

Perspective**OCULAR MANIFESTATIONS OF DIABETES MELLITUS: IT'S REMEDIES AND PREVENTION*****Sanjeev Bhattarai¹, Pragati Gautam Adhikari¹, Deependra Kumar Sah²***Department of Ophthalmology, Maharajgunj Medical Campus, Institute of Medicine, Maharajgunj, Kathmandu, Nepal,
²Shree Birendra Military Hospital, Chhauni, Kathmandu, Nepal.***Submitted: 17th - February-2023, Revised: 10th -April-2023, Accepted: 15th -May-2023****DOI: <https://doi.org/10.3126/mjen.v2i01.56202>****ABSTRACT**

Diabetes mellitus which is a multi systemic disease is a common public health problem which can affect children, young people, adults and older people due to uncontrolled hyperglycemia. Ocular and other systemic complications of diabetes are becoming the most significant cause of visual impairment and other morbidities and are either preventable or curable with early detection and prompt treatment. Its prevalence is increasing globally with sight threatening ocular manifestations. The most of the published articles highlighted that the common ocular manifestations were diabetic retinopathy, snowflake cataract, primary open angle glaucoma, corneal lesions, recurrent stye, Chalazion and extraocular muscle palsies. Treatment options for diabetic retinopathy are laser photocoagulation and intravitreal injection of steroids. Expert opinion is always required in a case with glaucoma, cataract, optic nerve disorders and cranial nerve palsies. Control of blood sugar level, proper nutrition and adequate physical exercise and periodic eye examination can play a crucial role for its prevention.

Key Words: Cataract, Diabetes mellitus, Diabetic eye diseases, Diabetic retinopathy, Neovascular glaucoma.**INTRODUCTION**

Diabetes mellitus is estimated to affect more than 200 million people worldwide¹. Diabetic eye diseases are the commonest cause of blindness in the working population. World Health Organization has divided diabetes into Type I (Insulin dependent) and type II (Non insulin dependent). Type I is typically of juvenile onset and is characterized by insulin deficiency where as Type II is typically of adult onset and is characterized by insulin resistance¹. Risks factor for ocular manifestation varies according to type of disease, duration of disease, glycemic control and presence of hypertension, nephropathy, smoking, pregnancy, obesity, heredity, hyperlipidimia etc. Among them the most common ocular manifestation is diabetic retinopathy, which in type I is rare at time of diagnosis but develops in over 90% after 15 years. In type II disease, retinopathy is present in 20% at the time of diagnosis

and rises to 60% after 15 years of initial diagnosis^{2,3}.

AIM OF THE STUDY

The main purpose of this review article is to provide a general view of various ocular manifestations observed in diabetes mellitus. Diabetes mellitus is known to cause various vision threatening ocular manifestations in past literatures. So this article is aimed to find out those ocular diseases that might present as ocular manifestations of diabetes mellitus.

METHODS

The study was done during the period of 5th February 2023 AD to 13th April 2023 AD. as a review study. In this review, Google, Google Scholar and PubMed were searched by various key words to find out the ocular manifestations of diabetes mellitus. A few



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renowned and other timely edited books were also consulted to find out the ocular manifestations due to diabetes mellitus. Moreover original journal articles published from 2011 AD to 2023 AD were also taken as references for our study.

COMMON OCULAR MANIFESTATIONS OF DIABETES MELLITUS

There are numerous ocular manifestations of diabetes mellitus. The usual one is diabetic retinopathy which is a microangiopathy leading to both microvascular occlusion and leakage due to prolonged hyperglycemia. Diabetes mellitus affects 4% of world's population, and almost half of them have some degree of diabetic retinopathy at a given time. It has been shown that nearly all cases of diabetes mellitus type I and 75% of type 2 diabetes mellitus will develop diabetic retinopathy after duration of 15 years^{4, 5}. Diabetic retinopathy is conventionally classified into two broad categories as Non proliferative (Background) and Proliferative retinopathy. In Non proliferative, findings include microaneurysms, venous dilatation, yellow white waxy looking hard exudates, intra retinal hemorrhages, arteriolar attenuation and macular edema. In Proliferative retinopathy, there is neovascularization on the Optic Disc or elsewhere in the retina. Similarly Vitreous may show hemorrhages, liquefaction, detachment and collapse. Diabetic maculopathy can occur in both Non proliferative and Proliferative diabetic retinopathy. Diabetic maculopathy presents with macular edema which occur due to leakage from dilated capillaries around macula with increased retinal thickness in the macula^{3,4}.

Beside diabetic retinopathy, there might be other ocular manifestation too. Diabetes mellitus may induce dry eye with tear film abnormality. There is reduction in corneal sensitivity with recurrent corneal erosion and neurotrophic superficial punctuate keratitis. Cornea even may show endothelial cell changes with delayed epithelial healing due to abnormality in epithelial basement membrane. The conjunctiva may show microaneurysms, dilated and tortuous blood vessels or may present with subconjunctival hemorrhages. Eyelids may present with blepharitis, wart, xanthelesma, recurrent external or internal hordeolum. Iris may have rubeosis with depigmentation and atrophy. Diabetic eye may have small size pupil with poor dilatation capacity with mydriatics. Lenticular changes include diabetic cataract with snow flake opacities either with posterior cortical or subcapsular cataract even in young adults. The chance of orbital cellulitis is high with orbital mucormycosis. During hyperglycemia there may be change in refractive error with myopic shift. There may be transient paralysis of accommodation along with involvement of either third, fourth or sixth nerve palsy. Diabetes patients are more susceptible to the development of primary open

angle glaucoma, uveitis with its rapid progression, diabetic papillopathy leading to ischemic optic neuropathy. Patient may present with diplopia due to paralysis of extraocular muscles. The vitreous may show hemorrhages with fibrovascular proliferation, liquefaction, collapse and ultimately leading to a detachment^{6, 11}.

In a study done by Sayin and Kara in 2015 AD, the major ocular manifestations of diabetes mellitus were diabetic retinopathy, followed by papillopathy, cataract, glaucoma and other external ocular surface disorders¹³. This study was in a harmony with a study of Nirmala and Sundari who also highlighted that the development of diabetic retinopathy was proportional to the duration of the disease itself¹⁴. In a context of Nepal, a study done by Shrestha in 2011 AD showed that the major ocular manifestation was diabetic retinopathy with associated macular edema¹⁵. Similarly in a study done by Sarawade et al in 2021 AD concluded that the common ocular manifestations were diabetic retinopathy, cataract, primary open angle glaucoma, neovascular glaucoma, recurrent Chalazion and sty, blepharitis, orbital cellulitis, corneal ulcer and extraocular muscle palsies¹⁶. Similar findings were suggested from the authors Anuradha and Deepa from India¹⁷. But a bit different ocular manifestations were observed in a study done by Padma and Sivaraman in 2022 AD where the findings were like keratitis, retinal vascular occlusion, ischemic optic neuropathy, macular degeneration, lid lesions, glaucoma, cataract and diabetic retinopathy¹⁸. Similarly in another study by Ahmad et al in 2023 AD highlighted that the major ocular manifestations were non proliferative diabetic retinopathy, dry eyes, cataract, posterior blepharitis and delayed pupillary response¹⁹. We can observe that more or less findings are similar in various published journal articles.

REMEDIES AND PREVENTION

The treatment portion is mainly focused on the diabetic retinopathy with its control. Initially only follow up and supervision is necessary for Background and Preproliferative diabetic retinopathy within nine to twelve months. But frequent follow up is needed for proliferative retinopathy with maculopathy or with no maculopathy in three to six months. The advanced stages with vision threatening conditions require even more frequent follow up and treatment^{4,9}. The common treatment is laser photocoagulation. For persistent maculopathy, intravitreal triamcinolone is applied and observed at four to six months period. Similarly Endolaser with Vitrectomy will be carried out for rubeosis and extreme vitreous hemorrhages. For rubeotic glaucoma urgent Pan retinal photocoagulation and Trabeculectomy should be done. The article from Stewart suggested that intravitreal injections for clinically significant macular edema and proliferative

diabetic retinopathy include steroids like Triamcino-lone and anti VEGFs like Avastin²⁰. Similarly according to Tomita et al, Surgery is indicated in all cases of retinal detachment, subretinal neovascular membrane, tractional bands and vitreous hemorrhages in a retina²¹. Patients who have undergone laser photocoagulation should be screened every three months to monitor the effect of treatment. Mansour et al has also highlighted the role of anti VEGFs, corticosteroids and pan retinal photocoagulation as an evolving treatment of diabetic retinopathy associated with macular edema²². If cataract is affecting vision significantly, it should be operated^{7, 8}. Eyelid inflammations with Styel, Blepharitis and Chalazion should be managed with warm compression and local antibiotic drops and ointments. The tear film disorders including dry eye can be managed with artificial lubricating drops and ointments at night time. Similarly the inflammation of Cornea, Conjunctiva, Orbits and Lids can be managed with consultation with external ocular disease specialist. Neuroophthalmological evaluation is needed in cases of Optic disc, Pupil, Accommodative changes and Cranial nerve palsies with double vision. All forms of Glaucoma should be managed with Glaucoma specialist either with topical medications or with surgery^{6,9,10}.

Always prevention is better than a cure. If a patient is diabetic, cessation of smoking and drinking alcohol decreases the chance of microvascular retinal diseases. Body weight should be in control and physical

exercise greater than thirty minutes per day is advised for Type II diabetes mellitus. Blood pressure should be lesser than 130/80 mm of Hg^{11,21}. Careful control of diabetes during first five years of the disease may reduce the severity or delay the onset of diabetic retinopathy. Similarly renal parameters, lipid profile and hemoglobin should be in normal limit. All diabetic patients should be in follow up at least annually for screening ocular changes and its timely management^{12,22}.

CONCLUSION

Diabetes mellitus which affects four percentage of the world's population is a common public disease till now. Almost half of them have some degree of diabetic retinopathy or any other ocular manifestation at a given time. In diabetic retinopathy, there is damage to the microvascular system in retina due to prolonged hyperglycemia. The common ocular manifestations include dry eye, external hordeolum, subconjunctival hemorrhages, cataract, neurotrophic keratitis, double vision, vitreous hemorrhages etc. The initial treatment for diabetic retinopathy is laser photocoagulation. In complicated cases, intravitreal injections of steroids and anti VEGFs are indicated. Tight control of blood sugar and blood pressure slows progression of retinopathy and other ocular manifestations. All patients with diabetes mellitus should be in follow up at least annually for screening ocular changes.

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