STUDY OF ASSOCIATION OF DIABETIC RETINOPATHY WITH DYSLIPIDAEMIA IN TYPE 2 DIABETES MELLITUS PATIENTS

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ABSTRACT

BACKGROUND
Dyslipidaemia is highly prevalent in type 2 diabetes mellitus patients. The role of dyslipidaemia in macrovascular complications of diabetes have been extensively studied, but its role in microvascular complications namely retinopathy are still unclear. The present study was undertaken to study the association of diabetic retinopathy with diabetic dyslipidaemia.

The aim of the study is to study the association between serum lipid profile and retinopathy in patients with type 2 diabetes mellitus.

MATERIALS AND METHODS
100 patients with type 2 DM attending OPD or admitted over a period of 1 year were studied. Detailed history was taken and clinical examination was done. Serum lipid profile was studied in all patients and its association with diabetic retinopathy was assessed.

RESULTS
The prevalence of dyslipidaemia in DM patients in our study was 90%. There was significant association of diabetic retinopathy with high total cholesterol and Low-Density Lipoprotein-Cholesterol (LDL-C). However, diabetic retinopathy was not associated with triglycerides and High-Density Lipoprotein (HDL-C).

CONCLUSION
Dyslipidaemia is a common problem in patients with diabetes and it has significant association with diabetic retinopathy. Hence, patients should be managed with lifestyle modifications with or without lipid lowering agents to achieve target lipid values along with adequate glycaemic control to prevent or delay the appearance and progression of diabetic retinopathy.

KEYWORDS
Type 2 Diabetes Mellitus, Diabetic Retinopathy, Dyslipidaemia.

BACKGROUND
The prevalence of diabetes mellitus is growing rapidly worldwide and is reaching epidemic proportions. The global prevalence of diabetes among adults is estimated to be 6.4% affecting 285 million people in 2010 and is expected to increase to 7.7% affecting 439 million people by 2030.[1] Lipid abnormalities associated with diabetes are termed as dyslipidaemia rather than hyperlipidaemia because there maybe changes in both quantity and quality of the lipoproteins. Diabetes Mellitus (DM) is a common secondary cause of hyperlipidaemia, particularly, if glycaemic control is poor. The exponential rise in the global prevalence of diabetes almost certainly can be associated with an inevitable and parallel increase in the long-term complications that associate with diabetes. Diabetes threatens to reduce life expectancy and increase morbidity and mortality as a result of its complications, which are classified as macrovascular and microvascular. Diabetes mellitus is a major cause of avoidable blindness in both the developing and the developed countries. Patients with diabetes are 25 times more likely to become blind than nondiabetics.

The role of dyslipidaemia in macrovascular complications is well established. But, its role in microvascular complications, namely diabetic retinopathy has not been studied extensively. The present study aimed to study association of diabetic dyslipidaemia with diabetic retinopathy.

Design- This study was a cross-sectional hospital-based study.

Statistical Analysis Used- Various descriptive and inferential statistics have been calculated. As far the descriptive statistics are concerned, quantitative data have been expressed in terms of mean, whereas qualitative data as frequency and percentages. The non-numeric data have also been graphically represented by bar diagram and pie

charts. Chi-square test has been applied for the comparison of various prevalence in different groups. The p-value of <0.05 was considered statistically significant. The data have been analysed using statistical package version SPSS-20.

MATERIALS AND METHODS

This study was a cross-sectional hospital-based study. 100 randomly selected patients with type 2 diabetes mellitus attending to the outpatient department or admitted in the Department of General Medicine, VIMS and RC, Bangalore, who satisfy inclusion criteria were included in the study.

Inclusion Criteria

Patients with type 2 diabetes mellitus between 40-80 yrs. of age irrespective of duration of diabetes. Both males and female patients were included.

Exclusion Criteria

- Patients with hypertension.
- Patients with BMI >30 kg/m2.
- Patients on lipid-lowering agents (statins, fibrates, etc.).
- Patients on treatment with medications, which alter lipid profile.

All cases were studied with reference to history, physical examination and necessary investigations. Fasting Blood Sugar (FBS) and Postprandial Blood Sugar (PPBS) and fasting lipid profile was done. Low-density lipoprotein cholesterol (LDL-C) was calculated by Friedewald's formula. Glycosylated haemoglobin (HbA1c) was analysed by high pressure liquid chromatography method. Patients having one or more parameters (TG, TC, HDL-C or LDL-C) outside the targets recommended by American Diabetes Association (ADA) were considered to have dyslipidaemia, which includes TG ≥150 mg/dL, LDL ≥100 mg/dL, HDL ≤40 mg/dL in males and ≤50 mg/dL in females and TC >200 mg/dL. Ophthalmological examination was done to look for diabetic retinopathy and patients were classified according to Early Treatment Diabetic Retinopathy Study Levels of Diabetic Retinopathy (ETDRS) classification.

Statistical Analysis- In our study, various descriptive and inferential statistics have been calculated. As far the descriptive statistics are concerned, quantitative data have been expressed in terms of mean, whereas qualitative data as frequency and percentages. The nonnumeric data have also been graphically represented by bar diagram and pie charts. Chi-square test has been applied for the comparison of various prevalence in different groups. The p-value of <0.05 was considered statistically significant. The data have been analysed using statistical package version SPSS-20.

RESULTS

During our study, we randomly selected 100 diabetes mellitus patients visiting OPD or admitted in the Department of Medicine at our institution.

Sex	Number of Patients
Male	56
Female	44

Table 1. Sex Distribution of Diabetes Mellitus Patients

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Mean age	54.9 ± 7.6
Mean duration of diabetes	5.13 ± 4.5
Mean HbA1c	9.03 ± 2.1
Mean FBS	169.6 ± 54.7
Mean PPBS	278.9 ± 91.3

Table 2. Mean and Standard Deviation of Age, Duration of Diabetes, HbA1c, FBS and PPBS

Sex	Dyslipidaemia	Normal Lipid	Total
Male	51 (91%)	5 (9%)	**56**
Female	39 (88.6%)	5 (11.4%)	**44**
Total	**90**	**10**	**100**

Table 3. Distribution of Dyslipidaemia in Males and Females

Lipid Parameter	Males (%)	Females (%)	Total	P value
High total cholesterol	11 (19.6%)	8 (18.1%)	19	0.853
Low HDL-C	43 (76.7%)	35 (79.5%)	78	0.741
High LDL-C	22 (39.2%)	16 (36.3%)	38	0.765
High triglycerides	33 (58.9%)	24 (54.5%)	57	0.660

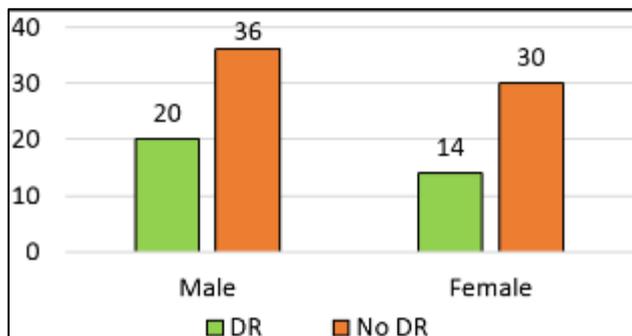**Table 4. Prevalence of Individual Lipid Abnormality**
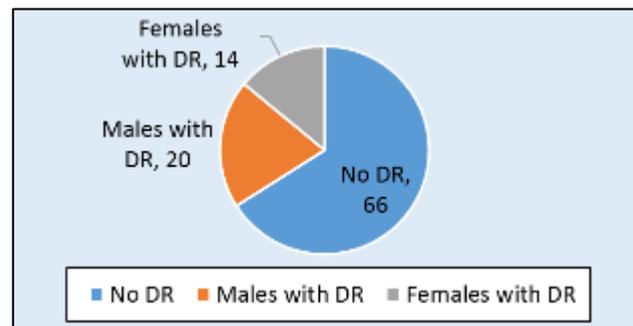
Graph 1. Distribution of Patients According to DR

In our study, 34 out of 100 patients had diabetic retinopathy.
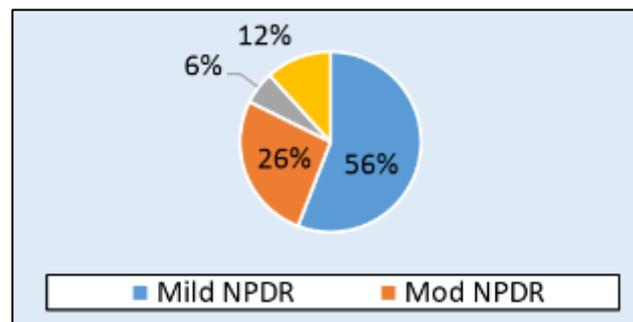
Graph 2. Distribution of Patients According to Severity of DR

In our study, 34 out of 100 patients had diabetic retinopathy.

Graph 3. Distribution of DR in Males and Females

There was no significant difference in the prevalence of DR among males and females.

Lipid Parameter	Patients With DR (n=34)	Patients Without DR (n=66)	P Value
Low HDL-C	22 (64.7%)	56 (84.9%)	0.021
High TC	17 (50%)	2 (3%)	<0.001
High LDL-C	28 (82.4%)	11 (16.6%)	<0.001
High TG	23 (67.6%)	34 (51.5%)	0.123
Table 5. Association of DR with Lipid Parameters			

There was significant association of high TC and high HDL-C with diabetic retinopathy.

DISCUSSION

The prevalence of dyslipidaemia in diabetes mellitus patients in our study was 90%. This finding was similar to studies done by Jayarama N et al,[2] Hetal Pandya et al,[3] and Daniel Nii Aryee Tagoe et al,[4] which showed prevalence of 91%, 85% and 93%, respectively. There was no statistically significant difference in the prevalence of dyslipidaemia among males and females.

The prevalence of diabetic retinopathy in our study was 34%. Similar results were found in studies done by Gnaneswaran S et al[5] and Jyothi Idiculla et al,[6] which have shown prevalence of 32.5% and 42.7%, respectively. Slightly higher prevalence of DR was seen in study done by Hala El-Mofty et al (55.36%).[7]

In present study, all patients with DR had dyslipidaemia. We found statistically significant association of DR with high TC and high LDL-C with p value <0.001. However, DR was not associated with high TG and low HDL-C levels (P value 0.123 and 0.021, respectively). This was in comparison with study done by Gnaneswaran S et al,[5] which showed significant association of DR with TC and LDL-C with 'p' value of 0.026 and 0.003, respectively. They found no association of DR with HDL-C and TG. Study done by Klein R, et al[8] showed that retinopathy was associated with higher plasma total cholesterol and LDL cholesterol. However, DR was not associated with plasma HDL-C and triglycerides.

The following studies show variable association of DR with different lipid parameters. Study done by Alpana Mathur[9] showed association of TG with DR. They found no association of TC and LDL-C with DR. Study done by Rema M et al[10] (CURES) showed significant association of TG and Total Cholesterol (TC) with DR and LDL-C with DME. The

Hoorn study[11] showed that the prevalence of retinopathy was positively associated with elevated serum cholesterol and triglyceride levels. Results from the Singapore Malay Eye Study (SMES)[12] revealed that LDL-C is an independent risk factor for any retinopathy.

CONCLUSION

The present study highlights the magnitude of dyslipidaemia in type 2 diabetes mellitus patients and that there is a significant association of diabetic retinopathy with lipid parameters.

Since, diabetic retinopathy is associated with high TC and LDL-C, patients should be managed with lifestyle modifications with or without lipid-lowering agents to achieve target lipid values along with adequate sugar control to prevent or delay the appearance and progression of diabetic retinopathy.

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