

PREVALENCE AND PATTERNS OF DYSLIPIDEMIA AMONG TYPE 2 DIABETIC PATIENTS IN THE CITY OF HYDERABAD: AN OBSERVATIONAL STUDY**¹Dr. P. Srinivas Rao, ²Gandla Radhika, ³Deepak Raghava, ⁴K. Kavya Priya, ⁵Sowmya Bairavi and ⁶*Dr. Deepika M. L. N.**¹Associate Professor, Gandhi Medical College, Hyderabad.²Technical Assistant, Cytomol Labs, Hyderabad.³Student Bharat Institute of Higher Education and Research Chennai.⁴Student GITAM University, Vishakhapatnam.⁵Student Vellore Institute of Technology, Vellore.⁶Scientist, Cytomol Labs, Hyderabad.***Corresponding Author: Dr. Deepika M. L. N.**

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ABSTRACT

Background: India is considered as the world's diabetes capital with an estimated incidence of 8.7% in metropolitan (urban) regions while 7.9% in rural regions. Till date, several studies had shown an association of dyslipidemia with type 2 diabetes with an increased risk of cardio vascular disease (CVD). The present study was aimed to estimate the prevalence of dyslipidemia among type 2 diabetes patients in the city of Hyderabad, Telangana. **Methodology:** The present retrospective study was carried out by Cytomol Labs, Hyderabad, Telangana, India. A total of 1481 type 2 diabetic subjects comprising of 728 males and 753 females were enrolled over a period of 2016-2017. Clinical data on fasting blood glucose, postprandial blood glucose level, HbA1c, lipid profile TC, HDL-C, LDL-C, VLDL-C, and TG-C were collected from lab records. **Results:** The percentages of male and females were 728 (49%) and 753 (51%) respectively. Dyslipidemia was seen in 95% (1402) of cases with a prevalence being 97.8% and 91.6% in males and females respectively that differed significantly between the groups ($p < 0.05$). Proportion of patients with combined dyslipidemia was highest affecting 307 (43.1%) dyslipidemic males. Isolated single parameter dyslipidemia was seen in 706 (51%) patients, while only 10% patients revealed a mixed pattern. In females high LDL was the most common pattern of isolated single parameter dyslipidemia followed combined dyslipidemia with high TG and high HDL. **Conclusion:** The present study marks the importance of early diagnosis of dyslipidemia and regular follow up for early detection of CAD among subjects with type 2 diabetes.

KEYWORDS: Dyslipidemia, type 2 diabetes, lipid profile, elevated triglyceride, cholesterol, obesity.**INTRODUCTION**

Diabetes mellitus (DM) is the most widely recognized metabolic disorder influencing the general population around the world.^[1] It is a chronic disease caused due to insulin deficiency or insulin resistance which results in the increase of glucose level in blood.^[2] Diabetes is a major cause of morbidity and mortality, although these outcomes are not due to the immediate effects of the disorder. There are two major types of diabetes, type 1 diabetes mellitus (T1DM) which is also known as insulin dependent diabetes mellitus (IDDM) and type 2 diabetes mellitus (T2DM) referred as non-insulin dependent diabetes mellitus (NIDDM). Impaired glucose tolerance (IGT) and impaired fasting glycemia (IFG) refer to levels of blood glucose concentration above the normal range.^[3] Subjects with IGT and/or IFG are at considerably at higher risk of developing diabetes and

cardiovascular disease than those with normal glucose tolerance. T2DM is one of the most common secondary causes of hyperlipidemia. Insulin resistance and obesity combine to cause dyslipidemia, hyperglycemia and hyperlipidemia that have additive affect on cardiovascular risk. Chronic uncontrolled hyperglycemia could lead to micro and macro-vascular complications that include cardiovascular disease (CVD), retinopathy, nephropathy, neuropathy and atherosclerosis.^[1]

According to WHO approximately 150 million people around the world are diagnosed with DM and this number may double by the year 2025.^[1] This increase in number can be seen mainly in developing countries due to the changes in lifestyle, population growth and unhealthy diets. More than 30 million people in India have now been diagnosed with diabetes. The Crude

prevalence rate is estimated to be 9 percent in India's metropolitan regions while the incidence in rural regions is about 3% of the total population.

Till date, several studies were attempted to correlate parameters of serum lipid profile with type 2 diabetes mellitus.^[3] Insulin plays an important role in lipid metabolism by synthesizing fatty acid in adipose tissue of the liver, intestine and also accounts for increased synthesis of cholesterol. The activity of lipoprotein lipase in white adipose is also increased. Various lipid fractions and lipid peroxide in the cases of diabetes mellitus may be of some help in the diagnosis and in preventing the possibilities of complications or secondary disorders. The present study was carried out to estimate the prevalence of dyslipidemia among type 2 diabetes patients in the city of Hyderabad, Telangana.

MATERIALS AND METHODS

The present retrospective study was carried out by Cytomol Labs, Hyderabad, Telangana, India. A total of 1481 type 2 diabetic subjects comprising of 728 males and 753 females were enrolled. Information based on clinical laboratory records with patient identification data, age, sex, date of test and test results over a period of 2016-2017 was used.

Data Collection

Clinical data on fasting blood glucose, postprandial blood glucose level, HbA1c, lipid profile TC, HDL-C, LDL-C, VLDL-C, and TG-C were collected from

Cytomol lab records, Hyderabad, Telangana and noted in an excel sheet along with age, sex and test values. The mean lipid profile values of overall patients was calculated and compared with the normal range. Further, comparisons were carried out after categorizing the data into male and female groups.

Statistical Analysis

The percentages obtained were compared by using test of proportion calculator. The mean glucose and lipid parameters were analyzed for significance using F-test calculator at 95% confidence interval. A p-value of <0.05 was considered to be statistically significant.

RESULTS

In this retrospective study, a total of 1481 diabetic patients were included and the percentage of males and female were 728 (49%) and 753 (51%) respectively. The age range and mean age of subjects was 21-85 years and 53.07 ± 11.29 , while it was 53.19 ± 11.31 and 52.96 ± 11.27 years in males and females correspondingly. The test values did not differ significantly between the groups.

The lipid profile means in total subjects were CHO (252.5 ± 42.68), HDL (34.0 ± 3.83), TG (203 ± 63.26) and LDL (128.7 ± 33.54). The levels differed significantly between male and female subjects with respect to TG ($p < 0.05$). The glucose and lipid parameter in overall study group, males and females is given in **Table 1**.

Table 1: Levels of FBS, PLBS, HBA1C, TG, HDL and LDL among patients with type 2 diabetes mellitus.

	Normal range	Total 1481	Male 728	Female 753	F- value	p-value
HbA1C	> 5.7	9.28 ± 31.80	9.52 ± 36.14	9.04 ± 26.96	0.08	0.77
FBS	>110	131.94 ± 47.79	131.92 ± 45.53	131.95 ± 49.89	-	>0.05
PLBS	>170	190.34 ± 70.23	189.92 ± 68.90	190.74 ± 71.50	0.05	0.82
TG	> 150	203.19 ± 63.26	223.97 ± 84.05	182.41 ± 42.48	16.42	<0.05*
HDL	< 40	34.07 ± 3.83	33.68 ± 4.06	34.46 ± 3.61	3.30	0.07
LDL	> 100	128.71 ± 33.54	127.16 ± 26.69	130.25 ± 40.39	0.41	0.50

F test was carried out for male and female groups; *indicates statistically significant difference at 95% confidence interval.

Prevalence of dyslipidemia

Nearly 95% (1402) of diabetic subjects demonstrated dyslipidemia, with a prevalence being 97.8% and 91.6% in males and females respectively that differed significantly between the groups ($p < 0.05$). Overall the most common pattern among the total subjects was high HDL followed by combined dyslipidemia, High TG and low HDL.

Pattern of dyslipidemia in males

Proportion of patients with combined dyslipidemia was highest affecting 307 (43.1%) dyslipidemic males. Isolated single parameter dyslipidemia was seen in 706 (51%) patients, while only 10% patients revealed a mixed pattern. Among patients with combined dyslipidemia, 122 (16.8%) patients had high LDL with low HDL, 117 (16.1%) had high TG with low HDL,

while high TG with high LDL was the least. Sub-analysis of males with isolated single parameter dyslipidemia revealed that the most common pattern among males was combined dyslipidemia, with High LDL (25%), followed by isolated high TG.

Pattern of dyslipidemia in females

Even among females, combined dyslipidemia was more common involving 33.8% (255) dyslipidemic patients. High LDL was the most common pattern of isolated single parameter dyslipidemia followed combined dyslipidemia with high TG and high HDL. The patterns of dyslipidemia differed significantly between the groups with respect to mixed, isolated and combined dyslipidemia ($p < 0.05$) except High TG and high LDL ($p > 0.05$) [Table 2].

Table 2: Prevalence and pattern of dyslipidemia among male and females with type 2 diabetes.

Type of dyslipidemia	Total N(%) 1481	Males N(%) 728	Females N(%) 753	Z – Score	p-value
Mixed dyslipidemia					
High TG, high LDL and low HDL	124 (8.4)	73 (9.8)	51 (6.8)	2.09	0.03*
Combined dyslipidemia					
High TG and low HDL	210 (14.2)	117 (16.1)	93 (12.4)	2.21	0.02*
High TG and high LDL	154 (10.4)	68 (9.3)	86 (11.4)	1.32	0.18
High LDL and low HDL	198 (13.4)	122 (16.8)	76 (10.1)	3.85	0.0001*
Isolated single parameter dyslipidemia					
High Cholesterol	69(4.7)	23(3.2)	46(6.1)	2.79	0.005*
High TG	167 (11.3)	75(10.3)	92(12.2)	3.86	0.0001*
High LDL	333 (22.5)	182 (25)	151 (20.0)	2.30	0.02*
Low HDL	137 (9.3)	52 (7.1)	85 (11.3)	2.69	0.007*
Total	1392(93.9)	712(97.8)	680(90.3)	6.20	<0.05*

Z score was carried out for male and female groups; *indicates statistically significant difference at 95% confidence interval

DISCUSSION

Patients with type 2 diabetes mellitus have a 2 to 4 fold increased risk of cardiovascular, disease, which are the leading causes of morbidity and mortality in our population. Many Western epidemiological studies have shown an association between diabetic dyslipidemia, which is characterized by hypertriglyceridemia; low levels of HDL cholesterol; postprandial lipidemia and small, dense LDL cholesterol particles and the occurrence of cardiovascular disease.^[4-6]

In the present study, we investigated the prevalence of dyslipidemia among the diabetic population in the city of Hyderabad, India. Our study demonstrated that the prevalence of dyslipidemia was 94% with an increased prevalence of dyslipidemia among males than females. A cross sectional study conducted by Pan et al., 2016 in Chinese population revealed the prevalence of dyslipidemia to be 34% while a study in Gujarati diabetic population demonstrated dyslipidemia among 83% of patients which is almost similar to our findings.^[7,8] These results suggests that there is a marked increase of severe form of dyslipidemia among patients with type 2 diabetes which projects the need to prevent and treat dyslipidemia that could be further achieved by regular screening. Similar study in Gujarati diabetic population also revealed a very high incidence (83%) of dyslipidemia as our findings (94%).^[8]

The increased prevalence of dyslipidemia among men than women was much higher than previous studies^[7,9-10], though contradictory to the findings of Qi et al., 2015 that revealed the prevalence to be higher in females.^[11] Several studies pertaining to type 2 diabetes and dyslipidemia was carried out across India and other countries however the incidence of these abnormalities are quite high in south Indian diabetic population.^[12-13;15-18]

Furthermore, the most common isolated single parameter was high LDL levels followed by high TG and low HDL among the combined dyslipidemia and

these findings were similar to the western counterparts.^[8,14,17] Elevated levels of TG and LDL are often considered as the risk factor for CAD in diabetic patients.

CONCLUSION

This study demonstrated the existence of dyslipidemia in T2DM patients of Hyderabad population. Overall high LDL, TG and lower HDL indicate the risk for CVD in type 2 diabetes patients.

Increased LDL in males suggests the risk of CVD to be higher in males than females. Based on these findings, we strongly recommend detailed lipid profile to be done for every diabetic patient at the time of diagnosis and regularly on follow up for early detection of CAD among these individuals and acquire the prompt preventive measures to reverse the increased prevalence of CAD among diabetic patients.

Conflicts of interest

None.

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