Original Research Article

Association between lipid profile and silent coronary artery disease in south Indian patients with type 2 diabetes mellitus

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ABSTRACT

Background: The patients with type 2 diabetes have an increased prevalence of lipid abnormalities (Dyslipidemia). Early diagnosis of diabetic patients with silent CAD and dyslipidemia can reduce the morbidity and mortality for cardiovascular death. The objective of the present study is to assess the prevalence of silent coronary disease among south Indian type-2 diabetic patients without cardiovascular symptoms and association between lipid profile and silent coronary disease among them.

Methods: 100 Type 2 diabetes mellitus patients (65 males and 35 females) of age 40-80 years attending the OPD of Sri Siddhartha Medical College, Tumakuru, Karnataka, India were enrolled in this study. The Serum samples were analysed for fasting blood glucose (FBS), post prandial blood glucose (PPBS), HbA1c, and lipid profile. The patients were classified into CAD and Non CAD groups based on ECG changes and stress test. Results were analysed SPSS 16.0 software.

Results: The study revealed that 46% of our study population had silent CAD. The prevalence of dyslipidemia was found higher in males than females in both study groups. CAD group patients had significantly higher levels of serum total cholesterol, triglycerides, LDL- cholesterol and low HDL - cholesterol compared to Non CAD group.

Conclusions: Dyslipidemia is indicating the strong association with silent CAD in type 2 diabetes mellitus. It is also advisable to have a screening ECG for silent CAD at the time of diagnosis or during the follow-up period in type 2 diabetes.

Keywords: Dyslipidemia, Lipid profile, Silent coronary artery disease, Type 2 diabetes mellitus

INTRODUCTION

The global burden of diabetes mellitus (DM) is rapidly increasing due to its sharp rise in incidence and prevalence in the developing countries especially type 2 DM. In future the prevalence of type 2 DM is expected to increase than type 1 DM because of increased obesity and increased sedentary life style.[1] Coronary artery disease (CAD) represents one of the major causes of morbidity and mortality in India especially in urban population.[2]

Various studies have shown that the prevalence of CAD among diabetic patients is higher than non-diabetic patients.[3] It is also seen in literature that the prevalence of CAD among the urban is higher compared to rural patients.[2]

CAD in diabetic patient is mainly owing to dyslipidemia (raised triglycerides, raised cholesterol and low HDL). Both persistent hyperglycaemia and dyslipidemia, especially raised LDL and low HDL eventually causes

endothelial cell dysfunction leading to atherosclerosis. Dyslipidemia is strongly associated with atherosclerosis which contributes to the risk of cardiovascular disease in diabetic patients. Early diagnosis of diabetic patient with silent CAD can reduce the morbidity and mortality for cardiovascular death.[4,5]

The objective of the present study is to assess the prevalence of silent coronary disease among south Indian type-2 diabetic patients without cardiovascular symptoms and association between lipid profile and silent coronary disease among them.

METHODS

The study population consists of 100 Patients with type 2 Diabetes, aged between 40 to 80 years who had been admitted to medical wards and attended to OPD of Sri Siddhartha Medical College (during the two year study period 2014-2016). A base line ECG was taken in all cases irrespective of cardiac involvement. Patients with normal ECG patterns were further evaluated with stress test for latent coronary artery disease. Patients with ischemic changes on ECG or positive stress test were considered as CAD group and those who were negative for changes on ECG or negative stress test were considered as Non CAD group. All the patients were subjected to lipid profile, fasting blood glucose, two hours post prandial blood glucose, HbA1c.

Inclusion criteria

- Patient above the age of 40 years
- Patient with type 2 diabetes mellitus.

Exclusion criteria

- Patients with hypertensive heart diseases
- Patients with corpulmonale
- Patients with rheumatic heart disease and congenital heart disease
- Patients with gestational diabetes mellitus.

RESULTS

This study consists of 100 patients (65 males and 35 females) with type 2 diabetes includes both rural and urban subjects between 40-80 years of age inclusive. One hundred (100) subjects composed of 46 CAD group and 54 Non CAD group were enrolled in the study. Of the CAD group 31 (67.4%) were males and 15 (32.6%) were females while in Non CAD group 34 (62.96%) were males and 20 (37.04%) were females. After obtained due consent, clinical and biochemical assessments were carried out. Final analysis was done after collecting the complete data for 100 subjects. Statistical analysis was performed using SPSS 16.0 software. P value <0.05 was considered as significant.

Out of 100 type 2 diabetes mellitus patients, 65 were male patients and 35 were female patients. The ratio of male: female is 1.7:1 .The mean age of the subjects was 55.79 years (males 56.12 years and females 55.79 years). The maximum numbers of patients were found to be in the age group of 40-60 years (Table 1).

Table 1: The age and sex distribution of the patients studied.

Age	Male	Female	Total	Percent
40-50 years	28	15	43	43%
51-60 years	21	14	35	35%
61-70 years	7	4	11	11%
71 and Above	9	2	11	11%
Total	**65**	**35**	**100**	**100%**

Table 2: Characteristics of subjects with type 2 diabetes mellitus.

Parameters	CAD group (n = 46)	Non CAD group(n = 54)	P Value
	Mean±SD	Mean±SD	
DMDU (years)	8.07±4.52	6.44±3.62	0.0492*
FBS (mg/dl)	200.2±55.78	165.31±42.55	0.0006***
PPBS (mg/dl)	244.00±67.79	234.81±62.45	0.4826
HbA1c (%)	8.18±0.49	7.6±0.49	<0.0001***

Table 3: Comparison of lipid profile in the study groups.

Parameters	CAD Group (n = 46)	Non CAD Group (n = 54)	P value
	Mean±SD	Mean±SD	
Total cholesterol	213.98±26.5	200.69±22.7	0.0082**
LDL-cholesterol	135.2±21.7	108.7±16.8	<0.0001***
HDL-cholesterol	40.8±6.3	45.8±5.04	<0.0001***
Triglycerides	186.24±40.7	169.3±38.2	0.0346*

Table 2 shows the mean duration of diabetes (DMDU), fasting blood glucose level (FBS), post prandial blood glucose (PPBS) and HbA1c among the study groups. CAD group had significantly longer duration of diabetes mellitus and higher FBS and HbA1c levels than Non CAD group.

Table 3 shows quantitative analysis of lipid profile in the study groups. CAD group patients had significantly higher levels (P <0.05) of serum total cholesterol, triglycerides, LDL- cholesterol and low HDL- cholesterol compared to Non CAD group.

Table 4: Comparison of the lipid profile in both sexes among study groups.

Parameters	CAD group (n = 46)		P -value	Non CAD group (n = 54)		'P' Value
	Male (n = 31)	Female (n = 15)		Male (n = 34)	Female (n = 20)	
Total cholesterol	216.3 (±27.87)	209.2 (±23.7)	0.5778	201.6 (±20.6)	199.1 (±26.4)	0.3323
LDL-cholesterol	135.1 (±21.4)	135.4 (±23.0)	0.2976	107.3 (±15.3)	111.2 (±19.2)	0.5153
HDL-cholesterol	39.55 (±6.25)	43.6 (±5.7)	0.0084	45.09 (±4.68)	47.05 (±5.12)	0.0001
Triglycerides	188.2 (±40.3)	182.2 (±42.8)	0.758	171.38 (±32.7)	165.75 (±46.8)	0.5623

Table 4 shows the comparison of the lipid profile with respect to gender in the CAD group and Non CAD group respectively. The mean serum HDL - cholesterol level was highly significant among the lipid profile of the male and female patients in CAD group as well as Non CAD group, whereas the mean serum total cholesterol and serum triglycerides level were higher in males than females in both study groups but the difference was not significant. The pattern of disturbance in lipid profile among the study groups is shown in Table 5.

Table 5: The pattern of hyperlipidemia in type 2 diabetic patients.

Parameters	CAD group (n = 46)	Non CAD group (n = 54)
	n (%)	n (%)
High cholesterol	29 (63.04%)	21 (38.9%)
High LDL-cholesterol	24 (52.17%)	5 (9.25%)
Low HDL-cholesterol	18 (39.13%)	6 (11.11%)
High triglycerides	43 (93.5%)	31 (57.4%)

DISCUSSION

Various studies show that the prevalence of CAD in the diabetic patients range from 9.5% to 55%.[6,7] The prevalence of silent CAD with type 2 diabetes mellitus in our study population was found to be 46%. It is very difficult to diagnose silent CAD very early. Disturbances in lipid parameters, hypertension and retinal changes may be already present by the time the disorder is diagnosed.

Different authors have well acknowledged that the patients with type 2 diabetes have an increased prevalence of lipid abnormalities (dyslipidemia).[8,9] National Cholesterol Education Programme (NCEP) Adult Treatment Panel III (ATP III) guidelines were followed to interpret the serum lipid reference values. According to these guidelines, diabetic dyslipidemia is characterized by serum total cholesterol >200 mg/dl, LDL - cholesterol > 130 mg/dl, HDL - cholesterol < 40 mg/dl and serum triglycerides levels are > 150 mg/dl.

The present study has revealed a very high prevalence of raised LDL-C, low HDL-C level, hypercholesterolemia and hypertriglyceridemia in CAD group patients which was significantly different from those of Non CAD group.

In this study the higher prevalence of dyslipidemia were found in male than female in both study groups. A study conducted by Uttra KM et al showed that serum cholesterol level >200 mg/dl was found in 14% patients with type 2 diabetes and serum triglycerides level>150 mg/dl was found in 31% diabetic patients.[10]

Ahmed et al conducted a study in Nishtar Hospital, Multan showed that serum cholesterol level was raised in 21% patients with type 2 diabetes (>200 mg/dl) whereas in our study, raised serum cholesterol level (>200 mg/dl) was seen in 63.04% patients in CAD and 38.9% patients in Non CAD groups.[11] He also reported that raised serum triglycerides level was seen in 34.2% patients with type 2 diabetes (>150 mg/dl) whereas in our study, raised serum triglycerides level (>150 mg/dl) was seen in 93.4% in CAD group patients and 57.4% in Non CAD group patients. Ibrahim M et al did a similar study on 1000 patients with CAD and reported that 45% patients had raised serum triglycerides level.[12]

A study conducted by Ibrahim M et al reported that a low HDL - C (<40 mg/dl) was found in 38% of CAD male patients whereas in our study a low HDL-C was reported in 39.13% of CAD group patients and 11.1% in Non CAD group patients.[12] Low HDL-C was found more in Male than female. The results showed no significant gender differences in lipid levels in both study groups

except HDL-C levels. Our finding was similar and in consistence with the study done by Vinter-Repalust.[13]

Mahato et al conducted a study on 294 type 2 Diabetes mellitus patients and reported that 63.26% had raised serum LDL-C level (>130 mg/dl).[14] Meenu et al did a similar study on 150 type 2 diabetes mellitus patients and reported that 18% had raised serum LDL-C levels.[8] Very high prevalence 98% was reported by singh et al whereas in our study, the prevalence of raised LDL- C was found in 52.17% of CAD group patients and 9.25% in Non CAD group patients.[15]

The commonest lipid abnormality (dyslipidemia) noted in this study was raised serum triglycerides and raised serum total cholesterol. In Our study, serum total cholesterol (63.04%) and serum triglycerides (93.4%) levels were found to be much raised among CAD group compared to Non CAD group.

CONCLUSION

The present study has revealed a very high prevalence of raised LDL-C, low HDL-C level, hypercholesterolemia and hypertriglyceridemis in CAD group patients than the Non CAD group patients, indicating the strong association of dyslipidemia with silent CAD in type 2 diabetes mellitus. Hence we conclude that a regular follow up with lipid profile will helps in reducing the morbidity due to silent CAD in type 2 diabetes. It is also advisable to have a screening ECG for silent CAD at the time of diagnosis or during the follow-up period in type 2 diabetes.

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