

# Study of correlation between diabetic age and stage of diabetic retinopathy

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## Abstract

**Aims:** To study co-relation between diabetic age and severity of diabetic retinopathy. 1) To see correlation of control of Diabetes and occurrence of diabetic retinopathy **Setting and Design:** Study is observational, prospective type of study in Diabetes patient attending Ophthalmology OPD and IPD from October 2013-October 2015 in a Tertiary care Medical College **Material and Methods:** 480 eyes of 240 diabetic patients were examined for ocular as well as systemic findings. Patients with other ocular pathology were excluded. Eyes were grouped according to duration and staged. **Results:** 41.45% of the total eyes had some evidence of diabetic retinopathy. Mild diabetic retinopathy/Background diabetic retinopathy was more commonly seen in all subgroups of patients(91.46%).proliferative diabetic retinopathy was least common (8.54%). **Conclusion:** No correlation was found between Diabetic age and severity of retinopathy. However retinopathy as more common in uncontrolled group than controlled group.

**Keywords:** Diabetes, Diabetic retinopathy, Maculopathy, Diabetic age.

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## INTRODUCTION

Diabetes is metabolic disorder of multiple etiology characterized by chronic hyperglycemia with disorder of carbohydrate, protein and lipid metabolism resulting from insufficient insulin secretion or resistance to insulin action or both<sup>1</sup>. Diabetic affects mainly the vascular structures in body know as macro and micro vasculopathy. Chief cause of Diabetic Retinopathy is micro vascular pathology leading to other complications giving rise to various stages of Retinopathy in eye. Type I diabetic is more prone for retinopathy compared to Type II (75%) and control of diabetics may prolong the occurrence of retinopathy.<sup>2,3</sup> Indian population is fast growing and diabetic patients will increase in near future. Visual impairment due to retinopathy is estimated to be 8% by WHO.<sup>4</sup> Diabetic age is considered to be main

factor is development of retinopathy, hence it is necessary to study the severity of Retinopathy (stages) in relation to diabetic age.

## MATERIAL AND METHODS

Patient with known Diabetes attending the Medical College OPD as well as IPD patients were included in this study.

Patient with other ocular pathology were excluded. Patients were grouped in four groups by Diabetic age,

**I Group:** less than 10 yrs,

**II Group:** 10 – 15 yrs

**III Group:** 16 – 20 yrs,

**IV Group:** More than 20 yrs.

After ocular examination and fundus photograph, eyes were classified as per ETDRS classification in each Diabetic age group.<sup>5</sup> Control of diabetic was taken as glycosylated Hb- 6.5 and less.

## RESULTS

Table 1 As per aim of our study, 480 eyes of 240 patients were grouped as per diabetic age into 4 groups. Minimum diabetic age considered to cause changes in retina is considered to be 7-10 yrs as given in the textbook. So, first group is taken as < 10 yrs of diabetic age.<sup>1</sup> Average prevalence of diabetic retinopathy was 41.45%

**Table 1**

Diabetic Age (Years)	Stage Of DR			
	TOTAL		DR present	
	NUMBER OF EYES	% OF EYES	NUMBER OF EYES	% OF EYES
< 10	270	56.25%	113	41.32%
10 to 15	142	29.58%	59	41.54%
16 to 20	46	9.58%	18	40%
> 20	22	4.59%	9	40.90%
	480	100%	199	41.45%

Chi Square Test=23.61; df=3; p<0.05; Significant

**Table 2: Occurrence of nonproliferative diabetic retinopathy and proliferative diabetic retinopathy in eyes**

Diabetic age	DR present		Background DR		Proliferative DR	
	Number of eyes	%	Number of eyes	%	Number of eyes	%
< 10 YRS	113	56.78%	108	95.57%	5	4.43%
10-15 YRS	59	29.64%	50	84.74%	9	15.26%
16-20 YRS	18	9.04%	15	83.34%	3	16.66%
>20 YRS	9	4.54%	9	100.00%	0	0
	<b>199</b>	<b>100.00%</b>	<b>182</b>	<b>91.46%</b>	<b>17</b>	<b>8.54%</b>

Mild Non proliferative diabetic retinopathy was most common (91.46%) in all age group while Proliferative diabetic retinopathy was 8.54%.

**Table 3: Occurrence of subgroups of diabetic retinopathy and diabetic age**

Diabetic Age (Years)	Diabetic retinopathy subgroups					
	TOTAL	MILD NPDR	MODERATE NPDR	SEVERE NPDR	PDR	HIGH RISK PDR
< 10	56.78%	51.34%	38.95%	5.30%	2.65%	1.76%
10 to 15	29.64%	44.07%	37.31%	3.38%	8.47%	6.77%
16 to 20	9.04%	22.23%	27.78%	33.34%	0	16.65%
> 20	4.54%	22.21%	33.34%	44.45%	0	0
	100.00%	45.22%	37.18%	9.05%	4.02%	4.53%

In the first group, most common is mild DR (51.34%) followed by moderate (38.95%) and severe DR (5.30%) among total DR. In the 2<sup>nd</sup> group, most common is mild DR (44.07%) followed by moderate (37.31%) and PDR (8.47%) among total DR. In the 3<sup>rd</sup> group, most common is Severe NPDR (33.34%) followed by Moderate NPDR

(27.78%) and mild DR (22.23%) among total DR. In the 4<sup>th</sup> group, most common is severe DR (44.45%) followed by moderate (33.34%) and mild DR (22.21%) among total DR. Among all the groups mild type of Background DR is most common and PDR least common.

**Table 4: Presence of maculopathy**

Total no of eyes with DR	Maculopathy PRESENT
199	14

Z Test=5.41; p<0.001; Highly Significant

In our study, Maculopathy was seen in 14 eyes out of 199 eyes with presence of DR, hence shows prevalence of 7.03%. All the patients with Maculopathy had uncontrolled blood sugar level control, i.e., HbA1c of > 6.5%.

**Table 5: Relationship of control of blood sugar level and diabetic retinopathy**

	HbA1c_ relation			
	Total number Of patients		DR present	
	Number of patients	%	Number of patients	%
HbA1c_ <6.5	65	27.09%	19	29.23%
>6.5	175	72.91%	81	46.28%
<b>Total</b>	<b>240</b>	<b>100%</b>	<b>100</b>	<b>41.66%</b>

In our study we have taken HbA1c as marker of blood sugar level control in the human body. Accordingly patients are classified depending on HbA1c values >6.5 as uncontrolled and <6.5 as controlled diabetes into following groups. Out of 240 pts, 65(27.09%) pts of

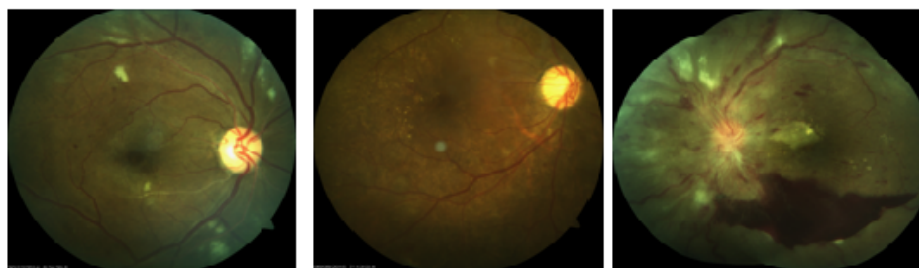
control group 19(29.23%) showed presence of DR. Out of 175 (72.91%) Pts of uncontrolled group, 81(46.28%) had DR. Uncontrolled group has shown higher percentage of DR (17%) Compared to uncontrolled group.

**Table 6:** Showing % of D. R. Eyes (199) as per ETDRS classification in 199 Background Diabetic Retinopathy 182 = 91.46 PDR – pt – 17 = 8.54

Sr. No.	Group	No. of pts	Mild	Moderate	Severe	No. of pt	PDR	High
1	< 10 yrs	108	51.34%	38.95	5.30	5	2.65	1.76
2	10 – 15 yrs	50	44.0%	37.31	3.38	9	8.47	6.77
3	16 – 20 yrs	15	22.23%	27.78	33.34	3	--	16.65
4	> 20 yrs	9	22.21%	33.34	44.45	0	--	--
		<b>182</b>	<b>45.22%</b>	<b>37.18</b>	<b>9.05</b>	<b>17</b>		<b>4.53</b>

Non proliferative Diabetic retinopathy was most common(91.46%) followed by moderate diabetic retinopathy (25.22%).Proliferative diabetic retinopathy

and macular edema was seen more in patients with uncontrolled systemic disease.

**Figure 1:** Mild non proliferative diabetic retinopathy mod npdr**Figure 2:** Severe NPDR CSME Proliferative Diabetic Retinopathy

## DISCUSSION

Diabetic retinopathy is a vascular disorder which affects the retina. It is seen in both Type 1 and Type 2 DM. It is estimated that nearly all Type 1 DM and 75% of Type 2 DM will develop Diabetic retinopathy after 15 year duration. With the increasing numbers of diabetics in India, Diabetic retinopathy has become an important cause of visual impairment. The incidence of Diabetic retinopathy is estimated to be 8% according to WHO. Diabetic Retinopathy was seen in 41.45% of total number of eyes examined. 41.54% was seen in Diabetic age of 10 – 15 years, however figures in other age groups are also similar with very little difference. In the study by Sankara Netralaya, the prevalence of diabetic retinopathy in the population with diabetes mellitus was 18.0%.<sup>6</sup> Similar type of grouping was seen in Andhra Pradesh Eye Disease study<sup>7</sup>, showed that diabetic age of 0–9 years patients were 155 and DR was seen in 21 (13.5%), 10–14 years patients were 27 and DR was seen in 5 (18.5%), 15–19 years patients were 12 and DR was seen in 7 (58.3%) and >20 years were 6 DR being 5 (83.3%) showing prevalence of 19%. Blue Mountains Eye<sup>8</sup> Study, 32.4% prevalence of DR in diabetics in and 36.8% in

Beaver Dam Eye Study<sup>9</sup>, similar to our study. In a large series of diabetics attending a diabetes center in southern India by Rema *et al*, 34.1% were reported recently to have DR.<sup>10</sup> This study clearly indicates that irrespective of diabetic age, Mild NP DR is most common outcome compared to PDR. Thereby showing increase in diabetic age has no bearing on occurrence of severity of DR. In conclusion, we can say DR does occur with advancing diabetic age, but inversely, advanced diabetic age cannot predict severity of Diabetic retinopathy. Proliferative diabetic retinopathy was seen in 8.54% while Mild DR was 91.46%. According to APEDS study, Most of the DR 87.2% were in background DR (mild (51.3%) or moderate (35.9%) non-proliferative type); one subject (2.6%) had proliferative retinopathy. In our study, maculopathy was seen in 14 eyes out of 199 eyes with DR, showing prevalence of 7.03%. This was seen more in patients with uncontrolled sugar level. According to CURE eye study 1, the prevalence of maculopathy was 2.4%.<sup>11</sup> Study by Sankara Netralaya, shows prevalence of maculopathy of 3.4%. Out of 65 (27.09%) patients of control group 19 (29.23%) showed presence of DR. while 175 (72.91%) patients of uncontrolled group, 81 (46.28%) had DR. This

showed that uncontrolled diabetes is major risk factor for occurrence of DR. PDR was seen in patients with uncontrolled sugar. According to The Diabetes Control and Complications Trial (DCCT) Research Group, Intensive diabetic control leads to reduction in the development and progression of all diabetic complications<sup>11</sup>

## CONCLUSION

Hence we conclude that

1. There is no correlation seen in severity of Retinopathy corresponding to increase in Diabetic age, Mild NPDR being more common than PDR. Hence it is necessary for every Diabetic patient to undergo frequent eye screenings.
2. Clinically significant macular edema was seen in 14 patients (7.03%).
3. Uncontrolled diabetics has more evidence of Retinopathy (46.28%) compared to 29.23% of control group hence glycemic control is essential for Retinopathy control.

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