



Evaluation of Dry Eye Syndrome in Type 2 Diabetes

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Abstract

Introduction

Diabetes is an important systemic risk factor for dry eye disease. The present study is done to evaluate dry eye syndrome in patients of type 2 diabetes mellitus.

Materials And Methods

The Schirmer I test and tear film breakup time (TBUT) were evaluated in 200 patients of diabetes.

Results

124 diabetic patients (62%) had dry eye syndrome. Dry eye syndrome was higher in older population (32%) and is directly co related to duration of diabetes. Majority of patients had mild-moderate dry eye syndrome.

Conclusion

Examination of dry eye should be an integral part of the assessment of diabetic eye disease

Keywords: Dry eye, Diabetes mellitus, Schirmer Test, Tear film break-up time

Introduction

The prevalence of diabetes mellitus (DM) has increased significantly in the past several decades and the disease continues to remain a global epidemic. Estimates suggest that 439 million people in the world are likely to have DM by 2030 and this increase in number of diabetics is predicted to be disproportionately more in developing countries ⁽¹⁾. People with diabetes are also prone for ocular surface disease that includes dry eye, persistent epithelial defects, decreased corneal sensation, and tear film dysfunction. Studies have shown an intimate, complex relationship between diabetes, dry eye, and ocular surface abnormalities. ^(2,3) Diabetes mellitus (DM) has been identified as one of the leading systemic risk factors for dry eye syndrome (DES). The reported prevalence of DES in diabetics is 15–33% in those over 65 years of age and increases with age and is 50% more common in women than in men ⁽⁴⁾. The cornea is one of the most densely innervated

parts of the human body containing myelinated A- δ and unmyelinated C fibres, deriving its innervation from the ophthalmic division of the trigeminal nerve. Recent data suggested that patients with polyneuropathy have corneal nerve fibre damage and reduced corneal sensitivity ⁽⁵⁾. According to the International Dry Eye Workshop (DEWS), the reduced corneal sensitivity favours the occurrence of DES in two ways: first by decreasing the reflex-induced lacrimal secretion and second by reducing the blink rate and increasing evaporative tear loss ⁽⁶⁾

Chronic hyperglycemia, diabetic periphery neuropathy, decreased insulin levels, microvasculopathy, and systemic hyperosmotic disturbances are risk factors for diabetes-associated DES.

Diabetic patients with dry eye may have the same symptoms as DES without diabetes. One of the most

common reasons for dryness is aging process. The mechanism responsible for dry eyes is unclear⁽⁷⁾, but autonomic dysfunction may be responsible⁽⁸⁾. Aldose reductase, the first enzyme of the sorbitol pathway, may also be involved⁽⁹⁾. The oral administration of aldose reductase inhibitors has been shown to improve the tear dynamics significantly⁽¹⁰⁾. The symptoms of dry eye includes gritty sensation, soreness, decreased visual acuity, photophobia, itching, decreased goblet cell density and corneal sensitivity, and tearing and pain concomitant with abnormalities in TBUT, Schirmer's test, and corneal staining. In severe cases, it may be complicated by corneal lesions, conjunctivitis, keratopathy, and inflammation. It has been reported that gritty sensation is the most prominent symptom followed by the abnormalities of the tear film in patients with DMDES. The aim of this study is to evaluate prevalence and severity of dry eye in type 2 diabetic patients.

Materials And Methods

A cross sectional study was conducted on patients after taking written and informed consent in department of Ophthalmology for a period of 6 months who are diagnosed with type 2 diabetes mellitus of more than 5 years duration. patients with corneal abnormalities, lid abnormalities (ectropion, entropion, lid lag, lagophthalmos), connective tissue disorder, ocular trauma, ocular surgery, patients with contact lenses, pregnant women, smokers, drugs like antihistaminic, oral contraceptives, diuretics, antidepressants were excluded from the study. A minimum sample size of 200 was calculated by using EPI Software version 2.6 considering confidence limit of 95%. The data was entered and analyzed using IBM SPSS statistics. The study protocol was approved by the Institutional Ethics Committee, and the study was conducted according to the principles of the Declaration of Helsinki.

Detailed history regarding duration of diabetes, treatment taken and glycemic control was noted. Thorough ocular evaluation was done on all selected patients both clinically as well as with the help of diagnostic instruments. Visual Acuity was measured using Snellen's charts. Both uncorrected and best corrected visual acuities were noted. Anterior segment evaluation by diffuse torch light and slit

lamp examination was done to look for neovascularization of iris, diabetic cataract. Detailed fundus examination was done with indirect ophthalmoscopy. The Schirmer I test and tear film breakup time (TBUT) were evaluated. Dry eyes were suspected on the basis of a history of ocular discomfort, including soreness, gritty sensation, itchiness, redness, blurred vision that improves with blinking, and excessive tearing.

Tear Film Breakup Time- Moistened with no preservative saline fluorescein strips (Omni Strips Fluro; Ophthalmic Strips U.S.P.) were introduced into the conjunctival sac with minimal stimulation, undetected by the patients. The individuals were then instructed to blink several times for a few seconds to ensure adequate mixing of fluorescein. The tear film was examined with a broad beam and a cobalt blue filter. The interval between the last complete blink and the appearance of the first corneal black spot or line in the stained tear film was measured using a stopwatch. A TBUT value more than 10s was considered normal, a value of 8–10 s was considered mild dryness, a value of 5–7 s was considered moderate dryness, and a value less than 5 s was considered severe dryness.

Schirmer's Test- Schirmer test I without topical anaesthesia (total tear secretion) was carried out with standardized strips. The strip was folded at the notch and placed at the junction of the middle and lateral thirds of the lower eyelids and allowed to stay in place for 5 min with patient's eyes gently closed. The filter paper was removed, and the amount of wetting was measured. More than 10 mm of wetting after 5 min was considered normal, 8–10 mm of wetting was considered mild dryness, 5–7 mm of wetting was considered moderate dryness, and less than 5 mm of wetting was considered severe dryness at the end of 5 min.

patient was labelled as dry eye syndrome if any one of the tests (tbut or schirmer's test) was abnormal.

Results-

Out of 200 type 2 diabetic patients, 124 patients had dry eye syndrome, in which 32% were males and 30% were females. But there was no significant association between sex and frequency of dry eye syndrome.

GENDER	DIABETIC WITH DRY EYE SYNDROME	DIABETIC WITHOUT DRY EYE SYNDROME	TOTAL
MALES	64	46	110
FEMALES	60	30	90

Table no 1 : gender predisposition of dry eye syndrome in diabetic patients

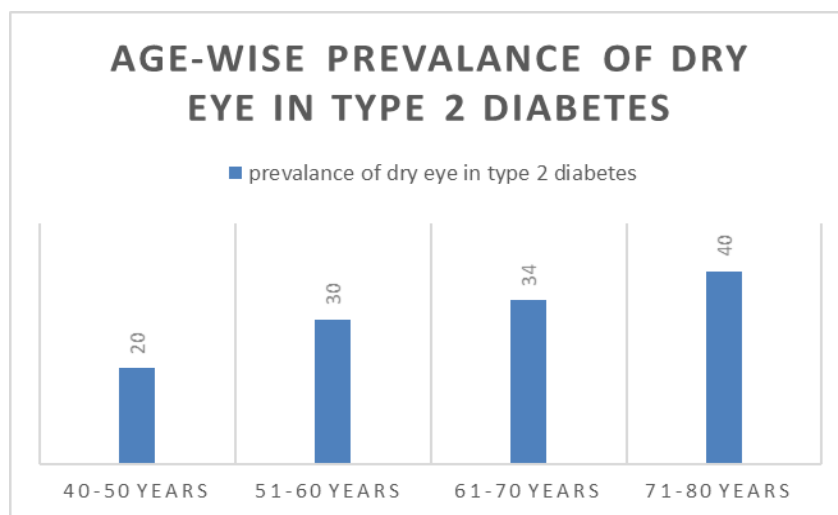


Figure 1

Frequency of dry eye was highest in age group 71-80 years (32%) and lowest in age group 40-50 years (16%) (figure 1).

Out of 65 % patients with dry eye, the mean duration of diabetes was 10 ± 6.4 years; while the duration of diabetes was 5 ± 4.5 years in patients without dry eye. A significant association was observed between duration of diabetes and dry eye syndrome.

Out of 124 dry eye patients, 70% patients had complaints of gritty sensation, 30% had complaints of heaviness / soreness whereas none of them had complaints of pain, tearing and photophobia.

61% patients had abnormal TBUT and 63.5% patients had abnormal Schirmer’s test (table 2). None of them had severe dry eye and abnormal corneal staining.

	TBUT	Schirmer’s test
Normal	76	80
Mild	59	63
Moderate	65	57
Severe	0	0

Table no 2

Discussion-

In our study, dry eye was assessed by TBUT and Schirmer's test done in patients with diabetes. It was found in our study that, 62% of the patients suffering from diabetes mellitus had dry eye symptoms associated.

Diabetes is an important systemic risk factor for dry eye disease. According to a Canadian Dry Eye epidemiology study, thirty seven percent of patients with diabetes had dry eye symptoms. The prevalence of dry eye in Indian population was 18.4% as reported by Sahai Ansu *et al* ⁽¹¹⁾. The prevalence of dry eye in diabetes mellitus has been varying in different studies. Hom and De Land reported that 53% of patients with either diabetes or borderline diabetes had self-reported, clinically relevant dry eyes ⁽¹²⁾. Ozdemir *et al.* ⁽¹³⁾ in his study did find that TBUT and Schirmer's test values were significantly lower in diabetic patients compared with controls ($P < 0.001$). One more study showed the changes in tear film and ocular surface in patients with diabetes which showed corneal sensitivity, TBUT, total and basal tear secretions were significantly lower in the diabetic group compared with the control group ⁽¹⁴⁾. Another study was done on the amount of tear production and stability of the tear film in diabetic and nondiabetic individuals was carried out to detect the possible tear film abnormalities in type 2 diabetic patients which showed significant decreased values of TBUT and Schirmer's test in diabetic group than the control group ⁽¹⁵⁾.

Goebbels M ⁽¹⁶⁾ reported decreased Schirmer 1 test values in the patients with diabetes. He suggested that amount of the reflex tearing is lowered in the diabetics which may be due to diminished corneal and conjunctival sensations or may be due to neuropathy involving the innervations of the Lacrimal gland Dogru *et al* ⁽¹⁷⁾ reported 22.7% of the diabetics had Schirmer test value < 5 millimetres. A severe diabetes mellitus associated dry eye disease leads to visual impairment, corneal scarring, and ulcers, leading to secondary bacterial infections. Tear film dysfunction not only leads to the occurrence of dry eye but simultaneously aggravates the ocular surface, which induces a corneal epithelial defect which is a common sign in diabetics ⁽¹⁸⁾.

Our study showed that mild to moderate degree of dry eye syndrome was seen in 62% of type 2 diabetic patients. None of them had severe dry eye syndrome

of corneal. Similar results were found in Masoud Reza Manaviat's study (19).

Prevalence of dry eye is very high in our study. It might be due to hot and dry atmospheric condition in our region. Lack of control group and glycaemic assessment, specially HbA1c could be limitation of our study.

Conclusion:

Though there is mild to moderate level of dry eye syndrome in type 2 diabetic patients, the prevalence is very high among diabetic. So thorough dry eye evaluation should be an integral part of assessment of diabetic eye disease.

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