



## EYE CHALLENGING LIFE OF A DIABETIC PERSON: A REVIEW

Dr. Juluri Krishna Dutta Tejaswi \*

Department of Pharmaceutical Analysis, A.K.R.G College of Pharmacy, Nallajerla,  
West Godavari (AP), India.

\*Corresponding author E-mail: [y2kteja@gmail.com](mailto:y2kteja@gmail.com)

### ARTICLE INFO

### ABSTRACT

#### Key words:

Diabetes, Retinopathy,  
Insulin, Resistance

Access this article online

Website:

<https://www.jgtps.com/>

Quick Response Code:



Diabetes mellitus (DM), a set of metabolic illnesses defined by chronically increased blood sucrose levels, is becoming more common across the world. As a result of pancreatic beta cell failure, inadequate insulin is formed. The total health burden incurred by DM will be driven by the severity of diabetic complications in different organs. The ocular surface, including the superficial and transparent cornea, is known to be involved in diabetes in various ways: this includes common diseases like dry eye and recurrent corneal erosions. Diabetes is the main cause of visual defect in the adult in the world. Diabetes causes problems in maximum parts of eye, like in retina it causes retinopathy affecting about 50–85% of people, in lens it causes cataract, in lids- lashes the xanthasma is more common, in conjunctiva the bacterial infections are more common as in diabetes they receive more nutrition and easy to proliferate, in cornea it causes karatopathy and it is more severe it is also linked to tear function abnormality. Diabetes is the well known major factor for visual impairment as there are 12000 to 24000 new cases of visual loss every year. By 2030, it is expected that more than 342 million individuals worldwide will have diabetes, with the degree of diabetic consequences in various organs determining the total health burden.

### INTRODUCTION

Diabetes mellitus (DM) is a metabolic disease defined by elevated blood glucose (BG). DM is a global epidemic and the prevalence is anticipated to continue to increase that currently affects about 150 million people worldwide and is expected to affect >200 million people by the year 2025. One of the most frequent complications of diabetes is diabetic retinopathy (DR), which is estimated to account for 80% of all cases of legal blindness in person's age 20–74 years in the USA and other European Countries. Initially, DR usually manifests as a gradual, painless progression of vision loss; however, visual loss may occur with vitreous haemorrhage or macular oedema (thickening of the central part of the back layer of the eye, the retina). Symptoms of DR and diabetes

May include general blurred and double vision, distorted vision, floaters (spots) in the field of vision, or changes in refractive error. Symptoms may fluctuate throughout each day and from day to day. The main stay of treatments for severe DR and macular oedema are laser photocoagulation for proliferative DR (PDR) and, in severe cases of PDR with vitreous haemorrhage and detachment threatening or involving the macula, vitrectomy. Diabetes can damage your eyes overtime, resulting in blurry vision or possibly blindness. Taking care of your diabetes, on the other hand, can help you avoid diabetic eye illness or keep it from worsening. Diabetic patient are more likely to develop glaucoma, cataracts, and other eye issues. Hyper-glycemia is hazardous to

practically all of body's cells. The cornea and retina are the most affected by hyperglycemia ophthalmic consequences. In diabetic tear film, glucose levels are four times greater than in control tears. Patient with high blood glucose level with corneal problems, also known as diabetic keratopathy, are approximately 70% of all diabetics. Diabetic retinopathy has higher prevalence and cause of blindness in adults over 50, with the retina accounting for the high amount of visual loss. Furthermore, vascular alterations in the diabetic choroid are comparable to those seen in the diabetic retina. The ocular complications of DM negatively impact the quality of life and carry an extremely high economic burden. While systemic control of BG can slow the ocular complications they cannot stop them, especially if clinical symptoms are already present. With the advances in biodegradable polymers, implantable ocular devices can slowly release medication to stop, and in some cases reverse, diabetic complications in the eye. In this review we discuss the important issue to address as new developments such as cellular, molecular biology and animal genetics have advanced considerably in the last few years.

**EPIDEMIOLOGY:** Type-1 diabetes, which has an autoimmune aetiology, affects about 10% of people and is most common in children and younger age group. Type-2 diabetes, on the other hand, accounts for 90% of cases and is linked to increased weight, insulin resistance. Up to 20% of patients come up with Type-2 diabetes may actually have type 1.5, or latent autoimmune diabetes, these patients are not fat and show no signs of insulin resistance. Type 1 insulin is generated to efficiently clear blood sucrose; type 2 insulin is formed to effectively clear blood glucose; type 3 insulin is produced (T2DM), which is characterised by insulin resistance. When the hormone fails to have an effect on the target cells, gestational diabetes mellitus (GDM), which arises while a woman is pregnant as there is resistance for release of Insulin.

**VARIOUS EYE PROBLEMS:** High blood glucose is not likely to cause visual damage in short term. It causes damage when patient change their diabetes treatment plan or

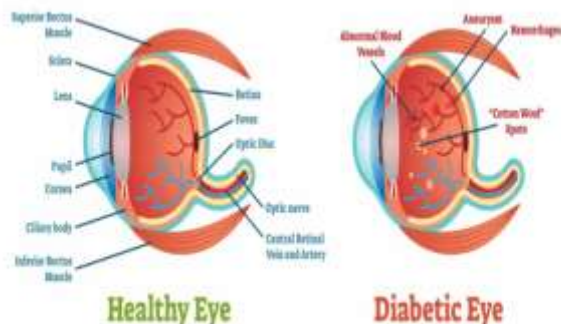
prescription, they may have blurry vision for a few days or weeks. Increase blood glucose levels might affect fluid levels or cause inflammatory process in the tissues that help you focus, resulting in blurred vision. This form of hazy vision is only temporary and will disappear as your blood glucose levels returns to normal. Blood sugar levels that remain increased for a brief period of time can harm the tiny blood vessels in the back of your eyes. Pre-diabetes is a condition in which blood sucrose echelons are increased than usual but not increased plenty to be called with diabetes. Arteries and vein that have been damage may leak intracellular fluid and produce oedema. It's also possible that new, weak arteries and vein will form. These veins can go into the eye's centre which is optic disc or macula, causing scarring or dangerously high pressure inside the eye. Blood vessel issues are the root of the majority of significant diabetic eye disorders.

**1. DIABETIC CORNEA:** Recurrent erosions, delayed wound healing, ulcers, and edema are all symptoms of cellular dysfunction and faulty repair processes in the diabetic cornea. Changes in the epithelial basement membrane also happen, which are probably related to epithelial dysfunction. In diabetic corneas, neuropathy causes a decrease of corneal sensitivity and innervations, which can be linked to corneal epithelial abnormalities. Corneal epithelial deficiencies are thought to be caused by neuropathy. Nephropathy, final-stage renal failure, peripheral neuropathy, and vision loss are examples of diabetes related microvascular consequences. The frequency of these consequences is strongly depending on the length of the condition and the patient's age. Dry eye, superficial punctate keratitis, recurrent corneal erosion syndrome, and persistent epithelial abnormalities are all more common in diabetic eyes as shown in **Fig.1**. Because the corneal epithelium is the eye's initial layer, it is continually vulnerable to wear and tear and must be replaced.

## **2. DIABETIC RETINA**

Diabetic retinopathy is a micro vascular condition in which serum seeps from the microvasculature, vascular leakage increases, and capillaries are destroyed starting in the

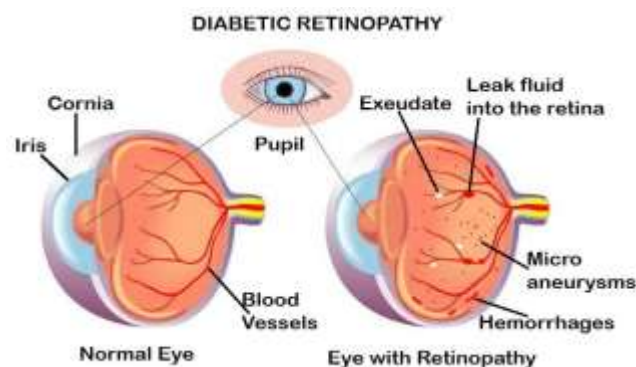
disease. Endothelial cells, pericytes, and neurons are toxic to heightened blood sucrose level and mitochondrial and outside cellular region reactive oxygen species, resulting in their demise early in Diabetic Retinopathy.



**Fig.1: Normal Eye and Diabetic Eye**  
**Cornea**

Low grade inflammation appears to be at the root of diabetic retinopathy vascular issues, according to mounting data. Inflammation is the body's general response to organ injury, during which white blood cells are drawn to the inflammatory area. Diabetic retinopathy is finest described as a persistent decreased-level inflammation with heightened systemic inflammation. The macula is the region of your retina that you use for reading, driving, and seeing faces. Diabetic macular oedema is the distension of the macula triggered by diabetes. This illness can progressively demolish the tubular vision in this zone of the eye, causing in visualisation loss. Macular edoema is highly common in diabetic retinopathy people who also have different symptoms. Diabetic retinopathy is happened by disturbance to the retina's blood vessels induced by diabetes. The retina is the back layer of tissue in the inner eye. Light and photos that comes the eye are converted into nerve impulses that are delivered to the brain. Diabetic retinopathy is the main cause of visual loss or blindness in those aged 20 to 74. This illness can disturb persons with type one or type two diabetes. Diabetic retinopathy typically has no symptoms in the early stages. Some people report changes in their vision, such as difficulty reading or seeing objects that are far away. These shifts can occur at any time. Blood vessels in the retina begin to bleed into the vitreous in the latter stages of the illness

(gel-like fluid that fills your eye). You may notice black, floating dots or streaks that resemble cobwebs if this happens. The spots may clear up on their own, but it's critical to get treatment as soon as possible. Without therapy, the bleeding may recur, worsen, or result in scarring. Diabetic retinopathy can progress to proliferative diabetic retinopathy, which is a more advanced manifestation. Damaged blood vessels seal off in this kind, foremost the retina to develop new, aberrant blood vessels. These new blood vessels are fragile, and they may leak into the transparent, jellylike fluid that fills your eye's centre vitreous. The retina might ultimately separate from the posterior of your eye due to scar tissue formed by the establishment of new blood vessels. If the new blood vessels barricade the usual flow of liquid out of the eye, compression in the eyeball might raise up. As a result, glaucoma develops as shown in **Fig.2**.

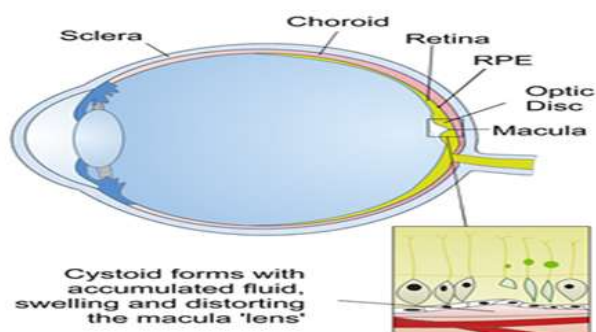


**Fig.2: Normal Eye and Diabetic Retinopathy.**

### 3. MACULAR OEDEMA

Diabetic Macular edoema (DME) is the most common cause od diabetic individuals moderate to severe vision loss. DME develops independently of the DR stage and should be assessed accordingly. Although central macular thickness does not directly correlate with visual acuity in diabetic eyes, there is a strong correlation between photoreceptor inner/outer segment junction unity and visual acuity. It's possible that the new blood vessels will outflow into the transparent, jelly like liquid that fills your eyes centre. Only a few black patches may seem if the amount of bleeding is negligible. Blood can plug the vitreous cavity and entirely obstruct your

vision in extra severe situations as shown in Fig.3.



**Fig.3: Diabetic Macular Edema:** In most cases, a vitreous haemorrhage does not outcome in permanent visual loss. Within a few weeks or months, the blood in the eye usually clears. Your eyesight will most likely recover to its original sharpness unless your retina is injured. Diabetic retinopathy causes abnormal blood vessels to form, causing scar tissue to form and the retina to retract away from the back of the eye. Floating dots in your vision, blinding flashes, or significant vision loss are all possible outcomes. New blood vessels can grow in the iris (front part of the eye), obstructing the normal flow of fluid out of the eye and causing pressure to build up. The nerve that communicates pictures from your eye to your brain might be spoiled by this pressure (optic nerve).

#### **SYMPTOMS OF DIABETIC EYE DISEASE**

- 1) Blurry or wavy vision
- 2) Frequently changing vision
- 3) Poor colour vision
- 4) Spots or dark strings
- 5) Flashes of light
- 6) floaters in the visual field
- 7) Trouble with bright lights
- 8) Difficulty reading small print
- 9) Total visual distortion to temporary loss of sight
- 10) Difficulty driving, especially at night
- 11) Loss of independence, especially mobility and increased fear of accidents
- 12) Had a profound impact on social activities

**PREVENTION:** Almost all existing therapies for DR are more successful when given sooner than later, which adds to the need for a comprehensive screening

programme. It's all the more terrible since in one research, more than half of the people who became blind from DR had never been examined. sic lifestyle changes have been known to decrease the level of risk of type 2 diabetes or delay its onset. Public should do the things to save and prevent Tyypr-2 diabetics and its complications like having normal body weight, be physically active by engaging in at least thirty minutes of more than normal intensity activity on most days.

For weight loss, increase physical activity; consume a balanced diet low in sucrose and saturated fats; and eliminate smoking, which raises danger of diabetes and cardiovascular disease. Other cost-diminishing measures include: Retinopathy screening and treatment, Blood Cholesterol control and early detection and prevention of diabetes related kidney damage. Type one diabetes necessitates the practise of insulin, but type-2 diabetics can be treated with oral drugs but necessitate the practice of insulin as well as blood pressure regulate and foot care means patient self care by keeping foot hygiene, wearing suitable footwear, looking for professional care for ulcer management and consistent examination of feet by health professionals. Request about a glycosylated haemoglobin test with your doctor. The glycosylated haemoglobin test, frequently known as the haemoglobin A1C test, measures your usual blood sugar level over the earlier 2 to 3 months. The A1C purpose for most persons with diabetes is to keep it around 7%. Uphold a healthy blood pressure and cholesterol level. Eating well-proportioned meals, exercising frequently, and diminishing weight can all help. Medication is occasionally compulsory as well. If you smoke or use other tobacco products, talk to your doctor about quitting. Smoking increases your probabilities of developing diabetes complications including diabetic retinopathy.

#### **CONCLUSION**

Finally, hyper-glycemia has a wide range of impacts on the eye. It grounds diabetic karatopathy in the cornea, and it destroys vascular and neuronal cells in the retina and choroid, either straight or meanderingly. The most oblivious treatment

is maintaining normo-glycemia or patient compliance. Basement membranes have collected hazardous progressive glycosylation finish products and cell death has happened after the eye has been exposed to hyperglycemia for a long time. Despite improved understanding of these visual disorders and the development of effective treatments, diabetes mellitus and associated ocular consequences remain a chief cause of blindness. All diabetic ocular problems can be avoided with early detection and treatment. As a result, regular eye check-ups are crucial to prevent diabetes-related vision loss. The chief goal in preventing ocular consequences of diabetes is to maintain good blood glucose management and to manage other systemic risk factors such as hypertension and hyperlipidemia.

**DECLARATION:** “I declare that the manuscript has not been published in any journal/Book or proceedings or in any other publication, or offered for publication elsewhere in substantially the same or abbreviated form, either in print or electronically.

#### **REFERENCES**

1. Xu KP, Li Y, Ljubimov AV, Yu FS. High glucose suppresses epidermal growth factor receptor/phosphatidylinositol 3-kinase/Akt signaling pathway and attenuates corneal epithelial wound healing. *Diabetes*. 2009, 2(3), Pg: 123-130.
2. Agai N, Murao T, Okamoto N, Ito Y. Kinetic analysis of the rate of corneal wound healing in Otsuka long-evans Tokushima Fatty rats, a model of type 2 diabetes mellitus. *Journal of Oleo Science*. 2010, 1(1), Pg: 101-110.
3. Kim J, Kim CS, Sohn E, Jeong IH, Kim H, Kim JS . Involvement of advanced glycation end products, oxidative stress and nuclear factor-kappaB in the development of diabetic keratopathy. *Graef Arch Clin Exp Ophthalmol Albrecht von Graef Arch Klin Exp Ophthalmol*. 2011, 3(6), Pg: 320-326.
4. Kaple, Meghali Narayan, Chandrashekhar C. Mahakalkar, Anita Kale, and Swati Shambharkar. “Correlation of Metal Ions in Diabetic Patients.” *Journal of Clinical and Diagnostic Research*. 2020, 14(5), Pg: 14–16.
5. Thakare, Pratiksha, And Ruchira Ankar. “To Assess The Knowledge Regarding Prevention Of Sign And Symptoms Of Diabetic Ketoacidosis Among Diabetes Patients In Selected Hospitals Of Wardha District.” *International Journal of Modern Agriculture*. 2020, 9( 3), Pg: 125–130.
6. Thakare PS, Ankar R. To Assess the Knowledge Regarding Signs and Symptoms of Diabetic Ketoacidosis and Its Prevention among Diabetes Patients in Wardha District, Maharashtra, India. *Journal of Evolution of Medical and Dental Sciences*. 2021, 10 (19), Pg: 1413–1416.
7. Thool AR, Dhande NK, Daigavane SV. Study of Correlation between Renal Function Test and Severity of Diabetic Retinopathy in Patients with Type 2 Diabetes Mellitus. *Journal of Evolution of Medical and Dental Sciences*, 2021, 17 (20), Pg: 1511–1514.
8. David P, Yeola M, Ankar R. Efficacy of Nursing Skin Care Protocol on Prevention of Skin Related Problems among Newly Diagnosed Diabetic Patients. *Journal of Pharmaceutical Research International*. 2021; 33(31a), Pg: 1–8.