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## Observational study on ocular manifestations in type 2 diabetes patients attending the ophthalmology department, at RVM hospital, South India

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### Abstract

**Introduction:** India is infamously known as the Diabetes capital of the world. The national wide prevalence of diabetes in India now is 9%. By 2030, India will have 100 million people with type 2 Diabetes.

**Methodology:** Cross sectional observational study, Study was conducted in ophthalmology department at RVM Hospital, Siddipet District, and Telangana State. The study was conducted in April 2018 to December 2019. The Sample Size is 300.

**Results:** 188(63%) were males and 112(37%) are females. Among both sexes, age groups between 51 to 60 years had maximum number of patients (34%). 33 patients had some lid lesions, out of which 12 had styel followed by 10 had Xanthelasma. Conjunctival lesions found were pterygium 13(4.33%) and conjunctivitis 6(2%). 6 patients had corneal ulceration (2%), 3 had reduced corneal sensation (1.0%) while 1 patient had perforation (0.33%). 11.5% people are affected by mild NPDR within 5 years, which increases significantly to 26.6% in 10 years.

**Conclusion:** Thus both prevalence and severity of retinopathy correlates with HbA1C levels in this study group. The most common type of cataract found was cortical type (39.13%) followed by senile posterior cortical cataract (32.60%). In general, the visual prognosis following cataract surgery in diabetic patients is favourable. The prevalence of Primary open angle glaucoma was 2.33% and 2.0% had neo-vascular glaucoma. Diabetes predisposes to infection in different body parts, and ocular structures are not an exception.

**Keywords:** Diabetes, retinopathy, cataract, conjunctiva, glaucoma

### Introduction

The global prevalence of diabetes in 2019 is estimated to be 9.3% (463 million), rising to 10.2% (578 million) by 2030 and 10.9% (700 million) by 2045. Most of these patients are classified as having type 2 diabetes mellitus and the metabolic syndrome. Most of the increase in total number of diabetic patients is expected to occur in developing countries [1]. Changing dietary and exercise trends to play a major role in the increasing prevalence of diabetes mellitus. India is infamously known as the Diabetes capital of the world. The national wide prevalence of diabetes in India now is 9%. By 2030, India will have 100 million people with type 2 Diabetes [2]. Diabetes Mellitus being a lifestyle disease, is on the rise in urban areas, Shankar Nethralaya reported that the prevalence of Diabetes Mellitus in the population older than 40 years, in urban India was around 28% in 2014. Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation. Diabetic retinopathy is the most well-known ocular complication of diabetes and the leading cause of blindness among the people 20-60 years of age in the U.S. A Meta- analysis by Yau JY [3] provides a global estimate of the prevalence of DR and the severe stages of DR (PDR, DME) using individual- level data from population based studies worldwide. On the basis of the data from all 35 studies on more than 20,000 participants with diabetes, they estimated that among individuals with diabetes, the overall prevalence of any DR was 34.6%, PDR was 7.0%, DME was 6.8%, and VTDR was 10.2%. The prevalence of DR in the Chennai Urban Rural Epidemiology (CURES) Eye Study in south India was 17.6%, significantly lower than age- matched western counterparts [4]. It is also one of the most common causes of blindness in India (NPCB). The causes are cataract, refractive errors, glaucoma, age-related macular degeneration, trachoma, childhood blindness and diabetic retinopathy.

### Aims & Objectives

1. To determine the common ocular manifestations in Diabetes
2. To determine Ocular manifestations relating to Duration of Diabetes and Severity of the Diabetes

**Methodology:** Cross sectional observational study, Study was conducted in ophthalmology department at RVM Hospital, Siddipet District, and Telangana State. The study was conducted in April 2018 to December 2019. The Sample Size is 300.

**Inclusion Criteria:** A patient who has been diagnosed type 2 diabetes mellitus, b. patients more than 30 years of age.

**Exclusion Criteria:** a) Patient with type 1 diabetes b) Patients with known eye disease c) Patients with hypertension d) Patients who has undergone treatment earlier for any form of diabetic eye disease. All subjects were interviewed as per semi-structured questionnaire and complete examination was done.

### Results

This study was conducted on 300 patients of type 2 diabetes attending ophthalmology department.

**Table 1:** Age and Sex distribution among the study participants

Age in years	Males	Females	Total
31-40	9	6	15
41-50	39	30	69
51-60	70	42	112
61-70	46	26	72
71-80	25	8	33
Total	188	112	300

188(63%) were males and 112(37%) are females. Among both sexes, age groups between 51 to 60 years had maximum number of patients (34%).

**Table 2:** Distribution of patients according to type of lid lesion among the study participants

Type of lid lesion	No of patients	Percentage (%)
Stye	12	4.0%
Xanthelasma	10	3.33%
Blepharitis	9	3.0%
Recurrent chalazion	2	0.7%
Total	33	11.0%

**Table 7:** Distribution of retinopathy among the study participants

Retinopathy types	No of patients	Percentage
Mild NPDR	24	24.5
Moderate NPDR	41	42.2
Severe NPDR	18	18.5
TOTAL NPDR	83	86
PDR	14	13.8
Total retinopathies	97	100

108 patients were affected by some form of retinopathies (36%) making it the most common pathological condition found in the study population 93(31%) of them had NPDR

33 patients had some lid lesions, out of which 12 had stye followed by 10 had Xanthelasma.

**Table 3:** Distribution of conjunctival lesions among the study participants

Conjunctival Lesions	No of Patients	Percentage (%)
Pterygium	13	4.33%
Conjunctivitis	06	2.0%

Conjunctival lesions found were pterygium 13(4.33%) and conjunctivitis 6(2%)

**Table 4:** Distribution of corneal lesions among the study participants

Corneal Lesions	No of Patients	Percentage
Reduced corneal sensation	3	1.0%
Ulceration	6	2.0%
Perforation	1	0.33%
Total	10	3.03%

6 patients had corneal ulceration (2%), 3 had reduced corneal sensation (1.0%) while 1 patient had perforation (0.33%)

**Table 5:** Distribution of cataract among the study participants

Type of cataract	No of patients	Percentage
Cortical	36	39.13%
Nuclear	20	21.73%
Posterior cortical	30	32.62%
Snow flake	3	3.26%
Mature cataract	3	3.26%
Total	92	100%

92 of total patients presented with cataract (30.66%) and it is the most common mode of ocular diabetes in our study. Most common variant found was cortical: 36 of them (39.13%) in the study which is more prevalent than the posterior cortical (32.62%)

**Table 6:** Distribution of glaucoma among the study participants

Type of Glaucoma	No of patients	Percentage
POAG	7	2.33%
Neo-vascular	6	2.0%
Total	13	4.33%

7 (2.33%) were diagnosed with POAG, 6 (2.0%) had Neo-vascular glaucoma

and 15(5%) of them PDR. Among NPDR group, 27 had mild NPDR (25%), 46 were moderate NPDR (42.5%) and 20 had severe NPDR (18.5%)

**Table 8:** Co-relation between duration of diabetes and type of retinopathy

Diagnosis		Duration Of Diabetes			
		0-5	6-10	>10	Total
Mild NPDR	Frequency	5	7	12	24
	Percentage	11.6	22.5	22.6	18.8
Moderate NPDR	Frequency	09	12	20	41
	Percentage	20.9	38.7	37.7	32.2
Severe NPDR	Frequency	11	4	3	18
	Percentage	25.5	12.9	5.6	14.17
PDR	Frequency	1	4	9	14
	Percentage	2.3	12.9	16.9	11.02
CSME	Frequency	6	1	8	15
	Percentage	13.9	3.2	15.9	11.8
Others	Frequency	11	3	1	15
	Percentage	25.5	9.09	1.8	11.8
Total		43	31	53	127

11.5% people are affected by mild NPDR within 5 years, which increases significantly to 26.6% in 10 years.

**Table 9:** Co-relation among HbA1C levels and prevalence of retinopathy

HbA1C	No of Patients	Mild NDPR	Moderate NDPR	Severe NDPR	PDR	Total
6-7%	213	20(83.3)	5(12.1)	1(5.5)	0(0)	26(26.8)
7-8%	60	02(8.3)	28(68.2)	04(22.2)	7(50)	41(42.2)
>8%	27	02(8.3)	08(19.5)	13(72.2)	7(50)	30(30.9)
Total	300	24(100)	41(100)	18(100)	14(100)	97(100)

In this study, it observed that mild NPDR (85.1%) is found at lower levels of HbA1C, Mod NPDR (69.5%) is most prevalent between 7-8% of HbA1C and Severe (75%) NPDR is most common at >8% of HbA1C levels.

**Table 10:** Overall prevalence of ocular manifestations observed among the study participants

Sr.no	Ocular morbidity	No. Of patients	Percentage
1.	Lids	33	11%
2.	Conjunctiva	19	6.33%
3.	Cornea	10	3.33%
4.	Glaucoma	13	4.33%
5.	Lens	92	30.66%
6.	Retina	108	36%

It was observed from this study that retinal manifestations are more (36%) followed by the lens (30.66%) and least effected would be cornea (3.33%)

## Discussion

300 Diabetic patients were studied, and the common age group of the patients were found to be in the age group of 51-60 years. All the patients were above 30 years. There were 188 males 112 females in the study group. The average age of the patient was 55 for males, 56 for females. Average duration of diabetes was 6.4years in males, 7.3 years in females; the observed results are similar with the Wisconsin epidemiologic study of diabetic retinopathy [5].

In the present study we found retinal lesions were most common ocular complication occurring in diabetes, of which retinopathies of all kind constituted majority of them. The prevalence of cataract was 30.66%, followed by Glaucoma (4.33%) and other ocular pathologies like conjunctivitis, recurrent styes, dacryocystitis, etc. these

results are similar with StanzPE, which reported that retinopathy is most common ocular complication of long standing diabetes mellitus followed by other lesions like cataract, uveitis, etc.

This study confirms that diabetic retinopathy in its various forms is the most common complication of diabetic eye disease in India. Different eye lid lesions were noted in our study such as recurrent stye (4%), xanthelasma (3.33%), blepharitis (3%), recurrent chalazion (0.7%). Xanthelasma are rare in the general population. Variable incidence of 0.56-1.5% has been reported from the western developed nations. The incidence in our study is 3.33%, which is explained by the fact that xanthelasma is a cutaneous marker for underlying diabetes and dyslipidemia. Diabetes predisposes to infection in different body parts, and ocular structures are not any different from it. Thus recurrent styes (4%), blepharitis, conjunctivitis, dacryocystitis can be explained in group of our patients, these findings are supported by study conducted by Kruse [6], which reported that diabetes is a risk factor for acute infectious conjunctivitis, with an Odds Ratio (OD) of 1.24 in diabetics. There were 13 patients with Pterygium in our study group, in which males have 4.33% prevalence, this results are in contrast with two different studies reported, one by Asokan, (Chennai group, 2012) and Hua Zhong (study of adult Chinese population) have statistically found out no association between prevalence of pterygium and diabetes. There were 6 patients presenting with corneal ulcer of which 5 were bacterial type and 1 was non-healing. There was 1 patient presenting with corneal perforation. This signifies the need for appropriate microbiological diagnosis of microbial corneal ulceration in order to provide prompt and effective medical remedy and to avoid empirical treatment. Nielsen found that the prevalence rate of primary open glaucoma and ocular hypertension was 6.0% and 3.0% respectively in diabetes type 2 patients. Neovascular glaucoma occurred in 2.3% of all diabetics. In our study, 7 patients (2.33%) were POAG and 6 patients (2%) presented with neo-vascular glaucoma. Thus the prevalence is similar in both studies.

Persons with diabetes mellitus have been found to be at increased risk of developing cataracts when compared with non-diabetic persons. The report by lein [7] describes the study of characteristics which may be related to this problem in a population-based sample of diabetic persons. Nearly two thirds of the Indian diabetic population showed evidence of cataract; mixed cataracts were more common than the monotypes ones in a recent study by Shankar Nethralaya 30.66% of our study population had cataract which is lesser than the Shankar Nethralaya group. The most common type of cataract was cortical type (39.13%). Nearly two thirds of Indian diabetic population showed evidence of cataract 30.66% of our study population had cataract. The most common type of cataract found was cortical type (39.1%) followed by posterior cortical cataract (30%) followed by senile posterior cortical (32.60%). Cataracts may be reversible in young diabetics with improvement in metabolic control.

In Indian scenario, JS Jain *et al.* at PGI Chandigarh diabetic clinic reported retinopathy prevalence rate of 42.9%. Two other south Indian studies have shown prevalence rate of 34.1% and 37% respectively. Andhra Pradesh Eye disease study (APEDS) the prevalence rate for DR is 26.2%. The prevalence in the AIOS study was 21.27%. The prevalence

of retinopathy in our study population is 36% of which NPDR is 31% and PDR is 5%. Studies have reported that the prevalence of diabetic retinopathy in India varies from 20 to 31%. The prevalence of any DR in those with Type 2 diabetes was 30.3% according to the UK National diabetic retinopathy screening service. Among US population, the estimated crude prevalence of DR among persons with DM was high, with an overall crude prevalence of 40.3%.

The Aravind Eye Disease Survey in southern India reported a retinopathy prevalence of 27% in a population aged 30 yrs. or older with self-reported diabetes, similar to the 22% prevalence reported from another population based study in an urban population in Hyderabad, India. The prevalence of DR in Chennai Urban Rural Epidemiology (CURES) Eye Study in south India was 17.6%, significantly lower than age matched western counter parts. Thus in this study higher prevalence of retinopathies than other Indian studies.

In the present study, the prevalence of proliferative retinopathy was 2.3% for those with diabetes duration of 5 years, increasing to 16.9% for 10 years. In our study, the prevalence of NPDR varied from 57% in persons who had diabetes for less than five years to 67% in persons who had diabetes for 5 to 10 or, more years and 68.1% in more than 10 years. Increased incidence of CSME was noted as the duration of diabetes increased (13.9% to 15.9% over the same duration intervals of diabetes). Similar increased incidence of CSME with increased duration of diabetes was noted in a study conducted by Varma. The findings are consistent with the fact that the strongest predictor for the prevalence of retinopathy in persons with type 2 diabetes is duration of diabetes which was proven statistically significant (p-value<0.002).

### Conclusion

According to this study, Retinal lesions (like Retinopathies, CSME, BRVO, ARMD and RD) were the most common ocular complication occurring in diabetes subjects (36%). The prevalence of retinopathy in our study population was 36%. Of which NPDR were 31% and PDR 5%. This study shows a higher prevalence of retinopathies than other Indian studies. The prevalence of NPDR was significantly higher in female diabetes patients (62.6%) than in male diabetic patients (58.5%). The prevalence of NPDR varied from 57% in persons who had Diabetes for to 10 or more years and 68.1% in more than 10 years. 26.8% of diabetic patients with HbA1C between 6-7% had some form of DR, while the prevalence rises further with HbA1C of 7-8% and >8%. It is also seen that mild NPDR is found clustering at lower levels of HbA1C (<7%), moderate NPDR is most prevalent between 7-8% of HbA1C levels and Severe NPDR is most prevalent at > 8% levels. Thus both prevalence and severity of retinopathy correlates with HbA1C levels in our study group. The most common type of cataract found was cortical type (39.13%) followed by senile posterior cortical cataract (32.60%). In general, the visual prognosis following cataract surgery in diabetic patients is favorable. The prevalence of Primary open angle glaucoma was 2.33% and 2.0% had neo-vascular glaucoma. Diabetes predisposes to infection in different body parts, and ocular structures are not an exception.

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