The relationship of dry eye syndrome with diabetic retinopathy in non-insulin dependent diabetic patients.

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ABSTRACT

Background: Diabetes is the most common systemic disease and dry eye syndrome is one of the ocular complications in diabetes. Our aim was to determine the relationship between dry eye and proliferative diabetic retinopathy (PDR) and non proliferative diabetic retinopathy (NPDR). Materials and Methods: In this study, 150 eyes of 100 patients with NIDDM and 50 non-diabetic persons examined for evaluation of dry eye syndrome. The subjects were divided into three groups: the first group including PDR patients, Group II NPDR patients and Group III controls. Schirmer test I, II and basic secretion test was done. Results: 56% of patients with PDR and 50% with NPDR and 54% of controls were male and mean age ± SD) was 59.7 ± 12.2 in PDR patients, 59.3 ± 9.0 in NPDR patients and 50.5 ± 14.2 in controls. Mean (± SD) of disease duration in PDR was 11.9 ± 6.8, and 13.5 ± 9.2 in NPDR. Prevalence of dry eye in patients with PDR was 68%, in patients with NPDR 18% and 4% in control. Prevalence of dry eye in patients with PDR was significantly higher than control. There was a significant correlation between duration of disease and dry eye syndrome. Conclusion: Dry eye is one of the complications in non-insulin-dependent diabetes mellitus (NIDDM) and its prevalence was higher in PDR patients than controls. Diabetes duration had a significant relation with dry eye syndrome. It is recommended that diabetic patients especially with more disease duration evaluated for dry eye during ophthalmic examination.

INTRODUCTION

Diabetes is the most common systemic disease. Global incidence of diabetes mellitus has increased dramatically over the two past decades. Furthermore, the prevalence of diabetes increased due to obesity and decreased physical activity in older age, so that in reached to 20% in persons over 65 years of age. Diabetes affects many organs, including the eye. Ocular involvement in diabetes, include diabetic retinopathy, neovascular glaucoma, cataract, changes in refractive errors, Ptosis, ophthalmic nerve paralysis and dry eye syndrome. [1]

Diabetic retinopathy is a common complication in diabetes and if untreated, can result in higher health care costs and reduced quality of life. [2]

Diabetic retinopathy is a major cause of blindness in the world and has two stages: proliferative diabetic retinopathy (PDR) and non proliferative diabetic retinopathy (NPDR)

Dry eye syndrome occurred due to decrease of tear production, changes in the quality or excessive evaporation of tears. This condition is one of the diabetes complications which presented with signs of burning, pain, foreign body sensation, and loss of vision in some cases. [3] In prolonged diabetes, destruction of small vessels in lacrimal gland associated with autonomic neuropathy impair tears production. [4] Patients often complain of dry eye symptoms and in Schirmer test, decreasing of tear production is observed. [5] Also, the composition and the protein content of tears changes in diabetic patients as compared with healthy persons. [6-9] There are several studies which assessed the relationship between diabetes and dry eyes, and in most cases this relation has been confirmed, [5, 10, 11] however, in some studies, decreased tear production or increased tear film evaporation has not been observed in patients with insulin-dependent diabetes mellitus. [5]

There is another important issue in patients with diabetes that the corneal sensation reduced in them, which may decrease tear production. In two studies by Duane and Neville (1961) and Nep and colleagues (2000) on
corneal sensation in patients with diabetes they showed that corneal sensation is reduced [12, 13] With due attention to decreased corneal sensation in diabetic patients, the true prevalence of dry eye syndrome is not clear on the basis of clinical symptoms. [13] This study aimed to assess the prevalence of dry eye syndrome in NIDDM based on clinical tests.

**MATERIALS AND METHODS**

In a study, diabetic patients who referred to ophthalmology clinic after determining the type and stage of retinopathy by ophthalmologist and explain the goals and study methods for them enrolled in study. Totally, fifty patients with PDR, fifty with NPDR and fifty healthy subjects with similar demographic conditions were enrolled. All patients who had a history of eye and eyelid surgery and patients with rheumatoid arthritis, asthma, smokers and those received anticholinergic and antihistamine drugs or had contact lenses, were excluded from the study.

Schirmer test I and II and Basic Secretion Test was used for evaluation of the dry eye syndrome. All tests perform by SNO Strip manufactured by Chauvin Company, France. The Schirmer I test is performed by placing a narrow piece of filter paper into the inferior conjunctival cul-de-sac and rests on the lower lid margin and the eyes are then lightly closed. Generally, less than 5 mm of wetting after 5 minutes is suggestive of a dry eye.

The Schirmer II test is performed in same way as the Schirmer I except that reflex tearing is stimulated by tickling the nose with a cotton-tipped applicator. This test measures the amount of reflex tearing and basal tear secretion. Generally, less than 10 mm of wetting after 5 minutes, indicating a defect in the reflex tear secretion.

Basic secretor test is performed by anesthetizing the eye with anesthetic drops. The eye and cul-de-sac are wiped dry and filter paper is placed along the inferior lid margin in the standard fashion. Test results read at 5 minutes and normal basal tear secretion is 12 to 15 mm of wetting and less than 5 mm indicating dry eye.

Data analyzed by using statistical tests including X2, t-test and logistic regression at a significance level of 5%.

**Results:**

We studied 50 patients with PDR, 50 patients with NPDR and 50 healthy controls. 56% of patients with PDR, 50% of patients with NPDR and 54% of controls were male and gender distribution was similar in all 3 groups (p=0.829). Prevalence of dry eye in men and women with PDR were 54.5% and 64.3% respectively. Prevalence of dry eye in men and women with NPDR were 40% and 52%, respectively. 8.7% of men and 11.1% of women in control group had dry eyes syndrome. Mean (± SD) age of the patients in the PDR, NPDR and control groups was 59.7 ± 12.2, 59.3 ± 9.0 and 50.5 ± 14.2 years, which was significant (P =0.01). The age distribution of the three groups is shown in Table 1.

<table>
<thead>
<tr>
<th>Age</th>
<th>NPDR</th>
<th>PDR</th>
<th>Control</th>
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<tr>
<td></td>
<td>No</td>
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<tr>
<td>&lt; 50</td>
<td>8</td>
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<td>50-59</td>
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<td>34</td>
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<td>≥ 60</td>
<td>25</td>
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Mean (± SD) disease duration in the PDR and NPDR groups was 13.5 ± 9.2 and 11.9 ± 6.8 respectively, which was not significant.

Based on the Schirmer I test results, 60% of PDR patients and 46% of NPDR patients had dry eye syndrome. Prevalence of dry eye syndrome in patients with PDR, NPDR and control groups was 28, 22 and 4%, respectively based on Schirmer II test results. Prevalence of dry eye by the Basic Secretion Test results in PDR, NPDR and control groups was 20, 18 and 2%, respectively. In 16% of patients with PDR results of three tests were positive and in 16% of them the results for two of three tests were positive. In 12% of NPDR patients all three tests results and in 16% two of three tests results were positive. In only 6% of control group results in two of three tests were positive and none of the controls had positive results for all three tests.

Logistic regression analysis was performed that simultaneously includes all factors present. The results suggest that the risk of dry eye occurrence in patients with PDR is 4.43 times more likely than control group (P= 0.026). Disease duration had significant effect on dry eye occurrence so that by increasing of any year of disease duration the risk of dry eye would increase 1.1 times (P= 0.004).
Discussion:

The results of our study indicate that the risk of dry eye in patients with PDR is 4.43 times more likely than control group and disease duration also had significant effect on dry eye occurrence so that by increasing of any year of disease duration the risk of dry eye would increase 1.1 times.

Jin and colleagues studied 100 patients with diabetes (type II) and showed that dry eye prevalence in diabetic patients was higher than the control group [15]. In another study Seifart and Strempel was assessed 92 patients with diabetes type I, who 52% of them had dry eye syndrome [11]. In these patients, eye dryness is due to decreased corneal sensitivity and reduced tear secretion after stimulation of the corneal surface [16]. Another cause of dry eyes is lacrimal gland dysfunction and peripheral neuropathy [17]. Diabetes increase oxidative stress and production of free radicals. Free radicals damage the lacrimal glands and conjunctiva and eventually lead to tear film instability, eye symptoms, dry eye syndrome and corneal complications [18].

In our study, the prevalence of dry eye syndrome in diabetic patients was more than controls. The prevalence was 68% in diabetic patients with PDR, 18% in diabetic patients with NPDR and 4% in the control group. The prevalence of dry eye syndrome was significantly higher in PDR group compared with control. Difference of dry eye syndrome prevalence in NPDR group compared with PDR group and also NPDR group with control group was not significant that may be due to small sample size.

Masood Raza Manaviat and colleagues in a study evaluated the prevalence of dry eye syndrome and diabetic retinopathy in patients with diabetes type II. The results of the study showed a higher prevalence of dry eye syndrome in diabetic patients with retinopathy. In this study, there was no significant correlation between age and sex with dry eye syndrome. However, the duration of diabetes was significantly associated with dry eye syndrome [19].

In another study, 100 patients with non-insulin dependent diabetes were studied. Prevalence of dry eye syndrome was 60% in diabetic patients with PDR and 52% in patients with NPDR. This study had no control group, but the prevalence of dry eye syndrome in NPDR patients was higher than our study that may due to type of tests which used in the diagnosis of dry eye syndrome (Schirmer test, TBUT test and Fluorescein Staining of the Cornea) [14].

Prevalence of syndrome between PDR and NPDR with control group has not been compared previously which were compared in our study. Results showed that risk of dry eye syndrome is multiply in patients with PDR in addition to risk of intraocular complications, so this matter should be considered in treatment of these patients.

With regard to this important point that dry eyes can have a dramatic effect on patient's life and problems, and even some studies have told that its morbidity is equal to heart diseases, in addition this syndrome in higher levels can cause impairment the intensity of patient's vision. So, it is important to pay attention to the dry eye in diabetic patients based on the level and type of retinopathy and physician should always consider this complication.

Our study showed that the prevalence of PDR syndrome was significantly higher compared to the control group. Its prevalence in patients with NPDR had no significant difference with PDR and control groups that maybe due to the low sample size or better control diabetes in NPDR. Therefore, it is recommended that a comparative study with large sample size and also including the HbA1C as an indicator for control of blood glucose.

Due to the lack of studies on the prevalence of dry eye among patients with PDR, NPDR and control groups were compared, the study by comparing these cases showed that patients in the PDR addition to being at risk for complications of intraocular are -The risk of dry eye in a few times and they should be considered in these patients.

With due attention to this point that dry eye can lead to impairment of vision and corneal perforation, so diagnosis and treatment in early stage is very important and it is recommended to diabetic patients assessed for dry eye during ophthalmic

REFERENCES


