Tear film Status In Patients of Diabetes Mellitus Type II

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ABSTRACT

Objective — *To relate the level of tear film (aqueous layer) in male patients with the duration of diabetes mellitus type II.*

Study design — *Observational study.*

Place & Duration of study — *Khalid Eye Clinic Karachi, from July 2019 to December 2019.*

Methodology — *Male patients diagnosed with diabetes mellitus type II for the last five to twenty years were included. Patients were divided into two groups depending upon the duration of diabetes mellitus. Group A included fifty patients with a duration of diabetes from five to ten years, whereas, Group B included patients with a duration from fifteen to twenty years. Tear film component (aqueous layer) was measured with a Schirmer strip test. Independent sample t test was used to find the significance. A p<0.5 was considered as significant.*

Results — *A total of 100 patients were included. The age was between 50 to 60 years. The results of Schirmer test in group A was 8.5±1mm, where as 8±1mm in group B. The results were not found statistically significant.*

Conclusions — *Tear film level reduces with the duration of diabetes mellitus but it was not statistically significant.*

Key words — *Diabetes mellitus, Schirmer test, Dry eye.*

INTRODUCTION:

Diabetes mellitus is the leading cause of blindness in the middle age and elderly due to the formation of cataract and retinopathy as its ocular complications. Recently, diabetes related ocular surface problems especially dry eye has come to light.[1] Diabetes may cause abnormalities in the tear secretion as well as decreased corneal sensitivity resulting from inadequate tear production due to the autonomic neuropathy which affects the nerves controlling the lacrimal gland.[1,2] This eventually leads to an array of complications in the cornea such as punctuate keratitis, neurotrophic ulceration, and non healing epithelial defects.[3]

Dry eye due to aqueous deficiency is usually caused by decreased amount of production of tears, whereas, evaporative dry eye is due to meibomian gland dysfunction and is more common.[4] Both are found in diabetic patients as dry eye disease (DED) progresses with the later being a major contributor.[5,6] A study was done on diabetic patients showed that diabetics have a decreased tear production and tear film break up time test (TBUT) as compared to the control group.[7] Further, a study found 54.3% of diabetics to have dry eyes syndrome.[8] A study done by Jin observed that type II diabetics have the tendency towards development of dysfunction of the tear film.[9]

Bacterial infections causing scarring, visual disturbances and perforation of the cornea can occur secondary to the diabetes related dry eye. If picked

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up at early stage, diabetes related ocular complications can be prevented.[3] Various studies conducted have shown a close affiliation between dry eye and diabetes mellitus (DM) but the results remain discordant. Due to the lack of studies done previously to assess the rate of dry eyes in diabetic patients, we conducted this study with the aim of observing the tear film status in relation to the period of diabetes mellitus by assessing it via Schirmer strip test, only in males to avoid the bias of hormonal issues in females.

METHODOLOGY:

This observational study was conducted at Khalid Eye Clinic Karachi from July 2019 to December 2019. Male patients were enrolled in this study who were suffering from diabetes mellitus type II. Patients were divided into two groups depending upon the duration of diabetes mellitus. Group A included fifty patients with duration of diabetes mellitus from five to ten years, whereas, Group B included patients with a duration of diabetes mellitus from fifteen to twenty years. Tear film component (aqueous layer) was measured with a Schirmer strip test. Patients with diabetes mellitus of 10 to 15 years duration were not included in the study.

Patients suffering from eye diseases such as glaucoma or uveitis, disorder of eyelids, lacrimal pathway, prior eye surgery, ocular allergies, pterygia, or blephritis or any systemic disease causing dry eye were excluded from the study. Special emphasis was given on inquiring about dry eye symptoms and signs such as feeling of dryness, grittiness, and burning which characteristically worsened by the end of the day, stringy discharge, crusting of the lids and transient blurring of vision. Proforma was used to record information regarding history and complete ophthalmic examination, including visual acuity, refraction, general slit lamp examination including ocular adnexa and anterior segment, fundus examination with slit lamp biomicroscopy using 90 D lens or indirect ophthalmoscope with 20 D lens. Examination was directed at observing for signs of posterior blephritis, meibomianitis and conjunctival keratinization. Approval was obtained from the Institutional Ethical Review Committee in accordance with the guidelines of the Declaration of Helsinki.

Tear meniscus height was evaluated by reading the scale of slit lamp microscope without using flourescein (in the normal eye meniscus is about 1mm in height), while in dry eye it becomes thin or absent. We used Schirmer test 1 (without anesthesia) and 2 (with anesthesia) in all patients of both groups and noted the results. Schirmer test was done by observing the amount of wetting of no. 41 Whatman filter paper (5 mm wide and 35 mm long), folding 5mm of one end and inserting it at the junction of the middle and lateral third of the lower lid without touching the cornea and lashes. Patients were advised to close the lids and the level of wetting from the fold was measured after 5 minutes and recorded. Data was analyzed in SPSS version 21. Frequency with percentage was calculated for Schirmer test. Independent sample t test was used to find the significance. A $p<0.5$ was considered as significant.

RESULTS:

This study included 100 patients with 50 patients in each group. They have been suffering from diabetes mellitus type II of 5 to 20 years duration. The age was between 50 to 60 years with mean age of 44±3.2 years. Results of group A showed less than 8.5 ± 1mm wetting in Schirmer test 2 (with anesthesia) and 5.5 ± 1mm wetting in Schirmer test 1 (without anesthesia) ($p=0.60$) whereas in group B it was less than 8 ± 1mm in Schirmer test 2 (with anesthesia) and 5.1±1mm wetting in Schirmer test 1 (without anesthesia) with $p=0.55$. No significant difference was observed in the tear film status of both the groups as observed by the Schirmer test 1 and 2.

DISCUSSION:

Diabetes mellitus is a well known disease globally and has an impact on the tear film status leading to dry eye due to a loss of tear film homeostasis.[10] Most of the time, attention is given to diabetic retinopathy which leaves the tear stability changes being hardly recognized. Few studies have been done that evaluated dry eyes symptoms among diabetic patients. It is also a concern that patients often have the disease for a variable duration of time before it is diagnosed. It is difficult to decide the precise disease length in those patients. This study was conducted to assess the tear film parameter changes in long-term in diabetic patients.

Table I: Results of Schirmer Test

Groups	Schirmer Test 1	Schirmer Test 2	P - value
Group A	5.5 mm ± 1 mm	<8.5 mm ± 1 mm	P = 0.60
Group B	5.1 mm ± 1 mm	<8 mm ± 1 mm	P = 0.55

There are multiple ways through which diabetes can contribute to reduced tear film stability including the possibility of damage to the microvessels of the lacrimal gland along with neuropathy which leads to impaired gland function. Peripheral neuropathy in diabetes leads to abnormalities in corneal nerve function which correlates with a minimum number of goblet cells resulting in altered tear film.[11-13] A study showed that the incidence of dry eye was considerably linked with age.[14] Similarly, a research evaluated individuals with diabetes mellitus and observed reduced tear production in some diabetic patients was associated to dysfunction of the autonomic nervous system.[15]

Schirmer strip test is considered to be a quick, simple and an inexpensive diagnostic test available for assessing the tear film component (aqueous layer). Study done by Goebbels observed that the Schirmer's test result was notably less in patients suffering from diabetic mellitus as compared to the control group.[16] Our study focused on the tear film status in association with the time period of diabetes mellitus. The factors behind such structural changes in the ocular surface in the course of the diabetes are still not apparent. It may possibly be due to age-related changes and external harsh environmental conditions at the place of study. These results highlighted that dry eye is an important feature of the diabetic eye surface disease. While some authors have reported results similar to ours, one study has found no significant difference.[17]

It has been anticipated that as the length of diabetes increases, the possibility of diabetic neuropathy increases significantly. We expect that ocular surface parameters measured in this study to become significantly worse with persistent diabetes.[18] However, this is not necessarily true based on our results, as tear film status observed via Schirmer test result in both group A and B in this study were not statistically significant in relation to the time period of diabetes mellitus.

CONCLUSIONS:

Tear film level reduced with the time length of diabetes mellitus, but it was not statistically significant.

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