



## THE PREVALENCE OF DRY EYE AND ITS RELATIONSHIP TO HBA1C LEVELS AMONG TYPE 2 DIABETIC PATIENTS

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**ABSTRACT** **Background:** Dry Eye is caused in diabetics due to diabetic neuropathy reducing corneal sensations and meibomian gland dysfunction. HbA1c > 6.5% is diagnostic of diabetes and is indicative of chronic persistent hyperglycemia. High HbA1c level is linked to many systemic and ocular complications. **Aims and Objectives:** To discover prevalence of Dry Eye among type 2 diabetics and to determine whether any correlation exists between HbA1c level and Dry Eye. **Study design:** Cross-sectional observational study performed in a medical college in West Bengal. **Methods:** 179 diabetics were tested using Schirmer's Test 1 and TBUT. HbA1c levels and duration of diabetes recorded. **Results:** Prevalence of Dry Eye was found to be 34%. No correlation was found between HbA1c and Dry Eye, positive correlation found between Dry Eye and duration of diabetes. **Conclusion:** Dry Eye is common in aged and prolonged sufferers of diabetes.

### KEYWORDS : Dry Eye, Diabetes, HbA1c

#### INTRODUCTION

Dry eye is defined as multifactorial disease of the ocular surface, characterized by inflammation, tear film instability and hyperosmolarity. [1]

It is an extremely common condition which often goes undiagnosed. The most common ocular symptoms are feelings of dryness, grittiness and burning that characteristically worsens over the course of the day.

Dry Eye prevalence has been found to range between 7.4-33.7% worldwide owing to demographical and climate variations. [2] In North India the prevalence was found to be 32% in a study conducted by Jeewan Singh Titiyal, et.al in 2018. [3]

India is one of the new global epicentres for Type 2 Diabetes. Diabetes is strongly associated with ocular conditions such as diabetic retinopathy, iridopathy, unstable refraction, recurrent styes, accelerated age-related cataract, neovascular glaucoma.

HbA1c reflects mean glycemia over last 3 months and should be measured every 3-6 months. The recommended target HbA1c level in most individuals is <7%. Studies have shown that maintenance of HbA1c within the recommended range can lead to reduction of microvascular complications of diabetes. [4]

Various studies have found the incidence of Dry Eye Disease to be higher among diabetics. In the study conducted by Seifart and Stremple, 70% of type 2 diabetic patients were diagnosed with Dry Eye Syndrome. [5]

Diabetes can lead to Dry Eye by various mechanisms. Disruption of the pathway for sorbitol metabolism can lead to impaired barrier function of cornea, disturbing the formation of tear-film. [6] Deficiency of aldolase reductase enzyme in diabetics can cause cellular damage, leading to lacrimal gland dysfunction. [7]

Diabetic neuropathy can lead to the loss of autonomic control of lacrimal gland, and corneal desensitization. [8]

Uncontrolled hyperglycemia can lead to the release of a cascade of pro-inflammatory cytokines involved in the pathogenesis of DES. [9]

Diabetes has been found to be associated with a high incidence of meibomian gland dysfunction. Patients of meibomian gland dysfunction suffer from evaporative Dry Eye and tear film hyperosmolarity. [10]

#### AIMS AND OBJECTIVES

To determine the prevalence of Dry Eye among type 2 diabetics To determine whether any relationship exists between levels of HbA1c and the occurrence of Dry Eye

#### METHODS

179 type 2 Diabetic patients presenting at the Eye OPD of RG Kar Medical College Kolkata from the period of April 2021 to March 2022 were included in the study. Ethical clearance was obtained.

#### Exclusion criteria –

chronic inflammatory and autoimmune diseases Patients with eyelid abnormalities Sjogren's syndrome (primary, secondary), rheumatoid arthritis, Parkinson's disease, and SLE.

Microbial infections of eye Patients on medications like antihistamines, oral contraceptives, antidepressants, and diuretics Smokers Patients who had undergone LASIK surgery and SICS Patients with vitamin A and D deficiency Each patient was examined for proper evaluation of lid margin, medial and lateral canthi of the eye. Blinking rates of the eyes were estimated and the patency of the nasolacrimal ducts were checked.

Schirmer Test 1 was performed with patient being made to sit in a temperate room with electric fan switched off. No. 41 Whatman filter paper was folded 5 mm from one end and introduced at the lower fornix at the junction of the middle and outer thirds of the lower eyelid. The patient was asked to keep the eyes open and blink regularly. After an interval of 5 minutes, the length of the wetted paper was measured. A reading above 10 mm was considered normal. Measurement of 10-8mm was graded as mild Dry Eye. Reading of 7-5mm was graded as moderate Dry Eye. Less than 5 mm length signified severe Dry Eye.

Tear Film Break-up Time was estimated with the help of a slit lamp biomicroscope with a broad beam cobalt blue light. Fluorescein strip impregnated with 2% fluorescein was placed briefly on the bulbar conjunctiva of the patient with a drop of saline. The patient was urged not to blink and the tear-film was examined. The 'break up time' was calculated as the time between a complete blink and the emergence of the first 'black spot or streak.' Five subsequent measurements were obtained on a regular basis. It was then computed to find out the mean value. If the mean break-up time of the patient was less than 10 seconds, the test was considered as 'positive' for Dry Eye.

The patients were questioned to find out the duration of diabetes.

#### RESULTS

A total of 179 Type 2 Diabetic patients presenting to the Eye OPD were evaluated for Dry Eye. Among these patients, 63 were male and 116 were female. The mean age of the study population was found to be 57.03 years.

Among the 61 cases of Dry Eye, 19.55% were found to suffer from the mild grade, 12.29% from the moderate grade and 2.23% from the severe grade of the disease.

The prevalence of Dry Eye was estimated to be 34.07%. The prevalence of Dry Eye among diabetics was found to be 38.3% in a case-control study conducted by De Freitas, et al. [11]

**Table 1: Comparison of Dry Eye with HbA1c level**

HbA1c level	Dry Eye Present	Dry Eye Absent
Good (6.5-7%)	22	33
Fair (7.1-8%)	20	53
Poor (>8%)	19	32

Using chi-square test, no significant correlation was found between Dry Eye and HbA1c level as p-value>.05 (p-value = 0.2811)

This finding aligns with the results of a similar study conducted by Olaniyan SI, et al at Ibadan, Nigeria among 189 diabetic patients.[12]

Among the cases of Dry Eye diagnosed in our study 19 were male and 42 were female. Prevalence of Dry Eye among male patients was found to be 30.16%. Prevalence among female patients was found to be 36.2%. Hence the prevalence of Dry Eye was found to be higher among females in our study. However, no statistical relationship exists between Dry Eye and sex. (p= .4228)

This result is similar to that obtained by Manaviat, et al among 199 type 2 Diabetic patients, which concluded that symptoms of Dry Eye were more common among older females. [13]

Our study found the highest prevalence of Dry Eye among the group of patients older than 70 years (58.33%).

**Table 2: Comparison of Dry Eye between Age Groups**

Age	Dry Eye Present	Dry Eye Absent	Prevalence of Dry Eye
<50 years	5	36	12.19%
50-59 years	18	44	29.03%
60-69 years	31	33	48.44%
>70 years	7	5	58.33%

Using chi-square test, significant correlation was found between Dry Eye and Age as p-value < .05 (p-value=.000354)

This finding falls in line with those obtained by previous studies, such as the one conducted by Xiabo Huang, et al at Shanghai, China. [14]

**Table 3: Comparison of Dry Eye with Duration of Diabetes**

Duration	Dry Eye Present	Dry Eye Absent	Prevalence of Dry Eye
0-5 years	9	40	18.37%
6-10 years	21	74	22.10%
>10 years	31	4	88.57%

Prevalence of Dry Eye is found to be very high between patients who have been suffering for more than 10 years with Type 2 Diabetes. Using chi-square test, significant correlation was found between Dry Eye and duration of Diabetes as p-value < .05.

This finding corresponds to that of the study conducted by Ying Lu, et al which found that in people with Type 2 Diabetes duration > 10 years, the value of Schirmer I Test was significantly lower when compared to the control group having duration ≤ 10 years. (p<.001) [15]

**CONCLUSION**

Diabetes causes Dry Eye due to lacrimal gland dysfunction as well as ocular surface denervation. Dry Eye can cause redness, pain, foreign body sensation, itching, watering, and blurring of vision. It can lead to ocular discomfort and poor quality of vision. The prevalence of dry eye among diabetics has been found to be as high as 30-40% in various studies conducted all around the globe. In the present-day scenario,

when the burden of type 2 Diabetes is rising to alarming levels in developing countries like India, it is expected that more and more patients will be affected by diabetes induced Dry Eye. Older patients with longer duration of Diabetes are more likely to develop Dry Eye. It is a common as well as treatable condition that often goes undiagnosed and causes persistent discomfort.

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