Dry Eye Disease and Pterygium

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Purpose: To find the changes in tear film and ocular surface in patients with pterygium.

Study Design: A descriptive cross sectional study.

Place and Duration of Study: Federal Government Services Hospital Islamabad during June 2013 to December 2014.

Material and Methods: Dry eye questionnaire (DEQ-6) was administered by a trained researcher and DE tests were performed in all 256 willing subjects (136 with pterygium+120 control) age 30-76 years, by a single surgeon under same physical conditions after taking the consent and approval from Hospital Ethical committee. Diagnosis was made on presence of both symptoms and tear film parameters. Statistical analysis by simple percentages.

Results: Dry eyes (DE) were found in 73 (53.7%) of the pterygium cases and 28 (23.5%) of the normal patients. In this study, 55 (40.5%) patients were symptomatic, defined as reporting 1 or more DE symptoms often or all the time. There were 53 (39%) patients that showed corneal fluorescein staining (CFS) and 69 (51%) showed plugging/mucous threads in both groups. Of 136 eyes with pterygium there were 91 (67%) males and 45 (33%) females. Out of these 50 (36.7%) patients showed normal tear film and 86 (63.2%) showed deranged functions. Moreover, among the 120 control eyes there were 73 (61%) males and 47 (39%) females. Out of these 86 (72.3%) patients were normal and 34 (27.7%) had abnormal functions. These values were reduced indicating altered tear film in these patients.

Conclusion: Pterygium disturbs tear functions causing dry eye like symptoms.

Key Words: Dry eye, pterygium, tear film instability, ocular surface.

Pterygium means a wing in Greek and it was first mentioned by Hippocrates. It is a fleshy, pink growth on the conjunctiva also called Surfer’s eye. Both pterygium and pinguecula are abnormal growths on ocular surface.

Pterygium has a worldwide distribution but it is common after exposure to ultraviolet radiations in warm and dry weather. Sailors, skiers and sports people have a high incidence of pterygia due to reflected UV lights. Pterygium is also more common in New Zealand in Ozone layer depletion areas.

Wolff in 1946, emphasized that meibomian glands are the proper glands of the cornea which have moved out of the way in the benefit of vision. Smooth pre-corneal tear film formed after blinking protects the ocular surface to maintain quality of vision.

The knowledge about Dry Eye diseases has improved during last decade. Dry eye is tear film disorder damaging interpalpebral ocular surface and causing unstable tear film. Dry eye is also defined as a disturbance of lacrimal functional unit which consists of lacrimal glands, ocular surface including eyelids, meibomian glands, conjunctiva, cornea, goblet cells, and ocular nerves.

Dry eye is a common disease, affecting about 5-30% of subjects aged 50 years and older (DEWS 2007). The Beaver Dam population based study reported incidence of 14% in adults over 48-91 years. In
Australia it is about 7% in elderly people\(^9\). In Indonesia it is 27.5% with more prevalence in older subjects, with pterygium and smokers\(^10\).

The purpose of this study was to find out the relationship between tear film changes and pterygium.

**MATERIAL & METHODS**

There were 136 patients of 30-76 years attending the eye OPD of Federal Government Services Hospital Islamabad from June 2013 to December 2014 having nasal pterygium and 120 normal volunteers of same age, gender and geographical distribution from refraction clinic who were selected and evaluated after taking their consent. Patients with any surgery, any systemic disease, lacrimal system disease, contact lens or drops use and refractive errors were excluded from the study.

1. Do your eyes ever feel dry?
2. Do you ever feel a gritty or sandy sensation in your eye?
3. Do your eyes ever have a burning sensation?
4. Are your eyes ever red?
5. Do you notice much crusting on your lashes?
6. Do your eyes ever feel dry?

Fig. 1: DEQ-6 Questionnaire.

A 6 item standardized dry eye questionnaire (DEQ-6) (figure 1) was administered and scored by a trained researcher. Tear film breakup time (TBUT), Schirmer’s test (ST), corneal fluorescein staining (CFS) for presence of conjunctival injection, punctate epithelial erosions (pee) and meibomian gland dysfunction (MGD) were assessed by a single surgeon under the same physical conditions. The patients and controls were divided into two groups; group1 in whom both fluorescein break up time and Schirmer’s tests were normal and group11 in whom either or both tests were abnormal. The eye with the larger pterygium was evaluated amongst bilateral pterygia. The diagnosis was made on the presence of three out of five parameters. All data was entered into SPSS version 17 and analyzed for frequencies/percentages.

**RESULTS**

Of 256 subjects, age 30-76 years, 64.8% were urban, 69.9% were educated government servants, 22% were smokers and 29.6% were laborers. There were 19 (14.1%) subjects who showed pterygium in both eyes while 117 (85.9%) had pterygium in one eye (Table 1).

**Table 1**: Baseline characters in cases and control.

<table>
<thead>
<tr>
<th>Pterygium Subjects n = 136</th>
<th>Normal Eyes n = 120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
<td>Female</td>
</tr>
<tr>
<td>Dry eye</td>
<td>73 (53.6%)</td>
</tr>
<tr>
<td>Irritation</td>
<td>91 (67%)</td>
</tr>
<tr>
<td>Urban</td>
<td>92 (67.4%)</td>
</tr>
<tr>
<td>Average pterygium width</td>
<td>5.5 mm</td>
</tr>
<tr>
<td>Smokers</td>
<td>33 (24.2%)</td>
</tr>
<tr>
<td>Right/Left Eyes</td>
<td>58/78</td>
</tr>
</tbody>
</table>

Of 136 eyes with pterygium 50 (37.5%) showed normal tear film and 86 (62.5%) showed derranged functions whereas among 120 control eyes 86 (72.3%) were normal and 34 (27.7%) had abnormal tear functions. These values were reduced indicating tear film instability in these patients.

Burning was the most common symptom reported among 91 (67%) patients in the case group. Both genders during the fourth decade had more numbers of pterygia. Moreover indoor workers were affected more in both groups (Table 2).

**Table 2**: Age and gender wise distribution of cases and controls.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Eyes with pterygium n = 136</th>
<th>Normal n = 120</th>
</tr>
</thead>
<tbody>
<tr>
<td>In years</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>30-39</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>40-49</td>
<td>29</td>
<td>15</td>
</tr>
<tr>
<td>50-59</td>
<td>25</td>
<td>13</td>
</tr>
<tr>
<td>60-69</td>
<td>19</td>
<td>11</td>
</tr>
<tr>
<td>70-76</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>91 (67%)</td>
<td>45 (33%)</td>
</tr>
</tbody>
</table>

At limbus the average pterygium width was 5.5 mm and average corneal involvement was 4.0 mm. Dry eye tests showed low tear film breakup time TBUT (< or = 10 seconds) and low Schirmer test ST (< or = 5 mm/5min.) in 86(63%) and 46 (34%) of subjects respectively (Table 3) where the mean TBUT and ST values were 8.56 seconds and 12.19 mm respectively and in control group it was 22.25 seconds and 18.50 mm/5min. There were 53 (39%) patients who showed corneal fluorescein staining CFS and 69...
(51%) showed plugging/mucous threads in both groups. Dry eye tests in cases and controls are shown in Table 4.

### Table 3: TBUT percentages.

<table>
<thead>
<tr>
<th>TBUT</th>
<th>&lt;10 secs</th>
<th>10-15 sec</th>
<th>&gt;15sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal</td>
<td>(%)</td>
<td>(%)</td>
<td>(%)</td>
</tr>
<tr>
<td>N=</td>
<td>(n=)</td>
<td>(n=)</td>
<td>(n=)</td>
</tr>
<tr>
<td>Cases</td>
<td>86</td>
<td>63%</td>
<td>30</td>
</tr>
<tr>
<td>Control</td>
<td>16</td>
<td>13.3%</td>
<td>13</td>
</tr>
</tbody>
</table>

### Table 4: Dry eye tests in cases and controls.

<table>
<thead>
<tr>
<th>Dry eye Tests</th>
<th>n= (%)</th>
<th>Control n= (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal TBUT,</td>
<td>16</td>
<td>12%</td>
</tr>
<tr>
<td>Normal Schirmer’s</td>
<td>27</td>
<td>20%</td>
</tr>
<tr>
<td>Normal TBUT,</td>
<td>40</td>
<td>29%</td>
</tr>
<tr>
<td>Abnormal Schirmer’s</td>
<td>53</td>
<td>39%</td>
</tr>
<tr>
<td>Total</td>
<td>136</td>
<td>100</td>
</tr>
</tbody>
</table>

**DISCUSSION**

The pathogenesis of pterygium is not understood completely. In equatorial regions ultraviolet radiations cause pterygium formation specifically UV-B radiations. Studies show that p53 tumor suppressor gene undergoes mutations leading to abnormal limbal epithelium proliferation. The possible risk factors are age, hereditary factors, chronic inflammation, smoking, lower education, high refractive errors, sunlight, heat and micro trauma11.

It is common in the general population and progresses slowly but has little effect on vision. In our study most of the cases of pterygium were found in the fourth decade (40-49 years). It is similar to another study12. In advanced age excessive exposure to sun light causes the formation of pterygium. But, recent studies denied any relation of age with the pterygium incidence13.

In our study pterygium was seen more in patients with indoor activities contrary to the study of Viso et al, (2011)14. In Islamabad the indoor laborers (53%) suffered more than outdoor labourers (47%) with pterygium because in Islamabad they used to work 4-5 hours/day in the kitchen. Similarly, new studies denied any relationship between nature of work and pterygium2.

The tear film breakup time using fluorescein break is used to measure the tear film quality15. Our study indicated abnormal TBUT test in 62.2% of pterygium eyes and in 27.7% of eyes without pterygium. Another study reported reduced TBUT test in 30.3% of pterygium group and 21.9% eyes without that16. Another study reported TBUT instability in 39.7% eyes with pterygium and in 25% eyes without it17. Bekibele et al18 mentioned lower TBUT values in pterygium patients than normal eyes similar to our study.

Our results revealed reduced ST values in 34% of patients of pterygium group similar to the study of Roka et al, 201319. Conversely, the study of Kampitak and Leelawongtawun showed that the ST results did not change in pterygium patients20.

Tear functions improved as TBUT and Schirmer test were prolonged. Li et al found improvement in tear function in patients after pterygium excision21. However, Li and colleagues noticed that there is no difference in Schirmer test values after pterygium operations. Li et al. reported both tear quality and quantity decrease in pterygium group with a decrease in goblet cell population. Turkyilmaz et al.22 found that the mean goblet cell density was increased 1 month after excision. Moreover, Ye et al reported that both tear film break-up time and Schirmer test were different in study and control groups similar to our study23.

In the literature no cases of pterygium were found in children below the age of 5 years. This study revealed that 67% males were more affected than 33% females. One Study2 noticed no gender dependence. Another study from rural Dali in China noticed an increased pterygium formation in females than men24. The lifestyle of labor between the genders may be the reason. A study by Peng et al in Tibet reported that women were at a higher risk than men related with their lifestyle. In Tibet, women were more often involved in outdoor activities and jobs25.

It has been found that excessive use of drops containing preservatives can destroy goblet cells and the ocular surface resulting in DE16. A pterygium induces astigmatism if larger than 3 mm. More than 3.5 mm lesions can result in more than 1 D of astigmatism causing blurring of vision. Also interestingly our study showed that the prevalence of pterygium increased with age until 69 years of age and then declined similar to another study26. In this study 51% subjects showed lid plugging and mucous threads. This mucus pattern brings changes in the...
ocular surface. Mucin reduces the surface tension of tears and increases the wettability of the hydrophobic lipoprotein epithelial surface. This study was done to know the dry nature of the eyes having pterygium. Other studies have proved that pterygium excision improved tear osmolarity and tear film functions which were deteriorated again with the recurrence of pterygium.

In this study when normal subjects were compared with pterygium patients, both tear film breakup time and Schirmer's test showed changed values. The tear film changes cause dellen formation leading to focal dryness.

The limitation of our study was that it was conducted in a single center. Further studies need to be done with larger sample size to improve the generalizability of the results.

CONCLUSION
There is a relation between tear film functions, ocular surface changes and pterygium. The function of Meibomian gland is deranged in pterygium patients which initiates dellen formation which leads to dryness. Pterygium disturbs tear functions causing dry eye like symptoms.

REFERENCES
22. Türkylmaz K, Oner V, Sevim MS, Kurt A.


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