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An Assosciation of Diabetic Retinopathy with Serum Lipids Level – A Study

Authors
Dr. Preeti Rawat[1], Dr. Divya Patel[2], Dr. Sachin Tammannavar[3], Dr. Ulka Srivastava[4]
Dr. Vijay Bhaisare[5], Dr. Narmada Prasad Tiwari[6]

[1]Assosciate Professor, Department of Ophthalmolgy, MGM Medical College & MYH Hospital -Indore
[2,3]Resident, Department of Ophthalmolgy, MGM Medical College & MYH Hospital -Indore
[4,5]Professor, Department of Ophthalmolgy, MGM Medical College & MYH Hospital –Indore
[6]Resident, Department of Pathology, MGM Medical College and MYH Hospital-Indore
Corresponding Author
Dr. Divya Patel
House number 50,Saptshrungi Nagar, Near Silicon city, AB Road, Rau, INDORE-452012 (India)
Email: *tammannavarsachin@yahoo.com*

ABSTRACT

Aim: *To study the assosciation of Diabetic retinopathy with serum lipids level in Type 2 diabetic subjects.*

Settings and Design: *The Cross sectional nonrandomized study.*

Materials and Methods: *A total 150 patients with Type 2 diabetes mellitus were assessed for presence and severity of retinopathy and they were correlated with age, sex, duration of Diabetic mellitus and serum lipids level. Diabetic Retinopathy was diagnosed by fundus examination using indirect ophthalmoscope with 20D lens and slit lamp biomicroscopy with 78D lens and classified according to the Early Treatment Diabetic Retinopathy Study (ETDRS) grading system.*

Results: *A total 150 patients were evaluated out of which 108(72%) had diabetic retinopathy & 42(28%) were not having any Diabetic retinopathy. When Diabetic Retinopathy subjects were compared with those without Diabetic Retinopathy ,the mean serum cholesterol, serum triglycerides and non-high density lipoprotein (HDL)-cholesterol (all having P <0.05) concentrations were higher in Diabetic Retinopathy subjects. Triglycerides & HDL were more deranged in Diabetic Retinopathy, while Triglycerides & LDL were more deranged in CSME patients.*

Keywords: *ETDRS,LDL,HDL,CSME, and Triglycerides.*

INTRODUCTION

Diabetic retinopathy (DR) is a major microvascular complication of diabetes and leading cause of irreversible blindness. Previous studies have shown that intensive control of risk factors such as high blood sugar and blood pressure can be helpful in reducing the onset and progression of DR[1] . High serum lipid levels have also been proposed as a risk factor for DR. High lipid levels are known to cause endothelial dysfunction due to a reduced bioavailability of nitric oxide and this endothelial dysfunction was suggested to play a role in retinal exudate formation in DR[2]. Previous studies have shown that the risk factors for DR are degree of glycemic and blood pressure control, duration of diabetes, presence of nephropathy and raised serum lipids [3,4]. It is possible that some of the differences noted in the prevalence of DR are related to the levels of these risk factors. In a clinic-based report several years ago, we showed an association between low-density lipoprotein (LDL)-cholesterol and diabetic maculopathy[5]. To study whether there is any true relationship of conventional lipid parameters with DR we undertook this population-based study in an central Indian Type 2 diabetic population.

AIM

1. To study the association of serum lipids with diabetic retinopathy (DR) in Type 2 diabetic subjects.
2. To evaluate relationship of various components of serum lipids with severity of DR & formation of clinically significant macular edema (CSME).

MATERIAL AND METHODS

This cross sectional nonrandomized study conducted in ophthalmology department, M.G.M. Medical college and MYH Hospital, Indore, India, between October 2012-october 2013.The study includes 150 patients with type 2 DM. Patients with less than 6 months H/O ocular surgery ,pregnancy, hypertension, active infection, co-existing other ocular diseases, other retinal vascular diseases, vitreoretinal degenerations & dystrophies, high myopia and non compliant patients were excluded from our study.

Methodology –

Diagnosed Diabetes Type 2 patients were enrolled into study after taking informed & written consent. Preliminary investigations (CBC,sugar level fasting & post prandial,Routine urine,ECG) were done in each & every patient.Serum lipid measurements using fasting samples were done. Analysis of serum cholesterol, serum triglycerides and cholesterol components like high-density lipoprotein (HDL)-cholesterol LDL-cholesterol were calculated. For serum lipid reference level, National Cholesterol Education Program (NCEP)-Adult Treatment Panel III (ATP III) guideline were referred. According to NCEP-ATP III guidelines, hypercholesterolemia is defined as TC > 200 mg/dl, high LDL when value> 100 mg/dl, hypertriglyceridemia as TG > 150 mg/dl and low HDL when value < 40 mg/dl. Dyslipidemia was defined by the presence of one or more than one abnormal serum lipid concentrations[7].

All preliminary Ophthalmological examination along with slit lamp examination was done.Detailed posterior segment examination was

done with indirect ophthalmoscope with 20D lens and slit lamp biomicroscopy with 78D lens. Fundus photographs were taken in patients with any grade of Diabetic Retinopathy by Topcon fundus camera.

Depending upon presence or absence of retinopathy patients were broadly divided into 2 groups, Group A without retinopathy & Group B with retinopathy. Group B was further divided according to modified Early Treatment of Diabetic Retinopathy Study(ETDRS) protocol as follows-

Group 1= Patient with mild non-proliferative diabetic retinopathy (NPDR),

Group 2=Patients with moderate non-proliferative diabetic retinopathy (NPDR),

Group 3=patients with severe NPDR,

Group 4=Patients with proliferative diabetic retinopathy(PDR).

Presence of hard exudates noted. Clinically significant macular edema (CSME) using slit lamp bio microscopy with 78D lens was noted & severity was recorded. Clinically significant macular edema was diagnosed based on the modified ETDRS protocol.[6]

1. Retinal thickening at or within 500 µm of centre of macula.
2. Hard exudates at or within 500 µm of centre of macula if associated with adjacent retinal thickening.
3. Zone or zones of retinal thickening one disc area in size, at least part of which was within one disc diameter of centre of macula.

Statistical Analysis-P value less than 0.05 was considered statistically significant. Various univariate analysis were done to evaluate effect of factors such as age, sex, duration of diabetes on degree of retinopathy & CSME.

RESULTS

Total 150 patients with diagnosed Diabetes type 2 attending Ophthalmology OPD at M.G.M. Medical college and MYH hospital, Indore, M.P.,from Oct.2012 to oct. 2013 were analysed and data obtained is as follows-

Male 84,Female 66.

108 (72%) patients-diabetic retinopathy in that 64 patients had various grades of CSME,

42 (28%) patients- non diabetic retinopathy,

20-80 years age group,

Duration of diabetes – 0 to 25 years,

Total 150 patients (male 84, female 66) with 20-80 years age group were evaluated out of which 108(72%) had diabetic retinopathy & 42(28%) were not having any Diabetic retinopathy.

64 patients had various grades of CSME,

Duration of diabetes – 0 to 25 years

Table 1: Relationship between Age & Diabetic Retinopathy

AGE	GROUPA	GROUP B				TOTAL
		Group1	Group2	Group3	Group4	
20-40	8	4	2	1	1	16
41-60	18	13	21	7	3	62
>60	16	17	24	10	5	72
Total	42	34	47	18	9	150

P value=0.0792, fisher exact test.

There was no significant relationship between age & various stages of Diabetic Retinopathy (P > 0.05)

Table 2: Relationship between age & CSME

AGE	ABSENT	MILD	MODERATE	SEVERE	TOTAL
20-40	6	4	4	2	16
41-60	38	10	9	5	62
>60	42	17	7	6	72
Total	86	31	20	13	150

P value=0.223,chi square test=3.00

There was no significant relationship between age & various stages of CSME (P > 0.05)

Table 3: Relationship between sex & Diabetic Retinopathy

SEX	GROUP A	GROUP B				TOTAL
		Group1	Group2	Group3	Group4	
Male	22	17	28	12	5	84
Female	20	17	19	6	4	66
Total	42	34	47	18	9	150

P value=0.578,chi square test=0.310

There was no significant relationship between sex & various stages of Diabetic Retinopathy (P > 0.05)

Table 4: Relationship between sex & CSME

SEX	ABSENT	MILD	MODERATE	SEVERE	TOTAL
Male	46	19	12	7	84
Female	40	12	8	6	66
Total	86	31	20	13	150

P value=0.473,chi square teat=0.516

There was no significant relationship between sex & various stages of CSME (P > 0.05)

Table 5: Relationship between duration of Diabetes Mellitus(DM) & Diabetic Retinopathy

DURATION	GROUP A	GROUP B				TOTAL
		Group1	Group2	Group3	Group4	
0-10 years	24	14	11	6	3	58
11-25years	18	20	36	12	6	
Total	42	34	47	18	9	150

P value=0.004,chi square test=9.83

As duration of Diabetes increases prevalence of Retinopathy also significantly increases (P < 0.05)

Table 6: Relationship between duration of Diabetes Mellitus(DM) & CSME

DURATION	ABSENT	MILD	MODERATE	SEVERE	TOTAL
0-10years	37	12	7	2	58
1-25years	49	19	13	11	92
Total	86	31	20	13	150

P value=0.204,chi square test=1.61

As duration of Diabetes increases prevalence of CSME also significantly increases (P < 0.05)

Table 7: Relationship between Diabetic retinopathy and Dyslipidaemia

DYSLIPIDEMIA	GROUPA	GROUP B				TOTAL
		Group1	Group2	Group3	Group4	
Present	11	16	25	12	6	70
Absent	31	18	22	6	3	80
Total	42	34	47	18	9	150

P value=0.002,chi square test=9.83

There was significant relation between diabetic retinopathy and dyslipidaemia (p Value < 0.05)

Table 8: Relationship between CSME & Dyslipidaemia

DYSLIPIDEMIA	ABSENT	MILD	MODERATE	SEVERE	TOTAL
Present	26	21	13	10	70
Absent	60	10	7	3	80
Total	86	31	20	13	150

P value 0.00,chi square test=21.9

Prevalence of Diabetic Retinopathy & CSME was significantly higher in Dyslipidaemia patients (P < 0.05)

Table 10: Distribution of various lipid components among Diabetic retinopathy patients.

DERANGED LIPID COMPONENT	NO. OF PATIENTS
Total cholesterol	48
HDL	66
LDL	42
VLDL	31
Triglycerids	34

Triglycerides & HDL were more deranged in Diabetic Retinopathy, while Triglycerides & LDL were more deranged in CSME patients.

Table 11: Distribution of various lipid components among CSME patients

DERANGED LIPID COMPONENT	NO. OF PATIENTS
Total cholesterol	24
HDL	35
LDL	21
VLDL	27
Triglycerides	16

DISCUSSION

Dysfunction of the vascular endothelium is regarded as an important factor in the pathogenesis of diabetic vascular complications and has been shown to originate from hyperglycaemia. Hyperglycaemia and its biochemical sequelae either alter endothelial function directly or influence endothelial cell functioning indirectly by affecting the pathways of growth factors, cytokines and vasoactive agents[8]. Hyperlipidemia is a powerful risk factor for atherosclerosis and related disorders such as ischemic heart disease, cerebrovascular diseases and retinal atherosclerosis[9,10] .There are conflicting reports in the literature regarding the effect of lipid profile on retinopathy or maculopathy. In ETDRS report, Chew *et al*[11] stated that patients with high total cholesterol and LDL levels were more likely to have retinal hard exudates compared to patients with normal lipid profile. Moreover, patients with elevated serum total cholesterol, LDLC, or triglyceride levels that did not have retinal hard exudate initially, were at increased risk of developing retinal hard exudate during follow-up. Association of LDL-cholesterol in subjects with DR was first shown by Dornan *et al*[12]. Rema et al [13]in an earlier study showed an association of DME in type 2 diabetic subjects with increased LDL levels.

Total Cholesterol was an independent risk factor for diabetic retinopathy in the Chennai Urban Rural Epidemiology Study (CURES)[14]. In our study we have found significant association of dyslipidaemia & Diabetic retinopathy as well as CSME. Same results were seen in ETDRS and WESDR studies [15,16]. In comparison to other components Triglycerides & HDL were more deranged in Diabetic Retinopathy, while Triglycerides & LDL were more deranged in CSME patients. Large population based studies

which are multi centric may provide us additional information regarding emerging risk factors for DR. Lipid lowering therapy was shown to have some beneficial effects on DR. It was reported that intensive glycemic control and combination treatment of dyslipidemia reduced the rate of progression of DR and treatment with fenofibrate DM reduced the need for laser treatment for DR[17]. The mechanism, however, seemed to be related to intraretinal lipid transportation rather than serum lipid levels. It is also observed that as duration of Diabetes increases chances to have Diabetic retinopathy & CSME also increase. In the study conducted by Dandona et al[18] in type2 diabetes, it is reported that87.5 per cent of those with >15 yr duration of diabeteshad DR compared with 18.9 per cent of those who had <15 yr duration. So we have time in our hands to convince these patients regarding control of serum Lipids.

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