had an abnormal level of serum triglycerides. Among the 54 (54) participants with abnormal triglycerides, 32% had borderline high levels (150-199mg/dl), 22% had high levels (200-499 mg/dl). Among the participants in the study, 21% male and 33% female participants had above normal triglyceride levels. The above stacked bar

chart shows that most participants had normal triglyceride levels. The total number of female participants who had abnormal triglycerides are higher than the male participants According to the NCEP ATP III criteria, HDL levels ≤ 40 is considered low for males and ≤ 50 is considered low for females. Based on this criterion, in our study, 53% participants had low HDL and 47% participants had normal HDL. The Gender distribution showed that 20 male participants (37.74%) and 33 female participants (62.26%) had low HDL.

Table 3: Serum Triglycerides

Serum Triglycerides	Male =38	Female=62	Total	Percentage
Normal (<150mg/dl)	17	29	46	46
Borderline high (150-199 mg/dl)	11	21	32	32
High (200- 499mg/dl)	10	12	22	22

Table 4: Serum HDL – distribution

Serum HDL	Male =38	Female=62	total	Percentage
Normal	18	29	47	47
Low HDL	20	33	53	53

Table 6: Serum cholesterol levels distribution

Serum cholesterol levels	Male =38	Female=62	Total	Percentage
Normal	24	45	69	69
Border line	12	13	25	25
High	2	4	6	6

In our study, among the 100 participants, 69(69%) participants had desirable total Cholesterol levels of <200mg/dl, 25(25%) had borderline high levels of 200- 239mg/dl and 6 (6%) had high total cholesterol levels of ≥ 240 mg/dl. Among the participants who

had elevated cholesterol levels, a female predominance was noted with 27.42% of participants who had borderline high cholesterol levels being female Among the total participants, according to the NCEP-ATP III criteria, 30 (30%) participants had

an optimal level of LDL of which 12 (40%) participants were males and 18 (60%) were females. 35 (35%) had near optimal levels of LDL and 14(40%) participants were males and 21(60%) were females. 21 (21%) had borderline high levels of LDL out of which 7 (33.33%) participants were males

and 14(66.67%) were females. 12(12%) had high levels of LDL of which 4 (41.67%) were males and 8 (58.33%) were females. 2 (2%) participants had very high levels of LDL of which 1 (50%) was male and (50%) was female.

Table 7: LDL levels- distribution

LDL levels	Male =38	Female=62	Total	Percentage
optimal levels	12	18	30	30
Near optimal levels	14	21	35	35
borderline high	7	14	21	21
High	4	8	12	12
Very high	1	1	2	2

Discussion

Out of the 100 participants of our study, all were type 2 diabetics diagnosed in the past 3 months. Overall gender distribution of the study population revealed that 38% were males and 62% were females. The higher proportion of females in this study may be due to the nature of the population seeking admission to our hospital. A similar female predominance was noted in a study done by Deepa et al comprising of 26001 participants[12].

Among the 100 participants, the maximum number of patients belonged to the age group of 40-50 years (54%) and the least number belonged to the age group 20-30 years (3%).

A similar study done by Nahar et al involving 200 participants also showed majority of participants in the between 40-50 years[13]. Among the 54 (54) participants with abnormal triglycerides, 32% had borderline high levels (150-199mg/dl), 22% had high levels (200-499 mg/dl). Among the participants in the study, 21% male and 33% female participants had above normal triglyceride levels.

In our study, 54(54%) participants had high triglycerides i.e., ≥ 150 mg/dl according to NCEP ATP III criteria and 46 (46%) had normal triglycerides. A study done by

Bharadwaj et al, in North India showed that hypertriglyceridemia was present in 42.7% of subjects who were diabetics.¹⁴ In our study, we found among the 54 (54) participants with abnormal triglycerides, 32% had borderline high levels (150-199mg/dl), 22% had high levels (200-499 mg/dl). Among the participants in the study, 21% male and 33% female participants had above normal triglyceride levels. The above stacked bar chart shows that most participants had normal triglyceride levels. The total number of female participants who had abnormal triglycerides are higher than the male participants. A study done in four selected regions of India showed that 29.5% had hypertriglyceridemia with the highest prevalence in Chandigarh and the common risk factors being obesity, diabetes and dysglycemia[15].

In our study, among total 100 participants, 53% participants had low HDL and 47% participants had normal HDL. The Gender distribution showed that 20 male participants (37.74%) and 33 female participants (62.26%) had low HDL.

In a study down by Karadag et al to assess prevalence of metabolic syndrome in cardiac patients and it was found that the most prevalent parameter was found to be low HDL (69%). The result quite similar to our study shows that low HDL is one of the

important risk factors for cardiovascular diseases[16].

In our study, 30 (30%) had optimal levels of LDL (<100mg/dl) and 70% had elevated LDL levels. A study by Ogbera showed that elevated LDL levels was the most commonly documented lipid abnormality in patients with metabolic syndrome[17].

High LDL 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.

In our study, among the 100 participants, 69(69%) participants had desirable total Cholesterol levels of <200mg/dl, 25(25%) had borderline high levels of 200- 239mg/dl and 6 (6%) had high total cholesterol levels of \geq 240mg/dl. Among the participants who had elevated cholesterol levels, a female predominance was noted with 27.42% of participants who had borderline high cholesterol levels being female. 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[15].

Conclusions

We concluded that the hyperlipidemia is the commonest complication of the diabetes mellitus and it can predispose patients to premature atherosclerosis and microvascular complications. Good glycemic control can prevent the development and progression of common lipid abnormalities in diabetes like raised triglycerides, LDL, serum cholesterol and low HDL.

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