ORIGINAL RESEARCH

An Association Of Serum Lipid Profile In Type 2 Diabetes Mellitus With Diabetic Retinopathy

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ABSTRACT
Aims And Objectives: To find an association of serum lipid profile in Type 2 Diabetes Mellitus with diabetic retinopathy. **Study Period**: 6 months. **Study Design**: Hospital based Prospective observational study. **Study Population**: Patients with Type 2 Diabetes Mellitus attending as in patient and out patient in Regional Institute of Ophthalmology, Gauhati Medical College. **Targeted Sample Size**: 250. **Inclusion Criteria:** Patients with Type 2 Diabetes mellitus with Diabetic retinopathy. Age between 20 to 80 years and both male and females will be included. **Exclusion Criteria:** Patients who were on lipid lowering drug, Bilateral media opacity and Pregnant patients.Patients on Haemodialysis,CAD and Hepatic Diseases. **Materials And Methodology**: 250 patients with Type 2 Diabetes Mellitus were selected and was categorized into patients with diabetic retinopathy and patients with no diabetic retinopathy. Serum lipid profile of both the groups were measured and compared. **Results**: Out of 250 patients,193 patients had diabetes with dyslipidemia and 57 patients had diabetes with no dyslipidemia.Mean ± SD of LDL(mg/dL) in patients with diabetic retinopathy was 119.85±40.50 which was significantly higher as compared to patients without diabetic retinopathy indicating a significant association of LDL(mg/dL) with diabetic retinopathy. **Conclusion:** Serum lipid profile which are derranged are supposed to play a major role in the progression of diabetic retinopathy. Elevated serum LDL levels were found to be a significant risk factor for diabetic retinopathy.

INTRODUCTION
Diabetes Mellitus is a group of metabolic diseases characterised by hyperglycemia due to disorder in the insulin secretion, action of insulin or both.As a result of chronic hyperglycemia,diabetes mellitus is associated with damage, dysfunction or failure of various vital organs due to micro and macrovascular complications. Latest estimated prevalence of diabetes mellitus worldwide id more than 500 million[1].Prevalance of Diabetes mellitus is more than 62 million and is projected to harbour more than 109 million people by 2035[2]. Diabetic retinopathy is one of the most common microvascular complications of diabetes mellitus which includes diabetic retinopathy and diabetic macular edema[3].It is one of the leading cause of visual impairment and blindness at the global level[4].Global burden of visual impairment due to diabetic retinopathy is estimated to be 2.6 million in 2015[5].Diabetes mellitus and its complications has become has become a major public health issue[6].Abnormal Lipid level is hypothesized to have been a risk factor for Diabetic Retinopathy as it causes endothelial dysfunction. This endothelial dysfunction and breakdown of blood retinal barrier by abnormal serum lipids is likely to play a role in retinal exudates formation as seen in Diabetic Retinopathy[7]. The correlation between Serum Lipid profile and diabetic Retinopathy in different studies had shown conflicting results.ETDRS reported that Total Cholesterol and LDL levels were associated with Diabetic Retinopathy[8].Similarly,Chennai Urban Rural Epidemiology Study showed serum Lipids were higher in patients with Diabetic Retinopathy than in patients without Diabetic Retinopathy[9].While Tapp RJ et al (2003) did not find any such association in their study[10].This study aims to find if there is any such association between Diabetic retinopathy and Serum lipid profile.

AIMS AND OBJECTIVES
1. To find an association of serum lipid profile in Type
2. Diabetes Mellitus with diabetic retinopathy.

MATERIALS AND METHODS
STUDY PERIOD: 6 months

STUDY DESIGN
This is a Hospital based Prospective observational study to be conducted in RIO,Gauhati Medical College and Hospital from June 2023 to November 2023

STUDY POPULATION

Patients with Type 2 Diabetes Mellitus attending as in patient and out patient in Regional Institute of Ophthalmology, Gauhati Medical College.
TARGETED SAMPLE SIZE: 250

INCLUSION CRITERIA

Patients with Type 2 Diabetes mellitus with Diabetic retinopathy. Age between 20 to 80 years and both male and females will be included.

EXCLUSION CRITERIA

- Patients who were on lipid lowering drug.
- Patients with Bilateral media opacity.
- Pregnant patients.
- Patients on Haemodialysis.
- Patients with CAD and Hepatic Diseases.

STUDY PROCEDURE

- Vision was assessed using illuminated Snellen's Chart.
- Anterior segment was evaluated in detail by slit lamp examination and fundus examination was done in a dark room with indirect ophthalmoscope.
- Fundus was also evaluated by means of direct ophthalmoscopy and slit lamp biomicroscopy with +90D lens.
- Fundus camera was used to obtain a fundus photograph.
- Participants were segregated into 2 categories.

Group-1 included patients with type 2 diabetes mellitus with diabetic retinopathy.

Group-2 included patients with type 2 diabetes mellitus without diabetic retinopathy.

- For grading the severity of diabetic retinopathy, Early Treatment Diabetic Retinopathy Study (ETDRS) protocol was followed. For a detailed analysis, the DR group was further divided into patients with NPDR and those with PDR based on the ETDRS protocol.
- To measure serum lipid levels, patient was kept fasting for 12 hours (No food or drink, except water). 2 ml of blood was collected from a resting patient using an optimal venopuncture technique in a red vacutainer and serum lipid levels namely serum total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides were measured.*Normal range of serum TC is <200mg/dl, serum HDL-Cholesterol is 35-80mg/dl in males and 42-88mg/dl in females, serum LDL-Cholesterol is <130mg/dl, serum TG is 40-160 mg/dl.Fasting plasma glucose was measured after an overnight fast(8 hours fasting with no food, drink except water). *Normal levels of fasting blood glucose range between 70-100 mg/dl. Fasting blood glucose level of 126 mg/dl or above is indicative of diabetes mellitus.To measure HbA1C, 2 ml of blood was collected in a lavender vacutainer containing EDTA as a preservative. *Normal level of HbA1C is 4.8-5.9%. HbA1C of 6.5% or higher is indicative of diabetes mellitus. The above lab tests were conducted and results were documented.

All details of participants were kept after taking proper consent from the patients. The data were then collected, compiled and Statistical tests were applied after tabulating the data. A p Value of <0.05 was considered to be statistically significant
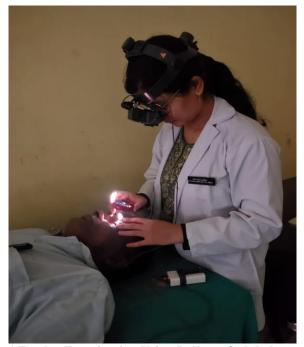

Fig: 1 Fundus Examination Using Indirect Ophthalmoscope

Fig: 2 Fundus Photography

Fig: 3 Optical Coherence Tomography

OBSERVATIONS AND RESULTS

Table: 1LDL Prevalence of dyslipidemia in our study was 77.2 % (193 patients).

DYSLIPIDEMIA	FREQUENCY	PERCENTAGE
NO	57	22.8
YES	193	77.2
TOTAL	250	100

Mean ± SD of LDL(mg/dL) in diabetic retinopathy was 119.85±40.50 mg/dl and 102.97±35.84 mg/dl in patients without diabetic retinopathy .Thus significant association was seen between serum LDL levels and diabetic retinopathy.(p=0.006)

Lipid profile	DIABETIC RETINOPATHY(n=125)	NO DIABETIC RETINOPATHY(n=125)	TOTAL	P VALUE	TEST PERFORMED
Normal	75(60%)	96(76.8%)	171(68.4%)	0.004	Chi square test
Derranged	50(40%)	29(23.2%)	79(31.6%)	0.004	Chi square test
Mean ± SD	119.85±40.50	102.97±35.84	111.41±38.17	0.006	t test

Table: 2 HDL Mean ± SD of HDL (mg/dL) in patients with diabetic retinopathy was 37.88±6.24 mg/dl and in patients without diabetic retinopathy was 38.02±6.34 mg/dl with no significant association between them. (p=0.763)

Lipid profile	DIABETIC RETINOPATHY(n=125)	NO DIABETIC RETINOPATHY(n=125)	TOTAL	P VALUE	TEST PERFORMED
Normal	56(44.8%)	66(52.8%)	122(48.8%)	0.396	Chi square test
Derranged	69(55.2%)	59(47.2%)	64(51.2%)	0.396	Chi square test
Mean ± SD	37.88±6.24	38.02±6.34	37.95±6.29	0.763	t test

Table: 3

TOTAL: CHOLESTEROL: Mean ± SD of total cholesterol (mg/dL) in diabetic retinopathy was 178.24±54.24mg/dl and in patients without diabetic retinopathy was 169.48±38.56mg/dl and no significant association was seen between them. (p=0.170)

Lipid profile	DIABETIC RETINOPATHY(n=125)	NO DIABETIC RETINOPATHY(n=125)	TOTAL	P VALUE	TEST PERFORMED
Normal	88(70.4%)	101(80.8%)	189(75.6%)	0.106	Chi square test
Derranged	37(29.6%)	24(19.2%)	61(24.4%)	0.106	Chi square test
Mean ± SD	178.24±54.24	169.48±38.56	173.86±46.4	0.170	t test

Table: 4

TRIGLYCERIDE

Mean ± SD of Triglyceride in diabetic retinopathy was 162±80.50 mg/dl and in patients without diabetic retinopathy was 151.80±46.8 mg/dl and no significant association was seen between them. (p=0.582)

Lipid profile	DIABETIC RETINOPATHY(n=125)	NO DIABETIC RETINOPATHY(n=125)	TOTAL	P VALUE	TEST PERFORMED
Normal	90(72%)	77(61.6%)	167(66.8%)	0.102	Chi square test
Derranged	35(28%)	23(38.4%)	58(33.2%)	0.102	Chi square test
Mean ± SD	162±80.50	151.80±46.8	156.5±63.65	0.582	t test

Table 5

DISCUSSION

In present study, out of 250 patients,193 patients had Type 2 Diabetes Mellitus with dyslipidemia and 57 patients had Type 2 Diabetes Mellitus with no dyslipidemia. The prevalence of dyslipidemia was found to be as high as 77.2% (Table 1). High prevalence of dyslipidemia has also been reported by Parikh et al.,[11] who found the prevalence of dyslipidemia (the parameters used were: triglycerides above 150 mg/dl or LDL equal to or more than 100mg/dl or HDL less than 40 mg/dl for males and less than 50 mg/dl among females) in diabetics (n=788) to be 97.8% in females and 85.5% in males. In another study by Joshi SR et al.,13.9 % subjects were found to have raised total cholesterol,29.5 % of subjects had elevated triglyceride levels,72.3 % of subjects had reduced levels of HDL cholesterol,11.8 % of subjects had raised levels of LDL cholesterol and 79% of subjects had one of the lipid abnormalities.[12]In our study, Mean ± SD of LDL(mg/dL) in patients with diabetic retinopathy was 119.85±40.50 which was significantly higher as compared to patients without diabetic retinopathy (Table 2) indicating a significant association of LDL(mg/dL) with diabetic retinopathy. (p value=0.006). This can be corroborated with the 1996, ETDRS report no. 22, which evaluated the relationship between serum lipid levels and retinal hard exudates in 2709 patients with diabetic retinopathy. At baseline, patients who were found to have elevated serum total cholesterol or elevated serum low-density lipoprotein cholesterol (LDL-C) levels were more likely to have retinalhardexudate.[13]In our study, no significant association was seen in the distribution of total cholesterol (mg/dL), HDL(mg/dL), Triglyceride (mg/dL) with diabetic retinopathy(pvalue>.05) (Table3,4,5)Similar results were seen in a meta-analysis of 7 studies conducted by Yue Zhou et al., where obvious differences in TG, TC and HDL-C levels between patients with diabetic retinopathy and those without diabetic retinopathy were not found. However, slightly higher LDL-C levels were observed in the DR cases and in their study, Fenofibrate was proven to be beneficial in patients with DR and dyslipidemia.[14] In a study by Idiculla J et al., [15] retinal hard exudate formation was found to have a positive statistical correlation with the presence of dyslipidemia (p=0.02), increased levels of total cholesterol (p=0.002) and also LDL levels (p=0.001).

CONCLUSION

There are various risk factors which are related to diabetic retinopathy.Serum lipid profile which are derranged are supposed to play a major role in the progression of diabetic retinopathy.Elevated serum LDL levels were found to be a significant risk factor for diabetic retinopathy.

CONSENT

Informed and written consent taken in all the cases.

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