

## EVALUATION OF TEAR SECRETION AND TEAR FILM STABILITY IN PATIENTS WITH PTERYGIUM AND NORMAL INDIVIDUALS

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**ABSTRACT****Introduction:** Abnormalities of any of the components of lacrimal function unit can lead to dysfunctional tear film and development of dry eye. Dry eye is a commonly encountered problem in general population.**Materials and Methods:** A hospital-based, case-control study was conducted at National Medical College and Teaching Hospital, Nepal from 1st August 2018 to 30th July 2019. A total of 279 participants: 93 cases of pterygium (Group A: case) and 186 (Group B: control) normal individuals with no ocular surface disorder were enrolled. Objective analysis was done by Schirmer's (SCH) without and with anesthesia and Tear Break up Time (TBUT). Dependent t test was used to analyze the data. P value <0.05 was considered statistically significant.**Result:** The mean age of the patients was 47.82 ±11.09 years (range 26-71) with male being 48 (51.6%) in Group A and in Group B, 101 (54.3%) were male with mean age being 42.16 ±13.13 years (range 32-75). The mean SCH without and with anesthesia and TBUT values were 16.94±5.61mm, 13.81±5.06mm, 10.14± 4.06 sec in Group A whereas in Group B, 20.39 ±6.08mm, 16.74 ±5.25mm and 13.05 ±4.32 sec respectively which was statistically significant (p < 0.05). Patients with pterygium had higher risk of having dry eye than normal individuals (Odd ratios: 2.69, 2.44 and 2.27 respectively).**Conclusion:** Pterygium is a common ocular surface disorder which could result in instability of tear film indices, dysfunctional tear film and thus dry eye.**Keywords:** Dry eye; Pterygium; Schirmer's test; Tear film; Tear breakup time.**INTRODUCTION**

Pterygium (Greek , small wing) consists of 'cap' usually that gets attached to the corneal surface, a 'head' at its apex encroaches cornea and the 'body' represents the main bulk that lies over the sclera, and extends from the canthal region.<sup>1</sup> It has worldwide distribution with prevalence ranging from 1.3 to 38.7%.<sup>2</sup> Incidence increases with age, male predominance, lower education level and rural habituation, black race,<sup>3</sup> micro trauma,<sup>4</sup> UV radiation,<sup>5</sup> but the exact cause has not yet been

discovered. There is no clear consensus on pterygium being one of the major risk factors for dry eye as there are varying data in and against favor of it being the risk factor for dry eye.

This study aims to evaluate the nature of tear secretion and tear film stability in patient with pterygium and normal individuals and deduce correlation between tear film abnormalities and pterygium.

## MATERIALS AND METHODS

It is a hospital-based, case-control study conducted from 1<sup>st</sup> August 2018 to 30<sup>th</sup> July 2019 at National Medical College & Teaching Hospital, Nepal. A total of 279 participants (93 cases of pterygium and 186 normal individuals) meeting the inclusion criteria were included in the study. Inclusion criteria include: Group A (case)- Patient having unilateral or bilateral pterygium, all grades of pterygium, Group B (control)- Age and sex matched patients presenting with complaints other than ocular surface disease. History of systemic illness (e.g. Sjogren's syndrome), contact lens users, use of any systemic medication (e.g. Diuretics), other adnexal disease, anterior or posterior segment disease which alters tear secretion and stability, any recent ocular surgeries, use of any topical medications which may lead to dry eye and patient who do not give consent in Group A whereas in Group B patients with ocular surface diseases were excluded. This study was conducted after approval from ethical committee. A written informed consent was taken from all the cases and asked them to fill the proforma. Detailed history including age, sex, address, occupation, presenting complaint, duration of the disease and the complaints along comprehensive anterior segment evaluation was done by using Zeiss bio-microscopic slit lamp.

### Assessment

- a) Schirmer's test without anesthesia
- b) Schirmer's test with anesthesia
- c) Tear break-up time (TBUT)

These tests were performed on the day of presentation under normal environmental condition.

- a) Schirmer's test without anesthesia was done to assess the aqueous tear production by placing the Schirmer's strip, made up of Whatman no. 41 filter paper with dimension of 5 mm x 35 mm. The initial 5 mm of the Schirmer strip was folded and kept at the junction of the lateral one third and medial two third of the lower fornix of the eye and was kept in situ for 5 minutes. The wetting of the strip at the end of 5 minutes was recorded.

- b) Schirmer's test with anesthesia was done 15 minutes after the initial test in which basal secretion was measured. Proparacaine Hydrochloride 0.5% was installed into the lower conjunctival cul-de-sac, 1 drop installed 2 minutes apart and excess anesthetic solution was wiped off than after Whatman 41 filter paper was placed in same manner as above and wetting was recorded 5 minutes later. Value less than 15 mm was considered abnormal. Further grading of severity of dry was done, with values between 10-15 mm it was considered mild dry eye, values between 5-10 mm were taken as moderate grade of dry eye and values less than 5 mm were considered as dry eye with severe grade.
- c) The tear break-up time assessment was done and the readings were analyzed. This test was done for evaluating mucin component of the tear film. The tear film was stained by using fluorescein strips wetted with 4% xylocaine drops. After putting the fluorescein strip in the lower fornix, patient was asked to blink frequently for few seconds and then asked to stop blinking. TBUT measures the appearance of first dry spot over the cornea after the last complete blink in time period. This is evaluated under slit lamp bio microscopy using cobalt blue filter. Average of consecutive three readings was considered. Break up time less than 10 sec was considered abnormal.

The data were entered and evaluated in statistical software (IBM SPSS statistics version 21 and Microsoft Excel 2010). Dependent sample t-test was used to analyze the data. To test for level of significance, p value at 0.05 was considered statistically significance.

## RESULTS

A total of 279 patients, out of which 93 patients were of pterygium and 186 patients (control) with age and sex matched normal individual group were enrolled in the study. The mean age of the patient was 47.82 ±11.09 years (range 26-71 years) with male being 48 (51.6%) in Group A. Similarly in Group B 101 (54.3%) cases were male and the average age of the patient was 42.16 ±13.13 years (range 32-75 years). Out of 93 cases studied, 71

(76.3%) had unilateral pterygium and 22 (23.7%) had bilateral involvement. The left eye was involved in 42 (45.2%) cases and right eye in 29 (31.2%) cases. Eighty-eight (94.6%) cases had nasal pterygium while 5 (5.4%) cases had temporal involvement. In our study, there was a relationship between occupation and dry eye ( $p < 0.05$ ) whereas relationship between gender, education, socioeconomic status and gender with dry eye was not significant ( $p < 0.05$ ).

The mean Schirmer's test without anesthesia was  $16.94 \pm 5.61$  mm in Group A while it was  $20.39 \pm 6.08$  mm in Group B which was statistically significant ( $p < 0.05$ ). Likewise, mean Schirmer's test with anesthesia was  $13.81 \pm 5.06$  mm and  $16.74 \pm 5.25$  mm respectively in Group A with Group B showing statistically significant difference between the two groups ( $p < 0.05$ ). The mean TBUT in Group A was  $10.14 \pm 4.06$  sec which was significant ( $p < 0.05$ ) with the mean TBUT of  $13.05 \pm 4.318$  sec in Group B [Table 1]. Schirmer's test without and with anesthesia along with TBUT test was done to evaluate the severity of dry eye in Group A and B [Table 2,3,4].

**Table 1: Tests for tear secretion and tear stability in all participants**

Dry Eye Test	Group A (n=93)	Group B (n=186)	p-value
SCH without anesthesia(mm)	$16.94 \pm 5.61$	$20.39 \pm 6.08$	<0.05
SCH with anesthesia(mm)	$13.81 \pm 5.06$	$16.74 \pm 5.25$	<0.05
TBUT (sec)	$10.14 \pm 4.06$	$13.05 \pm 4.32$	<0.05

**Table 2: Severity of dry eye while using Schirmer's test without anesthesia**

Value (mm)	SCH without anesthesia (Group A) n=93	SCH without anesthesia (Group B) n=186
Normal (>15)	51(54.8%)	139(74.7%)
Mild (11-15)	29(31.2%)	34(18.3%)
Moderate (6-10)	12(12.9%)	12(6.5%)
Severe (2-5)	1(1.1%)	1(0.5%)

**Table 3: Severity of dry eye while using Schirmer's I test with anesthesia**

Value (mm)	SCH with anesthesia (Group A) n=93	SCH with anesthesia (Group B) n=186
Normal (>15)	37(39.8%)	119(64%)
Mild (11-15)	39(41.9%)	45(24.2%)
Moderate (6-10)	12(12.95)	18(9.7%)
Severe (2-5)	5(5.4%)	4(2.2%)

**Table 4: Severity of dry eye while using TBUT**

Value	TBUT (Group A) n=93	TBUT (Group B) n=186
Unstable (<10 sec)	37 (39.8%)	42(22.6%)
Borderline (10-15 sec)	44(47.3%)	67(36%)
Normal (>15 sec)	12(12.9%)	77(41.4%)

In our study we found relationship between pterygium and dry eye with p value <0.05. Similarly, the risk of having pterygium in dry eye patients was 2.69, 2.44 and 2.27 respectively (on the basis of Schirmer's test with and without anesthesia and TBUT test) higher than those of normal individuals [Odd ratios 2.69, 2.44, 2.27 respectively].

## DISCUSSION

Pterygium is one of the common conjunctival disorders with highest prevalence in male from 4<sup>th</sup> to 5<sup>th</sup> decades of life. Our findings were consistent to the study done by Luthra R. and colleagues.<sup>3</sup> Some studies showed female preponderance<sup>6</sup> and one study showed no relationship with gender.<sup>7</sup> Earlier studies pointed out that pterygium occurs due to exposure to UV rays, dry climates and dusty environment<sup>8</sup> and its prevalence was higher in outdoor workers<sup>9</sup> which we found in our study that the relationship between occupation and dry eye was significant. Similarly, the relationship between educations, socioeconomic status with dry eye was not significant which was similar to the study conducted at Korea by Lee YB et al.<sup>10</sup> We found no relationship between dry eye and gender which was contrast to the study done by Debra A et al.<sup>11</sup> where the frequency and severity of dry eye was more common in female.

There are various tests available to detect and diagnose dry eye but most commonly preferred and handy

techniques are Schirmer's test, TBUT and Rose Bengal staining. The Schirmer's test detects the quantity of the tear production while TBUT assesses the quality of tear film. In this study, mean Schirmer's test without and with anesthesia and TBUT in both groups were statistically significant. Results of our study was comparable with the study done by Rajab QY<sup>12</sup> and Roka N.<sup>13</sup> Regarding Schirmer's test with anesthesia my results were consistent with results obtained in other studies conducted in South India by Ganeshpuri AS<sup>14</sup> and Manhas A et al.<sup>15</sup> Analysis of TBUT results was comparable to a study done by Rajab AY.<sup>12</sup> Manhas A et al.<sup>15</sup> also obtained similar TBUT results which were quite similar to our study. The severity of dry eye in Schirmer's without anesthesia was mild in 29 (31.2%) cases, moderate in 12 (12.9 %) cases and severe in 1 (1.1%) case and degree of dry eye in Schirmer's test with anesthesia was mild in 39 (39.9%) cases, moderate in 12 (12.95%) cases and severe in 5 (5.4%) cases which was comparable with the results of severity of dry eye in previous study conducted in Nepal.<sup>13</sup>

We found 81 (87%) of patients in Group A had dry eye using TBUT test which was similar to the study conducted at Kerala, India by Velayudhan DK et al.<sup>16</sup> in which 35.77% of patients with pterygium had dry eye. Our study has shown that dry eye was present in 60.21 % of pterygium patient and 36.02 % in the normal control group and the odds ratio is 2.69 on the basis of Schirmer's test with anesthesia. 45.16 % and 25.26 % of patients with and without pterygium had dry eye on the basis of Schirmer's test without anesthesia and the odds ratio was 2.44 while on the basis of TBUT, dry eye was present in 39.78% and 22.58% in pterygium and normal control group respectively with odds ratio of 2.27. Our results for higher chances of tear film instability and dry eye in patients with pterygium is consistent with the results of various researches included in literature review.<sup>12,13,16,17</sup>

## CONCLUSIONS

Pterygium is one of the most common ocular surface disorders which could results in instability of tear film indices and thus lead to dysfunctional tear film and development of dry eye. In our study we found prevalence of pterygium was more common in male from fourth to fifth decades of life. There was no relationship between

education, socioeconomic status and gender with dry eye.

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