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Original Research Article

Lipid Abnormalities in Type 2 Diabetes Mellitus

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Abstract: Diabetes is the major non-communicable disease in the developing countries like India. Diabetes along with diabetic dyslipidemia is a major contributing factor to development of coronary artery disease during younger ages which has implications on the economy of the country. Hence is the requirement of intense monitoring, prevention and treatment of dyslipidemia in diabetic patients. Our study included 200 diabetic subjects who fitted into inclusion criteria. A detailed history, clinical examination, fasting and post prandial blood sugars and fasting lipid profile was performed in all the patients. Subjects were in the age group of 25 - 90 years, which included 57% males and 43% females. One or the other lipid abnormality was found in 179 (89.5%) subjects. Total cholesterol of >200mg/dl was found in 99 (49.5%) subjects, LDL-C of > 100mg/dl was found in 112 (56%) subjects, Triglycerides > 150mg/dl was present in 96(48%) subjects, HDL-C of < 40mg/dl was found in 110 (55%) subjects. High levels of LDLc and low levels of HDLc were of frequent occurrence.
Keywords: Lipid profile, fasting blood sugars, dyslipidemia, coronary artery disease

INTRODUCTION

Diabetes Mellitus (DM) a metabolic disorder of multiple aetiology characterised by chronic hyperglycaemia with abnormalities of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both [1].

The prevalence of diabetes in India in 1970s was 2.3% in urban and 1.5% in rural areas as shown by the multi centric study conducted by the Indian Council of Medical Research (ICMR). In 2000s, the prevalence has risen to 12% to 19% in urban areas and to 4% to 9% in rural areas. A study from rural Andhra Pradesh reported a prevalence of 13.2% [2]. India has the largest number of diabetes which is around 50.8 million in 2010 and is going to be 87 million by 2030 [3].

Diabetes is well associated with lipid abnormalities which is characterised by raised triglycerides, low high density lipoprotein and high low density lipoprotein. Dyslipidemia contributes to the development of coronary artery disease in diabetic patients and the measurement of the serum lipids in diabetic patients is a standard in the diabetic care [4].

Incidence of Diabetes Mellitus in south India is high [5]. Hence this study was undertaken, as modification of life style along with addition of lipid lowering drugs in diabetic dyslipidemic patients will reduce the cardiovascular morbidity and mortality.

MATERIALS AND METHODS

Aim

To study lipid abnormalities in type 2 Diabetic patients.

Study population

The subjects for this study were Type 2 Diabetic patients attending either as out-patient or in-patient of Department of Internal Medicine, Shridevi Institute Of Medical Sciences And Research Hospital. Tumakuru. Karnataka.

Study period

1st April 2016 to 30th September 2016.

Study Design

Cross sectional study.

Inclusion criteria

All patients with Type 2 Diabetes.

Exclusion criteria

Patients on lipid lowering drugs, conditions affecting the lipid levels like thyroid disorders, renal failure, chronic liver disorders, familial hyperlipidemia. Exclusion criteria was implemented based on history, clinical examination and relevant investigations.

Informed consent was obtained from every subject included in the study. Detailed history was taken and clinical examination done . Every subject had fasting blood glucose, post prandial glucose and fasting lipid profile done. Blood glucose estimation was done using Glucose oxidase enzymatic method, lipid profile using auto-analyser. Total cholesterol was measured by CHOD-PAP method, Triglycerides by GPO-Trinder method, HDL by Direct Trinder method. LDL-Cholesterol was estimated by using Friedewald's formula [LDLc = TC - HDLc - [TG/5]]. The lipid profile of the subjects were classified based on NCEP ATP III model [6].

STATISTICAL ANALYSIS

Statistical analysis was done by using MS Excel and SPSS.

RESULTS

Total number of patients who participated in the study were 200. Among them were 114 [57%] men and 86 [43%] women. These patients were in the age group of 25 to 90 years, 25-30 years - 2 [1%], 31-40 years - 14 [7%], 41-50 years - 47 [23.5%], 51-60 years - 55 [27.5%], 61- 70 years - 52 [26%], 71- 80 years - 23 [11.5%], 81-90 years - 7 [3.5%].

Family history of diabetes was present in 84 (42%) subjects, only 24 [12%] of our patients followed exercise as a routine, BMI of >= 25kg/m^2 was found in 93 (46.5%) subjects. Women were found to have higher BMI values than Men. Pearson Chi-Square was applied for calculation of association between BMI and Gender distribution; p-value = 0.021806, since $p < 0.05$, it is Statistically Significant. There is an association between BMI and Gender among the patients with Diabetes.

One or the other lipid abnormality was found in 179 (89.5%) subjects. Total cholesterol of >200mg/dl was found in 99 (49.5%) subjects, LDL-C of > 100mg/dl was found in 112 (56%) subjects, Triglycerides > 150mg/dl was present in 96(48%) subjects, HDL-C of < 40mg/dl was found in 110 (55%) subjects.

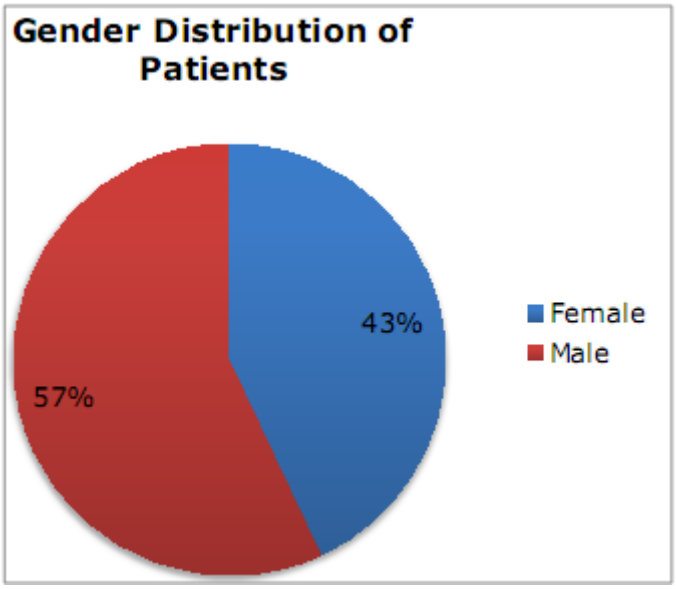

Fig-1: Pie-chart representing Gender distribution of patients

Table 1: Descriptive Statistics of Age of Patients

N	200
Mean	58.16
Std. Deviation	12.381
Minimum	27
Maximum	90

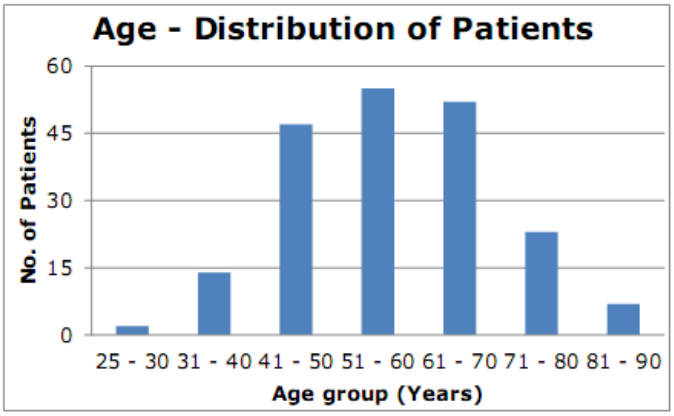

Fig-2: Bar Diagram representing Age Distribution of patients

Table 2: BMI of patients

BMI	Female		Male		Total	
	N	%	N	%	N	%
Normal	38	44.19	69	60.53	107	53.50
Over weight	48	55.81	45	39.47	93	46.50
Total	86	100.00	114	100.00	200	100.00

Pearson Chi-Square = 5.261202; p-value = 0.021806, Since $p < 0.05$, it is Statistically Significant. There is an association between BMI and Gender among the patients.

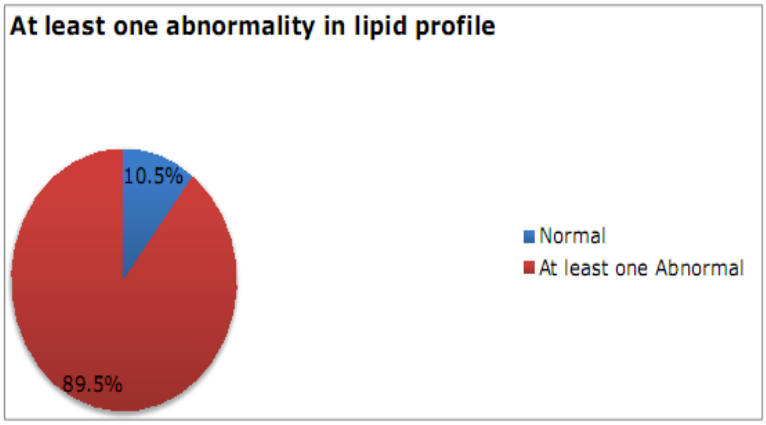

Fig-3: Pie-chart representing at leastone abnormality in Lipid profile of patients

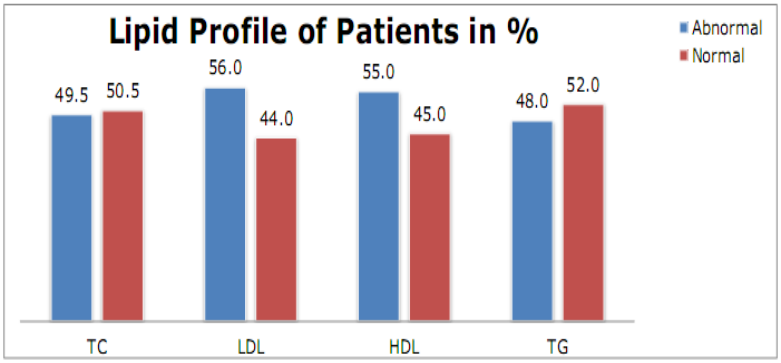

Fig-4: Bar Diagram representing Lipid profile of patients

DISCUSSION

High prevalence of coronary artery disease is found in patients with Diabetes mellitus, diabetic dyslipidemia being the major contributor. UKPDS study showed coronary artery disease is associated with high levels of low density lipoproteins and triglycerides and low levels of high density lipoproteins [7].

"Evaluation of dyslipidemia in type 2 diabetes mellitus" a study conducted by Devendra Pratap Singh Rajput *et al* [8] showed the pattern of dyslipidemia was significantly higher level of serum cholesterol, serum triglycerides, LDL cholesterol in both female and male diabetics and lower levels of HDL cholesterol in female diabetics which we have also found in our study.

In our study, lipid abnormality was found in 89.5% subjects. Total cholesterol was high in 49.5%, high LDL-C in 56%, Triglycerides was high in 64%, HDL-C was low in 55% subjects.

Fagot-Campagna AN *et al* state that 70% to 97% of adult type 2 diabetic patients have one or more abnormalities in lipid profile [9] which correlates with our study. Our study also correlates with the Indian study by Udawat *et al* [10] which quotes 89% with some form of dyslipidemia. This high level of lipid abnormality is probably due to urbanisation and life style changes which are begin in early life itself.

"A study of lipid profile in Patients with Type 2 Diabetes Mellitus " a study conducted in Hyderabad in Andhra Pradesh by Ramu Kandula *et al* [11] showed the results as follows. Dyslipidemia was seen in 86%, high cholesterol in 41%, high triglycerides in 47%, high LDL cholesterol in 64%, and low HDL in 71%. Prevalence of lipid disorders as a whole correlates with our study.

In the study conducted by Shalini M *et al* [12] "Study of Prevalence of Dyslipidemia in Women with Diabetes Mellitus - a Cross Sectional Study'" found high prevalence of dyslipidemia of 91.40%, high cholesterol in 52.03%, high triglycerides in 53.84%, high LDL cholesterol in 48.86% and low HDL cholesterol in 41.62% which is in accordance with our study.

Many of the studies have shown high LDLc and low HDLc are most common patterns of dyslipidemia in diabetic patients. A high level of Triglycerides has been stated the risk factor for coronary artery disease irrespective of levels of HDLc.

Many of our patients did not have the concept of diet for dyslipidemia, and very few of them followed regular exercise schedule. Our patients with family history of Diabetes were not aware of preventive measures.

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CONCLUSION

Diabetic dyslipidemia is a major risk factor for coronary artery disease. Hence early evaluation of lipid profile as an integral part of diabetic check ups and reviews is a requirement of present day. Creating awareness amongst the patients about life style modification and addition of lipid lowering drugs and controlling blood sugars will go a long way in reducing the morbidity and mortality of diabetes and its complications.

ABBREVATIONS

TC Total cholesterol
TG Triglycerides
HDLC High density lipoprotein cholesterol
LDLC Low density lipoprotein cholesterol

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