

# Clinical study of prevalence of diabetic retinopathy in recently diagnosed type 2 diabetes mellitus patients

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## Abstract

**Background:** Diabetes mellitus, a chronic metabolic noncommunicable disease (NCD), has attained epidemic proportions worldwide. High prevalence of diabetes mellitus and diabetes-related complications is noted from various studies. In present study we aimed to estimate prevalence and severity of DR and in recently diagnosed type 2 DM patients. **Material and Methods:** Present study was conducted in patients who were recently diagnosed (less than 3 months from first diagnosis) for type 2 DM. Distant direct ophthalmoscopy, direct ophthalmoscopy and binocular indirect ophthalmoscopy were done. Data was collected, entered in Microsoft excel sheet and analysed by descriptive statistics. **Results:** In present study total 220 patients were evaluated for diabetic retinopathy. Most of patients were from 61-70 years (25%), followed by 51-60 years (21%) and 41-50 years (20%) age group. Male patients (56%) were more than female patients (44%). We noted 8% prevalence of diabetic retinopathy in study patients. Prevalence was more in males (65%) as compared to females (35%). In present study diabetic retinopathy was noted in 17 patients, divided as mild nonproliferative diabetic retinopathy (65%), Moderate nonproliferative diabetic retinopathy (18%), Severe nonproliferative diabetic retinopathy (6%) and proliferative diabetic retinopathy (PDR) (12%). Macular edema was noted in 4 patients. 50 % of them had mild macular edema while 25% each had moderate and severe macular edema. **Conclusion:** Screening for diabetic retinopathy is important for newly diagnosed diabetic patients. A systematic screening program in the community is needed for early detection and to reduce blindness in diabetic patients.

**Keywords:** diabetic retinopathy, type 2 diabetes mellitus, nonproliferative, macular edema

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## INTRODUCTION

Diabetes mellitus, a chronic metabolic noncommunicable disease (NCD), has attained epidemic proportions worldwide. As of 2015, >415 million adults have diabetes mellitus, and this number is estimated to increase to 642

million by 2040.<sup>1</sup> Diabetic retinopathy (DR) is the most frequent complication of diabetes and remains the leading cause of preventable blindness in the working-age population in developed countries.<sup>1,2</sup> DR has long been considered a microvascular complication of diabetes; however, growing evidence suggests that neurodegeneration is an early event in its pathogenesis.<sup>3</sup> The National Diabetic Retinopathy RAAB (Rapid Assessment of Avoidable Blindness) survey 2015-2019, conducted by RP Center for Ophthalmic Sciences under the aegis of the Ministry of Health and Family Welfare Govt India clearly and significantly showed the Prevalence of Diabetic Retinopathy among diabetics to be 16.9%, a reasonably high figure in a RAAB survey.<sup>4</sup> Most studies conducted in Indian populations have found a retinopathy prevalence of more than 30% in individuals of similar age and duration of disease and risk factors for developing

diabetic retinopathy were duration of diabetes mellitus and poor glycaemic control.<sup>4</sup> High prevalence of diabetes mellitus and diabetes-related complications is noted from various studies. In present study we aimed to estimate prevalence and severity of DR and in recently diagnosed type 2 DM patients.

**MATERIAL AND METHODS**

Present study was conducted in an Department of Ophthalmology, Belgaum Institute of Medical Sciences Belagavi during October 2019 to September 2020. This observational, prospective study was conducted in patients who visited the diabetic clinic and recently diagnosed (less than 3 months from first diagnosis) for type 2 DM. Institutional ethical committee approval was taken for present study.

**Inclusion criteria:** Patients who were recently diagnosed (less than 3 months from first diagnosis) for type 2 DM, willing to participate

**Exclusion criteria:**

Patients with mature cataracts and hazy media, whose fundi could not be examined.

Patients with a history of exposure to radiation, hypertensive retinopathy without DM, sickle cell disease and pheochromocytoma

Not willing to participate. Study was explained and a written informed consent was taken. Patients underwent history taking (age, sex, medical history, smoking), general physical examination and routine ophthalmological examination was done. The pupils of both eyes were dilated by using a mydriatic agent (1% Tropicamide eye drops). Distant direct ophthalmoscopy, direct ophthalmoscopy and binocular indirect ophthalmoscopy were done. Binocular indirect ophthalmoscopy was done with a 20 D lens with the patient in supine position. Findings were noted and patients were categorized according to findings; whether diabetic retinopathy was present or absent. If present, retinopathy was classified according to early treatment of diabetic retinopathy study (ETDRS) classification.<sup>5</sup> Presence of diabetic macular oedema was noted. If present, it was further classified into clinically significant (CSME) or non-significant.<sup>5</sup>

Data was collected, entered in Microsoft excel sheet and analysed by descriptive statistics.

**RESULTS**

In present study total 220 patients were evaluated for diabetic retinopathy. Most of patients were from 61-70 years (25%), followed by 51-60 years (21%) and 41-50 years (20%) age group. Male patients (56%) were more than female patients (44%). We noted 8% prevalence of diabetic retinopathy in study patients. Prevalence was more in males (65%) as compared to females (35%).

**Table 1: Age and gender distribution**

	Total (%) (N=220)	With diabetic retinopathy (%) (N=17)
Age distribution (years)		
≤ 40	22 (10%)	1 (6%)
41-50	43 (20%)	2 (12%)
51-60	46 (21%)	4 (24%)
61-70	56 (25%)	4 (24%)
71-80	37 (17%)	4 (24%)
>80	16 (7%)	2 (12%)
Total	220	17 (8%)
Gender		
Male	124 (56%)	11 (65%)
Female	96 (44%)	6 (35%)

In present study diabetic retinopathy was noted in 17 patients, divided as mild nonproliferative diabetic retinopathy (65%), Moderate nonproliferative diabetic retinopathy (18%), Severe nonproliferative diabetic retinopathy (6%) and proliferative diabetic retinopathy (PDR) (12%). Macular edema was noted in 4 patients. 50 % of them had mild macular edema while 25% each had moderate and severe macular edema.

**Table 2: diabetic retinopathy and macular edema**

	No. of patients	Percentage
DR (N=17)		
Mild NPDR	11	65%
Moderate NPDR	3	18%
Severe NPDR	1	6%
PDR	2	12%
Total	17	100%
Macular edema (N=4)		
Mild	2	50%
Moderate	1	25%
Severe	1	25%

(DR - Diabetic retinopathy, NPDR - nonproliferative diabetic retinopathy, PDR- proliferative diabetic retinopathy).

**DISCUSSION**

Proliferative diabetic retinopathy (PDR) is a treatable cause of severe visual loss in people with diabetes. If left untreated, most eyes with low-risk PDR characterized by mild to moderate retinal or optic disc neovascularization progress to high-risk PDR with increasing retinal or disc neovascularization. Risk factors for the development of retinopathy and visual loss include type of diabetes, duration of diabetes, poor glycemic control, poor blood pressure control, deranged lipid profile, obesity, obstructive sleep apnea (OSA), pregnancy and anaemia. The duration of diabetes is probably the strongest predictor for development and progression of retinopathy.<sup>4</sup> Systematic screening and timely treatment of PDR in countries with established screening programs have resulted in a decrease in the rate of blindness and the incidence of Advanced Diabetic Eye Disease (ADED) over

time.<sup>6</sup> Screening for diabetic retinopathy (DR) is still at its infancy in most low and middle-income countries (LMIC).<sup>7</sup> In the population-based Chennai Urban Rural Epidemiology (CURES) cohort, the prevalence of retinopathy in patients with self-reported diabetes mellitus was 17.6%, and very similar figures were reported by two other studies from other regions in India.<sup>8,9,10</sup> However, a referral bias among the diabetic patients who were reported to tertiary care centres could not be neglected. Because, with larger number of diabetics with higher diabetic ages reporting to the diabetic clinic, it is more likely that prevalence of complications may also be larger. Sosale A *et al.*,<sup>11</sup> studied 4600 (males 67%, females 33%) newly diagnosed patients with T2D, majority were from the age group 41-50 years (40%). 13.15% of newly detected India T2D had neuropathy 6.1% had retinopathy and 1.06% had nephropathy. Risk factors of macro vascular complication such as hypertension, obesity, and dyslipidemia were observed in 23.3%, 26%, and 27% of patients respectively. In view of this, screening must be instituted for all diabetics for complications at the time of diagnosis itself. Jammal H *et al.*,<sup>12</sup> conducted a cross-sectional study among 127 consecutive newly diagnosed (within the past 6 months) patients with T2DM, 7.9% had DR. Of those with DR, 40% already had clinically significant macular edema necessitating laser photocoagulation or intravitreal injections. Multivariate analysis revealed that age and HbA1c were significantly associated with DR. The odds of DR increased by 11% for each 1-year increase in age. For each 1% increase in HbA1c, the odds of DR increased by 43%. Fewer than one-tenth of newly diagnosed Jordanian patients with T2DM had DR, but more than one-third of these patients had significant maculopathy. Increased age and HbA1c values are associated with increased odds of DR. Similar findings were noted in present study. Hao Z *et al.*,<sup>13</sup> enrolled 947 patients in their study and were divided into two groups according to whether they were diagnosed with DR. There was no statistically significant difference between the two groups in sex, age, hypertension, DM diagnosed age, family history of diabetes, drinking history and HbA1c. BMI was significantly higher in DR patients. BMI was shown to be a related factor for DR in patients with newly diagnosed diabetes. Smoking status was also different between the two groups. When BMI was  $\geq 28$  kg/m<sup>2</sup>, heavy smoking was significantly associated with DR, and there was a negative correlation between DR and the age of diagnosis of diabetes  $\geq 60$  years. They concluded that heavy smoking was an important related factor for DR in patients with newly diagnosed diabetes mellitus when BMI was  $\geq 28$  kg/m<sup>2</sup>. Delaying the age of diabetes might prevent the occurrence of DR. In newly diagnosed T2DM subjects, DR is associated with reduced beta-cell responsiveness, resulting from beta-cell failure rather than

insulin resistance, leading to fasting and postprandial hyperglycemia and hypoinsulinemia.<sup>14</sup> The most effective way of preventing the risk of vision loss from diabetes mellitus is patient education about the need for screening for retinopathy even in the absence of any visual complaints. Therefore, early screening is strongly recommended for all newly diagnosed T2DM patients

## CONCLUSION

Screening for diabetic retinopathy is important for newly diagnosed diabetic patients. A systematic screening program in the community is needed for early detection and to reduce blindness in diabetic patients.

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