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A Clinical Study of Correlation between Glycaemic Control and Progression of Diabetic Retinopathy

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Abstract:
Aim: *To study the relationship between glycaemic control and the onset, progression and severity of diabetic retinopathy in diabetic individuals 2*
Patients And Methods: *The present study was done from june 2017 to august 2017 on 100 patients having diabetic retinopathy who attended the OPD of Ophthalmology, GGH, Guntur. Retinopathy will be assessed by retinal examination with Direct/Indirect Ophthalmoscopy, Fundus photography, Fundus flourescin angiography (FFA), B- Scan ultrasonography and optical coherence tomography (OCT). Staging of retinopathy will be determined basing on the ETDRS (Early treatment diabetic retinopathy study) which is the standard classification system accepted world over. HbA1C will be measured by standardized assay high performance liquid chromatography.*
RESULTS: Out of 100 patients in the study the mean age of Diabetes Mellitus is 60.24 +-7.82 years. Male to female ratio is 1.38:1. Mean duration of diabetes is 16.47+-5.32 years. The mean of HbA1c in the study population was 9.16+- 1.42. The present study constituted 13% mild NPDR, 48% moderate NPDR, 24% severe NPDR, 11% PDR and 4% high risk PDR. The severity of Diabetic Retinopathy is increased with increased levels of HbA1c and duration of Diabetes Mellitus.
Conclusion: *Increased HbA1c levels are associated with increased severity of diabetic retinopathy*
Keywords: *Diabetes mellitus, Diabetic retinopathy, Glycosylated haemoglobin[HbA1c]*

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I. Introduction

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Type 2 diabetes mellitus is more common constituting nearly 90% of the diabetic population. Recent epidemiological studies have shown a significant rise in the prevalence of diabetes mellitus worldwide. Diabetes mellitus results in generalized macro- and microvascular complications. Microvascular complications due to microangiopathy have been directly linked to glycemic control and affect the kidneys, eyes and peripheral nerves. Macrovascualar complications are more common in diabetic patients than the normal population but are not necessarily directly linked to the level of hyperglycemia and effect the heart, brain and limbs.

Diabetic retinopathy is a chronic progressive sight threatening disease of retinal microvasculature associated with hyperglycemia. Diabetic retinopathy is a leading cause of blindness world-wide. The severity and the duration of the inadequate glycemic control have been seen to be correlated with a higher risk of increased severity of retinopathy, from non-proliferative to proliferative Diabetic retinopathy. Advanced glycation end products (including glycosylated hemoglobin, HbA1c) are known to produce the micro-vascular complications in Diabetic retinopathy. As the life span of glycosylated HB is 120 days, unlike FBS and PPBS, it gives us the long term glycemic values. HbA1c has long been known to predict the incidence and progression of DR . The Early Treatment Diabetic Retinopathy Study (ETDRS) identified HbA1c as one of the most important risk factors for the progression to high risk proliferative retinopathy.
The present study is to investigate the relationship between glycaemic control and stage of retinopathy in diabetic population

II. Subjects And Methods

This is a prospective, cross sectional, hospital based study, done during a period of 3 months from june 2017 to august 2017 on 100 patients having diabetic retinopathy who attended the OPD and the referrals to the department of Ophthalmology, GGH, Guntur.

After taking the informed consent, a prepared proforma was used to collect the data which includes relevant history regarding the diabetes with respect to the age of onset, duration, nature and effect of treatment received , general examination, BCVA by snellens chart, detailed slit lamp examination of anterior segment, IOP measurement,and posterior segment examination. Retinopathy will be assessed by retinal examination with Direct/Indirect Ophthalmoscopy, Fundus photography, Fundus flourescin angiography (FFA), B- Scan ultrasonography and optical coherence tomography (OCT). Staging of retinopathy will be determined basing on the ETDRS (Early treatment diabetic retinopathy study) which is the standard classification system accepted world over. HbA1C will be measured by standardized assay high performance liquid chromatography

III. Results

A total of 100 patients of diabetic retinopathy who attended or referred to department of ophthalmology and met the inclusion and exclusion criteria were included in the study.

Total number of participants included in the study	**100**
Mean age (years)	**60.24+/-7.82**
Mean duration of diabetes	**16.47+/-5.32**
Mean HbA1c(%)	**9.16+/- 1.42.**

Table 1: Demographic data

The mean age of participants in this study was 60.24 +-7.82 . The mean duration of diabetes was 16.47 +- 5.32. The mean of Glycosylated haemoglobin (HbA1c) in the study population was 9.16 +/- 1.42.

Gender	Number
Male	**58**
Female	**42**
Total	**100**
Male: female	**1.38:1**

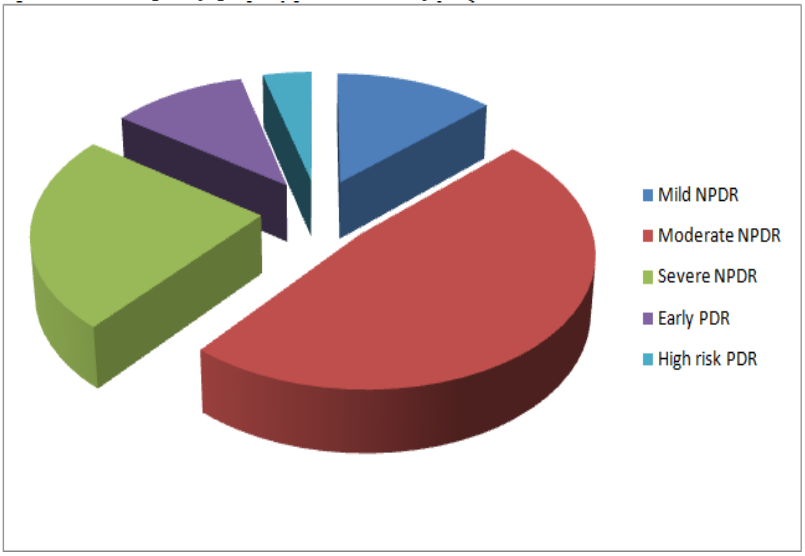
Table 2: Gender distribution

Out of the 100 participants, 58 are males and 42 are females, showing a male predominance. M:F ratio was 1.38:1 .

Retinopathy	Number	Percentage
Mild NPDR	**13**	**13%**
Moderate NPDR	**24**	**48%**
Severe NPDR	**48**	**24%**
Early PDR	**11**	**11%**
High risk PDR	**4**	**4%**

Table 3: Distribution of retinopathy

The present study constituted 13% mild NPDR, 48% moderate NPDR, 24% severe NPDR, 11% PDR and 4% high risk PDR. Out of 100 retinopathy patients studied majority have moderate and severe NPDR



HbA1c range (%).	Mild NPDR	Moderate NPDR	Severe NPDR	Early PDR	PDR with high risk
<8.0	12	8	10	0	0
8-10	1	24	9	7	1
10.1-12	0	15	2	3	2
>12	0	1	3	1	1
Total	13	48	24	11	4

Table 4: Correlation Between Hba1c And Severity Of Retinopathy

As the HbA1c levels increased, there is an increase in the severity of diabetic retinopathy.

IV. Discussion

The present study was conducted as a cross sectional hospital based study to determine the association between HbA1c and diabetic retinopathy. The present study included 100 cases of retinopathy which constituted 13% mild NPDR, 48% moderate NPDR, 24% severe NPDR,11% PDR and 4% PDR with high risk characteristics. Out of 100 retinopathy patients studied, moderate NPDR accounted for nearly half the patients. Regardless of the severity of retinopathy, 18% cases had CSME. The glycemic status of the patients was studied by measuring HbA1C levels. When the HbA1C values were compared in the groups with increasing severity of retinopathy, increasing levels of HbA1C were noted showing a significant correlation. Therefore it was noted that poor glycemic control led to the worsening of the retinopathy. The Diabetes Control and Complications Trial (DCCT) and the U.K. Prospective Diabetes study (UKPDS) were two randomized clinical trials which conclusively showed the efficacy of glycemic control in preventing diabetic retinopathy. These studies mentioned that glycemic control was protective for all levels of retinopathy. Comparison of the means of HbA1c in patients with and without CSME revealed statistically significant association of CSME with HbA1c. High glycosylated hemoglobin (HbA1c) level is a well-known risk factor for diabetic macular oedema. In addition, the DCCT had demonstrated that adequate treatment to maintain blood glucose levels at a normal range reduced the risk of clinically significant macular oedema at the rate of 23%.

Earlier studies in the literature have shown that mean HbA1c in patients with persistent unilateral CSME was 8.6% and that in bilateral CSME was 9.1%. Same study also revealed that type2 diabetics with persistent CSME have higher HbA1c at the time of their disease than patients with resolved CSME.

V. Conclusion

As the value of glycosylated haemoglobin (HbA1c) increase, the severity of diabetic retinopathy increases. The poor metabolic control as demonstrated by high HbA1c is significantly associated with onset, severity and progression of retinopathy and presence of CSME. Duration of diabetes and high HbA1c levels are found to be the major predictors of diabetic retinopathy in type II diabetes mellitus.

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