ORIGINAL RESEARCH PAPER

Ophthalomology

CORRELATION OF SERUM LIPID LEVELS WITH DIABETIC RETINOPATHY IN DIABETIC PATIENTS: A HOSPITAL BASED STUDY

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ABSTRACT

Purpose- To study the correlation of serum lipid levels with diabetic retinopathy in diabetic patients: A hospital based study **Material & Methods-** Our present study was a hospital based, prospective, case control study of 200 patients, of which 100 patients were of type 2 DM with diabetic retinopathy and 100 patients were non-diabetic patients who attended the eye OPD at R.D.Gardi Medical College, Ujjain. the patients were subjected to comprehensive ocular examination. Complete serum lipid levels (Total cholesterol, Triglyceride, LDL, HDL) were compared in both the groups after obtaining a written informed consent. **Results-** In the study, out of 100 patients with diabetic retinopathy 47 patients in group 1 and 61 patients from group 2 were females. In this study of 200 eyes, 64 eyes (32%) had mild NPDR, 41 eyes (20.5%) had moderate NPDR, 35 eyes (17.5%) had severe NPDR and 60 eyes (30%) had PDR in retinopathy group. Out of 200 eyes with diabetic retinopathy 117 eyes (58.5%) had cholesterol level of > 200mg/dl whereas 83 eyes (41.5%) had cholesterol level of <200mg/dl and 31eyes (15.5%) with mild NPDR, 21eyes (10.5%) with moderate NPDR, 19 eyes (9.5%) with severe NPDR and 46 eyes (23%) with PDR had cholesterol level >200mg/ dl. 29(29%) patients of group 1 (diabetics) and 78(78%) of group 2 (non-diabetics) had triglyceride levels <150 mg/dl, whereas 71(71%) patients of group 1 (diabetics) and 22(22%) of group 2 (non-diabetics) had triglyceride levels >150 mg/dl. **Conclusion-** Serum lipid levels such as raised triglycerides, cholesterol, LDL and lowered HDL were significantly associated with the occurrence of diabetic retinopathy.

INTRODUCTION

Diabetes which has been a global burden and the prevalence rates have been on a steep rise in the developing countries. It is estimated that diabetes mellitus affects 4 percent of the world's population, which is almost half of whom have some degree of diabetic retinopathy at any given time.[1] The most common factors responsible for the altered vascular response causing the dreaded chronic vascular complications are chronic hyperglycaemia, increased reactive oxygen species, decreased nitric oxides and increased fatty acids.[2] Patients with diabetes subsequently land with diabetic retinopathy which is invariably associated with risk factors such as duration of diabetes, HbA1c levels, hypertension, dyslipidaemia. Diabetic dyslipidaemia which is characterized by elevated serum total cholesterol(TC), triglycerides (TG), low density lipoproteins cholesterol(LDL-C), high density lipoproteins cholesterol(HDL-C) levels that are known to cause endothelial dysfunction due to reduced bioavailability of nitric oxide and this endothelial dysfunction was suggested to play a role in retinal exudate formation in diabetic retinopathy.[3]

MATERIALS AND METHODS

The study was a hospital based study carried out in the department of Ophthalmology, Ruxmaniben Deepchand Gardi Medical College (RDGMC), Ujjain (Madhya Pradesh). The study was a prospective, case control hospital based study of 200 patients out of which 100 patients were of Type 2 DM with Diabetic retinopathy and 100 patients were non-diabetic patients. A written informed consent was taken from all patients who were included in the study group.
Patients of the study group were divided into 2 groups:
A) 100 patients with diabetic retinopathy(Study Group)
B) 100 non-diabetic patients(Control Group)

Inclusion Criteria
1. Patients with diabetes mellitus having diabetic retinopathy were included.
2. Non diabetic patients which served as control group.

Exclusion Criteria
1. Patients with hazy media where posterior segment evaluation was not possible.
2. Patients with other maculopathy changes.
3. Patients with retinal detachment, ARMD and other vascular diseases of retina.
4. Pregnancy
5. Patients with drug allergy.

Patient underwent a detailed and comprehensive ocular examination including the anterior segment examination after recording the prelimnary data like name, gender, occupation and residence. Detailed fundus examination was done with the help of direct ophthalmoscope, indirect ophthalmoscope. Fundus Fluorescein Angiography and Optic Coherence Tomography was done in all the patients to confirm the diagnosis.

RESULTS
Our study was a case control study and following were the results.

Table No. 1 Gender Distribution Of Patients In The Study Group

	Group 1		Group 2	
Sex	No. of patients	%	No. of patients	%
Male	53	53.0	39	39.0
Female	47	47.0	61	61.0
Total	100	100.0	100	100.0

In our study out of 100 patients in group 1, 53 patients (53%) were males and 47 patients (47%) were females and from the other group (group 2) 39 patients(39%) were males and 61(61%) patients were females(Table 1)

Table No. 2 Pattern Of Diabetic Retinopathy In Group 1 Patients

Grade of Retinopathy	RE	LE	Total	Percentage
Mild NPDR	34	30	64	32.0
Moderate NPDR	17	24	41	20.5
Severe NPDR	19	16	35	17.5
Early PDR	14	14	28	14.0

High Risk PDR	16	16	32	16.0
Total	100	100	200	100.0

In this study of 200 eyes, 64 eyes (32%) had mild NPDR, 41 eyes (20.5%) had moderate NPDR, 35 eyes (17.5%) had severe NPDR and 60 eyes (30%) had PDR in retinopathy group(Table 2)

Table No. 3 Correlation Between Grade Of Retinopathy And Cholesterol Levels.

Grade of Retinopathy	Cholesterol levels <200mg/dl	%	Cholesterol levels >200mg/dl	%	Total Number	%
Mild NPDR	32	38.5	31	26.4	63	31.5
Moderate NPDR	20	24.0	21	17.9	41	20.5
Severe NPDR	17	20.4	19	16.23	36	18.0
Early PDR	6	7.2	22	18.8	28	14.0
High Risk PDR	8	9.6	24	20.5	32	16.0
Total	83	100.0	117	100.0	200	100.0

Out of 200 eyes with diabetic retinopathy 117 eyes (58.5%) had cholesterol level of > 200mg/dl whereas 83 eyes (41.5%) had cholesterol level of <200mg/dl and 31eyes (15.5%) with mild NPDR, 21eyes (10.5%) with moderate NPDR, 19 eyes (9.5%) with severe NPDR and 46 eyes (23%) with PDR had cholesterol level >200mg/ dl(Table 3).

Table no.4 Correlation Between Grade Of Diabetic Retinopathy And LDL/HDL Ratio in Group1

Grade of Retinopathy	LDL/HDL <3		LDL/HDL >3		Total	
	Number	%	Number	%	Number	%
Mild NPDR	10	50.0	53	29.4	63	31.5
Moderate NPDR	4	20.0	37	20.5	41	20.5
Severe NPDR	0	0.0	36	20.0	36	18.0
Early PDR	2	10.0	26	14.4	28	14.0
High Risk PDR	4	20.0	28	15.5	32	16.0
Total	20	100.0	180	100.0	200	100.0

In our study of 200 eyes with diabetic retinopathy 180 eyes (90%) had LDL/HDL >3 whereas 20 eyes (10%) had LDL/HDL <3, 53 eyes (26.5%) with mild NPDR, 37 eyes (18.5%) with moderate NPDR, 36 eyes (18%) with severe NPDR and 54 eyes (27%) with PDR had LDL/HDL >3.

Table No.5 Correlation Of Cholesterol Levels In Non Diabetic Group(Group 2)

Cholesterol levels	No. of patients	%
<200mg/dl	82	82.0
>200mg/dl	18	18.0
Total	100	100.0

In group 2 of non diabetics, 82(82%) had cholesterol level <200mg/dl and 18 (18%) had cholesterol level > 200mg/dl (table 5)

Table No.6 Correlation Of The Triglyceride Levels In Both The Groups

Triglyceride levels	Group 1		Group 2	
	No. of Patients	%	No. of Patients	%
<150 mg/dl	29	29.0	78	78.0
>150 mg/dl	71	71.0	22	22.0
Total	100	100	100	100.0

In our study, 29(29%) patients of group 1 (diabetics) and 78(78%) of group 2 (non-diabetics) had triglyceride levels <150 mg/dl, whereas 71(71%) patients of group 1 (diabetics) and 22(22%) of group 2 (non-diabetics) had triglyceride levels >150 mg/dl (table 6).

DISCUSSION
Our study was a prospective, case control hospital based study of 200 patients out of which 100 patients were of type 2 DM with diabetic retinopathy and 100 patients were non-diabetic patients which is carried out in the department of Ophthalmology, Ruxmaniben Deepchand Gardi Medical College (RDGMC), Ujjain (Madhya Pradesh).

Gender-
In our study we found that out of 100 patients in diabetic retinopathy group (group 1), 53 patients (53%) were males and 47 patients (47%) were females which was comparable with the Yin L et al (2020) quoted that more male patients were found to have diabetic retinopathy (p <0.0001).[4] Rema M et al (1996) found DR being more prevalent in males compared to females(sex ratio 2:1).[5]

Correlation Of Triglyceride Levels With Diabetic Retinopathy-
In our study, 29(29%) patients of group 1 (diabetics) and 78(78%) of group 2 (non-diabetics) had triglyceride levels <150 mg/dl, whereas 71(71%) patients of group 1 (diabetics) and 22(22%) of group 2 (non-diabetics) had triglyceride levels >150 mg/dl (see table 6).Van Leiden HA et al (2002) in their study found that prevalence of retinopathy was positively associated with high blood pressure, BMI, serum cholesterol and triglyceride levels in all glucose categories.[6]

Correlation Of Cholesterol Levels With Diabetic Retinopathy-
In this study of 200 eyes with diabetic retinopathy (group 1) ,117 eyes (58.5%) had cholesterol level of > 200mg/dl whereas 83 eyes (41.5%) had cholesterol level of 200mg/ dl which was comparable with Yau JW et al (2012) found that raised total serum cholesterol level was correlated with an increasing prevalence of macular edema and severe retinopathy in diabetic patients.[7] In contrast, out of 100 non diabetic patients (group 2) of our study, 82 (82%) non diabetics had cholesterol level 200mg/dl. According to another study by De Block CE et al (2005) elevated serum cholesterol and lipid levels are related with an increased risk of long-term vision loss in diabetic retinopathy.[8]

Pattern Of Diabetic Retinopathy In The Diabetic Patients-
In our study we found of 200 eyes, 64 eyes (32%) had mild NPDR, 41 eyes (20.5%) had moderate NPDR, 35 eyes (17.5%) had severe NPDR and 60 eyes (30%) had PDR in retinopathy group.

Correlation Between Grade Of Diabetic Retinopathy And LDL/HDL Ratio in Group1-
In our study of 200 eyes with diabetic retinopathy 180 eyes (90%) had LDL/HDL >3 whereas 20 eyes (10%) had LDL/HDL <3, 53 eyes (26.5%) with mild NPDR, 37 eyes (18.5%) with moderate NPDR, 36 eyes (18%) with severe NPDR and 54 eyes (27%) with PDR had LDL/HDL >3. Ezhilvendhan K, et al (2010) showed a significant positive association among DR and LDL cholesterol.[9] Kohner EM et al (1998) in their study found a positive association between sever grade of retinopathy with lower levels of HDL.[10]

CONCLUSION
Our study concluded a direct correlation of lipid levels with DR, dyslipidemia was a significant factor associated with various types of Diabetic retinopathy.

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