ORIGINAL ARTICLE

The Contribution of Dyslipidemia in development of Retinopathy in Type II Diabetic patients

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ABSTRACT

Background: Diabetic patients are at greater risk to present with Diabetic Retinopathy (DR). Dyslipidemic patients have high probability to show retinalatherosclerotic changes that can progress to blindness.
Aim: To determine contributory role of lipid profile abnormalities in the development of Diabetic Retinopathy (DR).
Methods: 381 Type 2 diabetic patients with 10 years duration were enrolled and investigated for presence of diabetic retinopathy. Ninety two patients exhibited retinopathic changes. They were compared with age and gender matched diabetic patients.
Results: The serum levels of Total Cholesterol (TC) and Low Density Lipoprotein-Cholesterol (LDL-C) were considerably raised in patients presented with diabetic retinopathy while lipid profile values for Triglycerides (TG) and High Density Lipoprotein – Cholesterol (HDL-C) were almost identical between two groups.
Conclusion: There is a strong relationship between dyslipidemia and diabetic retinopathy
Keywords: Dyslipidemia, Retinopathy, Type II Diabetes Mellitus

INTRODUCTION

Diabetic retinopathy (DR) is a major microvascular complication of diabetes. It is main reason for blindness in younger age group in developed countries[1,2]. The prevalence of DR is directly related to duration of diabetes. After 20 years of diabetes, all Type 1 and almost 60% of type 2 diabetic patients showed retinpathic changes[3,4]. Dyslipidemia in diabetes is not only consistent with the increased risk of macrovascular complications but also contributes to microvascular diseases. The results of previous studies have shown that emergence and advancement of DR would be delayed by treatment and regular monitoring of diabetes and hypertension[5,6]. The exact pathogenesis of DR is not fully understood. It is proposed that high level of cholesterol present in circulation of diabetics may permeate into retina and provide a stimulus for formation of macular edema and retinal hard exudates that may progress to blindness[7]. But it is debatable as not all diabetic patients show similar changes in their retina. The hypercholesterolemia may either act synergistically or serves as an independent variable in evolution and progression of this microvascular complication. So the present study was focused to determinecontributory roleof dyslipidemia in development of diabetic retinopathy.

MATERIAL AND METHOD

In the present case control study, total of 380 type 2 diabetic patients were enrolled from diabetic clinic of Bahawal Victoria Hospital with more 10 years duration of diabetes. The study was approved from the Ethics Committee and written consent was taken from all the participants after explaining detailed methodology to them. Patients with hypothyroidism, familial hyperlipidemia, familial hypercholesterolemia, patients taking lipid lowering agents during the previous 6 weeks were excluded from the study. The selected patients were examined for presence of diabetic retinopathy by fundoscopy. There were 92 patients who fulfilled the inclusion criateria. The patients with diabetic retinopathy were labeled ascases and 90 age and gender matched diabetic patients without retinopathy were considered as controls. Lipid profile and fasting blood glucose was done on fully-automated chemistry analyzer (Mindray BS-400) and glycosylated hemoglobin on Architect 8000i of Abbott Diagnostics. The values of total cholesterol >200 mg/dl, serum triglycerides >150 mg/dl, HDL <40 mg/dl, LDL >130 mg/dl were considered as abnormal.

Statistical analysis: The statistical analysis was done on SPSS 20.0. Mean and standard deviation were used to analyze the data. The statistical significance of measured analytes were carried out by unpaired students 't' test,using retinopathy as the dependent variable and age, sex, duration of diabetes, total cholesterol, HDL, LDL, triglyceride and blood sugar as independent variables. The $p<0.05$ was considered asstatistically significant.

RESULTS

There were total 50 male and 42 female participants in the case group and 60 male and 40 female in the control group. The levels of TC and LDL-C exhibited statistically significant differences with p value of 0.032 and 0.001 respectively. But lipid profile results for TG and HDL did not show significant differences between two measured categories

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Table: Association of various clinical characteristics and laboratory parameters with diabetic retinopathy

Character	With retinopathy (n=92)		Without retinopathy (n=289)		p-value
	Mean	SD	Mean	SD	
Age (yrs)	61.1	9.8	62.6	10.3	>0.05 (NS)
Duration (yrs)	16.15	7.8	13.38	3.0	<0.05 (S)
Fasting Blood Sugar(mg/dl)	151.5	87.6	146	68.6	>0.05 (NS)
Post Prandial Blood Sugar (mg/dl)	249.4	83.3	238.8	89.1	>0.05 (NS)
HbA1c (%)	8.1	1.1	7.8	1.4	>0.05 (NS)
Total Cholesterol (mg/dl)	248.8	44.6	215.5	48.8	<0.05 (S)
LDL-C (mg/dl)	132.8	28.7	114.26	26.6	<0.05 (S)
HDL-C (mg/dl)	38.2	12.0	36.1	12.3	>0.05(NS)
Triglycerides (mg/dl)	185.3	35.2	178.4	26.1	>0.05 (NS)

S: Significant NS: Not significant

DISCUSSION

Dyslipidemia is one of the salient and powerful risk factors for development of cardiovascular diseases. The structural and physiological hallmarks of retinal and coronary micro circulation are comparable so hyperlipidemia may be reason of retinal atherosclerosis[8].In diabetic patients bothhyperglycemia and dyslipidemiamay be basis of retinal degeneration. The hyperglycemia has promptcontribution to induce retinopathy[1]. Recent clinical trials have alsosupported convincing relationship between dyslipidemia anddiabetic retinopathy[9].The population-based study(2945 subjects) also determined association between dyslipidemia and ocular diseases[10].

The results of this study showed significant differences between serum TC and LDL-C in diabetic patients with DR than without DR. Howeverthe study conducted by Idiculla et al [11]showed that total cholesterol (TC), low density cholesterol (LDL-C) and triglyceride (TG) levels were significantly increased in different stages of diabetic retinopathy. The study conducted in India[12] showed that diabetic patients with retinal hard exudates on fundoscopy had elevated total cholesterol and low density cholesterol.

There are clinical evidences that dyslipidemia may contribute to the pathogenesis of DR butspecific alterations in retinal lipid metabolism in diabetes are yet to be cleared[13,14]. It is proposed that dysregulation of lipid metabolism results in increase in n6 Polyunsaturated Fatty Acids (PUFA) such as Arachdonic acid (AA) through activation of cytosolic phospholipase A2 (cPLA2) which is converted to pro-inflammatory mediators such as hydroxyeciosatetreanoic acids (HETEs), leukotriene and prostaglandins by different enzymatic pathways including cycloxygenase (COX2), lipoxygenase (LOX), and cytochrome P450 (CYP). In addition long-chain FAs are simultaneously converted into Diacylglycerol that contributes to thepathogenesis of DR in the form of differential synthesis and remodelingof extracellular matrix (ECM) proteins, liberation of angiogenic factors, endothelial and leukocyte dysfunctionleading to capillary obstruction, leukostasis, and changes in blood flow to the retina[15,16]

Some studies have reported that not only increase levels of TC and LDL- C but also low HDL abnormalities were associated with retinal hard exudates and diabetic macular edema[17, 18]. But our study drew similar conclusion to that of two other studies[19, 20]that dyslipidemia and specifically increased total cholesterol and LDL are major contributory factors for the development diabetic retinopathy and decreased vision. However limitation of our study was that we did not grade the diabetic retinopathy according to severity.

CONCLUSION

We conclude that effective monitoring of lipid profile would be beneficial in these patients to preserve the vision and prevent blindness. Howeverlarge population based multicentre study may provide us additional information regarding emerging risk factors for DR.

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