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Assessment of Lipid Profile in newly Diagnosed Type 2 Diabetic patients: an observational 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 and methods: A cross-sectional study was carried out to determine the lipid profile levels in newly diagnosed type 2 diabetics in the Department of Biochemistry in collaboration with Department of Medicine, M. M. Institute of Medical Sciences and Research, Mullana, Ambala for 6 months. A total of 200 newly diagnosed type 2 diabetics were enrolled in our study.

Results: In our study, 96 (48.0%) participants had normal serum triglycerides levels which is <150 mg/dl whereas 104 (52.0%) participants had an abnormal level of serum triglycerides. Among the 104 (52.0%) participants with abnormal triglycerides, 30.5% had borderline high levels (150-199mg/dl), 19.5% had high levels (200-499 mg/dl) and 2% participants had very high triglycerides (≥500 mg/dl). In our study, among the 200 participants, 142 (71%) participants had desirable total Cholesterol levels of <200mg/dl, 51 (25.5%) had borderline high levels of 200-239mg/dl and 7 (3.5%) had high total cholesterol levels of ≥240mg/dl and 31% of participants had near optimal levels of LDL, 35.5% had borderline high levels of LDL, 12% had high levels of LDL and 1% had very high levels of LDL.

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

I. 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.[1,4,5] As early as 1988, it was described a multi-factorial metabolic abnormality consisting of insulin resistance with compensatory hyperinsulinaemia, type 2 diabetes mellitus (T2DM), essential hypertension and hypercholesterolaemia.[6,7] Today, however, the World Health Organization (WHO) and International Diabetes Federation (IDF) use the term "Metabolic Syndrome" to describe this clustering of conditions.[8] The term diabetic dyslipidemia comprises a triad of raised triglycerides, reduced high density lipoprotein (HDL) and excess of small, dense low density lipoprotein (LDL) particles. The lipid abnormalities are prevalent in diabetes mellitus because insulin resistance or deficiency affects key enzymes and pathways inlipid metabolism.[9] Micro- vascular and macro-vascular complications, including cardiovascular disease (CVD), retinopathy, nephropathy, and neuropathy, occur due to chronic uncontrolled hyperglycemia in diabetics.[10,11] It has been proposed that the composition of lipid particles in diabetic dyslipidemia is more atherogenic than other types of dyslipidemia.[12] The causal association between atherosclerosis and dyslipidemia is well established. In diabetes the associated hyperglycemia, obesity and insulin changes highly accelerate the progression to atherosclerosis.[13,14] In a recent study, it was observed significant trends for rising risk of

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coronary heart disease (CHD), stroke and all-cause mortality in relation to higher levels of baseline HbA1c in more than 11,000 participants in the Atherosclerosis Risk in Communities Study. For HbA1c categories of <6.5% and ≥ 6.5%, there was a significant association between fasting blood glucose levels and coronary heart disease (CHD), stroke or death from any cause. It was attempted to correlate blood glucose levels with serum lipid profile parameters in previous studies 2 and it is clear that HbA1c values are lower in individuals with a decreased risk of micro-vascular complications.[15]

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.

II. MATERIAL AND METHODS:

The present study will be undertaken in the Department of Biochemistry in collaboration with Department of Medicine, M. M. Institute of Medical Sciences and Research, Mullana, Ambala.

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.

III. RESULTS

The maximum number of patients belonged to the age group of 40-50 years (50.5%) and the least number belonged to the age group 20-30 years 4 (2%). The Table 2 shows the gender distribution of the participants of our study. Among the total participants, 80 (40%) were males, and 120(60%) were females.

According to ATP III classification 96 (48%) participants had normal serum triglycerides levels which is <150 mg/dl whereas 104 (52%) participants had an abnormal level of serum triglycerides. Among the 104 (52)participants with abnormal triglycerides, 30.5% had borderline high levels (150-199mg/dl), 19.5% had high levels (200-499 mg/dl) and 2% participants had very high triglycerides (≥500 mg/dl). Among the participants in the study, 22% male and 30% 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 is 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, 49.5% participants had low HDL and 50.5% participants had normal HDL. The Gender distribution showed that 37 male participants (37.38%) and 62 female participants (62.52%) had low HDL.

In our study, among the 200 participants, 142 (71%) participants had desirable total Cholesterol levels of <200mg/dl, 51 (25.5%) had borderline high levels of 200- 239mg/dl and 7(3.5%) had high total cholesterol levels of ≥240mg/dl. Among the participants who had elevated cholesterol levels, a female predominance was noted with 30.83% of participants who had borderline high cholesterol levels being female Among the total participants, according to the NCEP- ATP III criteria, 62 (31%) participants had an optimal level of LDL of which 24 (36.70%) participants were males and 38 (61.30%) were females. 72 (36%) had near optimal levels of LDL and 28 (38.88%) participants were males and 44(61.11%) were females. 40 (20%) had borderline high levels of LDL out of which 17 (42.5%) participants were males and 23 (57.5%) were females. 24(12%) had high levels of LDL of which 10 (41.67%) were males and 14 (58.33%) were females and 1% participants had very high levels LDL.

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Table 1: Gender distribution among the participants

Gender	N=200	Percentage
Male	80	40
Female	120	60

Table 2: Age distribution among the participants

Age	N=200	Percentage
Below 30	4	2
30-40	45	22.5
40-50	101	50.5
Above 50	50	25

Table 3: Serum Triglycerides

Serum Triglycerides	Male N=80	Female N=120	Total	Percentage
Normal (<150mg/dl)	36	60	96	48
Borderline high (150-199 mg/dl)	27	34	61	30.5
High (200- 499mg/dl)	15	24	39	19.5
Very high (≥500 mg/dl)	2	2	4	2

Table 4: Serum HDL – distribution

Serum HDL	Male N=80	Female N=120	Total	Percentage
Normal	37	62	99	49.5
Low HDL	43	58	101	50.5

Table 5:Serum cholesterol levels distribution

Serum cholesterol levels	Male N=80	Female N=120	Total	Percentage
Normal	62	80	142	71
Border line	14	37	51	25.5
High	4	3	7	3.5

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Table 6: LDL levels- Distribution

LDL levels	Male N=80	Female N=120	Total	Percentage
optimal levels	24	38	62	31
Near optimal levels	28	44	72	36
borderline high	17	23	40	20
High	10	14	24	12
Very high	1	1	2	1

IV. DISCUSSION

Out of the 200 participants of our study, all were type 2 diabetics diagnosed in the past 6 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 comprising of 26001 participants.[16]Among the 200 participants, 75 % were less than 50 years and 25% were more than 50 years. Among them, majority of patients were in the age group of 40-50 years which is 50.5%. A similar study done by Nahar et al involving 200 participants also showed majority of participants in the between 40-50 years.[17.] In our study, 104 (52%) participants had high triglycerides i.e. ,≥150mg/dl according to NCEP ATP III criteria and 96 (48%) 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.[18] In our study, authors found that among the 104 participants with abnormal triglycerides, 30.5% had borderline high levels (150-199mg/dl), 19.5% had high levels (200-499 mg/dl) and 2% participants had very high triglycerides (≥500 mg/dl). In our study, 22% male and 30% 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.

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 hyper cholesterolemia.[19]

In our study, among total 200 participants, 49.5% had low levels of HDL cholesterol and of these, 62 (62.62%) were females and 37 (37.38%) 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 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.[20]

In our study, 31 (31%) had optimal levels of LDL (<100mg/dl) and 69% 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.[21]

V. CONCLUSION

In our present study, more than 50 percent 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 cerebro-vascular accidents among the diabetic patients. Hence in view of the associated cardiovascular mortality and morbidity, optimum care of these patients includes 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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