Original Research Article

Lipid profile abnormalities in newly diagnosed type 2 diabetics: a cross-sectional study

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ABSTRACT

Background: India is fast becoming the diabetes capital of the World. A direct atherogenic effect of triglyceride rich particles has been noted. This study assesses the lipid profile abnormalities in newly diagnosed type 2 diabetes mellitus. Since dyslipidemia is a risk factor for cardiovascular disease, such assessment will enable better recognition, prevention and management of cardiovascular mortality and morbidity.

Methods: The study was conducted over a period of one year at a tertiary care hospital in South India. A cross-sectional study of 100 newly diagnosed type 2 diabetics in a rural South-Indian population was done.

Results: In our study, 55 (55%) participants had high triglycerides and 45 (45%) had normal triglycerides. Among the 55 participants with abnormal triglycerides, 34% had borderline high levels (150-199mg/dl), 18% had high levels (200-499 mg/dl) and 3% participants had very high triglycerides (≥500 mg/dl). 26% male and 29% female participants had above normal triglyceride levels. In our study, 25% had borderline high cholesterol levels and 5% had high total Cholesterol. 39% of participants had near optimal levels of LDL, 19% had borderline high levels of LDL, 7% had high levels of LDL and 4% had very high levels of LDL. Significantly higher levels of triglycerides and LDL were noted.

Conclusions: Deranged lipid profiles are quite prevalent in type 2 diabetics with females having higher triglyceride levels. Recognition of such elevated triglyceride levels in even newly diagnosed type 2 diabetics will help in better prevention of associated cardiovascular disease.

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

INTRODUCTION

Man has known diabetes for the past 3500 years having been documented by the Egyptians.[1] India leads with the largest number of diabetic subjects earning the dubious distinction of being termed as 'the diabetes capital of the world'.

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.[2] The term diabetic dyslipidemia comprises a triad of raised triglycerides, reduced high density lipoprotein (HDL) and excess of small, dense low density lipoprotein.[3] 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.[4] 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.[5] 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.[6]

In the present study, authors 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.

METHODS

A cross-sectional study was carried out to determine the triglyceride levels in newly diagnosed type 2 diabetics in a rural South-Indian population. A total of 100 newly diagnosed type 2 diabetics were enrolled in our study. Relevant patient data was collected from the inpatient and outpatient department of Medicine, RMMCH. Fasting lipid profile levels were measured in these patients. The Study was carried out during a period of 1 year.

Inclusion criteria

- All patients who have been diagnosed as having type 2 diabetes mellitus within the last 3 months using the ADA (American Diabetes Association) criteria
- Age of the patient >25 years
- Sex: Both males and females.

Exclusion criteria

- Patients on steroids
- Type 1 diabetics
- Patients on antipsychotic medications
- Known cases of active hypothyroidism
- Known cases of Cushing's syndrome were excluded from the study.

Statistical analysis

- Continuous variables were expressed using mean, standard deviation, range and mean while categorical variables were expressed in terms of percentages
- Test of significance wad done using student t test for normally distributed continuous variables. Mann Whitney test was done for not normally distributed continuous variables
- P value less than 0.05 was considered as statistically significant.

RESULTS

Age distribution

Table 1 shows the age distribution of the participants in the study. The maximum number of patients belonged to

the age group of 40-50 years (53%) and the least number belonged to the age group 20-30 years (Table 1).

Table 1: Age distribution among the participants (n=100).

Age	No. of participants
20-30	1
30-40	20
40-50	53
50-60	26
Total	100

Sex distribution

The Table 2 shows the gender distribution of the participants of our study. Among the total participants, 43 (43%) were males, and 57 (57%) were females (Table 2).

Table 2: Gender distribution among the participants (n=100).

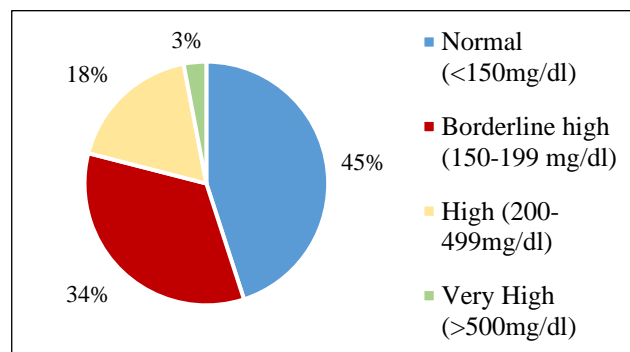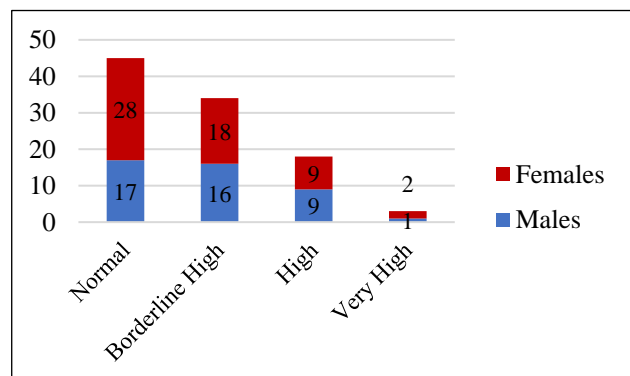|	Male	Female
Number	43	57
Percentage	43	57

Figure 1: Serum Triglycerides.

Figure 2: Gender distribution of the serum triglycerides.

According to ATP III classification 45 (45%) participants had normal serum triglycerides levels which is <150 mg/dl whereas 55 (55%) participants had an abnormal

level of serum triglycerides. Among the 55 participants with abnormal triglycerides, 34% had borderline high levels (150-199mg/dl), 18% had high levels (200-499 mg/dl) and 3% participants had very high triglycerides (≥500 mg/dl) (Figure 1).

Among the participants in the study, 26% male and 29% 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. (Figure 2). The p value was not statistically significant.
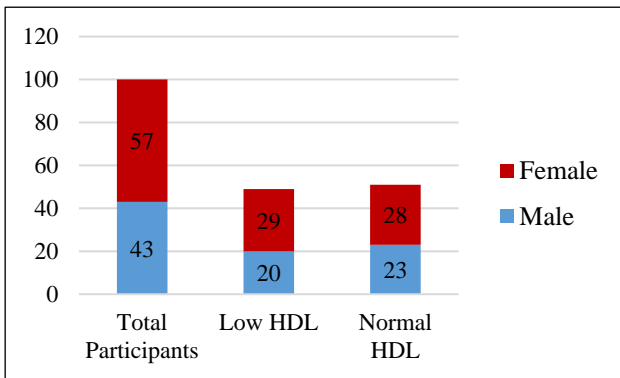

Figure 3: Serum HDL – distribution.

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, 49% participants had low HDL and 51% participants had normal HDL. The Gender distribution showed that 20 male participants (40.82%) and 29 female participants (59.18%) had low HDL. The P value was >0.05 and was not statistically significant (Figure 3).
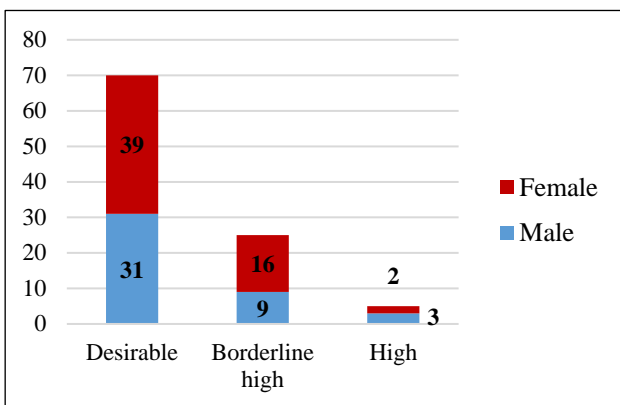

Figure 4: Serum cholesterol levels distribution.

In our study, among the 100 participants, 70 (70%) participants had desirable total Cholesterol levels of <200mg/dl, 25 (25%) 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

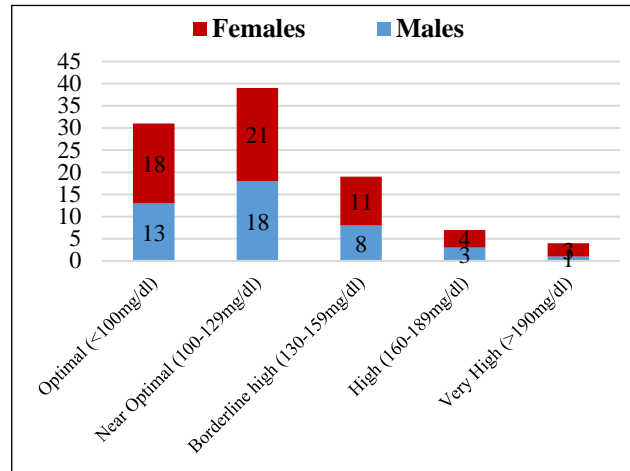64% of participants who had borderline high cholesterol levels being female (Figure 4).

Figure 5: LDL levels- distribution.

Among the total participants, according to the NCEP-ATP III criteria, 31 (31%) participants had an optimal level of LDL of which 13 (41.94%) participants were males and 18 (58.06%) were females. 39 (39%) had near optimal levels of LDL and 18 (46.15%) participants were males and 21 (53.85%) were females. 19 (19%) had borderline high levels of LDL out of which 8 (42.10%) participants were males and 11 (57.89%) were females. 7(7%) had high levels of LDL of which 3 (42.85%) were males and 4 (57.14%) were females. 4 (4%) participants had very high levels of LDL of which 1 (42.85%) was male and 3 (57.14%) was female (Figure 5).

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 43% were males and 57% 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.[7] Among the 100 participants, 74 were less than 50 years and 26 were more than 50 years. Among them, majority of patients were in the age group of 40-50 years which is 53%. A similar study done by Nahar et al involving 200 participants also showed majority of participants in the between 40-50 years.[8]

In our study, 55(55%) participants had high triglycerides i.e., ≥150mg/dl according to NCEP ATP III criteria and 45 (45%) 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.[9] In our study, authors found that among the 55 participants with abnormal triglycerides, 34% had borderline high levels (150-199mg/dl), 18% had high levels (200-499 mg/dl) and 3% participants had very

high triglycerides (≥500 mg/dl). In our study, 26% male and 29% female participants had above normal triglyceride levels. 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.[10]

In our study, among total 100 participants, 49% had low levels of HDL cholesterol and of these, 29 (59.18%) were females and 20 (40.82%) were males. 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 paramenter 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.[11]

In our study, 31 (31%) had optimal levels of LDL (<100mg/dl) and 67% 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.[12]

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. Our study also showed that 70% of participants had desirable levels of total cholesterol of <200mg/dl while 30% 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.[10]

CONCLUSION

In our present study, more than 50 per cent of diabetics were found to have hypertriglyceridemia and elevated LDL levels. This suggests that such high levels of dyslipidemia are seen even during the early stages and newly detected diabetics as well. These are likely to play a major role in the development of cardiovascular diseases and cerebrovascular accidents among the diabetic patients.

Hence in view of the associated cardiovascular mortality and morbidity, optimum care of these patients include not only adequate glycemic control but effective measure to control the dyslipidemia as well. The appropriate treatment for glycemic control should go concomitantly with lipid lowering drugs and lifestyle modifications.

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