ROLE OF LIPID PROFILE IN PATHOGENESIS OF DIABETIC RETINOPATHY

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ABSTRACT

Diabetes mellitus is a major metabolic disease associated with macrovascular and microvascular complications. Diabetic retinopathy is a highly specific vascular complication of Type 2 diabetes mellitus and is emerging as one of the causes of blindness in both developing and developed countries. Alteration in lipid levels in diabetics is hypothesized to be one of the risk factor in causation of retinopathy in DR subjects. The present study was to elucidate the role of serum lipids as a risk factor in causation of Diabetic retinopathy.

MATERIALS AND METHODS

A total number of 120 subjects aged between 40-70 yrs. participated in the study. They were divided into three groups. Gr. I Diabetics without retinopathy (40), Gr. II Diabetics with retinopathy (40), Gr. III control group age and sex matched without history of Diabetes. Serum Total cholesterol, Triglycerides, HDL cholesterol were estimated by Enzymatic methods. LDL cholesterol was calculated by Friedewald's equation.

STATISTICAL ANALYSIS

The data was analysed using SPSS software 17.0 version. P <0.05 is considered statistically significant.

RESULTS

It was found that Serum Total Cholesterol (p=0.004), TG (p<0.001), LDL cholesterol (p=0.013) were significantly elevated in Diabetics with retinopathy as compared to controls. Serum HDL cholesterol was significantly (p<0.001) decreased in Diabetics with retinopathy as compared to controls, whereas no statistically significant difference in Mean and SD of Total Cholesterol, TG'S, HDL-C, LDL-C was found between Diabetics with retinopathy and Diabetics without Retinopathy.

CONCLUSION

Our study shows that increased lipid levels probably has a role in the causation and progression of Diabetic retinopathy.

KEYWORDS

Lipid Profile, Diabetes Mellitus, Diabetic Retinopathy.

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INTRODUCTION

Diabetes is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both. The prevalence of diabetes for all age groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030. In India this increase of burden of diabetes is estimated to rise from 51 million people to 87 million people in 2030.[1,2] Chronic complications of Diabetes Mellitus (DM) affect many organ systems and are responsible for majority of morbidity and mortality. Chronic complications of Diabetes mellitus include Macrovascular complications like coronary artery disease, cerebrovascular disease, peripheral vascular disease. Microvascular complications include Retinopathy, Nephropathy, Neuropathy, Diabetic Retinopathy (DR) is highly specific complication of both Type I and Type II DM.[3]

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Risk factors associated with DR include duration of Diabetes, Glycaemic control, Systolic blood pressure, Dyslipidemia, smoking, Microalbuminuria. Fewer studies have looked at association of serum lipids with microvascular complications.[4] Moreover, the studies of association of Lipids with microvasular complications of DM show varying results. In this study, we made an attempt to look into association of various components of serum lipids and their role in pathogenesis of Diabetic Retinopathy.

MATERIALS AND METHODS

The present study was a (Case control) study conducted at Osmania Medical College/Hospital during the year 2011-2012. Ethical committee clearance was obtained before the start of study. Patients attending the OP of General Medicine Department and Retinal Clinic of Ophthalmology Department were the source population. A total no. of 120 subjects between age group 40-70 yrs. of both genders were included in the study. The Subjects were divided into three groups: Group I comprised of 40 Diabetics without Retinopathy, Group II comprised of 40 Diabetics with Retinopathy, Group III was control group which included 40 Non-Diabetic age, sex matched individuals. The classification of subjects into Diabetics was done based on American Diabetic association criteria.[5]

The Diabetic population included Diabetics with history of diabetes at least for minimum of six years. The classification of subjects into diabetics with and without retinopathy was based on retinoscopy findings such as microaneurysms, hemorrhages and proliferative changes.

BIOCHEMICAL ANALYSIS

Informed consent was taken from the participants prior to collection of sample. Participants were in overnight fasting status; 10mL of venous blood was drawn by venipuncture and was put into three tubes, one having sodium fluoride and potassium oxalate one with EDTA and the other was a plain tube for assessing FBS, Glycated Hemoglobin (Gly. Hb), Lipid profile respectively. FBS was measured using GOD-POD method. Gly. Hb was measured using Ion Exchange Resin method. Serum Total cholesterol (TC), Triglycerides (TG), HDL Cholesterol (HDL-C) were measured by Enzymatic methods (Cholesterol oxidase-PAP for TC, GPO-PAP for TG's, PEG-CHOD-PAP End point assay for HDL-C respectively).[6,7,8]

STATISTICAL ANALYSIS

The data obtained was analysed using SPS software version 17.0. The descriptive results are expressed as Mean and SD of various parameters in different groups. P value <0.05 was taken as significant.

RESULTS

The mean age of control group was 55.2 yrs. The mean age of diabetics without retinopathy group was 53.4 yrs. and the mean age of diabetics with retinopathy was 52.3 yrs. The significance of difference of mean values of different groups and within groups is represented by p values and p <0.05 is considered as significant. The mean values of Total cholesterol (p=0.011), TG (p=0.004), LDL cholesterol (p=0.003) were significantly higher in diabetics without retinopathy as compared to controls (Table 1). The mean values of HDL cholesterol was significantly (<0.001) lower in diabetics without retinopathy as compared to controls. The mean values of Total cholesterol (0.004), TG's (<0.001), LDL cholesterol (0.013) were significantly higher in diabetics with retinopathy as compared with controls. The mean values of HDL cholesterol was significantly (<0.001) lower in diabetics with retinopathy as compared with controls. The difference in mean value of Total cholesterol, TG, LDL cholesterol, HDL cholesterol in between diabetics with and without retinopathy was not statistically significant.

Parameter	Group I (Diabetics without Retinopathy)	Group III (Controls)	P value
FBS	158.5±44.66	88.67±15.03	<0.001
Gly. Hb	8.31±2.01	5.10±0.44	<0.001
Total Cholesterol	179.45±48.94	152.42±22.75	0.011
Triglycerides	166.35±74.73	116.67±32.88	0.004
LDL Cholesterol	112.02±46.45	84.00±20.16	0.003
HDL Cholesterol	37.02±6.88	44.95±4.16	<0.001

Table 1: Comparison of Mean, SD, P-value between Diabetics without Retinopathy and Controls

Parameter	Group II (Diabetics with Retinopathy)	Group III (Controls)	P value
FBS	167.97±42.68	88.67±15.03	<0.001
Gly. Hb	8.45±1.74	5.10±0.44	<0.001
Total Cholesterol	182.42±41.70	152.42±22.75	0.004
Triglycerides	199.30±77.21	116.67±32.88	<0.001
LDL Cholesterol	107.89±34.81	84.00±20.16	0.013
HDL Cholesterol	34.70±5.16	44.95±4.16	<0.001

Table 2: Comparison of Mean, SD, P-value between Diabetics with Retinopathy and Controls

Parameter	Group I (Diabetics without Retinopathy)	Group II (Diabetics with Retinopathy)	P value
FBS	158.5±44.66	167.97±42.68	0.516
Gly. Hb	8.31±2.01	8.45±1.74	0.917
Total Cholesterol	179.45±48.94	182.42±41.70	0.945
Triglycerides	166.35±74.73	199.30±77.21	0.080
LDL Cholesterol	112.02±46.45	107.89±34.81	0.873
HDL Cholesterol	37.02±6.88	34.70±5.16	0.174

Table 3: Comparison of Mean and SD, P–value between Diabetics with and without Retinopathy

DISCUSSION

Various studies have shown that diabetes is associated with dyslipidemia in the form of hypercholesterolemia and hypertriglyceridemia.[9,10,11,12] Studies of association of Lipid with microvascular complications of DM like retinopathy have shown varying results. The Wisconsin epidemiologic study of Diabetic Retinopathy, Klein et al. reported an association of Serum Cholesterol with severity of hard exudates in macula.[13] Van Leiden et al, showed an association between Triglyceride levels and Diabetic Retinopathy in subjects with type 2 diabetes.[14] Haddad and Saad found that Plasma Total Cholesterol and Triglycerides were risk factors for Diabetic Retinopathy.[15] Reema et al. (2006) showed association of TG with DR and LDL with diabetic macular oedema in Chennai Urban Rural Epidemiology Study Eye study.[16] The Diabetes Control and Complications Trial.[17] found that the severity of Retinopathy was associated with increase in Triglycerides and inversely associated with HDL cholesterol.

However, (Larson et al. and Hove et al. found no association between Triglycerides, Total Cholesterol, HDL Cholesterol with Diabetic Retinopathy.[18,19] Ozer et al. found no correlation between Serum Lipids and Macular Edema in Diabetic patients.[20] In the present study, it was found that Total cholesterol, TG, LDL–C were significantly higher in Diabetics without Retinopathy and Diabetics with Retinopathy as compared to control group.

Lack of Insulin causes increased release of FFA from adipose tissue. These FFA are used as substrates for Triglyceride synthesis by the Liver. Decreased clearance of TG

due to low lipoprotein lipase activity in the absence of insulin.[21,22] The above mechanisms probably have caused an increase in TG's in both the patient groups.

It is hypothesized that the increased TG levels might lead to increased blood viscosity and altered fibrinolytic activity, which may lead to formation of hard exudates.[23] Even the raised TG may get incorporated into cell membrane altering its fluidity and permeability leading to hemorrhage and edema.

In the present study, there was an increase in means of Total Cholesterol and Triglycerides in Diabetics with Retinopathy as compared to Diabetics without Retinopathy. This might explain the role of these in Pathogenesis of Diabetic Retinopathy, but the difference was not statistically significant. This might be due to the limited number of sample size studied. A large population study needs to be done to clearly establish the role of Lipid profile in causation of Diabetic Retinopathy.

CONCLUSION

Our study shows that alteration in Lipid profile has a role as a risk factor in causation and pathogenesis of Diabetic Retinopathy.

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