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Pterygium: A study of its Demography and Correlation with Dry Eye.

Ophthalmology

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ABSTRACT

PURPOSE: To analyze the epidemiological data of pterygium and assess its clinical co-relation with dry eye by evaluating the status of tear film
METHODS: This is a prospective study carried out from June 1, 2014 to July 30, 2016 in a tertiary referral care center of Western India in 240 eyes of which 120 eyes of 105 patients having pterygium were compared with 120 eyes of 120 normal healthy subjects.
The following parameters were evaluated in all patients:

- Tear film break up time
- Schirmer's test

RESULTS: In this study, age varied from 21 to 76 years (mean- 43.23 years for cases , 48.21 for controls). There were 56 men (53.3%) and 49 women (46.7%) in case group and 62 men (51.7%) and 58 women (48.3%) in control group. Majority of eyes (75 %) had a nasal pterygium while pterygium on temporal side was seen in 10 %. The remaining (15 %) had a double pterygium. The mean TBUT was 10.54 seconds (range 2.50 - 28.50 secs) in pterygium patients and 16.67 seconds (range 6.50 - 29.5 secs) in the control group. The mean Schirmer's test 1 was 16.15 mm (range 2.5 mm – 35.5mm) in the pterygium group and 20.23 mm (range 4.5 mm - 35 mm) in the control group. The mean basal secretion was 11.01 mm (range 1.5 mm – 27.5mm) in pterygium patients and 14.21 mm (range 0 mm - 28 mm) in the control group.
CONCLUSION: This study has clearly demonstrated that there is a strong relationship between dry eye and pterygium. Therefore, treatment of dry eye should be a part of pterygium management similarly precautions should be taken by all dry eye patients to protect their eyes from developing pterygium.

KEYWORDS:

pterygium, dry eye

Introduction

Pterygium (Greek meaning "wing") was first described by Hippocrates. Ninety percent of pterygia are located nasally. [1] One of the theories is that the tear film abnormalities cause local drying of the cornea and conjunctiva which in turn predisposes to these new growths. [2,3]

There is a worldwide distribution of pterygium, but it is more common in warm, dry climates and after exposure to (both UV-A and UVB) ultraviolet radiation. [3,4,5] Ultraviolet radiation exposure is a common cause of both pterygium and dry eye. It is unclear whether tear dysfunction is a precursor to pterygium growth or vice versa

The National Eye Institute published the definition of dry eye stating that "Dry eye is a disorder of the tear film with tear deficiency or excessive tear evaporation causing damage to the interpalpebral ocular surface and symptoms of ocular discomfort".

These theories have been supported by studies of geographical distribution (Cameron, I962)-pterygia appearing to occur more frequently in hot, dry climates-and by clinical and biochemical studies of the tear film. [3,6,7]

Dellen can be seen in front of the pterygium head as the tear film can not moisten the tissue in front of the head [8]

There is no diagnostic test that has a high degree of sensitivity for the diagnosis of dry eye therefore diagnosis depends on the history, examination, and a combination of diagnostic studies. The clinical tests used are slit-lamp examination, the Schirmer's test, the tear film breakup time (TBUT) and the Rose Bengal test. The other dry eye test include tear film osmolarity, (lysozyme and lactoferrin, impression cytology and conjunctival biopsy.) [9,10,11] Most commonly Schirmer's test and the tear film break up time (TBUT) are used routinely.

The main aim of this study was to compare tear secretion and tear film instability in patients with pterygium and normal healthy subjects. The objectives were to find clinical relationship between pterygium and dry eye; to find out the clinical features, natural history and demographic characteristics; to estimate tear secretion and tear film stability and to determine whether these are risk factors for the development of pterygium in this geographical location.

Materials and Methods:

This is a prospective study carried out from June 1, 2014 to July 30, 2016 in a tertiary referral care center of western India in 240 eyes of which 120 eyes of 105 patients having pterygium were compared with 120 eyes of 120 normal healthy subjects. All ethical aspects have been taken due care of.

This study included the patients with pterygium during study period. The exclusion criteria for the cases were: patients having other adnexal, anterior segment or posterior segment diseases that could alter tear secretion and stability or patients who refused to participate in the study, and for the controls all other diseases of the eye except refractive errors.

History and Examination included the following:

- Age and Sex of the patient
- Snellen's best corrected visual acuity
- Detailed ocular slit lamp examination
- Fundus examination by indirect ophthalmoscopy

The following examinations of the pterygium patients were conducted and recorded.

1. Grading of pterygium:

a) Grade 1: Transparent
b) Grade 2: Intermediate
c) Grade 3: Opaque

2. Breadth of the pterygium at the corneal periphery in mm
3. Encroachment into cornea in mm.

In both the pterygium and control groups, the tear secretion and its stability were tested by performing the following tests:

1. Tear film break up time (TBUT): Because manipulation of the eyelid or instillation of the anaesthetics may affect the tear film break up time, the TBUT test was performed before other dry eye tests and recorded after fluorescein staining. The time interval between the opening of the eye lids and appearance of the dry spots on the tear film was recorded. Three recordings were taken and the average was recorded as the TBUT and considered positive if the average tear film break up time was less than 10 seconds.

2. Schirmer's test
a) Without topical anesthesia (Schirmer's test 1)
b) After topical anesthesia (Schirmer's test 2)

The Schirmer test was performed with the help of Whatman filter paper after a thorough slit-lamp examination so that ocular irritation by the test strip would not interfere with other examination results. After 5 minutes, the strips were removed and the amount of wetting in millimeters was recorded. The Schirmer 1 test (without anaesthesia) was considered positive if the length of the wetting was less than 10mm at the end of 5 minutes. The Schirmer 2 test after anesthesia for Basal secretion was performed after the instillation of topical 4% xylocaine and (wiping the lower fornix with cotton), in the same manner as the Schirmer I test.

Results:
A total 240 eyes were evaluated in this study. In this group of patients there are 120 eyes of 105 patients with Pterygium were taken as cases and 120 eyes of 120 normal subjects without Pterygium were taken as controls for comparative analysis.

Their age varied from 21 to 76 years (mean- 43.23 years for cases and mean- 48.21 for controls).

Table 1: Age wise distribution of Cases and Controls

Age (years)	Cases	Controls
	No of patients	
20-29	14 (13.3%)	21 (17.5%)
30-39	15 (14.3%)	19 (15.8%)
40-49	27 (25.7%)	28 (23.3%)
50-59	23 (21.9%)	20 (16.7%)
60-69	15 (14.3%)	17 (14.2%)
70-79	11 (10.5%)	15 (12.5%)
Total	105	120

There were 56 men (53.3%) and 49 women (46.7%) in case group and 62 men (51.7%) and 58 women (48.3%) in control group

Majority of patients were laboureres (28.6%) followed by farmers (21.9%) in cases group.

Table 2: Occupation wise distribution of Cases and Control

Occupation	Cases	Control
	No of patients	
Farmer	23 (21.9%)	26 (21.7%)
Office worker	15 (14.3%)	22 (18.3%)
Housewife	13 (12.3%)	16 (13.3%)
Labourer	30 (28.6%)	27 (22.5%)
Driver	15 (14.3%)	18 (15%)
Student	9 (8.6%)	11 (9.2%)
Total	105	120

A total of 120 eyes of 105 patients were included in the study as cases out of which 15 patients showed bilateral involvement. The right eye was most commonly involved in 67 patients (55.8 %) and left eye was involved in 53 patients (44.2 %)

Majority of eyes (75 %) had a nasal pterygium while occurrence of pterygium on temporal side was seen in 10 %. The remaining eyes (15 %) had a double pterygium. Out of 90 eyes (75%) with nasal pterygium, 49 eyes had pterygium in their right eyes and 41 eyes had in their left eyes.A total 18 patients had double pterygium

Regarding the pterygium morphology of the 120 eyes studied, 38 eyes (31.7%) had Grade I (transparent) pterygia, 60 eyes (50 %) had Grade II (intermediate) pterygia and 22 eyes (18.3 %) had Grade III (opaque) pterygia. The average encroachment of the pterygium into the cornea was 2.56 mm and the average width of pterygium at the corneal junction was 5.4

Tests for tear secretion and tear stability:
TBUT: The mean TBUT was 10.54 seconds (range 2.50 - 28.50 secs) in pterygium patients and 16.67 seconds (range 6.50 - 29.5 secs) in the control group. The difference in the TBUT in these two groups was statistically significant ($P < 0.05$) (Table 3)

Schirmer's test 1: The mean Schirmer's test 1 was 16.15 mm (range 2.5 mm – 35.5mm) in the pterygium group and 20.23 mm (range 4.5 mm - 35 mm) in the control group. There was a statistically significant difference between the two groups ($P<0.05$) (Table 3)

Schirmer's test 2: The mean basal secretion was 11.01 mm (range 1.5 mm – 27.5mm) in pterygium patients and 14.21 mm (range 0 mm - 28 mm) in the control group. There was a statistically significant difference between the two groups ($P<0.05$) (Table 3)

Table 3: Schirmer's test and TBUT results comparison in cases and control group

Parameter	Cases		Control		P value
	Mean	SD	Mean	SD	
TBUT	10.54	3.56	16.67	5.43	< 0.05
Schirmer's test 1	16.15	7.68	20.23	8.23	< 0.05
Schirmer's test 2	11.01	6.56	14.21	6.76	< 0.05

After testing tear secretion and its stability, both the groups of patients were categorized under following headings.

a) Normal Schirmer's, normal TBUT,
b) Abnormal Schirmer's, normal TBUT
c) Abnormal TBUT, normal Schirmer's, and,
d) Abnormal Schirmer's, abnormal TBUT.

In this study, amongst the cases 53.3 % patients having dry eye. And amongst the control 25 % subjects having dry eye.

Table 4: Results of dry eye test

Test	Cases	Total	Control	Total
Normal Schirmer's, normal TBUT	56 (46.7%)	46.7%	90 (75%)	75%
Abnormal Schirmer's, normal TBUT	12 (10%)	53.3%	9 (7.5%)	25%
Abnormal TBUT, normal Schirmer's	30 (25%)		8 (6.7%)	
Abnormal Schirmer's, abnormal TBUT	22 (18.3%)		13 (10.8%)	
Total	120		120	

There is a relationship between pterygium and dry eye ($P < 0.05$). The risk of having pterygium in dry eye patients is 3.43 times higher than in those patients not having dry eye (Odds ratio 3.43).

Table 5 : Relationship between pterygium and dry eye

	Pterygium		
Dry eye	Yes	No	Total
Yes	64	30	94
No	56	90	146
Total	120	120	

Discussion:

Pterygium is common in the tropical and subtropical areas, particularly in persons exposed to sun, wind and dust.

In this study, we examined 240 eyes of 225 patients, of which 105 patients having pterygium and others were normal (not having pterygium). Their age varied from 21 to 76 years (mean- 43.23 years for cases and mean- 48.21 for controls). Although the prevalence of the lesion increases with age, the highest incidence occurs between the ages of 20 and 49 years, also demonstrated by hilgers et al. [12]

According to different authors pterygium is more common in male population in the same area of community, because they spend more time in outdoor activities and are thus more exposed to the damaging effects of dust and U-V rays in sunlight. [13,14] This is totally consistent with our reports in which 53.3 % cases were male. While some studies have shown females were more affected than males. [15]

In this study, we found that outdoor workers (64.8 %) were more affected by pterygium than indoor workers (35.2 %). Which is consistent with other studies. [16,17] However, some studies show that there is no association of pterygium with the nature of work. [18]

In this study, the mean Schirmer 1 value was 16.15 mm (range 2.5 – 35.5 mm) in the pterygium group and 20.23 mm (range 4.5 mm - 35mm) in the control group ($p<0.05$). The mean Schirmer 2 value was 11.01 mm (range 1.5 mm – 27.5mm) in pterygium patients and 14.21 mm (range 0 mm -28 mm) in the control group ($p<0.05$). In a study from India, Mithal et al, when Schirmer's test was done in two groups of patients, they found that the mean wetting of the filter paper was 12.6 mm (range 11 - 16 mm) and 5.2 mm (range 3 - 9.4 mm) respectively in normal healthy eyes and the eyes of patients with pterygium. They concluded that both the values were found to be significantly reduced in cases of pterygium indicating the inadequacy of tear film in these pterygium patients. [13]

Ishioka et al (2001) showed that Schirmer's test with anesthesia was shortened and was decreased in the eye with pterygium with marginal significance. They concluded that there is a correlation between pterygium formation and unstable tear film. [19] In another study from Nigeria (Balogun et al, 1995) it was found that the mean TBUT was lower in eyes with pterygium (17.90 secs) than in control eyes (19.86 secs), although the mean difference was not statistically significant. [20]

In this study, dry eye was diagnosed when Schirmer's reading was less than 10 mm and TBUT reading was less than 10.0 seconds. When this criterion was used, dry eye test results were normal in 46.7 % of the pterygium patients and 75 % of the control group. Dry eye test was abnormal in 53.3 % of the pterygium patients and 25 % of the control group. In this study, 25 % of the control patients showed abnormal dry eye test results although they did not have any symptoms of dry eye. These findings are in contrast to the findings of Goldberg and David (1976). They divided the patients in both their groups into 4 categories similar to the categories in our study and found that there was no statistically significant difference between the results between the two eyes of patients with unilateral pterygium and that in both groups, two thirds of the patients showed abnormal results in these tests although these patients did not have a dry eye. Therefore, they concluded that dry eye is not correlated with the pathogenesis of pterygium. [21]

Conclusion:

This study has clearly demonstrated that there is a strong relationship between dry eye and pterygium. Therefore, treatment of dry eye should also be part of pterygium management. All three tests of dry eye (TBUT, Schirmer 1 and Schiemer 2) should be performed in pterygium patients and appropriate tear substitute should be prescribed based on these results. Appropriate precautions should be taken by all dry eye patients such as use of UV protective glasses, hats and umbrellas to protect their eyes from developing pterygium. They should also avoid exposure of their eyes to strong winds and heat from open flames.

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