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**Keywords:** Newly diagnosed diabetics; Diabetic retinopathy; Hypertension; CSME; Prevalence



## Research Article



# Prevalence of Diabetic Retinopathy among Self-reported Newly Diagnosed Diabetics

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## Abstract

**Introduction:** Diabetic Retinopathy (DR) poses a significant threat to individuals with diabetes, leading to visual impairment and blindness if not promptly addressed. This study focuses on the prevalence of diabetic retinopathy among self-reported newly diagnosed diabetics.

**Material method:** This is a prospective study on 200 self-reported newly diagnosed diabetics from April 2022 to May 2023. Patient data, including complaints, diabetes duration, family history, hypertension, and therapy details, were comprehensively analyzed. Complete Ocular examinations including best-corrected visual acuity, intraocular pressure, slit lamp examination, fundus examinations, and Fundus fluorescein angiography were done. Diabetic Retinopathy was graded using a modified ETDRS grading system. Laboratory investigations included complete blood count, fasting and postprandial blood sugar, lipid profile, renal function test, and Hb1AC levels, providing a thorough assessment of patients' ocular and systemic health.

**Result:** Out of the 200 diabetics, 43.5% had diabetic retinopathy, with a slightly higher prevalence in males (44.64%) compared to females. The age group 50 - 59 had the highest prevalence (74.19%), and Hindus, Muslims, and other communities showed comparable percentages. Family history and hypertension were significant factors, with 88% of those with a family history developing retinopathy. NPDR was predominant (87.35%), while 12.64% had PDR. Clinically Significant Macular Edema (CSME) was present in 59.77%, with 80.76% of these cases having concomitant hypertension.

**Conclusion:** The study emphasizes the imperative for early detection and comprehensive management of diabetic retinopathy among newly diagnosed diabetics. Age, gender, family history, and hypertension emerge as crucial determinants, advocating for integrated care and targeted screening programs to safeguard vision.

## Introduction

The worldwide prevalence of diabetes mellitus has dramatically increased over the past two decades. It affects around 460 million people worldwide and was the eighth leading cause of death and disability in 2019. The global prevalence j. 2029 was 9.3% (463 million) expected to rise to 10.2% (578 million) by 2030 and 10.9% (700 million) by 2045 [1].

The most common manifestation of diabetes in the eye is diabetic retinopathy. With an ever-increasing number of diabetics, diabetic retinopathy is becoming a leading cause of blindness in both industrialized and developing countries [2]. In the past two decades, diabetic retinopathy has become the 6<sup>th</sup> leading cause of blindness from the 20<sup>th</sup> in India.

There are several conditions and risk factors including

duration of diabetes, poor glycemic control, hypertension, high cholesterol and triglyceride levels, gestational diabetes, smoking, and obesity, which have been associated with diabetic retinopathy [3]. All of these conditions, if not well and adequately controlled will hasten the progression of diabetic retinopathy [4].

The present study was carried out to study the prevalence of diabetic retinopathy among self-reported newly diagnosed diabetics with particular reference to the various risk factors associated with disease and visual loss.

## Material and methods

This is a prospective study of 200 self-reported newly diagnosed Type 2 Diabetics visiting the ophthalmology OPD of M.Y. Hospital, Indore between April 2022 and May 2023.

After obtaining written informed consent from the

patients, a detailed history of complaints was taken with special reference to the duration of diabetes, family history, presence of hypertension, and type of therapy were considered. All patients underwent complete ophthalmological examination which included BCVA, IOP, Slit lamp examination, fundus examination (indirect ophthalmoscope, +78 D), and fundus fluorescein angiography. The photographs were graded using a modified version of the ETDRS (Early Treatment Diabetic Retinopathy Study) grading system [5].

ETDRS classification system:

### 1. No Diabetic Retinopathy (NDR):

- No visible abnormalities in the retina.
- No microaneurysms, hemorrhages, exudates, or other signs of diabetic retinopathy.

### 2. Mild Nonproliferative Diabetic Retinopathy (NPDR):

- Presence of microaneurysms only, typically fewer than 20.
- No other signs of diabetic retinopathy are present.

### 3. Moderate Nonproliferative Diabetic Retinopathy (NPDR):

- More than just microaneurysms are present, but severity does not meet the criteria for severe NPDR.
- Includes microaneurysms, hemorrhages, and/or cotton-wool spots, but no signs of severe NPDR.

### 4. Severe Nonproliferative Diabetic Retinopathy (NPDR):

- Criteria include any of the following:
- Presence of at least 1 of the following:
- More than 20 intraretinal hemorrhages in each of the 4 quadrants.
- Venous beading in 2+ quadrants.
- Intraretinal microvascular abnormalities (IRMAs) in 1+ quadrant.
- Moderate to severe hemorrhages in 1+ quadrant and moderate to severe venous beading in 1+ quadrant.

### 5. Proliferative Diabetic Retinopathy (PDR):

- Presence of neovascularization (new blood vessel growth) on the retina or optic disc.
- Neovascularization can lead to vitreous hemorrhage,

tractional retinal detachment, or neovascular glaucoma.

### 6. Advanced Diabetic Retinopathy (ADR):

- Presence of advanced complications, such as vitreous hemorrhage, fibrovascular proliferation, tractional retinal detachment, or neovascular glaucoma.

Laboratory investigation included complete blood count, Fasting and Post post-prandial blood sugar, lipid profile, Renal function test, and Hb1AC. as noted.

Statistical analysis was performed using a statistical software package (SPSS Statistics for Windows, Version 22.0. IBM Corp, Armonk, NY). Demographics and patient characteristics were reported as the means and standard deviations or percentages in each group.

## Results

Out of 200 Newly diagnosed Type 2 diabetics visiting our eye OPD, 87 (43.5%) had diabetic retinopathy. 112 (56%) were male and 88 were females (44%). However, the prevalence of diabetic retinopathy in males was 44.64% while in females it was 42.04% (Table 1). Prevalence of diabetic retinopathy was maximum in the age group 50 years - 59 years (70.10 %) followed by 60-69 (43.75%) (Table 2). 134 (67%) patients were Hindus, 56 (28%) were Muslim and 10 (5%) were other community patients. However, the percentage prevalence of diabetic retinopathy in each group was comparable. In Hindus, the percentage prevalence of diabetic retinopathy was 45.52% while in Muslims it was 42.85% and in others, it was 20%. The duration of diabetes ranged from 0-25 years. Family history was present in 59 (28.5%) diabetics, out of whom 52 (88%) had diabetic retinopathy. Out of 87 patients with diabetic retinopathy, NPDR was present in 87.35% of cases and PDR in 12.64%. Hypertension was present in 33.5% of diabetics, out of whom 74.62% had diabetic retinopathy. CSME was present in 52 patients (59.77%). Out of these 52 patients with CSME, hypertension was present in 42 patients (80.76%).

**Table 1:** Sex distribution and Prevalence of DR included in the study.

S. No.	Group	Total diabetic patients (200)	Number of patients with diabetic retinopathy (DR)	Prevalence of DR (%)
1.	Females	88	37	42.04%
2.	Males	112	50	44.64%

**Table 2:** Age-wise distribution of Diabetic Retinopathy.

S. No.	Age group	Number of patients	Number of patients with diabetic retinopathy	Percentage with diabetic retinopathy
1.	< 49	63	3	4.76
2.	50 - 59	97	68	70.10 %
3	60 - 69	32	14	43.75 %
4.	70 - 79	8	2	25%
5.	> 80	0	0	0

Out of 87 patients with diabetic retinopathy, 53 had visual acuity  $\leq 6/12$  (60.9%). 4 eyes were blind due to diabetic retinopathy, out of which 3 had high-risk diabetic retinopathy and 1 had AION.

## Discussion

Diabetic Retinopathy (DR) is a microvascular disorder occurring due to the long-term effects of diabetes mellitus. Diabetic retinopathy may lead to vision-threatening damage to the retina, eventually leading to blindness. Knowledge of the retinopathy status of an individual is one part of the whole process of care in diabetes. Proper assessment of various risk factors associated with diabetes is needed for an institution of correct management of the condition. Risk factors for DR in the current study were duration of diabetes (> 10 years, OR 4.8, 95% CI: 3.3-6.9), poor glycemic control ( $\geq 200$  mg/dl, OR: 1.5, 95% CI: 1.2-1.7) and insulin treatment (OR:2.6, 95% CI: 1.7-4.1) [6]. 22.8% of those who reported diabetes had diabetic retinopathy in Melbourne Visual Impairment Project (1998) [7], 32.4% in Blue Mountain Eye Study (1996) [8], 26% in Rotterdam Study (1995) [9], 36.8% in Beaver Dam Eye Study (1992) [10] and 22.4% in APEDS (1999) [11]. The advanced figure in the study could be because of hospital bias as cases with ocular problems tend to attend an eye clinic more.

The study reveals the maximum number of cases of diabetic retinopathy is in the age group 50 - 59 (74.19%) followed by 60 - 69 (43.75%). However, the percentage prevalence of diabetic retinopathy in males is 44.64% and in females 42.04% which is comparable. Mohan, et al. (2005) found the prevalence of diabetic retinopathy significantly advanced in men (21.3%) than in women (14.6%) in a study conducted in an urban population of Chennai city of South India (CURES-1) [12].

With increasing duration of diabetes, the severity of diabetic retinopathy increases as indicated by Lalit Dandona (1996) [11], CURES I (2005) [12], and WESDR (1989) [13]. The mean age of diabetic patients with and without DR changes was 55.2 years (SD 12.6 yrs.) and 44.4 years (SD +/- 9.7 years), respectively, which was comparable to data provided in studies by Raman, *et al.* and Mohan, *et al.*

Neilson NV (1984) found BDR prevalence to be 43.4% and that of PDR to be 9.8% [14]. Mohan R (1996) reported that 34.1% had diabetic retinopathy in a study conducted in a diabetic center at Madras [15]. They reported 30.8% NPDR and 3.4% PDR. Dandona, et al. (1999) reported that the vast majority of those with diabetic retinopathy had mild or moderate NPDR (9.3%), and severe NPDR or PDR was present in only 10.7% [16].

Klein, et al. (2002) reported hypertension in people with

diabetes is common, affecting 30% of people with younger onset diabetes mellitus and 45% with older diabetes mellitus [17]. UKPDS (1998) showed that patients with systolic blood pressure  $\geq 140$  mm Hg were 2.8 times more likely to develop retinopathy as compared to patients with systolic blood pressure < 125 mm Hg [18].

In Barbados Eye Study, CSME was present in 8.6% and non-CSME in 6.7% [19]. Mohan R (2005) reported 6.4% of cases of macular edema in a study done in Madras. Diabetic macular edema is now known to be the main cause of moderate vision loss among individuals with DM globally [12,20,21].

ETDRS (1987) brought forward that dyslipidemia independent of glycemia is associated with an increased risk of developing retinopathy [22]. Amod Gupta, et al. (2003) suggested that lipid-lowering therapy in diabetics with hypercholesterolemia may be a useful adjunct in the management of diabetic macular edema with hard exudates [23]. Mohan R, et al. (2005) propounded that PDR was not associated with serum cholesterol, triglycerides, and LDL cholesterol but showed a strong association with decreased serum HDL cholesterol levels [12].

Dandona, et al. (1999) reported that visual impairment (visual acuity < 6/12) as a result of diabetic retinopathy was present in 1/10 of those with diabetic retinopathy. No eye was blind (visual acuity < 6/60) due to diabetic retinopathy in the sample studied [16]. Ghafour IM (1983) found diabetic retinopathy was responsible for 11.16% of patients with visual acuity  $\leq 6/60$  [24]. The demand for DR and CSME treatment will continue to rise significantly in the future.

## Conclusion

Anticipating diabetic retinopathy as an emerging cause of visual loss, it is time for all of us to get on guard. Knowledge of retinopathy status is one part of the whole process of care in diabetics. Proper screening for diabetic retinopathy can save vision by timely intervention at a relatively low cost.

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