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ORIGINAL ARTICLE

ASSOCIATION BETWEEN RETINAL HARD EXUDATES AND DYSLIPIDEMIA IN TYPE 2 DIABETIC PATIENTS IN RURAL KARNATAKA

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ABSTRACT: AIM: To evaluate the association of elevated serum lipids with retinal hard exudates in type 2 diabetic patients in rural Karnataka. **MATERIAL AND METHODS**: Hospital based cross sectional study which included 60 (n=60) type 2 diabetic patients (60 eyes) fulfilling the inclusion criteria. Patients were subjected to detailed ocular examination, fundus examination done under full dilatation using indirect ophthalmoscope with 20D lens and slit lamp biomicroscope with 90D lens. Fundus photographs were obtained using fundus camera. Grading of retinal hard exudates performed by utilizing modified Airlie House classification. The modified Airlie House Classification used is as follows: Grade 0 - No evidence of hard exudates; Grade 1: Questionable hard exudates present; Grade 2: Hard exudates less than standard photograph 3; Grade 3: Hard exudates greater than or equal to standard photograph 3, but less than standard photograph 5; Grade 4: Hard exudates greater than or equal to standard photograph 5, but less than standard photograph 4 and Grade 5: Hard exudates greater than or equal to standard photograph 4. These grades were further divided into three groups of patient severity as follows: Group 1 (absent or minimal hard exudates) included patients with Grade 0, 1 or 2 hard exudates; Group 2 (hard exudates present) included patients with Grade 3 or 4 hard exudates and Group 3 (prominent hard exudates) included patients with Grade 5 hard exudates. Fasting lipid profile including serum total cholesterol, low density lipoproteins, very low density lipoproteins, high density lipoproteins and triglycerides was obtained. Association of dyslipidemia with retinal hard exudates was analysed using one way ANOVA test. **RESULTS:** On statistical analysis with ANOVA test retinal hard exudates were significantly associated with elevated total cholesterol (p= .0001), triglycerides (p= .0001), serum LDL (p=.008), serum VLDL (p=.012), and negative correlation was found with serum HDL (p=.0001). **CONCLUSION:** Dyslipidemia was significantly associated with retinal hard exudates formation in type 2 diabetic patients. This study suggests treating ophthalmologist should get a fasting lipid profile done if patient has significant hard exudates on fundus examination. Study also recommends need of lipid lowering drugs due to high incidence of dyslipidemia in these patients.

KEYWORDS: Retinal hard exudates, dyslipidemia, type 2 diabetes.

INTRODUCTION: Diabetic retinopathy is the leading cause of visual impairment and blindness worldwide,[(1)] despite the efficacy of glycemic control with drugs, photocoagulation, anti VEGEF and various other treatment modalities. Macular edema is an important cause of loss of vision in diabetic retinopathy patients.[(2),(3)] Hard exudate, a lipoprotein deposit, is often associated with macular edema, While correlation between the various components of serum lipids and increased

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hard exudate formation and clinically significant macular edema (CSME) has been demonstrated by some studies in western population.[2],[3],[4],[5] In addition the role of dyslipidemia in the severity of retinopathy is still unclear. The aim of this study was to evaluate the relationship between the various components of serum lipids with retinal hard exudate formation in rural Indian population.

MATERIALS AND METHODS:

Type of study: Observational cross sectional study.
Period of study: From march 2015 to May 2015, 3 months.
Place of study: MVJ Medical College and Research Hospital Hoskote, Bangalore.
Sample size: 60.

This cross sectional hospital based study enrolled 60 patients(60 eyes, n= 60) with Type 2 diabetes referred to department of ophthalmology of our institute over a period of three months for evaluation and management of diabetic retinopathy (DR), patients were explained about the procedure and informed consent was obtained.

Inclusion Criteria were as follows:

1. Type 2 diabetes.
2. Fitness to undergo a dilated fundus examination and fundus photograph.

Exclusion Criteria were as follows:

1. Pregnancy,
2. Accelerated hypertension,
3. Active infection,
4. Co-existing ocular disorders like uveitis, opaque or hazy media,
5. Retinal disorders like retinal vein/artery occlusions, retinitispigmentosa,
6. Vitreoretinal degenerations and dystrophies,
7. High myopia and,
8. Recent ocular surgeries (< 6months).
9. Patients on hypolipidemic drugs.
10. Patients taking insulin.

Detailed history regarding duration of diabetes, use of oral hypoglycemic drugs, Insulin, oral hypoglycemic drugs and medical examination was recorded in proforma, detailed fundus examination done under full dilatation using indirect ophthalmoscope with 20D lens and slitlamp biomicroscope with 90D lens. Fundus photographs were obtained using fundus camera. Grading of retinal hard exudates performed by utilizing modified Airlie House classification. The modified Airlie House Classification used is as follows: Grade 0 - No evidence of hard exudates; Grade 1 - Questionable hard exudates present; Grade 2 - Hard exudates less than standard photograph 3; Grade 3 - Hard exudates greater than or equal to standard photograph 3, but less than standard photograph 5; Grade 4 - Hard exudates greater than or equal to standard photograph 5, but less than standard photograph 4 and Grade 5 - Hard exudates greater than or equal to standard photograph 4. These grades were further divided into three groups of patient severity as follows:

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Group 1 (absent or minimal hard exudates) included patients with Grade 0, 1 or 2 hard exudates; Group 2 (hard exudates present) included patients with Grade 3 or 4 hard exudates and Group 3 (prominent hard exudates) included patients with Grade 5 hard exudates. Serum lipids were measured using fasting blood samples, to analyze total cholesterol (TC), low density lipoproteins (LDL), very low density lipoproteins (VLDL), high density lipoproteins (HDL) and triglycerides (TG). All data was entered in Microsoft excel software and statistical analysis was done using SPSS 20 software. Analysis of association was performed using ANOVA test.

RESULTS: Out of 60 (60 eyes) patients included in the study 40(66.66%) were males and 20 (33.33) were females (Table 1) and age distribution was 57.02±10.93 (Table 2).

Ninteen eyes had hard exudates of Grade 2 or less and were included in Group 1 (absent or minimal hard exudates). Similarly, hard exudates of Grade 3 or 4 were seen in 23 eyes who were included in Group 2 (hard exudates present) while the remaining 18 eyes had Grade 5 hard exudates and were included in Group 3 (prominent hard exudates). The distribution of various parameters among the three groups is provided in (Table 3).

Retinal hard exudates formation was found to be statistically significant and strong correlation of association was observed with raised total cholesterol (p= .0001), triglycerides (p= .0001), and significant association with serum LDL (p=.008), serum VLDL (p=.012), and negative correlation was found with serum HDL (p=.0001).

DISCUSSION: Retinal hard exudates usually encountered in patients with diabetic retinopathy result from the leakage of lipoproteins from retinal capillaries into the extracellular space of the retina. As the density of these hard exudates increases, they tend to migrate towards the foveal centre where their deposition predisposes to development of subfoveal fibrosis leading to irreversible visual loss.[6]

Previous studies conducted predominantly in the Caucasian white population have shown significant association between retinal hard exudates and the serum cholesterol and LDL levels.[(2)(3)(4)] Independent of coincident retinal thickening, the severity of retinal hard exudates at baseline was associated with decreased visual acuity in the ETDRS. The severity of retinal hard exudates was also a significant risk factor for moderate visual loss during the course of the study. Elevated levels of plasma triglycerides were associated with a greater risk of developing high-risk PDR in the ETDRS patients.[3]

In Indian scenario Pradeepa et al., in a study from urban south India, identified higher HbA1c levels, male gender, longer duration of diabetes, macroalbuminuria and insulin therapy as independent risk factors for diabetic retinopathy.[7] Similarly Rani et al., in a mass screening study from southern rural districts of Tamil Nadu identified longer duration of diabetes, lean body mass index (lower BMI), higher systolic blood pressure and insulin treatment as the systemic risk factors significantly associated with referable diabetic retinopathy.[8] However, the above studies did not look into their lipid levels.

CONCLUSION: We have made tremendous progress in managing diabetic retinopathy. Large well-designed clinical trials have provided important information about the benefits of controlling hyperglycemia and hypertension to lower risk of retinopathy and its complications.

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Some recent studies have shown lipid lowering drugs to significantly cause regression of hard exudate deposits and improvement in vision.

Two recent randomized controlled clinical trials evaluating the plasma lipid-modulatory agent fenofibrate in combination with statins in individuals with elevated plasma lipids have demonstrated that fenofibrate reduces the risk of diabetic retinopathy progression.[9],[10]

Although the existing data including ours is observational, they suggest serum lipid lowering may help in preventing visual loss. In conclusion our study findings have added to the growing evidence that dyslipidemia is significant risk factors for the development of retinal hard exudates, and decreased vision. Apart from existing treatment strategies of treating diabetic retinopathy consideration of management of dyslipidemia will be beneficial.

This study suggests treating ophthalmologist should get a fasting lipid profile done if patient has significant hard exudates on fundus examination. Study also recommends need of lipid lowering drugs due to high incidence of dyslipidemia in these patients.

Preserving vision may be an additional motivating factor for lowering serum lipids.

Sex	Male	Female
Group 1	13	6
Group 2	17	6
Group 3	10	8
Total	**40**	**20**

Table 1

	Group	N	Mean	Std. Deviation
Age	1	19	56.37	10.340
	2	23	58.00	9.444
	3	18	56.44	13.566
	Total	**60**	**57.02**	**10.932**

Table 2

	Group	N	Mean	Std. Deviation	Minimum	Maximum	P Value
TC	1	19	215.68	5.735	204	226	0.0001
	2	23	237.57	8.061	220	250	
	3	18	262.17	9.464	240	276	
	Total	**60**	**238.02**	**19.967**	**204**	**276**	
HDL	1	19	31.74	2.600	28	36	0.0001
	2	23	25.52	2.172	22	30	
	3	18	18.89	3.579	14	28	
	Total	**60**	**25.50**	**5.777**	**14**	**36**	
LDL	1	19	117.42	5.146	110	130	0.008
	2	23	132.00	8.666	112	145	
	3	18	153.56	6.224	145	164	
	Total	**60**	**133.85**	**15.936**	**110**	**164**	

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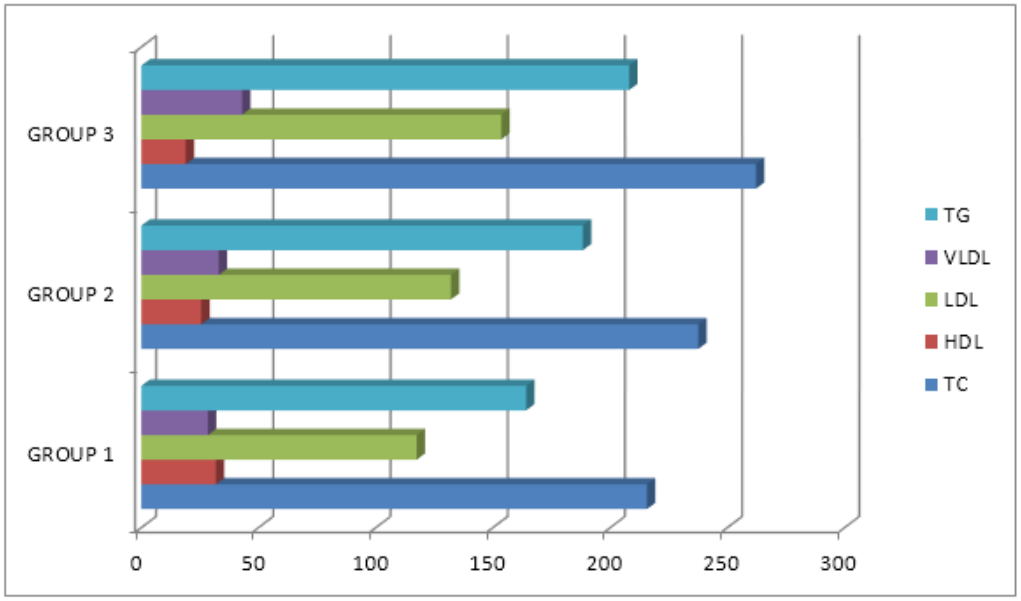
VLDL	1	19	28.37	3.183	24	36	0.012
	2	23	33.00	5.187	24	40	
	3	18	43.06	3.857	38	49	
	Total	**60**	**34.55**	**7.261**	**24**	**49**	
TG	1	19	164.11	6.036	154	176	0.0001
	2	23	188.30	8.673	178	200	
	3	18	208.94	30.748	97	230	
	Total	**60**	**186.83**	**25.059**	**97**	**230**	

Table 3



Graph 1

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