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Original Research Article

A Cross-Sectional Study to Assess the Irregularities in Lipid Profiles in Newly Diagnosed type 2 Diabetics

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Abstract

Aim: The aim of this study was to evaluate the lipid profile abnormalities in newly diagnosed type 2 diabetics.

Methods: This was a cross-sectional study was done in the Department of General Medicine, Vardhman institute of medical sciences, Pawapuri, Nalanda, Bihar, India. 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.

Results: According to ATP III classification 44 (44%) participants had normal serum triglycerides levels which is <150 mg/dl whereas 56(56%) participants had an abnormal level of serum triglycerides. Among the 56 (56) participants with abnormal triglycerides, 33% had borderline high levels (150-199mg/dl), 23% had high levels (200-499 mg/dl). In our study, 55% participants had low HDL and 45% participants had normal HDL. The Gender distribution showed that 23 male participants (41.82%) and 32 female participants (58.18%) had low HDL. In our study, among the 100 participants, 68(68%) participants had desirable total Cholesterol levels o f <200mg/dl, 27(27%) had borderline high levels of 200- 239mg/dl and 5 (5%) had high total cholesterol levels of ≥240mg/dl. 32 (32%) participants had an optimal level of LDL of which 13 (40.62%) participants were males and 19 (59.38%) were females. 34 (34%) had near optimal levels of LDL and 14 (41.18%) participants were males and 20 (58.82%) were females. 20 (20%) had borderline high levels of LDL out of which 8 (40%)

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participants were males and 12 (60%) were females. 10 (10%) had high levels of LDL of which 4 (40%) were males and 6 (60%) were females. 4 (4%) participants had very high levels of LDL of which 2 (50%) was male and (50%) was female.
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

Introduction

Diabetes (T2DM) and related cardiovascular complications are major public health challenges worldwide. Individuals with T2DM have two- to four-fold increased risk of coronary artery disease (CAD), the leading cause of death among people with T2DM.[1] Dyslipidemia and hypertension are major modifiable risk factors for T2DM and related CAD, which account for more than 87% of disability in low- and middle-income countries.[2] Furthermore, prediabetes (an intermediate metabolic state between normoglycemia and T2DM) has also been found to be associated with an increased risk for cardiovascular disease.[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] but the pattern of the different lipids may vary between ethnic groups, economic levels, and access to health care.[5] A recently published meta-analysis reported that abnormal levels of the above-mentioned lipid parameters reflect, to some extent, the risk of T2DM.[6] 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.[7] 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.[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, Vardhman institute of medical sciences, Pawapuri, Nalanda, Bihar, India . 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,

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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, 40 (40%) were males, and 60(60%) 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 (55%) and the least number belonged to the age group 20-30 years (4%).

Table 1: Gender distribution among the participants.

Gender	No.=100	Percentage
Male	40	40
Female	60	60

Table 2: Age distribution among the participants .

Age	No. of patients n=100	Percentage
Below 30	4	4
30-40	19	19
40-50	55	55
Above 50	22	22

According to ATP III classification 44 (44%) participants had normal serum triglycerides levels which is <150 mg/dl whereas 56(56%) participants had an abnormal level of serum triglycerides. Among the 56 (56) participants with abnormal triglycerides, 33% had borderline high levels (150-199mg/dl), 23% had high levels (200-499 mg/dl). Among the participants in the study, 22% male and 34% 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, 55% participants had low HDL and 45% participants had normal HDL. The Gender distribution showed that 23 male participants (41.82%) and 32 female participants (58.18%) had low HDL.
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Table 3: Serum Triglycerides

Serum Triglycerides	Male =40	Female=60	Total	Percentage
Normal (<150mg/dl)	18	26	44	44
Borderline high (150-199 mg/dl)	13	20	33	33
High (200- 499mg/dl)	9	14	23	23

Table 4: Serum HDL – distribution

Serum HDL	Male =40	Female=60	total	Percentage
Normal	17	28	45	45
Low HDL	23	32	55	55

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Table 5: Serum cholesterol levels distribution

Serum cholesterol levels	Male =40	Female=60	Total	Percentage
Normal	25	43	68	68
Border line	13	14	27	27
High	2	3	5	5

In our study, among the 100 participants, 68(68%) participants had desirable total Cholesterol levels o f <200mg/dl, 27(27%) had borderline high levels of 200- 239mg/dl and 5 (5%) had high total cholesterol levels of ≥240mg/dl. Among the participants who had elevated cholesterol levels, a female predominance was noted with 28.33% of participants who had borderline high cholesterol levels being female Among the total participants, according to the NCEP- ATP III criteria, 32 (32%) participants had an optimal level of LDL of which 13 (40.62%) participants were males and 19 (59.38%) were females. 34 (34%) had near optimal levels of LDL and 14(41.18%) participants were males and 20(58.82%) were females. 20 (20%) had borderline high levels of LDL out of which 8 (40%) participants were males and 12(60%) were females. 10(10%) had high levels of LDL of which 4 (40%) were males and 6 (60%) were females. 4 (4%) participants had very high levels of LDL of which 2 (50%) was male and (50%) was female.

Table 6: LDL levels- distribution

LDL levels	Male =40	Female=60	Total	Percentage
Optimal levels	13	19	32	32
Near optimal levels	14	20	34	34
Borderline high	8	12	20	20
High	4	6	10	10
Very high	1	3	4	4

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 40% were males and 60% 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.[12]

Among the 100 participants, the maximum number of patients belonged to the age group of 40-50 years (55%) and the least number belonged to the age group 20-30 years (4%).

A similar study done by Nahar et al involving 200 participants also showed majority of participants in the between 40-50 years.[13] According to ATP III classification 44 (44%) participants had normal serum triglycerides levels which is <150 mg/dl whereas 56(56%) participants had an abnormal level of serum triglycerides. Among the 56 (56) participants with abnormal triglycerides, 33% had borderline high levels (150-199mg/dl), 23% had high levels (200-499 mg/dl). Among the participants in the study, 22% male and 34% female participants had above normal triglyceride levels. A study done by Bhardwaj 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 56 (56)participants with abnormal triglycerides, 33% had borderline high levels (150-199mg/dl), 23% had high levels (200-499 mg/dl). Among the participants in the

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study, 22% male and 34% 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, 55% participants had low HDL and 45% participants had normal HDL. The Gender distribution showed that 23 male participants (41.82%) and 32 female participants (58.18%) 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, 32 (32%) participants had an optimal level of LDL of which 13 (40.62%) participants were males and 19 (59.38%) were females. 34 (34%) had near optimal levels of LDL and 14(41.18%) participants were males and 20(58.82%) were females. 20 (20%) had borderline high levels of LDL out of which 8 (40%) participants were males and 12(60%) were females. 10(10%) had high levels of LDL of which 4 (40%) were males and 6 (60%) were females. 4 (4%) participants had very high levels of LDL of which 2 (50%) was male and (50%) was female.

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, 68(68%) participants had desirable total Cholesterol levels o f <200mg/dl, 27(27%) had borderline high levels of 200- 239mg/dl and 5 (5%) had high total cholesterol levels of ≥240mg/dl. 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]

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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