ORIGINAL ARTICLE

Ocular Manifestations in Diabetes Mellitus

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ABSTRACT
Background: Diabetes mellitus is becoming more prevalent worldwide, and there are a number of ocular disorders associated with diabetes-related complications that can be fatal to vision.
Aim: To study ocular manifestations in diabetes mellitus.
Materials and Methods: An observational study, conducted with a total number of 200 patients with diabetes mellitus in a tertiary care hospital. Patients aged 20 to 70 years were included. The best corrected visual acuity and other ocular manifestations were evaluated, and the observed results were documented.
Results: It was noted that among the study population, majority of them (62.5%) were in the age group between 41-60 years and females (50.5%) were more in number. Most of the study participants had the Best Corrected Visual Acuity (BCVA) in the range 6/60 – 3/60. Diabetic retinopathy was the most common ocular manifestation (43%) followed by cataract (41.5%).
Conclusion: According to these ocular findings, diabetes individuals should have regular screenings and eye exams performed in order to lessen the burden of visual impairment.
Keywords: Type 2 Diabetes Mellitus, Diabetic Retinopathy, Cataract, Glaucoma, Ocular manifestations.

Introduction

Diabetes mellitus is a global health concern, with an increasing prevalence that has reached epidemic proportions. According to the International Diabetes Federation (IDF), approximately 537 million adults aged 20-79 were living with diabetes in 2021, and this number is expected to rise to 643 million by 2030 [1,2]. Type 2 Diabetes Mellitus (T2DM) constitutes the majority of diabetes cases worldwide. India faces a significant diabetes burden, with an estimated 77 million adults living with diabetes in 2019. The prevalence is expected to rise, fueled by factors such as urbanization, sedentary lifestyles, and a genetic predisposition to diabetes. Ocular manifestations of diabetes are significant contributors to morbidity and can lead to severe visual impairment and blindness. Diabetic retinopathy, diabetic macular edema, cataracts, and glaucoma are among the key ocular complications associated with diabetes. Ocular manifestations of diabetes are a major concern in India, contributing to the country's high prevalence of blindness [3]. Diabetic retinopathy is a leading cause of vision loss among working-age adults. The lack of awareness, limited access to healthcare facilities, and challenges in implementing nationwide screening programs contribute to late-stage diagnoses and complications. The global burden of diabetic retinopathy is substantial, affecting millions of individuals. The condition progresses from mild non-proliferative stages to severe proliferative stages, leading to retinal damage and vision loss if left untreated [4,5].

Diabetes can have significant effects on the eyes, leading to various ocular changes and complications. The primary ocular manifestations associated with diabetes include Diabetic Retinopathy (DR) whichis a common and potentially sight-threatening complication of diabetes. It occurs when high levels of blood sugar damage the blood vessels in the retina. Early stages may have no noticeable symptoms, but as it progresses, it can lead to vision loss. It is categorized into non-proliferative diabetic retinopathy (NPDR) and proliferative diabetic

retinopathy (PDR), with PDR being more advanced and severe. Diabetic Macular Edema (DME) is a specific complication where fluid accumulates in the macula, the central part of the retina responsible for sharp, central vision. This can result in blurred or distorted vision. DME often accompanies diabetic retinopathy and is a leading cause of vision loss in individuals with diabetes.Diabetes is a risk factor for the development of cataracts. Cataracts involve clouding of the eye's natural lens, leading to blurred or hazy vision. Individuals with diabetes may develop cataracts at an earlier age and progress more rapidly than those without diabetes. Diabetes increases the risk of developing glaucoma, a group of eye conditions that damage the optic nerve. Increased intraocular pressure is a common characteristic of glaucoma. Glaucoma can result in gradual peripheral vision loss and, if left untreated, may lead to total blindness. Fluctuations in blood sugar levels can affect the fluid balance in the eye, leading to temporary changes in refractive error. This can cause fluctuations in vision and may necessitate adjustments to eyeglass prescriptions.

The present study helps identify the early signs and risk factors for ocular complications in T2DM. Early detection is crucial for timely intervention, which can prevent or slow down the progression of diabetic retinopathy, macular edema, and other ocular conditions, ultimately preserving vision and improving the quality of life for individuals with diabetes. This study can contribute to the development and refinement of clinical management strategies for ocular manifestations in T2DM. Investigating the efficacy of existing treatments and exploring new therapeutic approaches can lead to better outcomes for patients with diabetes-related eye complications.

Materials and Methods

Study design: The present study was Hospital based Observational study.
Study setting: The present study was conducted at Dr.VRK Women's Medical College, Ranga Reddy District, Telangana, India.
Sample size: 200 patients of diabetes mellitus were included in the study.
Inclusion criteria: Patients with confirmed diagnosis of Diabetes and who consented were included in the study.
Exclusion criteria: Participants with ocular injuries, prior eye treatment, or related systemic co-morbidities and who did not consent were excluded from the study.

Methodology:

18 patients with Type 1 diabetes and 182 individuals with Type 2 diabetes mellitus were included in the study, which was done in a tertiary care setting. The majority of the study's patients (91%) were referred from diabetic clinics, while the remaining 9% had ocular symptoms that might indicate diabetes mellitus from an outpatient department of a medical college's department of ophthalmology. Blood sugar testing was used to make the diagnosis. A thorough medical history, including family history, was recorded in each case, and then ocular and general examinations were performed.

General and visual examinations were performed in each case following the documentation of the comprehensive history, including family history. Using a Goldman Aplanation tonometer to measure intraocular pressure, oblique illumination study, slit lamp biomicroscopy, Snellen's chart to measure visual acuity, and automated perimetry to assess visual fields were all part of the ocular examination. Using Tropicamide eye drops, patients' pupils were made dilated for fundus inspection and retinoscopy.

The best corrected visual acuity and various ocular manifestations that include Diabetic Retinopathy, Cataract, Dry Eye, Chalazion, Hardeolum, Glaucoma, Central Retinal Vein Occlusion (CRVO), Central Retinal Artery Occlusion (CRAO), Retinal Detachment, Corneal Ulcers, Blepharitis and Orbital Cellulitis were assessed throughout the examinations and the observed findings were recorded.

Statistical Analysis: The data was collected in MS Excel and presented as numbers and frequencies in the form of tables and charts.

Results:

200 patients were considered for this study (Table 1).

Table 1Gender

Gender	No. of Patients	%
Male	99	49.5 %
Female	101	50.5 %
Total	200	100 %

Almost half of the patients were male (49.5%) and the other half were female (51.5%).

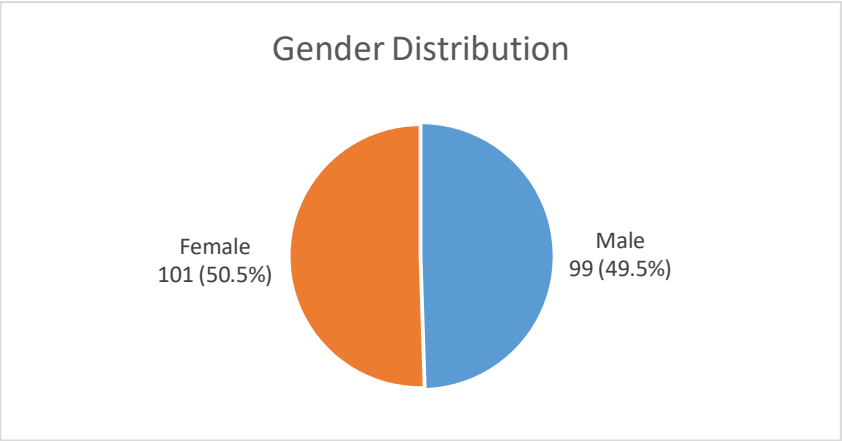

Fig.1 Gender Distribution

Table 2 Age Group

Age Group	No. of Patients	%
20 – 40 years	33	16.5 %
41 – 60 years	125	62.5 %
> 60 years	42	21.0 %
Total	200	100 %

The patients considered for the study were divided into 3 age groups i.e., 20 – 40 years, 41 – 60 years and older than 60 years. More than half of the patients were of the age group 41 – 60 years (62.5%). About one-fifth of the patients were more than 60 years old (21%) and only 16.5% patients belonged to the age group 20 – 40 years (Table 2).

Table 3 Diabetic Profile

Variable	No. of Patients	%
Type of Diabetes		
Type 1	18	9.0 %
Type 2	182	91.0 %
Duration		
≤ 5 years	74	37.0 %
> 5 years	126	63.0 %
Glycemic Control		
Good (HbA1C < 6.5 %)	38	19.0 %
Fairly Good (HbA1C 6.5 – 7.9 %)	87	43.5 %
Poor (HbA1C ≥ 8.0 %)	75	37.5 %

More than four-fifth of the patients considered for this study had Type 2 Diabetes (91%) while only 9% patients had Type 1 Diabetes. Almost two-third of the patients (63%) had diabetes for more than 5 years and more than one-third of the patients (37%) had diabetes for a period of less than or equal to 5 years. Of the 200 patients in this study, majority of them (43.5%) had fairly good Glycemic control (HbA1C 6.5 – 7.9 %) followed by 37.5% patients with poor Glycemic control (HbA1C ≥ 8.0 %). Only 19% exhibited good Glycemic control (HbA1C < 6.5 %) (Table 3).

Table 4 Best Corrected Visual Acuity

BCVA	No. of Patients	%
6/6 – 6/18	43	21.5 %
6/18 – 6/60	59	29.5 %
6/60 – 3/60	70	35.0 %
< 3/60	28	14.0 %
Total	200	100 %

Of the 200 patients considered for this study, majority of the patients (35%) had Best Corrected Visual Acuity in the range 6/60 – 3/60, followed by 29.5% patients in the range 6/18 – 6/60. More than one-fifth of the patients (21.5%) had BCVA in the range 6/6 – 6/18 while only 14% patients had BCVA less than 3/60 (Table 4).

Table 5 Ocular Manifestations

Ocular Manifestation	No. of Patients	%
Diabetic Retinopathy	86	43.0 %
Cataract	83	41.5 %
Dry Eye	54	27.0 %
Chalazion	43	21.5 %
Hardeolum (External + Internal)	26	13.0 %
Glaucoma	22	11.0 %
Central Retinal Vein Occlusion (CRVO)	7	3.5 %
Central Retinal Artery Occlusion (CRAO)	3	1.5 %
Retinal Detachment	2	1.0 %
Corneal Ulcers	2	1.0 %
Blepharitis	2	1.0 %
Orbital Cellulitis	1	0.5 %

Most of the patients in the study (43%) had Diabetic Retinopathy, followed closely by 41.5% having Cataract. More than one-fourth of the patients (27%) had Dry Eye condition while more than one-fifth of the patients (21.5%) had Chalazion. Hardeolum (External + Internal) was observed in 13% patients while Glaucoma was found in 11% patients. Only 3.5% patients had Central Retinal Vein Oclusion (CRVO) and 1.5% patients had Central Retinal Artery Oclusion (CRAO). Retinal Detachment, Corneal Ulcers and Blepharitis were each observed in 1% of the patients while Orbital Cellulitis was found in only 1 patient (0.5%)(Table 6).

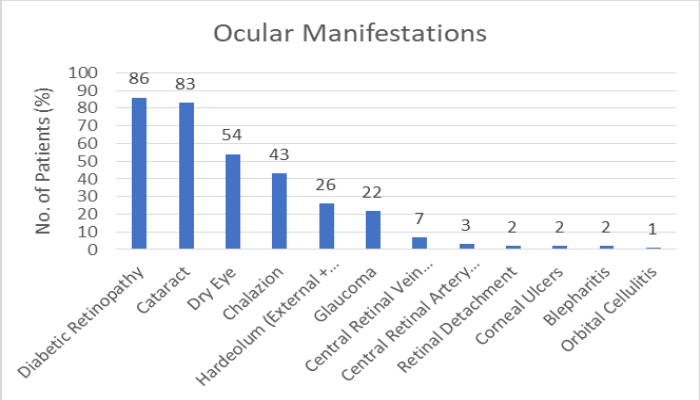

Fig.2 Ocular Manifestations

Discussion:

Ocular manifestations of diabetes have substantial public health implications. Investigating the prevalence, risk factors, and impact of these complications can inform public health policies, screening programs, and resource allocation to address the growing burden of diabetes-related visual impairment.

As a result, this study aids in our understanding of the variety of ocular symptoms that individuals with Type 2 diabetes mellitus may experience. Females outnumbered males in our analysis (Figure 1), with the majority (62.5%) in the 41–60 year age range, which is consistent with several studies [6-8]. Similarly, one study found that women were more likely than men to have chronic subclinical inflammation, which was associated with Type 2 DM [9]. Our investigation reveals that the majority of patients (35%) with the best corrected visual acuity were between 6/60 and 3/60, and 14% had visual acuity <3/60. Similar results were reported by Deepa *et al*. study. This highlights the need for regular eye exams for all diabetic patients, as well as the knowledge that diabetes can have vision-threatening complications [10, 11].

Diabetes patients had a higher chance of acquiring primary open angle glaucoma and neovascular glaucoma [12-15], which were the two main kinds of glaucoma; as in our study, of the patients with glaucoma (11%), primary open angle glaucoma was the most prevalent type. Numerous studies have shown a correlation between diabetes and cataract, with about 41.5% of the study group experiencing some kind of cataract as reported by Rowe *et al* [16], Hiller *et al* [17], Migilor*et al* [18] and Saxena *et al*'s [19] study. Approximately 43% of individuals with diabetes have been diagnosed with diabetic retinopathy, which is the primary cause of visual impairment in these people and the results were similar to the Raman *et al* [20], Solomon*et al* [21], Awh*et al* [22], Rauhan*et al* [23], Dandona*et al* [24] and Maurya *et al*'s [25] study.

In our study, diabetic retinopathy is the most prevalent manifestation (Figure 2); this is also the common symptom noted in the findings of Sivaraman*et al* [26]. Tractional retinal detachment, vitreous hemorrhage, and diabetic macular edema are the most frequent causes of impaired vision in people with diabetic retinopathy [27–29]. Thus, a wide range of ocular problems linked to diabetes were found in this investigation. Regular eye exams and the right ophthalmologist referral are crucial in preventing diabetes-related vision loss because the management of diabetic eye problems is essentially preventative.

Conclusion:

Ocular manifestations in diabetes mellitus are diverse and can significantly impact vision and overall eye health. These manifestations typically emphasize the importance of early detection, regular monitoring, and comprehensive management to prevent or minimize vision-related complications. The primary focus of managing ocular symptoms in diabetes mellitus is prevention. Diabetes-related visual loss can be prevented by routine eye exams and prompt referrals to an ophthalmology clinic. These can be achieved through careful patient counselling, dietary recommendations, lifestyle changes, stringent glycemic control, and close observation of treatment compliance and response. Regular eye examinations and glycemic control are integral components of a holistic approach to diabetes care, aiming to prevent and manage ocular complications effectively.

Ethical Clearance: Ethical Clearance was obtained from the Institutional IRB prior to the commencement of the study.
Conflict of Interest: Nil
Source of Funding: Self

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