

## Prevalence of Ocular Morbidities in Patients with Diabetes Mellitus in a Tertiary Care Hospital

Dr. Vasuki G<sup>1</sup>, Dr. Beena R<sup>2</sup>

<sup>1</sup>Assistant Professor, Dept of Physiology, Kanyakumari Govt Medical College, Asaripallam,  
Dr. MGR Medical University, Chennai/ India

<sup>2</sup>Assistant Professor, Dept of Ophthalmology, Kanyakumari Govt Medical College, Asaripallam,  
Dr. MGR Medical University, Chennai/ India

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### Abstract

**Background:** Diabetes mellitus is the most common lifestyle disorder and endocrine disease in the world. Diabetes related microvascular complications affect the visual system and cause visual disability even in younger age groups. Preventing the ocular complications is considered the best approach to preserve vision.

**Aim and objective:** Assessment of the prevalence of different ocular manifestations in diabetes mellitus. To create awareness about avoidable blindness in diabetic patients and to direct the patient towards further evaluation and follow up.

**Materials and Methods:** The study is a hospital-based, non-interventional, cross-sectional prospective study. The ocular disorders are evaluated in 500 patients attending Ophthalmology out patient department of Kanyakumari govt medical college hospital. Estimation of visual acuity, anterior segment examination, slit lamp examination, intraocular pressure, retinoscopy & fundus examination, visual field analysis, gonioscopy are done to detail the defective vision.

**Results analysis:** Data is analysed using SPSS. The common pathological changes in the visual apparatus causing defective vision are diabetic retinopathy- 94 patients (18.8%), Glaucoma- 34(6.8%), Cataract- 380(76%). Other ocular manifestations include episcleritis, keratitis, uveitis, choroidal and vitreoretinal changes, mononeuropathy. The common associated systemic disease is hypertension- 210 patients (42%).

**Conclusion:** Diabetic retinopathy, Glaucoma and Cataract are the most common manifestations of diabetes mellitus. Patients having cataract can be well managed by cataract extraction techniques. Prime importance is to diagnose the early changes of retinopathy and Glaucoma. A thorough ocular examination (anterior and posterior segment) following a standard protocol is a must, to prevent vision threatening complications of diabetes mellitus.

**Keywords:** Diabetes Mellitus, Diabetic Retinopathy, Glaucoma, Cataract

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### I. Introduction

Diabetes mellitus is one of the leading non communicable public health problems of the present era. Recent studies from WHO indicate that 19% of world's diabetic population lives in India. There was an estimated 19.4 million diabetes individuals in 1995 which is projected to increase to nearly 80 million in 2030.<sup>1</sup> The metabolic dysregulation associated with diabetes causes secondary pathophysiologic changes in all the structures of the visual apparatus. The complications associated are retinopathy, retinal vascular occlusions, glaucoma, extraocular muscle palsy and cataract.

Diabetic eye disease is the commonest cause of blindness in people of working age group. The impact of the disease can be profound and includes difficulty with employment, mobility, ability to drive and social isolation. Therefore the task of preventive care with stress management to avoid ocular complications and ensure quality vision can be demanding in this life style disorder.

India has been the first country in the world to initiate a public funded program for the control of blindness as a national priority health problem. With the launch of 'Vision 2020' global initiative, the focus has shifted to all causes of avoidable blindness rather than to cataract and rapid assessment have been expanded to include all causes of avoidable blindness.<sup>2</sup> Efforts should be made to recognize and treat those affected, at an early stage, for the benefit of the individual and the society. With this view, this study has been undertaken.

### II. Materials and methods

Study design - The present study is a hospital-based, non-interventional, cross-sectional prospective study. The study population consists of 500 diabetic patients attending Ophthalmology out patient department in Kanyakumari Govt Medical College Hospital. Informed consent is obtained from all the selected individuals, who fit into the criteria. By way of providing proforma, the required data is collected.

Inclusion criteria- 500 diabetic patients in the age group 30–70 years.

Exclusion criteria- Patients with acute injury to eye, Secondary causes of glaucoma, Lens induced complications, Previous surgeries like keratoplasty or RD surgery

**Ophthalmic examination:**

Visual acuity testing– The presenting distant visual acuity for both eyes is measured separately using a standard Snellen’s chart properly illuminated at a distance of 6m. Each participant had an anterior segment examination, using a torch, to detect the signs of conjunctival and corneal diseases. Slit lamp examination of cornea was done to determine the position, depth and site of corneal abnormality and lens opacities .

Recording of intraocular pressure– Schiottz indentation tonometer was used to record the intraocular pressure of the anaesthetized cornea. Visual field analysis-- done using automated static perimeter ( for selected cases) Retinoscopy was performed after pupillary dilatation to elicit the refractive status of the eye. Fundus examination was carried out using direct ophthalmoscope. Gonioscopy– to determine the type of angle in the anterior chamber of the eye ( selected cases)

**The following definitions are used for the study :**

- 1.Glaucoma: An intraocular pressure of more than 21 mm Hg associated with optic disc cupping and / or visual field defects.
- 2.Cataract: was defined as the presence of lens opacity of such magnitude as to cause a corrected visual acuity of <6/18
- 3.Diabetic Retinopathy is classified according to the Early Treatment of Diabetic Retinopathy Study (ETDRS) criteria. It is classified into non-proliferative (NPDR) and proliferative diabetic retinopathy (PDR). NPDR is further subdivided into mild, moderate, and severe. Diabetic macular edeme is classified into clinically significant and clinically non significant.

All the participants of this study had the following tests done. Estimation of blood sugar and serum cholesterol- blood samples are collected and sent to the Biochemical laboratory, Kanyakumari Govt Medical College Hospital and the reports collected.

**III. Results Analysis**

**Table – 1:** Distribution of subjects by age and sex

Age group (years)	Male	Female	Total
30- 40	15	30	45
41-50	53	42	95
51-60	86	84	170
61-70	112	78	190
Total	266	234	500

Among 500 diabetic patients examined, 266 are men and 234 are women.

**Table – 2:** Association of ocular diseases in diabetic patients

Ocular disease	30 – 40 years	41 – 50 years	51 – 60 years	61 -70 years	Total	Percentage
Episcleritis	1	2	3	-	6	1.2
Keratitis	1	-	-	-	1	0.2
Uveitis	3	1	-	-	4	0.8
Glaucoma	-	3	21	10	34	6.8
Cataract	5	62	138	175	380	76
Refractive errors	11	24	28	15	78	15.6
Vitreous	-	-	5	5	10	2
Chorioretinal	7	27	46	55	135	27
Mononeuropathy	-	1	2	2	5	1

The most common ocular manifestation in diabetic patients was cataract, followed by chorioretinal lesions, refractive errors and glaucoma. The least common presentation was keratitis.

**Table – 3:** Distribution of glaucoma and cataract among various age groups

Age group	Glaucoma				Cataract					
	Primary	Secondary	Total	%	Cortical	Nuclear	PCIOL RE/LE	PCIOL BE	Total	%
30-40	-	-	-	0	5	-	-	-	5	1
41-50	3	-	3	0.6	30	12	10	10	62	12.4

51-60	20	1	21	42	49	57	20	12	138	27.6
61-70	7	3	10	2	61	67	35	12	175	35
Total	30	4	34	6.8	145	136	65	34	380	76

Among 34 subjects with glaucoma, 30 of them had primary glaucoma, 4 had secondary glaucoma and the prevalence is found to be 6.8%. Among 380 patients with cataract, 145 of them had cortical cataract and 136 had nuclear cataract, 99 had PCIOL in either one eye or both eyes and the prevalence is 76%.

**Table – 4:** Prevalence of various types of refractive errors

Age group	Myopia	Hypermetropia	Astigmatism	Total
30-40	4	5	2	11
41-50	2	19	3	24
51-60	-	25	3	28
61-70	-	15	-	15
Total	6	64	8	78
Percentage	1.2	12.8	1.6	15.6

Out of 78 subjects with refractive errors, 6 were myopes, 64 hypermetropes & 8 of them had astigmatism.

**Table – 5:** Association of choroidal and retinal diseases in diabetes

Retinal Diseases	Female	Male	Total no: of cases	Prevalence %
Vitreous opacities	1	2	3	0.6
Vitreous hemorrhage	3	7	10	2
Diabetic retinopathy	34	60	94	18.8
Branch retinal vein occlusion	-	3	3	0.6
Branch retinal artery occlusion	-	1	1	0.2
Combined retinopathy	5	5	10	2
Retinal detachment	1	4	5	1
Macular hole	3	1	4	0.8
Chorioretinitis	1	1	2	0.4
Age related macular degeneration	5	3	8	1.6
Optic atrophy	1	4	5	1
Total	54	91	145	29

Diabetic patients with choroidal and vitreoretinal lesions were 145 ( 54 women, 91 men) and the prevalence is 29%. Retinopathy is found to be the most common retinal diseases.

**Table – 6:** Distribution of retinopathy in relation to duration of diabetes

Duration of diabetes (years)	No: of subjects	Diabetic retinopathy	Prevalence %
0 - 5	162	13	8
5 - 10	130	24	18
10 - 15	110	25	22
15 - 20	98	32	32

As the duration of diabetes increases, the percentage of cases of retinopathy also increases.

#### IV. Discussion

The 500 diabetic patients with the complaints of difficulty in vision selected for this study were examined thoroughly for the visual defects.

6 patients were found to have episcleritis. Episcleritis is a non- granulomatous inflammation of loose connective tissue between sclera and conjunctiva affecting females, benign and self limiting condition without causing any structural damage to the eye, associated with diabetes. These findings correlate with the findings reported by Foster CS et al.<sup>3</sup> These patients were treated with topical corticosteroids and non steroidal anti-inflammatory drugs.

One patient had a rare presentation of keratitis. Moraxella is highly associated as a causative agent in diabetic patients.<sup>4</sup> There is ulceration of epithelium with suppurative stromal infiltration and anterior chamber reaction. Bacterial corneal ulceration is an ocular emergency, corneal scraping and laboratory culture of the scraping, rapid initiation of antibiotic therapy is needed to improve the visual prognosis. The findings of our study is similar to that reported by Mc Leod SD et al.<sup>5</sup>

4 patients had defective vision due to panuveitis. This bilateral granulomatous disease occurs predominantly among women in 3rd-5th decade of life, most common cause are idiopathic and sarcoidosis.<sup>6</sup> The prevalence rates among diabetic patients are consistent with that of studies by Mc Cannel CA et al.<sup>7</sup> Our goal is to treat the inflammatory process with steroids.

34 diabetic patients with elevated intraocular pressure (IOP) were diagnosed to have glaucoma. 29 of them had Primary open angle glaucoma (POAG). The pathophysiological mechanism of intraocular pressure elevation is because of resistance to aqueous humor outflow in juxtacanalicular portion of trabecular meshwork.

Optic nerve head cupping and visual field defects are due to the compromise of microvasculature of retinal axons & direct mechanical damage to retinal nerve fibers. The higher prevalence of POAG among diabetics in our study coincides with that reported by Mitchell P et al. One case of Primary angle closure glaucoma (PACG) presenting in a female subject at about 60 years is due to obstruction of aqueous outflow by closure of angle of peripheral iris, thick lens and autonomic dysfunction in diabetes leading to mid dilated pupil. These findings are in tune with that of Schertzer RM et al.<sup>9</sup>

4 cases had Secondary glaucomas due to presence of a secondary ocular pathological process-neovascularisation, lens induced, trauma, uveitis etc.,. Among them Neovascular glaucoma occurs due to closure of anterior chamber angle by fibrovascular network. Phacolytic glaucoma is a lens induced glaucoma with release of lens proteins from hypermature cataractous lens, macrophages engulf these proteins & obstruct an open anterior chamber leading to increase in IOP. In Phacomorphic glaucoma, reduction in anterior chamber angle due to swollen lens in advanced cataract leads to increase in IOP.

The incidence of glaucoma 6.8% in our study is higher than the value reported in South India ( 2.6% to 4.1%) by Ramakrishnan et al.<sup>10</sup> Successful management aims to lower IOP either by laser therapy, medical or surgical intervention to a 'target pressure' below which further optic nerve damage is unlikely.

380 patients had visual impairment due to cataractous lens. Age-related senile cataract is the most common cause of visually significant cataract. Environmental, toxic, nutritional, systemic disease as diabetes, socioeconomic, biochemical factors act synergistically and genetic susceptibility to these insults play a major role. Brunescant cataracts (nuclear) are associated with increased oxidative damage to lens proteins and lipids with accumulation of specific chromophores.<sup>11</sup>

In diabetes, posterior subcapsular cortical cataract<sup>12</sup>(snow storm) is common. Diabetes accelerates the formation of these senile cataracts, probably through non- enzymatic glycation and cross linking of modified crystallins. Cataract occurs earlier in life and progress more rapidly in diabetic patients with poor metabolic control. The above findings and the prevalence percentage of cataract in our study –78% is similar to that of Harding JJ.<sup>13</sup> Cataract extraction with intraocular lens implantation restores quality vision. A possible protective effect from a high intake of antioxidant vitamins, as vitamin C,E, and beta carotene has been suggested by Sarma U et al.<sup>14</sup>

Regarding refractive status of 78 diabetic patient, the rapid rise in blood glucose levels may induce a marked 'Myopia', the rapid reduction of blood glucose level to normal may induce a marked 'Hyperopia'. Diabetic persons frequently demonstrate 'Presbyopia' at an earlier age than non- diabetic persons. This is in accordance with the findings reported by Marmor MF.<sup>15</sup> All these subjects are provided with suitable glasses for improving the vision.

10 patients were diagnosed to have vitreous pathology. Vitreous opacities (asteroid hyalosis) is a unilateral condition, diabetes is a risk factor, consists of complex lipids embedded in an amorphous matrix containing calcium and phosphorus attached to vitreous framework. The prevalence rate and the findings of our study correlate with that of Bergren RC et al.<sup>16</sup> Vitreous hemorrhage into subvitreal space is common, takes weeks to months to clear, similar findings have been reported by Butner RW et al.<sup>17</sup>

135 patients with defective vision were found to have retinal and choroidal lesions. Hyperglycemia is the primary cause of microvascular complications of diabetes including retinopathy. Glycosylation of tissue proteins plays a major role. The various manifestations are diabetic retinopathy<sup>18</sup>(18.8%), combined retinopathy<sup>19</sup>(2%), branch retinal vein occlusion(0.6%), branch retinal artery occlusion(0.2%), retinal detachment(1.6%), macular hole(0.8%), chorioretinitis(0.4%), age related macular degeneration(1.6%) and optic atrophy(1%). The incidence of diabetic retinopathy is found to increase with the length of time the patient had diabetes. The possible role of systemic risk factors as hypertension and dyslipidemia have been implicated in the development of retinal arteriolar changes. Specific treatment as laser photocoagulation, vitreoretinal surgery can restore useful vision to severely impaired eyes.

Five patients were found to have mononeuropathy (3,4,6 cranial nerves) as a consequence of long- standing diabetes mellitus. This is due to the chronic microvascular complications leading to the cranial nerve palsy as a result of hyperglycemia. The percentage of all extra- ocular muscle palsies, attributable to diabetes mellitus was 1% , lower than that reported by Rush JA.<sup>20</sup>

## **V. Conclusion**

The present study has been undertaken to find out the ocular morbidities prevalent among diabetic patients. 500 patients with complaints of defective vision have been clinically examined to find the causative factors in the visual apparatus.

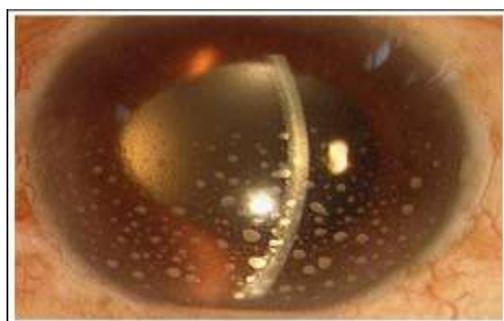
Diabetes mellitus is found to affect every structure of the visual system leading to visual impairment and blindness. Cataract was found to be the most common ocular manifestation of diabetes mellitus-380 patients (76%). The second most common manifestation was chorioretinal disorders - 145 patients (29%). Other ocular manifestations include glaucoma–34 patients (6.8%), refractive errors-78 patients (15.6%), episcleritis– 6

patients (1.2%), mononeuropathy– 5 patients (1%), uveitis- 4 patients (0.8% ), keratitis- 1 patient (0.2%). It has been well noted from our study that, in patients with increasing diabetic age, poor glycemic control, there is increased risk of development of vision threatening complications. It is also apparent that, dyslipidemia & hypertension are the risk factors and therefore earlier detection in younger age group and necessary lifestyle modification with treatment will help in protecting vision.

Diabetes mellitus is a stress-related, modern, lifestyle disease which can be prevented by suitable stress- relaxation techniques, healthy diet and aerobic exercise. Early detection, careful follow-up and prompt treatment are key stages in the successful management of diabetic eye disease, so that deterioration of visual function can be avoided. By these means vision can be preserved for a better living condition.

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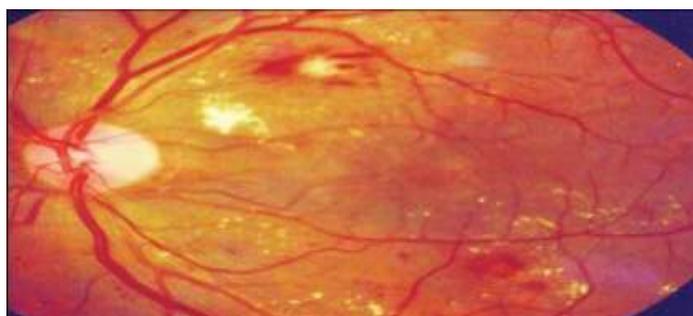
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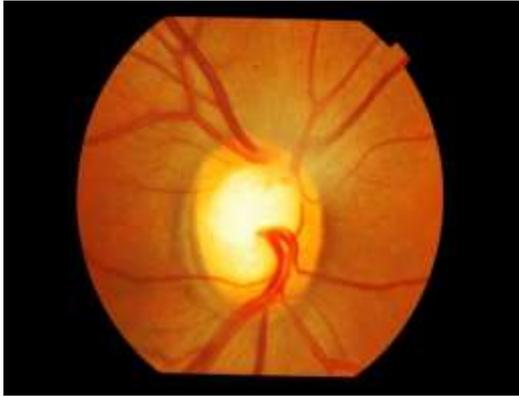
**(i) Uveitis**



**(ii) Cataract**



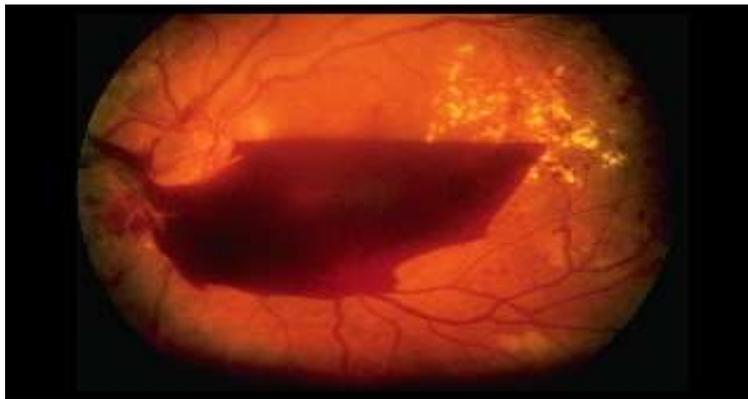
**(iii) Diabetic retinopathy**



**(iv)** Glaucomatous optic atrophy



**(v)** Keratitis



**(vi)** Vitreous hemorrhage