

# PREVALENCE OF ADVANCED DIABETIC EYE DISEASE AMONG DIABETIC PATIENTS IN A TERTIARY CARE HOSPITAL IN SOUTH INDIA

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## Abstract

**Introduction:** To analyze the Prevalence of advanced diabetic eye disease(ADED) among diabetic patients

**Methods:** This was a prospective cross-sectional study in a tertiary care hospital. A total of 1650 patients with a history of type 2 diabetes who visited ophthalmology department were enrolled in study after obtaining informed consent as per the declaration of Helsinki. History regarding socioeconomic status, literacy level, duration of diabetes, comorbidities, medications, HbA1c levels were analyzed. Visual acuity, Slit-lamp, fundus examination were done. Medical/surgical intervention was done to restore vision.

**Result:** A total of 1650 patients with a history of type 2 diabetes were analyzed. Among them 327 patients had fundus changes of diabetic retinopathy, hence the prevalence of DR among diabetics was 19.81%. Out of 327 patients, 53 patients had advanced diabetic eye disease and the prevalence of ADED among Diabetics was 3.20%. The mean age of the patients was 50.91+/- 9.06years. There were 42 (79.24%)males and 11 (20.7%)females.24 (45.28%)patients had vision of 6/6 - 6/60, 28 (52.83%) patients had vision 5/60-CFCF.15(28.30%) patients had PDR with vitreous hemorrhage.12 patients (22.64%) had PDR with subhyaloid hemorrhage,11 patients (20.75%) had PDR with FVP sparing macula,13 patients(24.52%) had PDR with FVP involving the macula,2 patients(3.77 %) had PDR with Neovascular glaucoma.34 patients (64.15%) underwent PRP,19 patients (35.84 %) needed surgical intervention.

**Conclusion:** This study shows that the prevalence of diabetic retinopathy among diabetic patients was 19.81%. The prevalence of Advanced Diabetic Eye Disease among diabetic patients was 3.2%. Hence Effective implementation of primary, secondary and tertiary prevention strategies has the potential to significantly reduce blindness due to DR.

**Keywords:** ADED- Advanced Diabetic Eye Disease, DR-Diabetic retinopathy, PDR- Proliferative diabetic retinopathy, VH-Vitreous hemorrhage, FVP-fibrovascular proliferation, HbA1c-Glycated hemoglobin.

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## INTRODUCTION

Diabetic retinopathy (DR) is a vascular disorder affecting the microvasculature of the retina. It has been found that diabetes mellitus affects 4 percent of the world's population, almost half of whom have some changes of DR at any given time.<sup>1</sup>

In India diabetic retinopathy is an important cause of visual disability. But this can be prevented and treated if detected early. If managed with timely intervention, the quality of life and the vision can be preserved. This study aims at providing an overview of prevalence and visual disability caused by advanced diabetic eye disease in the Indian scenario.<sup>2</sup>

Diabetic retinopathy is a progressive microvascular complication of diabetes. On funduscopy microaneurysms, cotton wool spots (CWS), hemorrhages, venous caliber abnormalities, intraretinal microvascular abnormalities (IRMAs), neovascularization of disc (NVD), neovascularisation elsewhere (NVE) are the features of Proliferative Diabetic Retinopathy. Uncontrolled glycemic status leads to advanced diabetic retinopathy (ADED) which is characterized by non resolving vitreous hemorrhage, fibrovascular proliferation, tractional retinal detachment, rubeosis iridis and gradually progresses and leads to irreversible blindness.<sup>3</sup>

The prevalence of DR varies in type 1 and type 2 diabetes. In EURODIAB IDDM complications study, the prevalence of DR ranged between 25-60 percent.<sup>4</sup> In India, there is a paucity of data on the prevalence of DR in type 1 diabetes mellitus, as a registry for the prevalence of type 1 diabetes is only recently being set up in the country. An earlier study done in a clinic-based population reported an overall prevalence of 14 percent.

Asian Young Diabetes Research (ASDIAB) Study, reported the prevalence of DR in 724 young diabetic subjects of age 12-40 yr with the duration of diabetes < 12 months in 7 centers of four Asian countries. They noted that DR prevalence was least among Indians (5.3%) as compared to other ethnic groups.<sup>5</sup> Lack of symptoms and the insidious onset

of type 2 diabetes may result in the development of DR at an early stage.<sup>6</sup>

Dandona et al found that multiple risk factors including duration of diabetes, more age, gender, poor glycemic control, hypertension, hyperlipidemia, anaemia, nephropathy, socioeconomic status, and family history of DM are significantly associated with the development and progression of Diabetes retinopathy (DR).<sup>7</sup>

## METHODS

This was a prospective cross-sectional study conducted at a tertiary care hospital. A total of 1650 patients with a history of type 2 diabetes who visited the ophthalmology department were enrolled in the study. The study period was from March 2019 to February 2020 for 12 months. Among them, 327 patients had fundus changes of diabetic retinopathy of various grades including non-proliferative and proliferative diabetic retinopathy. Out of 327 patients, 53 patients had advanced diabetic eye disease at presentation. The study adhered to the tenets of the Declaration of Helsinki and written informed consent was obtained from all the patients.

Patients with type 2 diabetes mellitus with proliferative diabetic retinopathy with NVD, NVE, subhyaloid hemorrhage, vitreous hemorrhage, Patients with severe vision-threatening proliferative diabetic retinopathy, fibrovascular proliferation with tractional retinal detachments were included in the study as advanced diabetic eye disease. History regarding demographic details including occupation, socioeconomic status, literacy level, duration of diabetes, medications, HbA1c levels at presentation was analyzed. Visual acuity was recorded using Snellen's visual chart. Slit-lamp examination of Anterior segment, Fundus examination was done for all patients using indirect ophthalmoscopy.

Patients with proliferative diabetic retinopathy with NVD, NVE, subhyaloid hemorrhage underwent emergency Pan retinal photocoagulation to prevent further progression of diabetic retinopathy and preserve vision.

Patients with severe vision-threatening proliferative diabetic retinopathy were advised urgent referral to a vitreoretinal surgeon for pars plana vitrectomy with endolaser a, membrane peeling, fluid air exchange, and silicon oil implantation.

## RESULTS

A total of 1650 patients with a history of type 2 diabetes were analyzed. Among them, 327 patients had fundus changes of diabetic retinopathy of various grades including non-proliferative and proliferative diabetic retinopathy. Out of 327 patients, 53 patients had advanced diabetic eye disease at presentation. The mean age of the patients was 50.03+/- years. There were 42 (79.24%) males and 11 (20.7%) female patients.

In our study, we found that 29 patients (54.71%) are of the age group 51-60 years. Out of which 42 were males, 11 were females. Twenty-two patients (41.50%) had a duration of diabetes of more than 10 years. 18 patients (33.96%) were on oral hypoglycemic drugs. 35 patients (66.03%) were on insulin. 33 patients had (62.26%) HbA1C level of 8.1-10.60% of the patients had hypertension and 30.18% patients had dyslipidemia, 28.30% patients had Chronic kidney disease, 11.32% patients had Ischemic heart disease, 3.77% patients had a stroke.

Thirty patients (56.60%) belonged to Middle-income Socioeconomic status. 58.49 percent of patients were hailing from the urban background, 41.50% were from the rural background. All the above patient demographic details are shown in table 1.

Table 1. Age distribution and Demographic details of patients

Age in years	Number( n)	Percentage (%)
30-40	6	11.32
41-50	16	30.18
51-60	29	54.71
>60	2	3.77
Duration of diabetes	Number(n)	Percentage(%)
0-5	10	18.86
06-Oct	21	39.62
>10	22	41.50
Hypoglycemic medications		
Oral hypoglycemic drugs	18	33.96
Insulin	35	66.03
HbA1C level		
06-Aug	6	11.32
8.1- 10	33	62.26
>10	14	26.41
Systemic co-morbidities		
Hypertension	32	60.37
Dyslipidemia	16	30.18
Chronic kidney disease	15	28.30
Ischemic heart disease	6	11.32
Stroke	2	3.77
Socioeconomic status		
High income	13	24.52
Middle income	30	56.60
Low income	10	18.86
Education level		
Primary education	3	5.66
Secondary education	27	50.94
Graduation and above	23	43.39
Place of residence		
Urban	31	58.49
Rural	22	41.50

Twenty four(45.28%)patients had a vision of 6/6 - 6/60, 28 (52.83%)of patients had vision 5/60-counting fingers close to face, One patient (1.88%) had Perception of light at presentation.36(67.92%)patients had immature cataract,17(32.07%) patients had undergone previous cataract surgery as shown in table 2.

Table 2 **Visual acuity and Lens status**

Visual acuity	Number(n)	Percentage(%)
6/6-6/60	24	45.28
5/60- CFCF	28	52.83
Perception of light	1	1.88
Lens status		
Phakia	36	67.92
Pseudophakia	17	32.07

In our study 15 (28.30%) patients had PDR with vitreous hemorrhage. Twelve patients (22.64%) had PDR with subhyaloid hemorrhage, 11 patients (20.75%) had PDR with FVP sparing the macula, 13 patients had (24.52%) had PDR with FVP involving the macula 2 patients had (3.77 %) had PDR with Neovascular glaucoma. Regarding the treatment 34 patients (64.15%) underwent Pan retinal photocoagulation, 19 patients (35.84 %) needed the surgical intervention Pars plana Vitrectomy. The

details of diagnosis and treatment are as shown in table 3 and shown in figure 1.

Table 3 **Diagnosis and Treatment**

Diagnosis	Number(n)	Percentage(%)
PDR with vitreous hemorrhage(VH)	15	28.30
PDR with subhyaloid hemorrhage	12	22.64
PDR with FVP sparing the macula	11	20.75
PDR with FVP involving the macula	13	24.52
PDR with Neovascular glaucoma(NVG)	2	3.77
Treatment		
Panretinal photocoagulation(PRP)	34	64.15
Pars plana Vitrectomy(PPV)	19	35.84

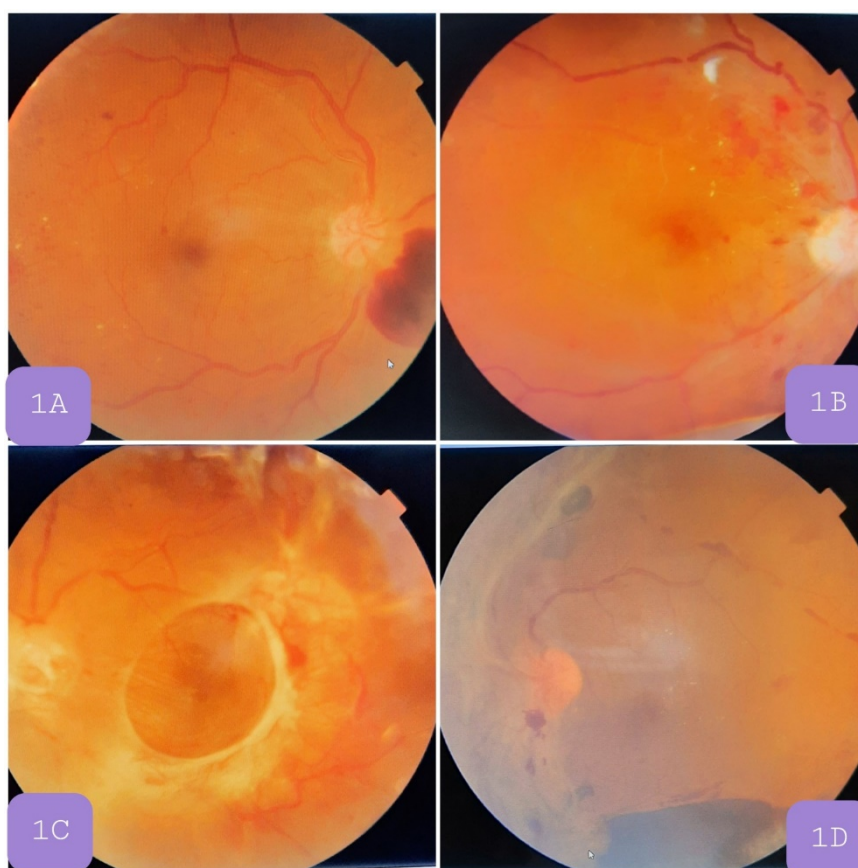


Figure 1 **1A: PDR with NVD and subhyaloid hemorrhage 1 B: PDR with NVE, NVD 1 C: PDR with extensive FVP, TRD involving the macula 1 D: PDR with FVP sparing macula with subhyaloid hemorrhage**

## DISCUSSION

Diabetes mellitus is one of the leading causes of avoidable blindness. Diabetes is a multi-factorial disease. Awareness of factors affecting the incidence and the severity of diabetic retinopathy is useful for preventing blindness and other micro-vascular complications of Diabetes mellitus. Screening of diabetic patients and advising on the regular follow-up to monitor the progression of diabetic retinopathy is of crucial in preventing advanced diabetic eye disease.

In this study, we found that 29 patients (54.71%) are of the age group 51-60 years. Out of which 42 were males, 11 were females. Gadkari et al reported that Among these, 61.2% were males. About 88.6% of those screened were between 40 and 80 years of age.<sup>8</sup>

We found that Twenty two patients (41.50 %) had a duration of diabetes of more than 10 years. Mehta et al found that when the duration of diabetes exceeded 10 years, the higher number of subjects (66.10%) had PDR. Bhutia et al reported the duration of diabetes was seen to be highest in 72 patients (> 20 years)<sup>9</sup>

In our study, we found that 18 patients (33.96 %) were on oral hypoglycemic drugs. 35 patients (66.03%) were on insulin. Raman et al reported that use of insulin (OR, 3.52; 95% CI, 2.05–6.02); longer duration of diabetes (>15 years; OR, 6.43; 95% CI, 3.18–12.90); and subjects with known diabetes mellitus (OR, 2.98; 95% CI, 1.72–5.17) had higher prevalence of DR.

We found that Thirty patients (56.60 %) belonged to Middle-income Socioeconomic status. 58.49 % of patients were hailing from the urban background, 41.50 % were from the rural background. Raman et al found that differences in socioeconomic status did not influence the occurrence of diabetic retinopathy.<sup>10</sup>

We found that 33 patients had (62.26 %) HbA1C levels of 8.1- 10. There is higher prevalence of ADED

in patients with poor glycemic control ( HbA1C > 7%). A study done by Shahi et al reported that having good glycemic control (HbA1c < 7%) had a lower prevalence of diabetic retinopathy (23.4%) as compared to those having poor control (HbA1c > 7%) (76.6%). The percentage increased to as high as 93.1% chances of having diabetic retinopathy if the HbA1c levels are above 8.5 % indicating a poor control of diabetes and more severe microvascular complications.<sup>11</sup>

We found that 60% of the patients had hypertension and 30.18 % of patients had dyslipidemia, 28.30 % patients had Chronic kidney disease, 11.32 % patients had Ischemic Heart Disease, 3.77% patients had a stroke. Karishma et al reported that hypertension was the most common comorbidity followed by heart disease, thyroid disease, neuropathy.<sup>12</sup>

We reported that 12 patients (22.64%) had PDR with sub hyaloid hemorrhage, 11 patients (20.75%) had PDR with FVP sparing the macula, 13 patients had (24.52%) had PDR with FVP involving the macula 2 patients had (3.77 %) had PDR with Neovascular glaucoma. Raman et al reported that 12 patients had ADED, 7 of them had retinal detachment, 4 of them had severe maculopathy with blindness and 1 had vitreous hemorrhage.<sup>10</sup>

We found that 24 (45.28%) patients had a vision of 6/6 -6/60, 28 (52.83%) patients had vision of 5/60- CFCF, 1 (1.88%) of patients had Perception of light. 15 (28.30%) of patients had PDR with vitreous hemorrhage. Khan et al reported that out of the 645 (73.5%), 356 (55.1%) had VA of 6/12 or better while 199 (30.8%) and 90 (13.9%) eyes had VA of worse than 6/12 and better than 6/60 and 6/60 or worse respectively. Almost 3/4th (75.8%) eyes in the persistent PDR group had VA < 6/12 as against 45% in the stable treated group (p = <0.0001).<sup>13</sup>

In a study done by Tien Yin Wong et al, they found the following reasons for the increase in the prevalence of diabetic retinopathy. Lack of awareness of DR among patients, treating

government, and then integrating these plans into national diabetes strategies.

Planning for services to be provided at primary/secondary/tertiary-level health care facilities

Table 4.

Primary prevention	Secondary prevention	Tertiary prevention
<ol style="list-style-type: none"> <li>1. Improve awareness of diabetic retinopathy to the patients and primary physician</li> <li>2. Lifestyle changes to control the body mass index and glycemic status.</li> <li>3. Medications to control risk factors like hypertension, dyslipidemia</li> <li>4. Systematic screening for early detection of DR</li> <li>5. Establishing a DR eye unit, training eye care professionals, screening for DR</li> </ol>	<ol style="list-style-type: none"> <li>1. Regular screening to monitor for progression of DR- periodic fundus examination and appropriate referral from medicine, endocrinology, nephrology, cardiology departments to ophthalmology to monitor diabetic retinopathy progression.</li> <li>2. To form the Guidelines for managing DR and preserve vision by the appropriate timely intervention</li> <li>3. comprehensive diabetic workup including an endocrinologist, ophthalmologist, cardiologist, nephrologist, vascular surgeons to be made available for the patients to prevent systemic and ocular complications of diabetes.</li> </ol>	<ol style="list-style-type: none"> <li>1. Medical management-               <ol style="list-style-type: none"> <li>a. Retinal lasers- Pan retinal photocoagulation (PRP)</li> <li>b. Intravitreal Anti-VEGF injections- Ranibizumab</li> <li>c. Intravitreal steroids- Triamcinolone acetate, Dexamethasone implant</li> </ol> </li> <li>2. Surgical intervention- Pars plana vitrectomy with endolaser and silicon oil implantation</li> </ol>

physicians, Lack of compliance with regular eye checkups, Lack of communication between primary care physicians and ophthalmologists regarding patients' ocular findings, efficient referral practices, Limited access to DR screening<sup>14</sup>. Hence the following solutions were formulated to overcome the challenges in DR.

Integrating eye care into routine diabetes care/primary care and integrating DR policies, guidelines, and training into all relevant national health policies and guidelines. Promote surveillance and research for assessing the burden of DR, population needs, and evaluating the cost-effectiveness of interventions, particularly in low- and middle-income countries. Developing national action plans for addressing DR in consultation with relevant stakeholders across diabetic and eye health care, patients, the private sector, and provincial

as shown in table 4.

## CONCLUSION

DR is a global epidemic that accounts for visual disability if not treated on time. The prevalence of diabetic retinopathy among diabetic patients was 19.81%. The prevalence of Advanced Diabetic Eye Disease among diabetic patients was 3.2%. Hence Effective implementation of primary, secondary and tertiary prevention strategies has the potential to significantly reduce blindness due to DR.

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