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ORIGINAL ARTICLE

Evaluation of dry eye in eyes with unilateral pterygium

Pelin Kiyat, Omer Karti

Department of Ophthalmology, Izmir Democracy University, Buca Seyfi Demirsoy Training and Research Hospital, Izmir, Türkiye

Abstract

Purpose: The purpose of this study was to determine if eyes with unilateral pterygium are more likely to suffer from dry eye symptoms and more prone to have abnormalities in dry eye parameters than healthy eyes.

Methods: Forty eyes of 20 patients were enrolled. The eyes that were diagnosed as having pterygium were considered as Group 1 and other healthy eyes of the same patients were defined as Group 2. The existence of dry eye was tested with tear film break-up time, Schirmer-1 test, Oxford scale, and Ocular Surface Disease Index (OSDI) score assessments.

Results: Median tear film break-up-time measurement and Schirmer 1 value were lower in Group 1; however, no statistically significant difference was detected (p=0.06 and p=0.308, respectively). Median OSDI score and median Oxford scale score were higher in Group 1; however, no statistically significant difference was detected (p=0.05 and p=0.250, respectively).

Conclusion: Between eyes with pterygium and healthy ones, there was difference in dry eye test results. These results may show that there might be a relationship between pterygium and dry eye disease regardless of the genetic background and environmental factors.

Keywords: Dry eye; ocular surface; pterygium.

Pterygium is a common disease of the ocular surface which is characterized by subconjunctival fibroblast activation resulting in conjunctival tissue invasion onto the cornea.[1] Although the exact cause of pterygium is not clear, ultraviolet (UV) light exposure is considered to be a main risk factor.[2] It is believed to cause oxidative stress, activate inflammatory pathways, and release growth factors which play a crucial role in pterygium pathogenesis.[3] Pterygium is usually seen as a unilateral condition. Yet, the main risk factor, UV exposure, has an impact on both eyes, so there might be other contributing factors to pterygium's development.

Tear film is one of the eye's protective mechanisms against harmful environmental situations.[4] There might be a relationship between abnormalities in the tear film layer and the development of UV-related diseases such as pterygium.

The aim of this study is to determine if eyes with unilateral pterygium are more likely than healthy eyes to suffer from dry eye symptoms and more prone to have abnormalities in dry eye parameters.

Materials and Methods

Twenty patients who were diagnosed with unilateral pterygium were included in the study. Any person with a

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Correspondence: Pelin Kiyat, M.D. Department of Ophthalmology, Izmir Democracy University, Buca Seyfi Demirsoy Training and Research Hospital, Izmir, Türkiye
Phone: +90 232 454 01 01 **E-mail:** pelinkiyat@gmail.com
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medical history of any other ophthalmic diseases or surgeries; patients with pre-existing dry eye disease or ocular surface disease; or those using any kind of topical drugs, were excluded from the study. Furthermore, those with any systemic disease or using any kind of systemic drugs were excluded from the study. Patients with any signs of developing pterygia, pingueculae, or any ocular surface disease in the healthy eyes were also excluded. The eyes that were diagnosed as having pterygium were considered as Group 1 and healthy eyes of the same patients were defined as Group 2. All subjects underwent a detailed ophthalmological examination including anterior and posterior segment evaluation with a slit-lamp biomicroscopy, intraocular pressure measurement with applanation tonometry, and visual acuity determination with Snellen chart. Dry eye tests were performed on both eyes including fluorescein tear film break-up time (T-BUT), Schirmer 1 test, corneal and conjunctival fluorescein staining and Oxford scoring, and Ocular Surface Disease Index (OSDI) score assessment.

Before the examination, all patients were required to complete the OSDI questionnaire which aimed to evaluate the visual disability due to dry eye. The questionnaire had three different parts to question ocular symptoms, vision related functions, and environmental triggers. The same ophthalmologist (P.K.) administered it to all the participants. The OSDI score was calculated according to the formula OSDI = (sum of scores) × 25/(number of questions answered). After the questionnaire, T-BUT was measured by touching the inferior fornix with a fluorescein strip. Then, the participant was instructed to blink and then hold his/her eyes open. The tear film was examined with a biomicroscope under a cobalt filter. The time to the first break in the corneal fluorescein layer was considered as T-BUT. It was repeated 3 times for each eye, and the average score was recorded. Corneal and conjunctival staining was evaluated by examining the ocular surface under a cobalt blue filter with a biomicroscope after fluorescein instillation and the staining was recorded according to the Oxford scale. The Oxford grading scale uses a chart consisting of a series of panels with increasing severity labeled from A to >E or from 0 to 5. In those charts, staining is represented by punctate dots. In our study, comparisons were made between the panels and the ocular surface staining of the patients. The reference grading panel was in the examination room and was readily visible during the examination for comparison purposes. After the examination and comparison, the Oxford grades were recorded. Furthermore, a Schirmer-1 test was performed using a 5x35 mm paper strip. The strip was placed at the junction of the middle and lateral third of the lower lid margin and after 5 min the strip was removed and the wetting was recorded.

Each subject provided written informed consent. This study was approved by Buca Seyfi Demirsoy Training and Research Hospital Medicine Ethics Committee (date: August 31, 2022; number: 2022/108 100) and adheres to the tenets of the Declaration of Helsinki.

Statistical Analysis

For statistical purposes, "IBM the Statistical Package for the Social Sciences 25" was used (SPSS Inc., Chicago, IL, USA). Data were analyzed using the Mann–Whitney U test for non-parametric values. Categorical variables were expressed as frequency and percentage and numeric variables as median and standard deviation. P-value under 0.05 was considered statistically significant.

Results

The median age of the patients was 51.00±8.1 (range 35–65) years. There were 9 (45%) men and 11 (55%) women. The median duration of the pterygium was 2.2±2.5 (1–8) years. Group 1's median Schirmer 1 value was 19.0±6.6 (range, 5–30) and Group 2's was 20.0±5.7 (range, 8–35) mm, (p=0.308). Group 1's median T-BUT value was 8.0±4.6 (range, 3–16) and Group 2's was 12.5±3.3 (range, 7–18) seconds, (p=0.06). Group 1's median Oxford scale (superficial punctate staining of the cornea and conjunctiva) was 0.5±0.7 (range, 0–2) and Group 2's was 0.0±0.5 (range, 0–2), (p=0.250). Group 1's median OSDI score was 36.4±31.4 (range, 4.1–87.5) and Group 2's was 17.6±17.0 (range, 4.1–72.9), (p=0.05) (Table 1).

Table 1. The dry eye tests of eyes that were diagnosed as pterygium and other healthy eyes of the same patients

	Group 1 (Mean±SD, range)	Group 2 (Mean±SD, range)	p-value
Schirmer-1 (mm)	19.0±6.6 (5–30)	20.0±5.7 (8–35)	0.308
T-BUT (sec)	8.0±4.6 (3–16)	12.5±3.3 (7–18)	0.06
Oxford scale	0.5 ±0.7 (0–2)	0.0±0.5 (0–2)	0.250
OSDI score	36.4±31.4 (4.1–87.5)	17.6±17.0 (4.1–72.9)	0.05

SD: Standard deviation; T-BUT: Tear film break-up time; OSDI: Ocular surface disease index.

Discussion

Pterygium is a common disease with unilateral presentation generally. The main responsible factor in ethiopathogenesis is UV light exposure;[2] however, people living in the same environment and exposed to the same amount of UV light do not develop pterygium.[5] Even in an individual patient, although both eyes are exposed to UV light in the same amount and both eyes have the same genetic predisposition, pterygium usually develops unilaterally.[6] These findings raise questions about the existence of other etiological factors in pterygium's development.

In our study in eyes with pterygium, the median T-BUT measurements were found to be lower and median OSDI scores were found to be higher in Group 1 and the difference was not statistically significant. The median Schirmer-1 test measurements were lower and the median Oxford score results were higher in Group 1; however, the differences were not statistically significant.

Like in our study, Ishioka et al.,[6] also evaluated dry eye test results in unilateral pterygium patients and compared the results between pterjiyum affected and healthy eyes. They found lower T-BUT values in eyes with pterygium. Furthermore, Ozsutcu et al.[7] investigated the dry eye existence with T-BUT and Schirmer test in unilateral pterygium and they reported significant reduction in dry eye tests in eyes with pterygium. In another study by Ye et al.,[8] median OSDI score in patients with pterygium was found to be significantly higher compared to those uneffected by pterygium. In a recent study by Adriano et al.,[9] a significant association was reported with the corneal fluorescein staining in pterygium patients.

In our study, the median Schirmer-1 test measurements were lower in Group 1; however, the difference was not statistically significant (p=0.308). With regard to tear secretion, whether pterygium is associated with decreased tear production or not is equivocal. The articles which evaluated the relationship between pterygium and Schirmer results, reported that the decreased Schirmer-1 test values could be the result of low sample sizes and difficulty in repeatability and reliability so the data may not be sufficient to make any meaningful conclusions.[10]

The chronic inflammatory nature of both pterygium and dry eye could make these diseases trigger each other. The secretion of proinflammatory cytokines and the release of MMP's in dry eye disease may trigger fibroblasts which develop pterygium,[11] and also, MMP-9 was shown to correlate with pterygium formation.[12]

In a recent study, a possible explanation for the relationship between pterygium and dry eye was explained.[13] The authors showed that the concentrations of tear IL-6, IL-8, VEGF, MMP-1, and MMP-9 were similar in patients with pterygium and those with dry eye. This study claimed that the results confirm the hypothesis that dry eye and pterygium have similar inflammation profiles.

Furthermore, the loss of regularity that pterygium growth causes can led to local inflammatory conditions which increase the release of inflammatory cytokines and due to the elevated inflammatory status, some changes in Meibomian gland can occur and as a result evaporation can result in abnormalities in tear film layer resulting dry eye disease.[14]

Our study has some limitations. We were not be able to classify eyes with pterygium according to their sizes or duration of the lesion due to the small sample size. Furthermore, tests such as mean goblet cell density and conjunctival impression cytology could not be performed.

Conclusion

In this study, we found changes in dry eye test results in eyes with pterygium and not in the healthy eyes of the same patients. These results may show a relationship between pterygium and dry eye disease regardless of the patient's genetic background and environmental factors. However, whether pterygium causes dry eye disease or dry eye disease led to pterygium remains unclear. Further investigation is needed to explain the common ethiopathology and the exact relationship between these two diseases.

Ethics Committee Approval: This study was approved by Buca Seyfi Demirsoy Training and Research Hospital Ethics Committee (date: 31.08.2022; number: 2022/08-100).

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Conflict of Interest: None declared.

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