ORIGINAL ARTICLE

# A Clinical Study to Assess the Correlation between Histopathological Changes in Different Nature of Pterygium and Severity of Dry Eye Disease

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**ABSTRACT**

**Purpose:** Primary pterygium is diagnosed by the presence of a wing of thick, reddish, and fibrovascular growth encroaching on the cornea. Studies proved that pterygium induces dry eye by triggering unstable tear film leading to progressive changes in tear film as indicated by decreased tear film breakup time and Schirmer's test. Nature of pterygium (progressive/degenerative) differs in histopathology. Whether these different histological variations in pterygium tissue inducing amount of ocular surface changes are same or different, are still not known or even evaluated. Therefore, this study was to assess the correlation between histopathological changes in different nature of pterygium and severity of dry eye disease. **Materials and Methods:** A total of 40 pterygia were included in the study. Severity of dry eye was assessed individually by each test and graded consequently. Patients then underwent pterygium excision with conjunctival limbal autograft and tissue sent for histopathological evaluation of pterygium tissue and classified into atrophic and fleshy pterygium. Histopathological results were then correlated with the severity of dry eye. **Results:** Although these histological changes seen in epithelial and goblet cells of ocular surface, while perceiving their correlation with dry eye severity, no significant relation could be established. In the present study, inflammatory responses were not significant to relate dry eye disease in pterygium. **Conclusion:** The histopathological findings in pterygium do not significantly correlate with the severity of dry eye. Therefore, histopathology in pterygium can be taken for other considerations such as malignancy and other evaluations for type of pterygium but not the severity of dry eye disease in patients.

**Key words:** Dry eye, grades, histopathology, nature of pterygium, pterygium

## INTRODUCTION

Pterygium is a common ocular disorder. It has a prevalence of 0.3–29% in different regions of the world.[1] It is most common in hot climates, and ultraviolet irradiation is suspected to be the most important factor for its development.[2] Primary pterygium is diagnosed by the presence of a wing of thick, reddish, and fibrovascular growth encroaching on the cornea. The nasal side is more commonly affected than the temporal side.[3]

Studies proved that pterygium induces dry eye[4] by triggering unstable tear film leading to progressive changes in tear film as indicated by decreased tear film breakup time (TBUT) and Schirmer's test.[5] Dry eye is known for producing number of changes in ocular surface. The most advanced changes occurring directly over the pterygium surface[6] confirm that pterygium is indeed an ocular surface disease index (OSDI).[7]

Nature of pterygium (progressive/degenerative) differs in histopathology.[8] Whether these different histological variations in pterygium tissue inducing amount of ocular surface changes are same or different, are still not known or even evaluated. The histopathological evaluation of the pterygium tissue can directly help to assess the severity of dry eye disease in relation with nature of pterygium.

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Therefore, this study was undertaken to evaluate the correlation of effect of histological changes in different nature of pterygium to severity of dry eye.

## METHODOLOGY

A total of 40 pterygia were included in the study who underwent pterygium excision with conjunctival limbal autograft and tissue sent for histopathological evaluation of pterygium tissue and classified into atrophic [Figure 1] and fleshy pterygium [Figure 2].

Demographic data were collected from patients. Before surgery, all patients underwent a complete ocular examination including slit lamp biomicroscopy, photography along with other parameters for dry eye testing OSDI score, tear meniscus height (TMH), TBUT, and Schirmer's test.

The OSDI is assessed on a scale of 0–100, with higher scores representing greater disability. The index demonstrates

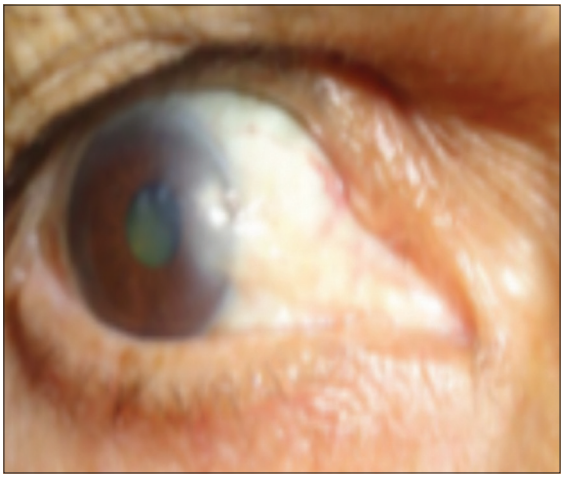

**Figure 1:** Grade 2 atrophic nasal pterygium

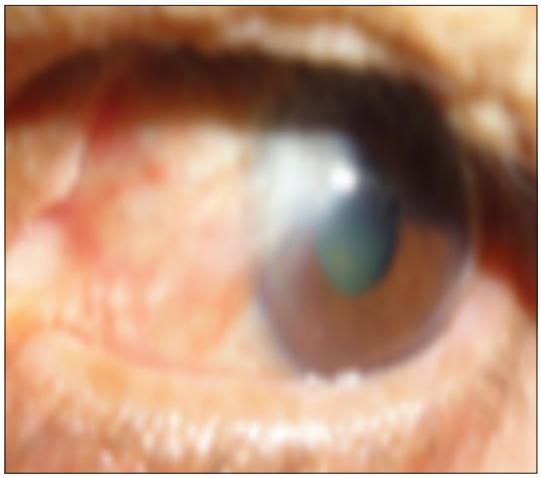

**Figure 2:** Grade 3 fleshy nasal pterygium

sensitivity and specificity in distinguishing between normal subjects and patients with dry eye disease.

Inferior marginal tear TMH was recorded with slit lamp <0.25 mm suggested a dry eye condition. TBUT was noted to assess the status of precorneal tear film. A breakup time of <10 s was taken as abnormal.

Schirmer's test was performed using No. 41 Whatman filter paper, 5 mm wide and 35 mm long. The test was executed without topical anesthetic (Schirmer 1) and with topical anesthetic (Schirmer 2). A measurement of <10 mm in Schirmer 1 and <5 mm in Schirmer 2 indicated dry eye.

Inclusion criteria were all primary pterygium Grade 2 and above.

Exclusion criteria were previous medical treatment for pterygium including topical steroids or nonsteroidal anti-inflammatory drugs, previous conjunctival surgery, conjunctival cicatricial disease, systemic autoimmune disease, and untreated dry eye disease.

All patients were surgically treated by pterygium excision with conjunctival limbal autograft after obtaining the written informed consent. The obtained tissue was sent histopathological examination.

Statistical analysis was calculated to search for an association between various histopathological parameters and dry eye severity.

## RESULTS

Table 1 shows age and gender distribution of pterygium patients. Maximum patients were seen in 50–60 years of age group without any gender preponderance.

Grading of severity of dry eye was recorded in individual case and cumulative grading was calculated into mild, moderate, and severe, as shown in Table 2.

Table 3 shows the association of predominant histopathological results and various grades of dry eye.

There was no significant difference in the histopathology of atrophic pterygium [Figure 3] and the presence of any of the

**Table 1:** Age and gender distribution

| Age group | Male | Female | Percentage |
|---|---|---|---|
| 40–50 years | 7 | 6 | 32.5 |
| 50–60 years | 7 | 9 | 40.0 |
| 60–70 years | 5 | 6 | 27.5 |

**Table 2:** Grading of severity of dry eye in respective patients

| Grade of dry eye | OSDI grading | TBUT grading | Schirmers 1 Grade | Schimer 2 Grading | Tear meniscus height grading | Cummulative grading (as per grade of dry eye in more than 2 tests) |
|---|---|---|---|---|---|---|
| Normal | 10 | 20 | 9 | 7 | 0 | 0 |
| Mild | 19 | 11 | 20 | 16 | 7 | 14 |
| Moderate | 9 | 9 | 9 | 14 | 17 | 21 |
| Severe | 2 | 0 | 2 | 3 | 16 | 5 |

**Table 3:** Association of various predominant grades of dry eyes with histopathological findings in atrophic pterygium

| Histpathological feature | Grade of dry eye (%) | | | Total (*n*=11) (%) | Chi-square test | Result |
|---|---|---|---|---|---|---|
| | Mild (*n*=4) | Moderate (*n*=6) | Severe (*n*=1) | | | |
| Squamous hyperplasia | 1 (25.0) | 1 (16.7) | 0 (0.0) | 2 (18.2) | $X^2$=0.356 DF=2 *P*=0.837 | Non-significant |
| Hyaline degeneration | 2 (50.0) | 1 (16.7) | 1 (100.0) | 4 (36.4) | $X^2$=3.077 DF=2 *P*=0.215 | Non-significant |
| Elastotic degeneration | 2 (50.0) | 5 (83.3) | 0 (0.0) | 7 (63.6) | $X^2$=3.077 DF=2 *P*=0.215 | Non-significant |
| Leukocytic infilteration | 1 (25.0) | 2 (33.3) | 1 (100.0) | 4 (36.4) | $X^2$=1.997 DF=2 *P*=0.368 | Non-significant |
| Microcalcification | 2 (50.0) | 3 (50.0) | 0 (0.0) | 5 (45.5) | $X^2$=0.917 DF= 2 *P*=0.632 | Non-significant |
| Hemorrhages | 1 (25.0) | 1 (16.7) | 1 (100.0) | 3 (27.3) | $X^2$=3.017 DF=2 *P*=0.221 | Non-significant |
| Stromal vascularity | 1 (25.0) | 2 (33.3) | 1 (100.0) | 4 (36.4) | $X^2$=1.997 DF=2 *P*=0.368 | Non-significant |

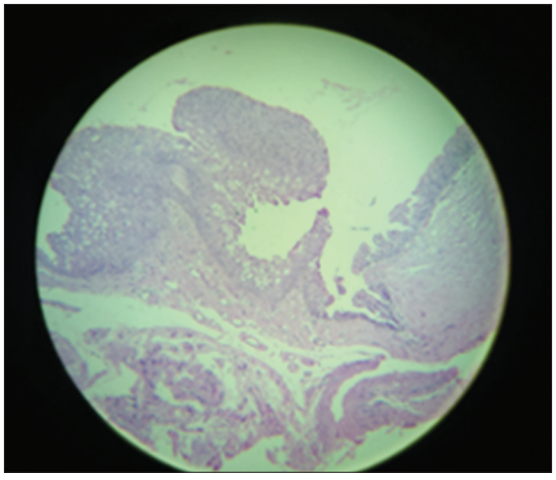

**Figure 3:** Histopathology of atrophic pterygium

symptoms or clinical findings in different grades of dry eyes. ($P > 0.05$)

Table 4 shows the association of predominant histopathological results in fleshy pterygium and various grades of dry eye.

There was no significant difference in the histopathology of fleshy pterygium [Figure 4] and the presence of any of the symptoms or clinical findings in various grades of dry eyes ($P > 0.05$).

## DISCUSSION

The present study was designed to determine histopathological changes in pterygium in correlation to severity of dry eye. In our study, 40% of pterygium patients were 50–60 years of age; indicating that age is a contributing factor in pterygium and more commonly affects population above 40 years of age. In this study, 52.5% of patients were female and 47.5% were male. This finding is in contradiction to earlier reports in most of the literature which indicating a higher incidence of pterygium in males.[9,10]

Progressive and degenerative nature of pterygium was examined for histopathological changes and compared with preoperatively performed various dry eye tests grouped in mild, moderate, and severe dry eye. To the best of our knowledge, till date, no other study has evaluated the

**Table 4:** Association of various predominant grades of dry eyes with histopathological findings in fleshy pterygium

| Histopathological feature | Grade of dry eye (%) | | | Total (*n*=29) (%) | Chi-square test | Result |
|---|---|---|---|---|---|---|
| | Mild (*n*=10) | Moderate (*n*=15) | Severe (*n*=4) | | | |
| Squamous hyperplasia | 4 (40.0) | 8 (53.3) | 1 (25.0) | 13 (44.8) | $X^2$=1.169 DF=2 *P*=0.557 | Non-significant |
| Hyaline degeneration | 0 (0.0) | 2 (13.3) | 1 (25.0) | 3 (10.3) | $X^2$=2.225 DF=2 *P*=0.329 | Non-significant |
| Elastotic degeneration | 4 (40.0) | 4 (26.7) | 3 (75.0) | 11 (37.9) | $X^2$=3.161 DF=2 *P*=0.206 | Non-significant |
| Leukocytic infilteration | 4 (40.0) | 3 (20.0) | 0 (0.0) | 7 (24.1) | $X^2$=2.787 DF=2 *P*=0.248 | Non-significant |
| Microcalcification | 1 (10.0) | 1 (6.7) | 0 (0.0) | 2 (6.9) | $X^2$=0.448 DF=2 *P*=0.800 | Non-significant |
| Hemorrhages | 0 (0.0) | 4 (26.7) | 2 (50.0) | 6 (20.7) | $X^2$=5.029 DF=2 *P*=0.081 | Non-significant |
| Stromal vascularity | 8 (80.0) | 11 (73.3) | 2 (50.0) | 21 (72.4) | $X^2$=1.300 DF=2 *P*=0.522 | Non-significant |

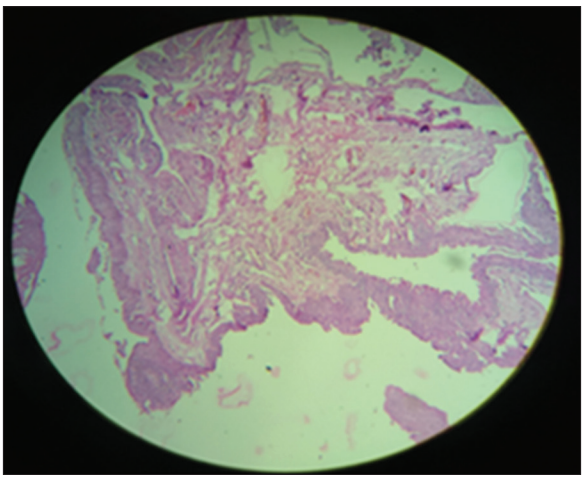

**Figure 4:** Histopathology of fleshy pterygium

histopathology of various types of pterygium in correlation with dry eye severity.

This study found many histopathological variables of pterygia. The most important variables in atrophic pterygium included elastotic degeneration (63.5%), microcalcification (45.5%), and stromal vascularity (36.4%) while in case of fleshy pterygium we found stromal vascularity (72.4%), focal cell hyperplasia (44.8%), elastotic degeneration (37.9%), and leukocytic infiltration (24.1%). This is in contrast with Gaton *et al*.[11] who also found only mild dysplasia in a few cases of pterygium (3 of 45, 6.6%). Chan *et al*.[12] found that pterygium commonly showed squamous metaplasia (73.2%); Hyperplasia associated with goblet cell hyperplasia (87.5%). Epithelial pigmentation was not seen in our study but was in evident in 48.9% of the cases in study done by Reda *et al*.[10] and Dodd *et al*.[13]

Although these histological changes seen in epithelial and goblet cells of ocular surface, while perceiving their correlation with dry eye severity, no significant relation could be established. No other study included this association between the histopathology results and dry eye.

In the present study, both epithelial and stromal vascularity and hyperplasia were detected, but the inflammatory responses as depicted by leukocytic infiltration was seen in 27.5% cases were also in agreement with Safi *et al*.[14] These were mild (not prominent) and chronic (rather than mixed or acute) in both the epithelium and the stroma. These were in contradiction to Nassar *et al*.[2] who reported an inflammatory response in all studied pterygium cases; A mild inflammatory response, whether epithelial (84.2%) or stromal (71.8%), was most common.[15]

On correlating in present study, these inflammatory responses were not significant to relate dry eye disease in pterygium, which was not estimated by others.

This study clearly shows that there is no correlation of histological changes in pterygium tissue and various grades of dry eyes.

Other clinical parameters such as duration of the pterygium affecting histopathological features[16] were not evaluated in our study similar to Safi *et al*.[14] There are other limitations to this study; The absence of immunohistochemistry, which could influence the sensitivity of the counting method. CD31 staining would specify some real but small capillary-sized blood vessels with no observable endothelium, thereby increasing the number of countable vessels which would

enhance the sensitivity of study for its association with the severity of dry eye.

## CONCLUSION

The histopathological findings in pterygium do not significantly correlate with the severity of dry eye. Therefore, histopathology in pterygium can be taken for other considerations like malignant changes in nature of pterygium but not the severity of dry eye disease in patients.

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