Original Research Paper

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Diabetology

CORRELATION OF INCIDENCE AND SEVERITY OF RETINOPATHY WITH SYSTEMIC RISK FACTORS IN TYPE 2 DIABETES

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ABSTRACT

Background: Diabetic retinopathy is the major cause of blindness among working age adults.

Objective: The objective of the study was to determine correlation of incidence and severity of retinopathy with systemic risk factors in type 2 diabetes.

Materials and Methods: 102 subjects of both sexes with mean age of 56.18 ± 9.41 years, with type 2 diabetes in age group of 40 to 70 years, were included in the study. Patients were screened for presence of associated risk factors including duration of diabetes, control of hyperglycaemia status, hypertension, HbA1c, neuropathy, nephropathy and dyslipidaemia. Ophthalmoscopic examination was performed after pupillary dilatation and staging of diabetic retinopathy was done.

Results: Out of 102 subjects studied, 20 (19.6%) had diabetic retinopathy .Prevalence was higher in age group of 50 to 70 years age. Out of 20 subjects 12(60%) were classified as mild non- proliferative diabetic retinopathy, 3 (15%) had moderate non proliferative diabetic retinopathy, 2 (10%) had clinically significant macular oedema-CSME, 1 (5%) had retinal detachment-RD. In diabetic retinopathy present cases BSL fasting (184.25)was higher as compare to retinopathy absent cases.(138.26) , which was statistically significant as P was 0.001, post meal sugar in retinopathy absent cases was (324.0),which was significantly higher than the diabetic retinopathy absent cases , where mean BSL post meal was (211.87)and p<0.0001.

Summary and Conclusions: A significant association was observed between the duration of diabetes and presence and severity of diabetic retinopathy. Also there was strong association between high Body mass index, higher HbA1c, high post prandial blood sugar level and development of diabetic retinopathy.

KEYWORDS : Diabetic Retinopathy, Hyperglycemia, Systemic risk factors

INTRODUCTION

Diabetes mellitus is group of disorders producing hyperglycaemia. [1] The total number of people with diabetes is expected to rise to an estimated 300 million cases by the year 2025, with the most significant increase in developing countries. [2] Diabetic retinopathy is common preventable cause of blindness in India only if detected early. Diabetes and diabetes related blindness are reaching alarming proportions in developing countries.[3]

Diabetic retinopathy is the most frequent cause of new cases of blindness among adults aged 20 -74 years. During the first two decades of disease , nearly all patients with type 1 diabetes and 60 % patients with type 2 diabetes have retinopathy .The prevalence of retinopathy increases with duration of Diabetes whether Type 1 or 2. [4] The American Diabetes Association (ADA) recommends that after initial evaluation of diabetic eye disease, routine follow up examination should occur annually at a minimum.[5]Prevalence of the complications is higher in lower socio-economic groups due to lack of good control of diabetes and hypertension and also due to behavioural factors. [6] The presence of diabetic retinopathy could indicate a systemic complication. The objective of the study is to study correlation of systemic risk factors with the retinopathy.

MATERIALS AND METHODS:-

The present study is hospital based study carried out in rural area during the six months period of august 2015 to January 2016.

Inclusion Criteria:-

Male and Female patients with type 2 Diabetes Mellitus attending opd, in the age group of 40 to 70 years.

Exclusion Criterias:

1. Gestational Diabetes Mellitus
2. Type 1 Diabetes Mellitus
3. Seriously ill patients

DATA COLLECTION:

After obtaining permission from ethical committee of CMC Vellore the study was carried out. A detailed history of clinical information including the age, sex, intercurrent illness was taken. Anthropometric parameters –Height, Weight, BMI, and WHR were recorded and clinical examination was performed to detect diabetic complications. A biochemical profile was done for Hba1c, Blood sugar fasting (overnight 8 hours) and posts prandial (two hours), Serum creatinine and lipid profile fasting (overnight twelve hours). Blood Sugar levels were determined by the glucose oxidase method. Concentration of Total Cholesterol was done by CHOD –PAP method, Triglycerides by GPO method, High density Cholesterol (HDL) by PTA method. Hba1c was measured by HPLC method. Fundus examination was done by Direct Ophthalmoscope of HEINE Ophthalmoscope. Confirmation of findings was done by Slit Lamp examination. Dilated fundus examination done according to the criteria of American Academy of Ophthalmology. Diagnosis was established and graded according to Early Treatment of Diabetic Retinopathy Study (ETDRS) criteria .Serum creatinine was measured for all patients. JNC 7 criteria used to define hypertension. [7] The national cholesterol education programme guidelines were used to define dyslipidaemia [8]. Statistical analysis was done by chi-square, Z test, odd ratio, 95% CI. The analysis was done by statistician on personal computer by using SPSS software version 17.

RESULTS:-

Out of 102 subjects studied, 20 were diagnosed with diabetic retinopathy. Out of 20 subjects 12 (60%) had mild Non proliferative diabetic retinopathy (NPDR)., 3 (15%) had moderate NPDR., 2 (10 %) had severe NPDR., 2(10%) had Clinically significant macular oedema, 1(5%) had Retinal detachment .None had proliferative retinopathy. Maximum subjects had mild NPDR.

Table 1: Distribution of patients according to duration of DM and grades of Diabetic retinopathy

Duration of DM	Mild NPDR	Moderate NPDR	Severe NPDR	Macular Oedema	Retinal Detachment	Total
0 < 5 yrs.			1		1	2
6-10 yrs.	3		1	1		5
11-15 yrs.	5	2		1		8
15 yrs.	4	1				5
Total	12	3	2	2	1	20

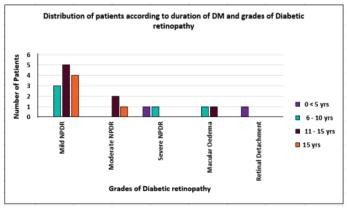

Fig.1. Distribution of patients according to duration of DM and grades of Diabetic retinopathy

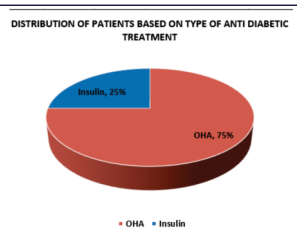

Fig. 2 Distribution of patients based on type of anti diabetic treatment (OHA Oral hypoglycaemic agents)

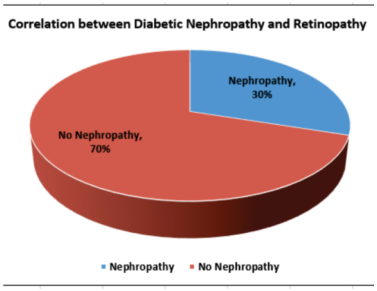

Fig. 3 Correlation between Diabetic Nephropathy and Retinopathy

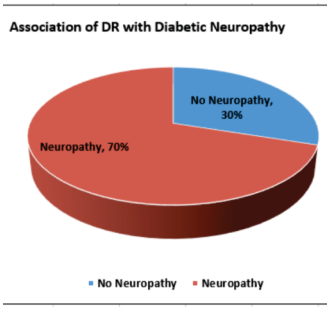

Fig. 4 Association of DR with Diabetic Neuropathy

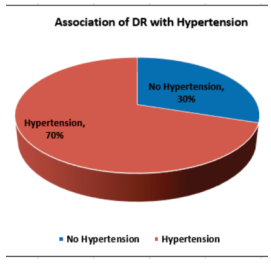

Fig. 5 Association of DR with Hypertension

Table 2: Comparison of blood sugar level according to diabetic retinopathy in study group

BSL at	Diabetic retinopathy				Z Value	P Value
	Present (n=20)		Absent (n=82)			
	Mean	SD	Mean	SD		
Fasting	184.25	52.181	138.26	52.165	3.54	0.001
Post meal	324.60	95.665	211.87	67.830	6.12	<0.0001

In diabetic retinopathy present cases mean BSL fasting and post meal is significantly higher than the diabetic retinopathy absent as P<0.0001.

Table 3: Association between Hba1c and diabetic Retinopathy

Diabetic Retinopathy	N	HbA1c		F Value	P Value
		Mean	SD		
Normal	82	7.74	1.408	10.99	<0.0001
Mild	12	9.79	1.465		
Moderate	3	10.63	1.656		
Severe	5	9.0	1.826		

The mean HbA1c in diabetic subjects without retinopathy was 7.74 ±1.40, the mean HbA1c in mild retinopathy group was 9.79 ± 1.46, in moderate retinopathy group was 10.63 ±1.65, in severe retinopathy group was 9.0 ± 1.82.This was statistically significant as p < 0.0001.

DISCUSSION:-

Diabetic retinopathy is found to be leading cause of visual deficit in the working population of both developed and developing countries. [9] The prevalence of diabetic retinopathy was 19.60% in type 2 diabetic subjects in rural area. This was significantly higher with longer duration of diabetes and severe systemic risk factors. We found 19.60% of retinopathy among 102 diabetic patients , which was less as compare to Dyck et al ,in their study observed 79% of IDDM patients and 55% of NIDDM patients had retinopathy.[10,11]The difference could be due to smaller sample size, different geographic location, failure to detect diabetic cases in the population. In this study there was no association between age of patient and diabetic retinopathy as p = 0.058. Some studies Salem M and Ajlounik and Klein et al reported a significant association between DR and age.[12,13] .In our study there was no association between sex and diabetic retinopathy as p =0.94 ,these findings were similar to some studies like Janghorbani et al where gender was not identified as risk factor.[14] In this study there was highly significant association between duration of diabetes and diabetic retinopathy as p<0.0001 ,which is similar to other studies like Jenchitr W et al [15] found that longer the duration of diabetes higher the prevalence of DR. Younis et al , found a strong association between duration of diabetes and presence of any form of retinopathy when a patient is first screened ,regardless of type.[16] In our study duration 6-10 years ,11-15 years and > 15 years are having 18.44 ,32.67 and 116.67 time risk of having diabetic retinopathy than duration < 5 years. In this study there was no association between family history of DM and diabetic retinopathy as p=0.94. In this study there was highly significant association between BMI and diabetic retinopathy in study group as p <0.0001.BMI 30 & above having 1.07 time risk of having diabetic retinopathy than BMI < 25. In a population based cross sectional study by Van Leiden et al (2005) [17], the prevalence of DR was positively associated with BMI. However ,other studies reported that the severity of DR was inversely with BMI ,with patients with DR having lower BMIs (32-35 kg/m2).In this study there was no significant association between WHR and diabetic retinopathy as p= 0.68. In this study there was no association between smoking and diabetic retinopathy as p > 0.05. It was found in other studies that, cigarette smoking increases the risk for diabetic nephropathy, retinopathy and neuropathy probably via its metabolic effects in combination with increased inflammation and endothelial dysfunction. [18]. In this study there was no statistically significant association between hypertension and diabetic retinopathy as p > 0.05, which is almost similar to HDS study which reported that the frequency of retinopathy was not significant between hypertensive and normotensive .[19]

In this study there was significant association between CAD, Nephropathy, Neuropathy and diabetic retinopathy in study group as p < 0.05, p < 0.01 and p < 0.0001 respectively. In individuals with type 2 diabetes, the presence of retinopathy signifies an increased CHD risk, independent of known risk factors. [20] In this study the mean Hba1c in diabetic retinopathy absent group was 7.74% and mean Hba1c in diabetic retinopathy present group was 9.72%, which is statistically significant. In our study, in diabetic retinopathy present cases, mean Hba1c level was significantly higher than the diabetic retinopathy absent as p < 0.0001. Hyperglycemia is considered an important risk factor associated with DR and it was significantly associated with retinopathy in some studies. This is consistent with other studies. [21,22] In diabetic retinopathy present cases mean BSL fasting (184.25)is higher as compare to retinopathy absent cases (138.26) which is statistically significant as p is 0.001 and post meal sugar in retinopathy present cases is (324.0), which is significantly higher than the diabetic retinopathy absent cases ,where mean BSL post meal is (211.87) and as p < 0.0001.In our study there is no significant difference of TC ,LDL ,TG and HDL according to diabetic retinopathy in study group as p > 0.05.This finding is different than the other studies where they found significant association of lipids and diabetic retinopathy.

CONCLUSIONS:-

After doing fundus examination in asymptomatic diabetic subjects, diabetic retinopathy can be diagnosed at early stage .There was highly statistically significant association was found between duration of diabetes and diabetic retinopathy. There was statistically significant association between CAD, Nephropathy, Neuropathy and diabetic retinopathy. Also it was found that there was statistically significant association of BMI with retinopathy. The mean Hba1c was statistically

significant higher in diabetic retinopathy present cases than retinopathy absent cases. The mean fasting and post meal sugar was statistically significantly higher in diabetic retinopathy present cases as compare to diabetic retinopathy absent cases. In our study there is no significant difference of TC, LDL, TG and HDL according to diabetic retinopathy in study group.. It should be emphasized that examination of systemic risk factors should be an integral part of the assessment of diabetic eye disease.

Strength and Limitations of the study: - Unavailability of published data from local rural area is strength of study. As it was hospital opd based study most of the subjects have less diabetes duration in yrs., so may not reflect exact prevalence of complications in diabetic population of particular area.

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