Prevalence and pattern of dyslipidemia in type 2 diabetes mellitus patients in a rural tertiary care centre, southern India.

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ABSTRACT

Diabetes mellitus (DM) is a common secondary cause of hyperlipidaemia, particularly, if glycaemic control is poor, which in-turn is an important risk factor for atherosclerosis and coronary heart disease. The spectrum of dyslipidemia in diabetes mellitus can include all the various types of dyslipidemia identified in the general population Objectives: To study the prevalence and pattern of dyslipidemia in type 2 diabetes. Methods: This is a cross sectional study, done on type 2 diabetes patients attending medicine outpatient department of RL Jalappa hospital, Kolar between March 2010 to April 2012 . All the patients were interviewed with pre-designed Performa. Fasting lipid profile and Glycosylated hemoglobin (HbA1c) of patients were measured. Patients suffering from other causes of secondary dyslipidemia were excluded. Patients having one or more parameters outside the targets recommended by American Diabetes Association (ADA) were considered to have dyslipidemia. Results: A total of 820 type 2 DM patients (533 males and 287 females) were studied. Prevalence of dyslipidemia among diabetic males was 95.4 % and 86.75% in females. Among males with dyslipidemia the proportion of patients with mixed dyslipidemia, combined two parameter dyslipidemia and isolated single parameter dyslipidemia were 24.5%, 44.2%, and 31.2% respectively. Figures for the same among female patients stood at 27.3%, 42.97% and 29.7% respectively. Conclusion: Majority of type 2 diabetic patients were dyslipidimic. The most common pattern of dyslipidemia among males was combined dyslipidemia with high triglycerides (TG) and low High density lipoprotein (HDL) and in females it was high Low density lipoprotein (LDL) and low HDL. The most prevalent lipid abnormality in our study was low HDL followed by high TG. No significant relation was found between HbA1c and serum lipid parameters.
Key words: Diabetes mellitus, Dyslipidemia, Lipid profile.

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Introduction

Type 2 Diabetes Mellitus is a heterogeneous condition characterized by the presence of both impaired insulin secretion and insulin resistance. [5] It has, unfortunately, reached epidemic proportions now-a-days. [6] Diabetes care is complex and requires that many issues, beyond glycaemic control, be addressed.[3] They are prone to certain complications and evidence emerged in the 1990s supporting the benefits of glycaemic control as well as control of blood pressure and lipid levels in the prevention or delay in onset and severity of diabetes complications .[15,12] The major clinical objective in the management of DM is to control hyperglycaemia and the long term objective is to prevent microvascular and macrovascular complications.

Diabetes mellitus is a common secondary cause of hyperlipidaemia, particularly, if glycaemic control is poor, which in-turn is an important risk factor for atherosclerosis and coronary heart disease.[8,9] The spectrum of dyslipidemia in diabetes mellitus can include all the various types of dyslipidemia identified in the general population; however, one

phenotype is particularly common in diabetes mellitus, which is attributed mostly to insulin resistance and insulin deficiency. The characteristic features of this phenotype are a high plasma triglyceride concentration, low HDL cholesterol concentration and increased concentration of small dense LDL–cholesterol particle. [4]

This study was conducted to see the prevalence and pattern of dyslipidemia in type 2 diabetes mellitus patients in a tertiary care centre in Southern India.

Materials and methods

This cross sectional study was done in R L Jalappa hospital attached to Sri Devraj Urs Medical College, Kolar. Type 2 diabetes patients attending medicine outpatient department of RL Jalappa hospital, Kolar between March2010 to April 2012 were taken. Institutional ethical committee clearance was taken and informed consent was obtained from patients. All the patients were interviewed with pre-designed and pre-tested Performa. Patients suffering from other causes of secondary dyslipidemia were excluded.

Fasting blood samples were analyzed for total cholesterol(TC) by enzymatic cholesterol oxidase/peroxidase method, triglycerides (TG) by enzymatic glycerol kinase/ peroxidase method, high density lipoprotein cholesterol (HDL-C) by precipitation method, low density lipoprotein cholesterol (LDL-C) was calculated by Friedewald's formula($TC-TG/5+HDL$).Glycosylated hemoglobin (HbA1c) was analysed by high pressure liquid chromatography method. Patients having one or more parameters (TG, HDL cholesterol, or LDL cholesterol) outside the targets recommended by American Diabetes Association (ADA) were considered to have dyslipidemia.[2] Which includes TG≥150 mg/dl, LDL≥ 100mg/dl, HDL≤40 mg/dl in males and ≤50 mg/dl in females. Glycemic control was considered as good in patients with HbA1c<7% and poor in patients with HbA1c≥7%. Those with dyslipidemia were further classified into mixed dyslipidemia (all three parameters abnormal), combined two parameter dyslipidemia (any two parameters abnormal) and isolated single parameter dyslipidemia (TG, LDL, HDL) .Comparison was also made of the lipid levels in patients with good control of diabetes (HbA1c<7%) with those having poor glycaemic control (HbA1c≥7%).[3]

Body mass index and duration of type 2 DM was not considered for stastical analysis. Unpaired't' test was used for statistical analysis. p value <0.05 was considered significant. The descriptive analysis of the data is done using, Statistical software namely SPSS 19.0.Graphs and tables were generated using Microsoft word and excel.

Results

A total of 820 type 2 DM patients (533 males and 287 females) were studied. Table 1 shows Clinical characteristics of diabetic patients.

Table1. Clinical Characteristics of diabetic Patients.

Parameter	Mean value
Age	55.03 ± 11.85 Years
Mean duration of Type 2 DM	9.1±5.09 Years
HbA1C	8.27 ± 2.05%
TG	199.4± 157.21mg/dl
LDL-C	113.3±57.89 mg/dl
HDL-C	46.8±72.88mg/dl

Graph 1 Shows Prevalence of dyslipidemia among males and females
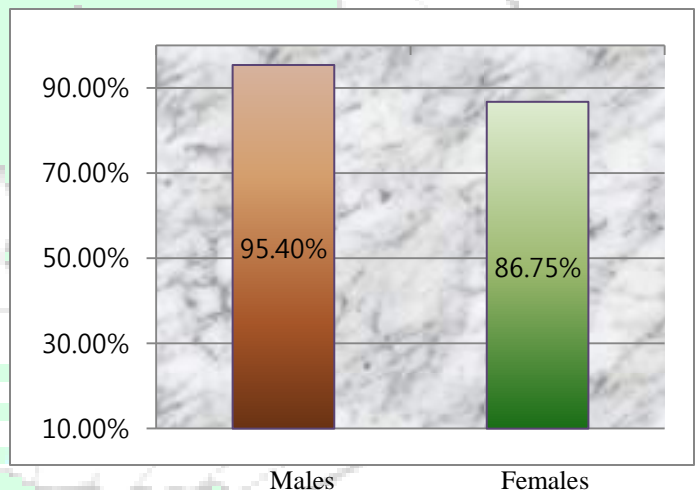
Prevalence of dyslipidemia in type 2 diabetics in our study was 92.4%. Among males it was 95.4 % and in females it was 86.75% .

Most common pattern of dyslipidemia in both males (44.2%) and females (42.97%) was combined dyslipidemia. Combined dyslipidemia with high TG and low HDL (20.43%) was most common in males and combined dyslipidemia with high LDL and low HDL (21.68%) was most common in females. Second most common pattern of dyslipidemia among males (31.2%) and females (29.7%) was isolated dyslipidemia. Isolated dyslipidemia with low HDL level was the most common affecting 17.09% males and 12.85% females with dyslipidemia.

The most prevalent lipid abnormality in our study

was low HDL (72.92%) followed by high TG (56.46%)). About 68.9 % (565) of type 2 diabetics were poorly controlled (HbA1c of ≥7). Of these patients 69.11 %, 70.43%and 68.39 % had TG, LDL, and HDL outside recommended levels respectively. Where as in those with good glycemic control (HbA1c of <7) 30.8%, 29.5% and 31.6% of patients had TG, LDL, and HDL outside recommended levels respectively. However there was no significant relation between HbA1c and serum lipid parameters (p value for TG, LDL and HDL was 0.39, 0.39 and 0.24 respectively).

Table. 2. Pattern of Dyslipidemia in males and females.

Pattern of dyslipidemia	Males	Females
1).Mixed dyslipidemia (LDL≥100,TG≥150& HDL<40{males}/50{females})	**24.5%**	**27.3%**
2).Combined two parameter dyslipidemia.	**44.2%**	**42.97%**
a.(LDL≥100,TG≥150&HDL>40/50)	9.62%	10.44%
b.(LDL<100,TG≥150&HDL<40/50)	20.43%	10.84%
c.LDL≥100,TG<150&HDL<40/50	15.71%	21.68%
3). Isolated single parameter dyslipidemia	**31.2%**	**29.7%**
a.LDL≥100 ,TG<150,HDL>40/50)	9.03%	7.22%
b.LDL<100,TG≥150&HDL>40/50)	4.91%	9.63%
c.LDL<100,TG<150&HDL<40/50)	17.09%	12.85%

Table.3 Shows type 2 diabetes patients with dyslipidemia according to their glycemic status.

| Lipid levels	HbA1C <7 (255)	HbA1C ≥7 (565)	Total n patients (820)	P value
Triglycerides≥150 mg/dl	143	320	463 (56.46%)	0.39
LDL≥100mg/dl	136	324	460 (56.09%)	0.39
HDL≤40/dl in mg/dl in males, ≤50 mg in females	189	409	598 (72.92%)	0.24

Discussion

Patients with Diabetes Mellitus have a high prevalence of coronary artery disease (CAD).The major risk factors in DM are hyperglycemia, dyslipidemia and hypertension.[13] There is a twofold to fourfold excess risk of coronary artery disease in type 2 DM compared to non-diabetics. [10] Patients with type 2 diabetes can have many lipid abnormalities, including hyperchylomicronaemia, elevated levels of very low-density lipoprotein cholesterol (VLDL-C), low-density lipoproteincholesterol (LDLC) and triglycerides; and low levels of high-density lipoprotein cholesterol (HDL-C). Lipid abnormalities may be the result of the unbalanced metabolic state of diabetes (i.e. hyperglycaemia and insulin resistance) and improved control of hyperglycaemia does moderate diabetes-associated dyslipidaemia. [10] Lipid abnormalities in diabetic patients are likely to play an important role in the development of atherogenesis and so are called atherogenic dyslipidemia. [13]

Graph 2 Shows number of patients with dyslipidemia in relation to HbA1c.
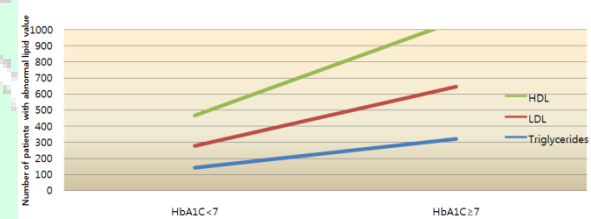
The mean age and HbA1c of study patients was 55.03 yrs and 8.27% which is comparable to the study done by Syed Shahid Habib ie 53.12 yrs and 8.9 % respectively .[13]

Dyslpidemia was present in 92.4% of diabetic patients in our study which is comaparble to study done by Udawat et al where it was 89%.[14]

In our study the prevalence of dyslipidemia in diabetics was 95.4% in males and 86.75% in females, where as in the study by Rakesh et al the prevalence of dyslipidemia is 85.5% and 97.5% in males and female diabetics respectively. [11]

Among males with dyslipidemia the proportion of patients with mixed dyslipidemia , Combined two parameter dyslipidemia and isolated single parameter dyslipidemia were 24.5%, 44.2%, and 31.2% respectively. Figures for the same among female patients stood at 27.3%, 42.97% and 29.7% respectively. This pattern of dyslipidemia is Comparable to study done by Rakesh et al only in females. [11]

In our study most common pattern of dyslipidemia among males was combined dyslipidemia with high TG and low HDL (20.4%), among females it was combined dyslipidemia with high LDL and low HDL (21.6%).Whereas in a study done by Rakesh et al most common pattern was combined dyslipidemia

with high LDL and low HDL in both males (22.7%) and females (33%).[11] In our study second most common pattern of dyslipidemia among males and females was isolated low HDL affecting 17.09% and 12.85% respectively. Where as in the study done by A.Al Adsani in Kuwait the second most common type of dyslipidemia is isolated increase in LDL-cholesterol, observed in 21% of the patients. [1] In our study we found hypertriglyceridemia in 56.46%, LDL hyperlipoproteinemia in 56.09% and HDL dyslipidemia in 79.29% of type 2diabetic patients. Where as in a study by Udawat H et al it was 22%, 76% and 58% respectively. [14]

Regarding with the metabolic control of diabetes mellitus and serum lipid levels, there have been different study results. In some studies, a positive correlation between HbA1c and serum lipid profiles is reported .[1,10,16] However, in certain studies, no correlation is reported between serum HbA1c and cholesterol level.[7] In the present study also we did not find significant relation between HbA1c level and serum lipid parameters including TG ,LDL and HDL.($p > 0.05$)

Conclusion
Majority of type 2 diabetic patients were dyslipidimic. The most common pattern of dyslipidemia among males was combined dyslipidemia with high TG and low HDL and in females it was high LDL and low HDL. The most prevalent lipid abnormality in our study was low HDL followed by high TG. No significant relation was found between HbA1c and serum lipid parameters.

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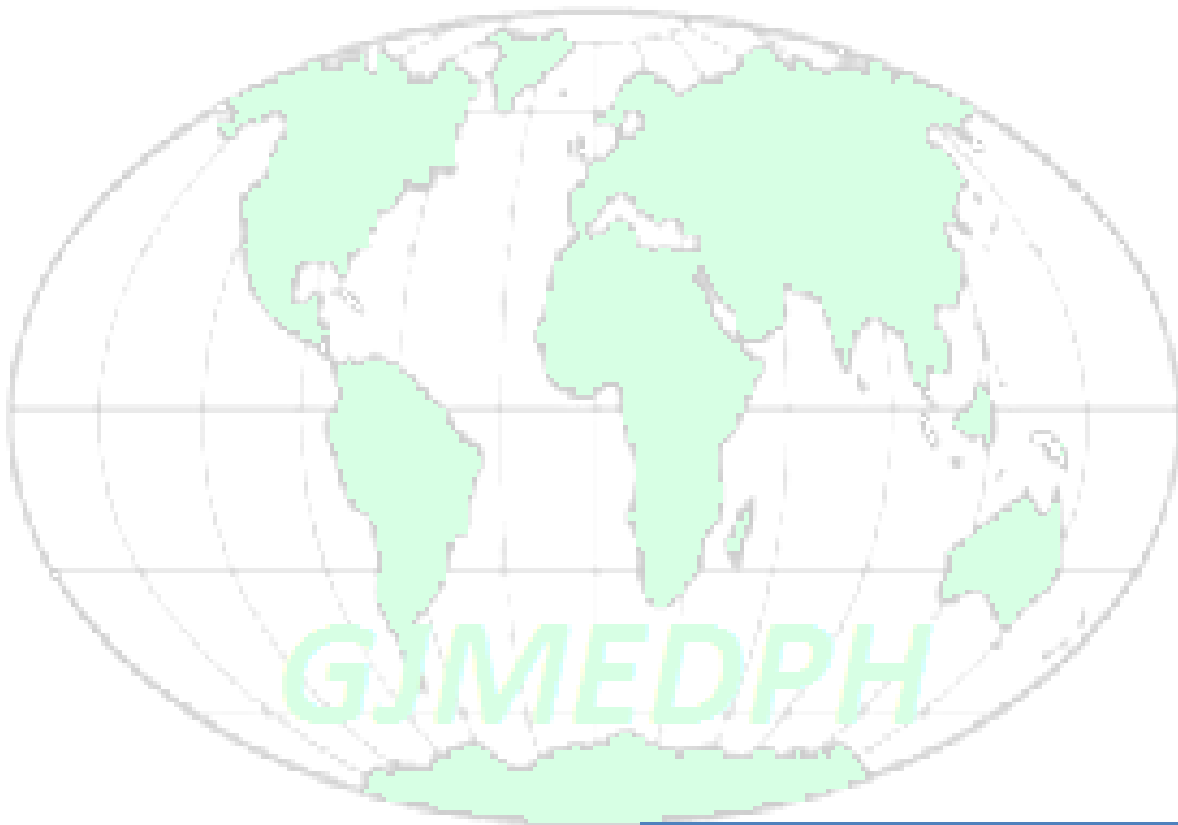
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