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Prevalence of dry eye syndrome at patients with diabetus melitus tip 2, one year retrospective study May 2011-June 2012

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ABSTRACT

Objective: To prescribe and analyze the correlation of Dry Eye and Diabetes Mellitus Tip II, at Polyclinic of Specialties Nr. 2 Ophthalmology service, between May 2011 and June 2012. **Methods:** A total number of 223 patients diagnosed with Diabetes Mellitus Tip II underwent ocular examinations. 120 male and 103 female, aged from 24-73 years old. To confirm the presence of diabetes among these patients fasting blood glucose level was performed (normal limit < 110 mg/dL). History of disease, duration of diabetes, age, sex was obtained by reviewing the medical records and direct patient interview. Also the patients complains: tearing photophobia, red eye, itching ,foreign body sensation, blurred vision was recorded. From the study were excluded all conditions which affects the tear film stability and contact lens wearer. **Results:** 118 patients were diagnosed with Dry Eye Syndrome of varying degrees. 58 male/61 female. The diagnosis was made by heaving two or more positive tests performed as mentioned above, and referring to patients complains. Fourteen patients represent pinpoint corneal dye with fluorosceini, forty-six patients was positive to cotton swab test diminution of corneal sensitivity, eighty-nine patients was positive to Schirmmer test less than 10 mm, positive TBUT test less than 9 s was found to be the amount of seventy-one patients. Positive tear meniscus at inferior lid margin was found at fifty-six patients. Dry eye is a disorder of tear film because of tear deficiency or excessive tear evaporation which causes damage to the inter palpaberal ocular surface and is associated with symptoms of ocular discomfort. This ocular disorder is very common among general population with 28% of the adults having dry eye syndrome. Early diagnosis and timely treatment, complications as secondary microbial infection and corneal ulceration could be avoided. **Conclusions:** In our study the Dry Eye Syndrome showed to have a high correlation with Diabetes Mellitus Tip II (about 52.9%). Prevalence of Dry Eye was significantly higher at patients with longer duration of diabetes. Dry Eye seems to be an important contributing factor related to corneal abnormalities. Age and sex not seem to play any important role in this condition. Good glycemic control is important for prevention and control of Dry Eye Syndrome.

1. Introduction

Diabetes is one of the most common leading causes of blindness in 20-74 year old persons. Cataract and retinopathy are well-known as ocular complications of diabetes. Recently, problems involving the ocular surface, dry eyes in particular, have been reported in diabetic patients. These patients suffer from a variety of corneal complications including superficial punctuate keratopathy, trophic ulceration, and persistent epithelial defect. Dry eye (Figure 2) is an important contributor to these problems.

Dry eye syndrome has many causes. One of the most

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common reasons for dryness is aging process.

The mechanism responsible for dry eyes is unclear, but autonomic dysfunction may be responsible. Aldose reductase, the first enzyme of the sorbitol pathway, may also be involved.

Dry eye can lead to vision deficit, scarring and perforation of the cornea and secondary bacterial infection. Dry eye affects 10% to 15% of adults. It refers to disorder of tear film caused by reduced tear production, poor tear quality or excessive tear evaporation (Figure 1).

If this syndrome is diagnosed at first stage and treated, would be protected from its complications. Therefore early diagnosis of dry eye syndrome in diabetic patients is important for beginning of treatment in early stages.

2. Materials and methods

A total number of 223 patients diagnosed with Diabetes Mellitus Tip II underwent ocular examinations. 120 male and 103 female, aged from 24-73 years old. To confirm the presence of diabetes among these patients fasting blood glucose level was performed (normal limit < 110 mg/dL). History of disease, duration of diabetes, age, sex was obtained by reviewing the medical records and direct patient interview. Also the patients complain: tearing, photophobia, red eye, itching, foreign body sensation, blurred vision was recorded. From the study were excluded all conditions which affects the tear film stability and contact lens wearer.

Routine ophthalmic examination was performed. Visual acuity was recorded by using Snellen's chart. Slit lamp (Nidek SL-450) examination (Figure 3) was performed with particular attention to lid margin, bulbar and tarsal conjunctiva and cornea. Binocular fundus examinations were carried out in each patient. Tear film tests, as Schirmmer's test, cotton-swab test for the corneal sensitivity damage and Tear film break-up time test were performed on these eyes.

Tear film breakup time test measurement (Figure 5) was performed using fluorescein strips (Fluorets strips by Chauvin Pharmaceuticals Ltd), which were introduced in the conjunctival sac with minimal stimulation. The patient was asked to blink several times and then to keep the eyes open. Cornea was examined under cobalt blue filter on slit lamp. The dry area was indicated by the presence of a black spot. The time between the last blink and the appearance of a random dry spot was recorded in seconds as the tear film breakup time (TUBT).

The test was repeated three times and average was recorded. The test was considered positive if average tear film breakup time was less than 10 s. A cotton swab was used testing the corneal sensitivity by touching with the cotton swab the cornea genteelly for few seconds .The test is positive if the patient doesn't close immediately the eyes when doing the test.

This mean that the corneal sensitivity is not intact and the damage occurr in the neurological corneal fibers. Statistical analysis was done by SPSS version 12. Sensitivity and specificity of Tear Film Break-Up Time Test was calculated taking Schirmer's test (Figure 4) as gold standard.

3. Results

118 patients were diagnosed with Dry Eye Syndrome of varying degrees. Classification was made by using Delphi dry eye index (Figure 9). Of those patients diagnosed with drye eye 58 where male and 61 female. The diagnosis was made by heaving two or more positive tests performed as mentioned above and referring to patients complains[2]: tearing photophobia, red eye, itching, foreign body sensation, blurred vision.

Fasting blood glucose level was performed (normal limit < 110 mg/dL) all the patients had the different levels of fasting blood glucose > 120 mg/dL. Total number of eyes subjected to slit lamp examination and diagnostic tests were 446. Duration of Diabetes varied between just diagnosed with diabetes mellitus type 2 and 20 years of suffering. Seventy-five patients (37.21%) had good control of their diabetes.

Hounded-nine eyes (25.17%) had non-proliferative diabetic retinopathy and hounded-fifty-one eyes (31.79 %) had proliferative diabetic retinopathy. Hundred-eighty-six eyes of (42.96%) did not show diabetic retinopathy. At 118 examined and diagnosed patients with Dry eye Syndrome fourteen (44.09%) patients represent pinpoint corneal dye with fluorosceini (Figure 6) forty-six (45.58%) patients was positive to cotton swab test diminution of corneal sensitivity, eighty-nine (79.29%) patients was positive to Schirmmer test less than 10 mm, positive TBUT test less than 9 s was found to be the amount of seventy-one (69.37%) patients. Positive tear meniscus at inferior lid margin (Figure 7) was found at fifty-six (66.67%) patients.

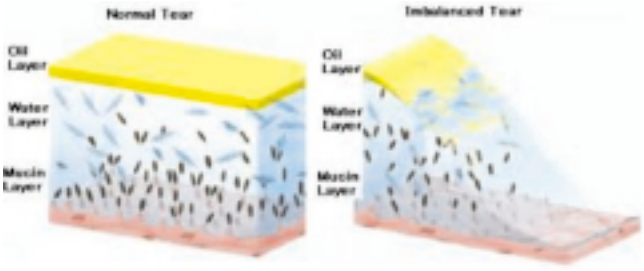

Figure 1. Normal tear film layer and abnormal tear film layer.

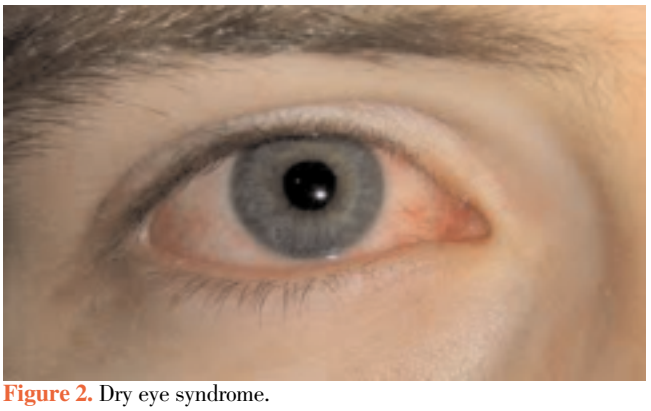

Figure 2. Dry eye syndrome.

Figure 3. Slit lamp examination.

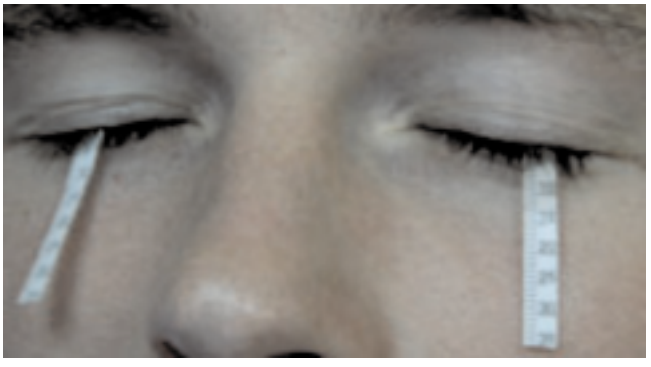

Figure 4. Scirmmer test.

Figure 5. TUBT test.

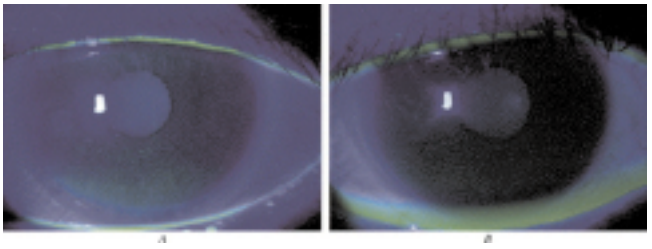

Figure 6. Inferior punctuate keratopathy.

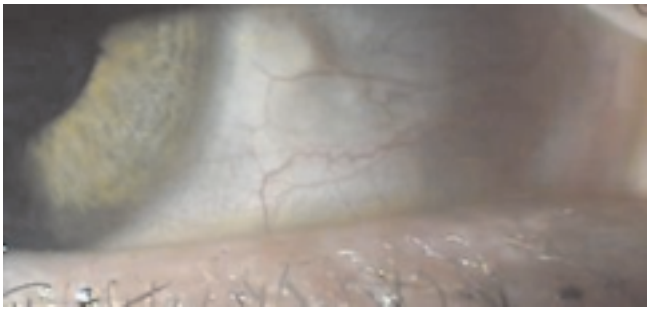

Figure 7. Thin tear meniscus.

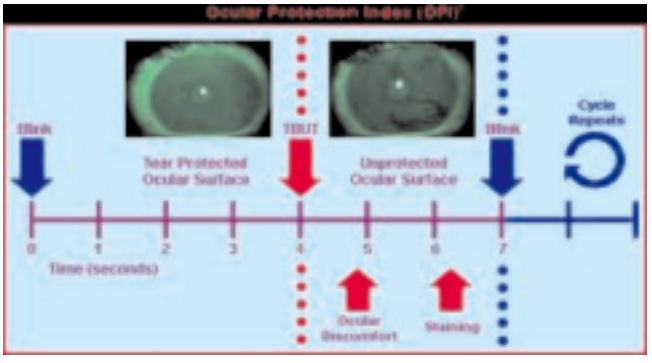

Figure 8. Ocular protection index TBUT.

Figure 9. Delphi panel for classification of dry eye.

4. Discussion

Dry eye[1] is a disorder of tear film because of tear deficiency or excessive tear evaporation which causes damage to the inter palpaberal ocular surface and is associated with symptoms of ocular discomfort. This ocular disorder is very common among general population with 28% of the adults having dry eye syndrome.

Early diagnosis and timely treatment complications as secondary microbial infection and corneal ulceration could be avoided. Etiological factors for dry eye syndrome are: increasing age, when the secretion of tears from the Lacrimal Gland decreases and reaches a borderline at 60 years of age.

Hormonal changes, commonly seen among menopausal women related to reduced level of androgens produced by the ovaries, autoimmune diseases as Sjogren's syndrome, Cicatricial Pemphigoid, and Erythema Multiforme. Pharmacological agents as antidepressants, anxiolytics, antihistamines, anticholinergics, antihypertensives, antipsychotics, antiparkinsonians, diuretics and vitamin A deficiency cause Dry Eyes.

Vitamin A has a specific effect on mucin production by the epithelium. Mucin is the agent responsible for wetting of the corneal surface and its deficient production affects tear film stability (Figure 1).

Dry eye can also be caused by inflammatory diseases or trauma to the Lacrimal Gland responsible for secretion of tear film constituents. Deficit afferent innervation due to trigeminal anaesthesia, contact lens wear and following laser *in situ* keratomileusis (LASIK) and deficit efferent innervation due to facial nerve paralysis often results in Dry Eye symptoms.

Corneal defects as corneal epitheliopathy or corneal dystrophy and eyelid disorders as ectropion and lagophthalmos causes failure of tears to spread over the ocular surface resulting in dry eye syndrome. The term "dry eye" may be applied to three different conditions.

The symptom is ocular dryness. The syndrome is the group of associated clinical manifestations: itching, redness, foreign body sensation, photophobia, and Blepharospasm. A large variety of diseases is associated with dry eye and includes blink disorders, Trachoma and Blepharitis. Blepharitis causes dysfunction of meibomian glands and lipid component of the tear film as a result tear evaporation increases hence leading to dry eyes. Dry eye is a significant feature of diabetes mellitus[13] in which accumulation of sorbitol by the action of aldose reductase on excess glucose contributes to the alteration in epithelium and endothelium and corneal hypoasthaesia.

Patients with diabetes have Dry Eye Syndrome more often than those without Diabetes. Diabetes Mellitus[3] is a systemic disease which is often accompanied by microvascular complications such as neuropathy, nephropathy and retinopathy. The prevalence of diabetic microvascular complications is higher in patients with longer duration of diabetes. These individuals are at an increased risk of developing Dry Eye Syndrome. Seifart and associates demonstrated that diabetic patients had an increased rate of Keratoconjunctivitis sicca[16] which may be attributed to decreased corneal sensitivity, neuropathy involving innervations of lacrimal glands and loss of goblet cells. The ocular complications which occur in association with diabetes mellitus can lead to blindness.

Schultz et al reported 47% to 64% of diabetic patients having corneal lesions as persistent epithelial defects, delayed epithelial healing, corneal ulceration and Keratoconjunctivitis sicca. Structural, metabolic and functional abnormalities are found in the conjunctiva and cornea of diabetic patients[17]. These abnormalities may be responsible for clinical corneal manifestation of diabetes.

The tear film has also been reported to be unstable[4]. Diabetic patients often complain of Dry Eye Symptoms as burning and foreign body sensation[5]. Most of our patients aged between 45 to 75 years presented with complaints of redness and burning sensation. Moss and associates have also reported a high incidence of dry eye among females 16.7% compared to males 11.4%. 3 Nepp and associates have shown that severity of Keratoconjunctivitis sicca correlates with severity of diabetic retinopathy[17].

Most of our diabetic patients had fasting blood glucose level between 120 mg/dL to 180 mg/dL (normal limit = 110 mg/dL), showing that these patients did not have a good glycaemic control. Kaiserman and associates have reported that good blood sugar regulation is important for prevention and control of dry eye syndrome among diabetic patients[3].

Most of our diabetic patients had a fasting blood sugar level more than 110 mg/dL, depicting a poor glycaemic control. We performed tear film tests such as Schirmer's test, Tear film meniscus ai inferior lid margin and Tear Film Break up time test on 446 eyes of these 223 patients. In our diabetic patients, 79.29% of the eyes had a positive Schirmer's test.

This could be attributed to the damage of microvasculature of the lacrimal gland, with autonomic neuropathy leading to impaired function of the lacrimal gland. Goebbel has reported that the Schirmer's test reading is significantly reduced among diabetics[5].

Kaiserman et al[3] have also reported that the prevalence of dry eye[7] increases with age. Tear Film Break-Up Time test was positive among 69.37% of diabetic eyes. This is a very non-specific test for determination of tear film stability[5]; it indicates the integrity of the lipid layer of tear film which may also be affected in Meibomian Gland Dysfunction[12].

In our study the Dry Eye Syndrome showed to have a high correlation with Diabetes Mellitus Tip II (about 52.9%). Prevalence of Dry Eye was signifcantly higher at patients with longer duration of diabetes. Dry Eye seems to be an important contributing factor related to cornea abnormalities. Age and sex not seem to play any important role in this condition. Good glycemic control is important for prevention and control of dry eye syndrome.

Keeping blood sugar levels as tightly controlled as possible is the first step in preventing and remedying dry eye syndrome associated with diabetes. Not only does chronically high blood glucose lead to autonomic neuropathy affecting the tear gland, it also affects the quality of our tears by increasing the amount of glucose in those tears and disrupting their normal chemical composition, a factor that also contributes to symptoms of dry eye.

Conflict of interest statement

We declare that we have no conflict of interest.

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