

“Association of Ocular Manifestation with Glycemic Control in Patients with Type 2 Diabetes Mellitus.”

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ABSTRACT

Objective: Diabetes mellitus is a chronic metabolic disorder which is preventable if appropriate measures are taken. The present study aimed to study the ocular manifestations in controlled and uncontrolled Type 2 Diabetes Mellitus

Material & Method: This is a Prospective observational study on 150 Type 2 Diabetes mellitus patients attending MNR Medical College & Hospital. Patients fulfilling inclusion criteria were taken for the study during the study period. The data was collected for each patient including detailed diabetes history, ocular complaints and complete ophthalmological examination was done. Data was compiled and tabulated using MS Excel spread sheet and statistical analysis done for relevant tables.

Results: The present study included total of 150 patients fulfilling inclusion criteria with majority of patients in the age group of 51-60yrs (47.3%) followed by 61-70yrs (25.34%). Among the gender 69 were male and 81 were female patients with marginal female preponderance in the study. Cataract was the most common complication found in 100 cases (66.66%), followed by retinopathy in 51 instances (34%). Dry eye was observed in 30 instances (20%), and lid involvement was observed in 17 cases (11.33%).

Conclusion: Diabetes is linked to a wide range of eye diseases. Diabetes affects the entire eye, from the lids to the retina and the cranial nerves. Cataract was discovered to be the most prevalent ocular symptom of diabetes mellitus. The periodic eye examinations remain the primary approach for reducing the impact of diabetes-related vision loss.

Keywords: Ocular, Diabetes Mellitus, Dry eye, Cataract, Retinopathy.

Main points

- The study highlights the various ocular manifestation in patients with diabetes mellitus.
- The study also helps to understand the ocular manifestation with control of diabetes mellitus.
- Helps to make a policy for period ocular examination in patients with diabetes mellitus.

Introduction

Diabetes mellitus is a chronic metabolic disorder which can be preventable if proper preventive measure are taken.(1,2) This is a group of metabolic disorders characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both.(3,4) It is broadly categorized into two types designated as type-1 and type-2. In type-1 diabetes mellitus there is complete or near total insulin deficiency. In type-2 diabetes mellitus there is decreased ability of the insulin to act on the peripheral tissue, which is called insulin resistance. During the early stages of insulin resistance, pancreatic β cells produce enough insulin to regulate blood glucose. However, over production of insulin can cause failure of β cells, resulting in type-2 diabetes. Chronic hyperglycemia is associated with long term damage, dysfunction and failure of different organs especially eyes, kidneys, nerves and heart.(5)

India is the Diabetes capital of the world with 41 million Indians suffering from diabetes. Prevalence of Diabetes for all age groups was expected to be 2.8% in 2000 and 4.4% in 2030.(6,7) The overall population of diabetics is expected to climb from 171 million in 2000 to 366 million by 2050. According to the International Diabetes Federation (2017), the prevalence of diabetes in 2017 and 2045 is expected to be 8.8 and 11.4%, respectively. Diabetic eye disease is getting more prevalent.(8) People with diabetes have an increased risk of developing a number of serious health problems.(3) Consistently high blood glucose levels can lead to serious diseases affecting the heart and blood vessels, eyes, kidneys, nerves and teeth.(4,9) In addition, people with diabetes also have a higher risk of developing infections. In almost all high-income countries, diabetes is a leading cause of cardiovascular disease, blindness, kidney failure, and lower limb amputation. The present study aimed to study the ocular manifestations in controlled and uncontrolled Type 2 Diabetes Mellitus

Material & Method

This is a Prospective observational study on 150 Type 2 Diabetes mellitus patients attending MNR Medical College & Hospital during the period of March 2021 to December 2021. Patients with type 2 diabetes mellitus willing to be part of study were included. The patients with type 1 diabetes mellitus, gestational diabetes, long term on steroid, history of endocrine disorder and known eye disorder not related with diabetes mellitus were excluded.

The study obtained institutional ethics clearance prior to starting patients' recruitment. The patients were explained about the study and obtained the written informed consent from all the participants. The data was collected for each patient including detailed diabetes history, ocular complaints and complete ophthalmological examination was done. Data was compiled and tabulated using MS Excel spread sheet and statistical analysis done for relevant tables.

Statistical analysis: All the patient data was collected on Microsoft windows excel sheet, and the statistical analysis was performed on the SPSS v21 operating on windows 10. The descriptive data was summarised as mean, median and proportion, frequency. The summarised data was represented using the tables and figures. The mean difference between the continuous variables were assessed using the student-test and for categorical data chi-square test was used. The p-value of <0.05 was considered statistically significant.

Result:

Total of 150 patients, in age group of 51-60yrs (47.3%) followed by 61-70yrs (25.34%). Among the gender 69 were male and 81 were female patients with marginal female preponderance in the study.

Table 1: Various ocular manifestation among study participants		
Ocular Morbidity	No. Of Cases	Percentage (%)
Lids and Adnexa	17	11.33

Conjunctiva	19	12.66
Cornea	33	22
Dacryocystitis	02	1.33
Glaucoma	05	3.33
Lens	100	66.66
Vitreous	09	6
Optic disc	03	2
Retina	56	37.33
Cranial nerves	02	1.33

Table 2: Showing the ocular manifestations among study participants

		No. of patients	Percentage (%)
Type of Lid Lesion	Stye	02	11.77
	Blepharitis	11	64.71
	Xanthelasma	01	5.88
	Wart	01	5.88
	Recurrent chalazion	01	5.88
	Preseptal cellulitis	01	5.88
Type of Conjunctival Involvement	Conjunctivitis	02	10.52
	Tortous Conjunctival vessels	5	26.32
	Pterygium	10	52.64
	Pinguecula	2	10.52
Type of Dacryocystitis	Acute	01	50
	Chronic	01	50
Corneal lesions	Reduced corneal sensation	03	9.09
	Non healing corneal ulcers	00	00
	Dry eye disease	30	90.91
Type of glaucoma	PAOG	03	60
	PACG	01	20

	NVG	01	20
Type of response	Full dilatation	135	90
	Poor dilatation	15	10
Type of cataract	Cortical	22	22
	Nuclear	14	14
	Posterior sub capsular	06	06
	Mixed	58	58
Vitreous finding	Asteroid hyalosis	01	11.11
	Synchysis Scintillans	01	11.11
	Microfibrillary degeneration	05	55.56
	Firovascular proliferation with vitreous hemorrhage	01	11.11
	Fibro vascular proliferation without vitreous hemorrhage	01	11.11
Type of Retinopathy	Mild NPDR	20	39.21
	Moderate NPDR	13	25.49
	Severe NPDR	03	5.88
	PDR	13	5.49
	PDR with Tractional RD	02	3.93
Other Retinal lesions	ARMD	03	60
	CRAO	01	20
	BRVO	01	20
	ARMD	03	60
Optic Nerve lesions	NA-AION	01	33.33
	Optic Neuritis	01	33.33
	Optic atrophy	01	33.33
	NA-AION	01	33.33

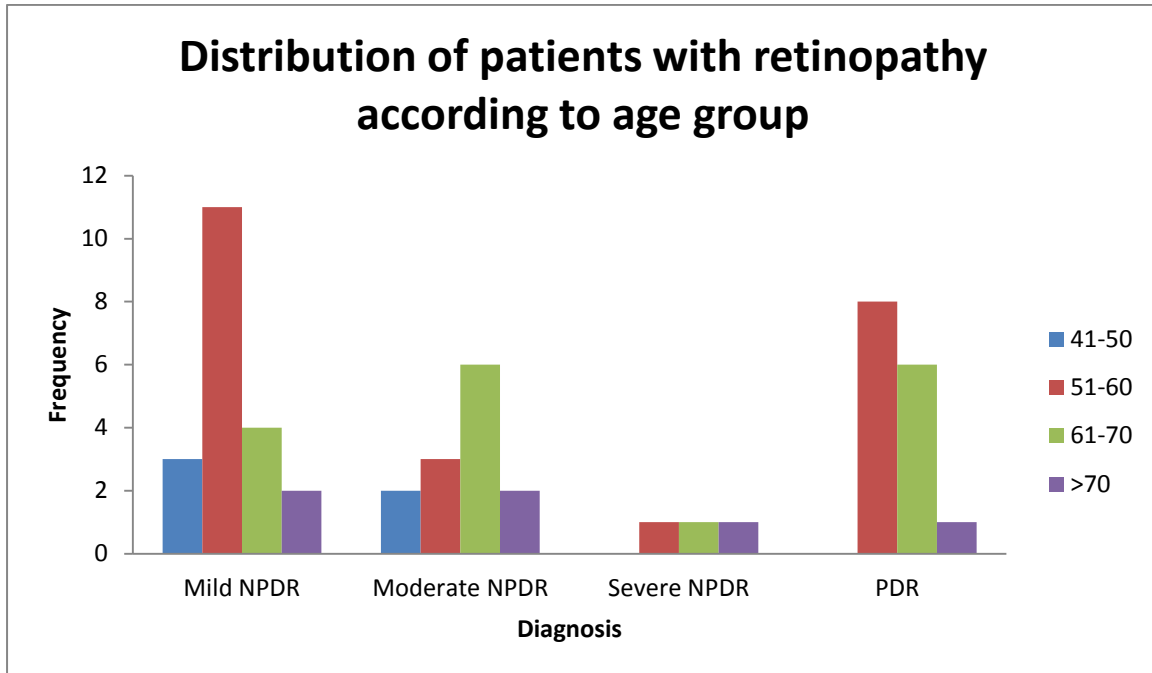


Figure 1: Distribution of patients with retinopathy according to age group

		Mild NPDR(%)	Moderate NPDR (%)	Severe NPDR(%)	PDR(%)	Total(%)	CSME (%)
Duration of DM in years	<5	04 (20)	03(23.07)	01(33.33)	00(0)	08(15.68)	01(8.34)
	5-10	10 (50)	06 (46)	01(33.33)	07(46.66)	24(47.05)	07(58.33)
	>10	06(30)	04(30.76)	01(33.33)	08(53.33)	19(37.25)	04(33.33)
HBA1C (Control)	<6 % (Excellent)	03(100)	00 (0)	00 (0)	03(100)	0(0)	00(0)
	6-8 % (Good)	13 (68.42)	02 (10.52)	01 (5.26)	03 (15.78)	19 (100)	03 (25)
	8.1-10 % (Fair)	04 (22.22)	07 (38.89)	01 (5.56)	06 (33.33)	18 (100)	04 (33.33)
	>10 % (Poor)	00 (0)	04 (36.37)	01 (9.09)	06 (54.54)	11 (100)	05 (41.67)

Discussion:

Diabetes retinopathy is a leading cause of avoidable vision loss in the working-age population and a major worldwide health concern. Chronic hyperglycemia causes it, as does diabetes mellitus, which predisposes patients to a variety of additional ocular issues such as diabetic macular oedema, eye infections, diabetic cataract, and dry eye and corneal difficulties.(10) Diabetics have a higher

incidence of cataract development due to a variety of reasons. Cataract surgery is now a frequent and safe operation because to technological advancements. Diabetic macular edema (ME), postoperative ME, diabetic retinopathy development, and posterior capsular opacification are all risks for the diabetic population. (11)

As per International Diabetes Federation (2017) estimation and projections for prevalence of diabetes for 2017 and 2045 are estimated to be 8.8 and 11.4% respectively. Diabetic eye disease is becoming an increasing problem.(8) According to the most recent epidemiological estimates from 2019, 77 million people in India have diabetes, with the number anticipated to climb to nearly 134 million by 2045. With 77 million diabetics, India is second only to China in the worldwide diabetes epidemic. Of these, 12.1 million are above the age of 65, with this number expected to rise to 27.5 million by 2045. It is also estimated that about 57% of individuals with diabetes in India, or around 43.9 million people, are undiagnosed.(12)

In the current study, cataract was the most common complication found in 100 cases (66.66%), followed by retinopathy in 51 instances (34%). Dry eye was observed in 30 instances (20%), and lid involvement was observed in 17 cases (11.33%). Blepharitis (64.71%) was seen in 11 instances, stye (11.77%), recurrent chalazion (5.88%), preseptal cellulitis (5.88%), xanthelasma (5.88%) and wart (5.88%) were observed in one case each. Recurrent styes and blepharo-conjunctivitis, according to Negi et al., are the initial signs of diabetes and should induce testing to rule it out. Blepharitis was the most prevalent lid involvement identified in the current investigation, accounting for 11 out of 150 patients (7.33%).(13)

Cataract was observed in 100 of 150 patients, making it the most prevalent manifestation of ocular diabetes illness in our research. The most common variety discovered in the research was Mixed (58%) followed by Cortical (22%), which is more common than the posterior subcapsular cataract (06%), which is believed to be a typical diabetic cataract. A recent study by Sankara Nethralaya et al., found that mixed cataracts were more frequent than monotype cataracts in nearly two-thirds of the Indian diabetic population.(14) We detected a significant relationship between diabetes duration and related ocular complications in this investigation (p-value-0.031). PDR (found in 53.33% of participants with diabetes for more than 10 years) was the most prominent consequence seen with prolonged diabetes duration. The prevalence of NPDR ranged from 22.22% in people with diabetes for less than five years to 47.22% in people with diabetes for five to ten years or more. Klein et al.,(15) and Yanko et al.,(16) found an increase in the incidence of retinopathy as the duration of diabetes increased. Diabetes with a duration of 6-10 years was associated with a higher frequency of CSME (58.33%). Our study found that males were more likely to have retinopathy (52.94%) than females (47.05%), whereas the Wisconsin Epidemiological Study of Diabetic Retinopathy discovered a higher prevalence of Diabetic Retinopathy in females.(17) Sunil Gupta's study found comparable results in terms of increased incidence of diabetic retinopathy in male patients. (18)

In a study by Kathiara A et al., the most prevalent ocular symptom of diabetes mellitus-35 individuals (58.33%) was cataract. Diabetic retinopathy was the second most prevalent symptom in 25 individuals (41.66%). Hypertension was shown to be the most prevalent related systemic condition in 20 individuals (33.3%). The two most prevalent signs of diabetes mellitus were cataract and retinopathy. Patients with cataracts can be extremely effectively controlled with improved cataract extraction procedures, but detecting early signs of retinopathy is critical. A complete eye examination of diabetic patients, including both anterior and posterior segment examination, is required. (19) Ocular problems linked with diabetes are progressive rapidly becoming the world's leading cause of morbidity; nevertheless, they are treatable with early identification and treatment. Sayin N et al. offered an overview of the five major visual problems linked with diabetes, including diabetic retinopathy and papillopathy, glaucoma, cataract, and ocular surface disorders.(20)

A similar tendency may be found in our research sample. Mild NPDR, with a prevalence rate of 68.42% at HbA1c (8%), is observed clustering at lower levels, but moderate and severe NPDR are more frequent at HbA1c levels >10%, with prevalence rates of 36.37% and 33.33%, respectively. PDR (54.54%) and CSME (41.67%) show similar results. Thus, in our research group, the severity of retinopathy corresponds with glycemic control (p-value-0.009). Patients with greater glycosylated haemoglobin levels were shown to be at a higher risk of retinopathy, with mean HbA1c levels above 12% being 3.2 times more likely to have retinal after 4 years than patients with HbA1c levels below 12%. (21) Ocular complications of diabetes can have a significant impact on a person's quality of life. Therefore, to identify these complications early, treat them effectively, and help patients achieve glycemic control, a multidisciplinary team approach with regular eye exams starting with the diagnosis of diabetes mellitus is needed. is required.(10) Also Saxena N et al., documented the positive relation of duration of diabetes with severity of the ocular complications among the patients with diabetes mellitus. Also well controlled diabetics have lesser complications in eyes due to diabetes. Patient's age, sex, duration and control of diabetes play important role in development and severity of complications in eye due to diabetes mellitus.(8)

Conclusion: Cataract was discovered to be the most prevalent ocular symptom of diabetes mellitus, with mixed and cortical types being the most common. They were discovered to be much more common in diabetes with a longer duration. Furthermore, they appeared to be more common in girls than in males. Diabetic retinopathy was the second most frequent manifestation. Males were found to have a higher prevalence of retinopathy than females. Furthermore, good glycemic management lowers the occurrence and development of diabetic retinopathy. Despite greater awareness of these visual disorders and the development of helpful therapies, diabetes and associated ocular consequences continue to be a major cause of blindness. All diabetic ocular problems can be avoided with early detection and treatment. As a result, periodic eye examinations remain the primary approach for reducing the impact of diabetes-related vision loss.

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