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# ORIGINAL ARTICLE

# Evaluation of ocular surface disorders in patients with diabetes mellitus

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***ABSTRACT:***

**Background:** Ocular surface disorders refer to a group of eye conditions that affect the outermost part of the eye, including the cornea and conjunctiva. The present study was conducted to evaluate ocular surface disorders in patients with diabetes mellitus. **Materials & Methods:** 60 diabetes mellitus patients with ocular surface disorders of both genders were enrolled. The two groups were formed. Patients with type II DM with ocular illness made up group I, and healthy controls made up group II. The tear film break-up time (BUT), Schirmer, fluorescein, and rose bengal dye tests were performed for each individual. **Results:** Out of 60 patients, males were 35 and females were 25. Tear function test was 8.21 seconds in group I and 13.7 seconds in group II, schirmer test was 8.82 mm in group I and 16.9 mm in group II, fluorescein staining was seen in 10 in group I and 4 in group II and Rose Bengal staining was positive in 20 in group I and 5 patients in group II. The difference was significant (P< 0.05). Tear film BUT and schirmer test found to be 10.9 seconds and 10.1 mm in good and 8.34 seconds and 6.86 mm in poor glycaemic control patients. Tear film BUT in patients with <10 years of diabetes was 9.29 seconds and >10 years of diabetes was 8.13 seconds. Schirmer test revealed 10.2 mm and 6.51 mm respectively. It was 9.57 seconds and 10.6 mm in NPDR and 7.81 seconds and 7.5 mm in PDR respectively. **Conclusion:** Type II diabetes raises the risk of tear dysfunction and ocular surface problems due to poor metabolic management, panretinal ALP, and PDR.

**Key words:** Ocular surface disorders, diabetes, cataract

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## INTRODUCTION

Ocular surface disorders refer to a group of eye conditions that affect the outermost part of the eye, including the cornea and conjunctiva. These disorders can cause discomfort, vision problems, and in some cases, significant damage to the eye.[1]One of the most common causes of blindness in people between the ages of 20 and 70 is diabetes. The well-known ocular consequences of diabetes include cataract and retinopathy.1 However, ocular surface issues have recently received more attention, particularly dry eye in diabetes individuals. Sometimes difficult to treat, diabetic keratoepitheliopathy causes quantitative and qualitative irregularities in tear production that reduce corneal sensitivity and impair the adherence of regenerated epithelial cells.[2]

Patients with diabetes mellitus (DM) frequently experience ocular surface abnormalities, including corneal epithelial fragility, decreased corneal sensitivity, aberrant wound healing, and an increased susceptibility to infected corneal ulcers.[3] Over the course of their lives, 47% to 64% of DM patients developed keratopathies. The progression of proliferative diabetic retinopathy, poorly managed serum glucose levels, peripheral neuropathy, and disease duration all linked with alterations on the eye's surface.[4]Reduced corneal sensitivity is seen in DM, and this is thought to have an adverse impact on the production of reflex tears.[5] Reduced tear break-up time in these people is caused by decreased goblet cell density in the conjunctiva as well as meibomian gland dysfunction. Additionally, it has been suggested that chronic illness may harm the lacrimal gland's microvascular supply, decreasing lacrimation.[6]The present study was conducted to evaluateocular surface disorders in patients with diabetes mellitus.

## MATERIALS & METHODS

The present study consisted of 60 diabetes mellitus patients with ocular surface disorders of both genders. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. According to the American Diabetes Association's criteria, uncontrolled diabetes was diagnosed if the fasting blood sugar was less than 126 mg/dl, the random blood sugar was 200 mg/dl with symptoms, or the postprandial 2-h plasma glucose was 200 mg/dl. The two groups were formed. Patients with type II DM with ocular illness made up group I, and healthy controls made up group II. The tear film break-up time (BUT), Schirmer, fluorescein, and rose bengal dye tests were performed for each individual. By injecting 0.5% tropicamide drops three times within 15 minutes, pupil dilatation was accomplished. The eyelid edge, tarsal and bulbar conjunctiva, and cornea received particular attention during the external ocular examination.Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

## RESULTS

**Table I Distribution of patients**

| Total- 60 | | |
|---|---|---|
| **Gender** | **Male** | **Female** |
| Number | 35 | 25 |

Table I shows that out of 60 patients, males were 35 and females were 25.

**Table II Assessment of tear function test**

| Parameters | Group I | Group II | P value |
|---|---|---|---|
| Tear film BUT (s) | 8.21 | 13.7 | 0.01 |
| Schirmer test (mm) | 8.82 | 16.9 | 0.03 |
| Fluorescein staining | 10 | 4 | 0.05 |
| Rose Bengal staining | 20 | 5 | 0.02 |

Table II, graph I shows that tear function test was 8.21 seconds in group I and 13.7 seconds in group II, schimer test was 8.82 mm in group I and 16.9 mm in group II, fluorescein staining was seen in 10 in group I and 4 in group II and Rose Bengal staining was positive in 20 in group I and 5 patients in group II. The difference was significant (P< 0.05).

**Graph I Assessment of tear function test**

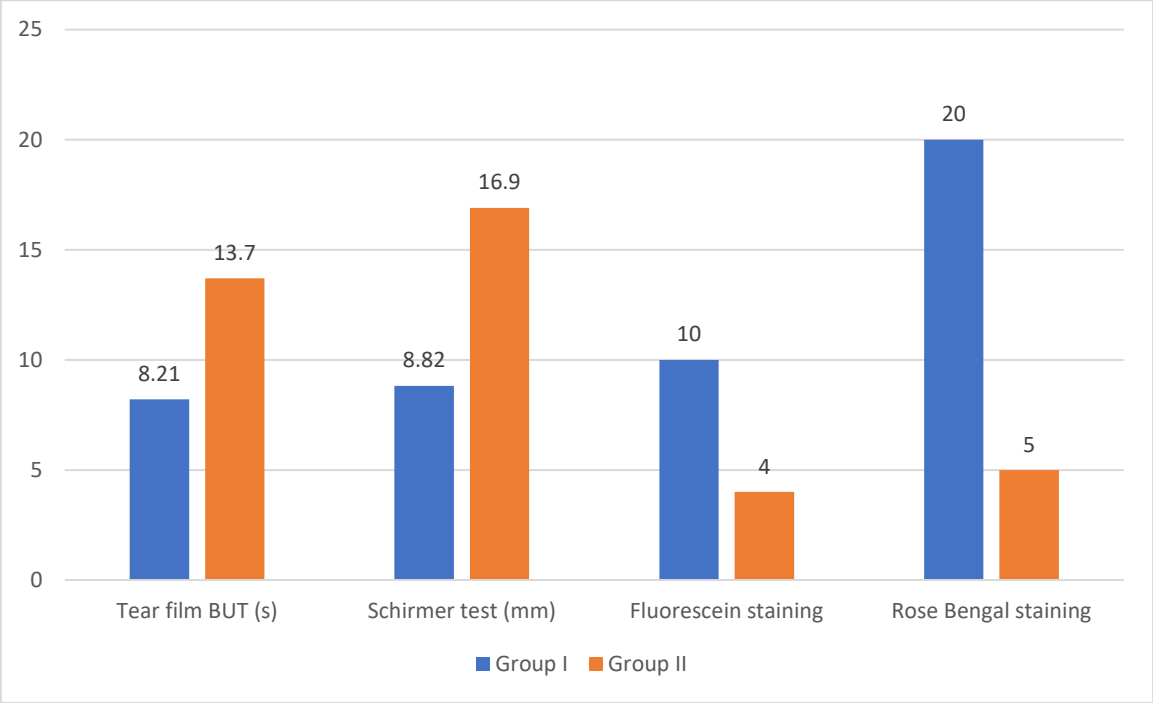


**Table III Relationship between tear function test and other parameters**

| Parameters | Variables | Tear film BUT (s) | Schirmer test (mm) |
|---|---|---|---|
| Glycaemic control | Good | 10.9 | 10.1 |
| | Poor | 8.34 | 6.86 |
| Duration of diabetes | <10 years | 9.29 | 10.2 |
| | >10 years | 8.13 | 6.51 |
| Stage of DRP | NPDR | 9.57 | 10.6 |
| | PDR | 7.81 | 7.5 |

Table III shows that tear film BUT and schirmer test found to be 10.9 seconds and 10.1 mm in good and 8.34 seconds and 6.86 mm in poor glycaemic control patients. Tear film BUT in patients with <10 years of diabetes was 9.29 seconds and >10 years of diabetes was 8.13 seconds. Schimer test revealed 10.2 mm and 6.51 mm respectively. It was 9.57 seconds and 10.6 mm in NPDR and 7.81 seconds and 7.5 mm in PDR respectively.

## DISCUSSION

Dry Eye Syndrome (Keratoconjunctivitis Sicca)occurs when the eyes do not produce enough tears or when the tears evaporate too quickly. This leads to

symptoms such as itching, burning, redness, and blurred vision.[7]Conjunctivitis is the inflammation of the conjunctiva, the thin, transparent membrane that covers the white part of the eye and the inside of the eyelids. It can be caused by viruses, bacteria, allergens, or irritants.Various conditions can affect the cornea, such as corneal abrasions, corneal ulcers, and corneal dystrophies.[8] These can result from injuries, infections, or genetic factors, leading to vision problems and discomfort.Tear osmolarity rises due to low tear production or excessive evaporation, which might further trigger the release of inflammatory mediators. In several publications, it has been underlined that the complications and management of diabetes mellitus are a common issue in the practice of ophthalmology.[9] Subjective symptoms are known to arise in diabetes patients with ocular surface diseases. Some writers have proposed that these issues are connected to tear dysfunction, despite the fact that the genesis of these disorders is not yet fully understood. Peripheral neuropathy, a common consequence of diabetes, may have an impact on the nerves feeding the tear glands and ocular surface.[10]The present study was conducted to evaluate ocular surface disorders in patients with diabetes mellitus.

We found that out of 60 patients, males were 35 and females were 25. Tear function test was 8.21 seconds in group I and 13.7 seconds in group II, schirmer test was 8.82 mm in group I and 16.9 mm in group II, fluorescein staining was seen in 10 in group I and 4 in group II and Rose Bengal staining was positive in 20 in group I and 5 patients in group II. In patients with type 2 diabetes, Ozdemir et al[11] assessed risk variables for ocular surface diseases and tear dysfunction. Diabetes patients had significantly poorer tear film BUT and Schirmer test results compared to controls. Significantly more people in the diabetic group than in the control group exhibited aberrant fluorescein and rose bengal stains. Poorer metabolic glucose management, panretinal ALP, and proliferative diabetic retinopathy were all linked with abnormal tear function tests but diabetes duration was not.

We found that tear film BUT and schirmer test found to be 10.9 seconds and 10.1 mm in good and 8.34 seconds and 6.86 mm in poor glycaemic control patients. Tear film BUT in patients with <10 years of diabetes was 9.29 seconds and >10 years of diabetes was 8.13 seconds. Schirmer test revealed 10.2 mm and 6.51 mm respectively. It was 9.57 seconds and 10.6 mm in NPDR and 7.81 seconds and 7.5 mm in PDR respectively. It had been suggested that one or more of the following initial events may lead to the alterations described in the tear film and ocular surface of diabetic patients: a) chronic hyperglycemia, b) corneal nerve damage and c) impairment on insulin action.Those events contribute to tissue injury and may create an environment for inflammation, as a non-specific response that increases and perpetuates the tissue injury.[12] As observed before, inflammatory proteins are produced and are implicated in diabetic complications in the early and subclinical stages of disease. The progressive peripheral neural damage is an example of afferent and efferent neural signaling pathway, that once damaged, as in neurotrophic keratitis interrupts the anti-inflammatory neural feedback.Insulin exerts important metabolic and mitogenic effects on several target tissues through the mediation of nutrient influx, energy storage, gene expression and protein synthesis. Exocrine gland secretions such as tears, saliva and milk contain insulin, which support the metabolism and growth of these glands.[13]Their relevance for corneal and lacrimal gland epithelial cell proliferation and culture maintenance was also indicated.

The limitation of the study is small sample size.

## CONCLUSION

Authors found that type II diabetes raises the risk of tear dysfunction and ocular surface problems due to poor metabolic management, panretinal ALP, and PDR.

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