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CORRELATION OF HbA1C IN DIABETIC RETINOPATHY

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Abstract: 60 patients diagnosed as Diabetes Mellitus of at least 1 year duration, on treatment with oral hypoglycemic agents (OHA) or insulin are taken up for the study. The fundi were evaluated by direct and indirect ophthalmoscopy & slit lamp biomicroscopy with +90D lens. Based on ETDRS criteria, patients were graded according to severity of retinopathy. HbA1c levels were determined in all patients by immunoturbidimetry method. For all cases HbA1c, Fasting and Post Prandial blood sugars, lipid profile, blood urea, serum creatinine, proteinuria were evaluated. Blood pressure was recorded in all cases. Our study found correlation between different grades of Diabetic Retinopathy and Clinically Significant Macular edema (CSME) with HbA1c levels.

Keywords: Diabetes , HbA1c, Retinopathy , CSME



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INTRODUCTION

Diabetes is a major cause for blindness in the world. The pathogenesis of diabetic retinopathy (DR) involves the retinal micro-vascular changes which result in the development of non-proliferative or proliferative retinopathy with or without clinically significant macular edema. HbA1c is an essential tool to indicate the progression of DR. Our aim was to determine the correlation of HbA1C levels with different grades of DR. Inadequate glycemic control have been seen to correlate with a higher risk of progression from non-proliferative to proliferative DR. Patients with DR are 20 times more likely to become blind than non-diabetic patients of similar age and gender. Currently it is demonstrated that severe vision loss due to diabetic retinopathy is preventable by achieving appropriate glycemic control.

MATERIALS & METHODS:

This study was conducted at our hospital (Sree Balaji Medical College & Hospital). 50 patients of type 2 Diabetes mellitus who were above 40 years of age were taken up for study. Ethical committee approval was obtained. Consent was taken in all the cases. Patients who were long standing diabetic & newly diagnosed diabetic were referred to our department to rule out diabetic retinopathy & those with DR were taken up for the study.

Patients with posterior segment disease in whom posterior segment was not visualized & those with non diabetic renal disorders were excluded from the study. Complete history was taken including age of onset of DM, duration of DM, any treatment for DM, any ocular treatment, and any other systemic illness/co-morbid disease. A detailed ophthalmological examination was done. Fundus examination by a direct ophthalmoscope, indirect ophthalmoscope and slit lamp biomicroscopy with a 90D lens was done to see for media, vitreous hemorrhage, pre-retinal hemorrhage, background retina for micro-aneurysms, hemorrhages, hard and soft exudates, venous beading, IRMAs, NVD, NVE, fibrovascular bands in tractional retinal detachment, and clinically significant macular edema (CSME). Severity of maculopathy and severity of retinopathy was noted.

Any evidence of hypertensive retinopathy, branch retinal vein occlusion, central retinal vein occlusion, age-related macular degeneration, macular scar was noted. All patients were investigated for blood sugar levels, urine sugar levels and HbA_{1c}, Hb%, blood urea, creatinine & lipid profile. Grading of DR was done by the ETDRS grading system.

RESULTS & DISCUSSION:

Table 1:

▶ **PREVALENCE OF GRADES OF DR**

GRADE OF DR	NO OF PATIENTS	PERCENTAGE (%)
MILD NPDR	2	4%
MODERATE NPDR	24	48%
SEVERE NPDR	10	20%
VERY SEVERE NPDR	4	8%
PDR	10	20%
TOTAL	50	100%

According to the observations made, NPDR (Non proliferative diabetic retinopathy) had highest prevalence amounting to 80%, whereas PDR (Proliferative diabetic retinopathy) accounted to remaining 20%.

Table 2:

► RELATIONSHIP BETWEEN DURATION OF DM & GRADES OF DR

DURATION	MILD NPDR	MODERATE NPDR	SEVERE NPDR	VERY SEVERE NPDR	PDR
10 YEARS	2 / 2 Pts (10 year duration)	4 / 24 Pts	-	-	-
11 - 15 YEARS	-	12 / 24 Pts (15 year duration)	2 / 10 Pts	-	2 / 10 Pts
16 - 20 YEARS	-	4 / 24 Pts	8 / 10 Pts (18 year duration)	-	-
>20 YEARS	-	4 / 24 Pts	-	4 / 4 Pts (21 year duration)	8 / 10 Pts (25 year duration)

Mild NPDR was seen in patients with more than 10 year duration of diabetes,

Moderate – Severe NPDR was seen in patients with 15 – 20 year duration,

Very severe NPDR & PDR were seen in patients with > 20 year duration.

Longer the duration, higher the severity of retinopathy.

Table 3:

▶ PREVALENCE OF HYPERLIPIDEMIA & HTN IN DR

GRADE OF DR	NO OF Pts WITH ↑ LIPIDS	PERCENTAGE	NO OF PATIENTS WITH HTN	PERCENTAGE
MODERATE NPDR	12	24%	10	20%
SEVERE NPDR	4	8%	4	8%
VERY SEVERE NPDR	2	4%	NIL	NIL
PDR	6	12%	4	8%
TOTAL	24	48%	18	36%

In our study we found that 48% of study population had associated abnormal lipid profile & 36% had associated systemic hypertension.

Table 4:

▶ RELATIONSHIP BETWEEN GRADE OF DR & HbA1C

HbA1C	NPDR		PDR	
	NO OF PATIENTS	%	NO OF PATIENTS	%
7 - 8	8	16	-	-
8 - 9	8	16	-	-
9 - 10	6	12	2	4
10 - 12	12	24	-	-
12 - 14	6	12	-	-
>14	-	-	8	16
TOTAL	40 Pts	80%	10 Pts	20%

NPDR - RANGED FROM
 7 - 14
 NONE had > 14

80 % of Pts with PDR
 had HbA1C >14

All those with NPDR (100%) had HbA1C ranging between 7.1 – 13.9% but none of them had HbA1C above 14%. 80% of PDR had HbA1C above 14%. Higher the levels of HbA1C , greater the severity of retinopathy.

Table 5:

▶ RELATIONSHIP BETWEEN HbA1C & CSME

HbA1C VALUES	NO OF PATIENTS WITH CSME	PERCENTAGE (%)
7 - 8	1	3.5 %
8 - 9	2	6.5%
9 - 10	4	13%
10 - 12	4	13%
12 - 14	10	32%
>14	10	32%
TOTAL	31	100%



Higher prevalence of CSME was seen in those with HbA1C of more than 9%

In our study we found longer the duration of diabetes, higher was the incidence of retinopathy. Hyperlipidemia & systemic hypertension were associated aggravating risk factors. Our study showed that HbA1C levels are higher as the severity of retinopathy increases. We found cut off values for HbA1C levels in our study, that all those with NPDR (100%) had HbA1C between 7.1 – 13.9% & none of them had above 14% whereas those with HbA1C of more than 14% were seen in PDR (80%). CSME was frequently observed in those with severe & very severe NPDR and PDR. All those with CSME had uncontrolled HbA1C (>9) suggesting relationship between CSME & uncontrolled diabetes.

Thus our study showed a significant correlation between high HbA1C levels & severity of diabetic retinopathy after 10 year duration of diabetes mellitus.

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