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## Relation of Tear Film Function with Monocular Pterygium

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# Relation of Tear Film Function with Monocular Pterygium

## Abstract:

**Background:** Pterygium appears as triangular fold of vascularized conjunctiva and can spread to the corneal limbus and beyond. Generally, it is asymptomatic but may cause dry eye symptoms such as redness, irritation, and blurred vision resulting from alteration of tear film function.

**Objective:** To find out the relation of the pre-corneal tear film function in eye with pterygium.

**Methods:** This study was taken place in the department of cornea at Ispahani Islamia Eye Institute and Hospital, Bangladesh during the period of September, 2022 to February, 2023. Fifty patients with unilateral pterygium were included in this study. Tear film break up time and Schirmer test with anesthesia were performed in both eyes of patients. Tear film break up time of less than 10 seconds and wetting length of filter strip of Schirmer test of less than 6mm were considered abnormal (Essentials of Ophthalmology. Samar K. Basak.) Test results were compared between eyes with pterygium and contralateral normal eyes. SPSS was used for statistical significance where P value was set at less than 0.05.

**Results:** This study showed the average age of the patients was  $39.80 \pm 8.89$  years. Out of 50 patients, 48% were male and 52% were female. Symptoms of patients with pterygium were redness 32 (64%), followed by cosmesis 27 (54%) and grittiness 19 (38%). The mean  $\pm$  SD of wetting length of filter strip of Schirmer test was significantly lower in eyes with pterygium than eyes without pterygium which were  $5.44 \pm 1.60$  mm vs  $10.12 \pm 1.93$  mm respectively and also the mean  $\pm$  SD of Tear film break up time was significantly lower in eyes with pterygium than eyes without pterygium which were  $7.92 \pm 1.63$  seconds and  $11.10 \pm 1.58$  seconds respectively and difference between two means  $\pm$  SD was statistically significant ( $P < 0.05$ ).

**Conclusion:** This study revealed significant abnormality which was found in Schirmer test and Tear film break up time (TBUT) test in the eyes with pterygium. So, tear film function was found abnormal in eyes with pterygium.

**Key word:** Pterygium, Dry eye, Tear film break up time (TBUT), Schirmer test

## CHAPTER - 1

## INTRODUCTION

### 1.1 INTRODUCTION

Pterygium is defined as a triangular fibrovascular subepithelial ingrowth of degenerative bulbar conjunctival tissue over the limbus on to the cornea which proliferates as vascularized granulation tissue to infiltrate the cornea destroying the superficial layers of stroma and bowman's membrane (Bowling 2015; Sihota and Tendon 2011).

The pathophysiology of pterygium is characterized by elastotic degeneration of collagen and fibrovascular proliferation, with an overlying covering of epithelium. Histopathology of the abnormal collagen in the area of elastotic degeneration shows basophilia with hematoxylin and eosin stain. This tissue also stains with elastic tissue stains, but it is not true elastic tissue, in that it is not digested by elastase. (Coroneo MT *et al.* 1999)

There is a worldwide distribution of pterygium, but more commonly it is found in the areas of warm and dry climate (Begley *et al.* 2006). Cameron (1983) mentioned "Pterygium belt" where pterygium is commonly seen. Pterygium is a common ocular disorder in many parts of the world with prevalence rate from 0.3 to 29% (Moran *et al.* 1984; Taylore *et al.* 1992).

Pterygium is most likely related to ultraviolet radiation (240-400nm) which causes mutation in limbal basal stem cells and alters expression of p-53 protein, tissue growth factor  $\beta$  and matrix metalloproteinases (Chan *et al.* 2002; Shiroma *et al.* 2009).

Eighty seven percent of the pterygium are located nasally (Antony *et al.* 2017) but can occur temporally.

Tear film consists of three layers (Essentials of Ophthalmology. Samar K. Basak.) The most superficial layer of the tear film is lipid layer, which is produced by the meibomian glands and that is 0.11  $\mu$ m thick (Essentials of Ophthalmology. Samar K. Basak). The middle layer is the aqueous layer produced by the main lacrimal gland and also from accessory lacrimal glands of Krause and Wolfring and thickness of which is 7.0  $\mu$ m (Essentials of Ophthalmology. Samar K. Basak). Deficiency of aqueous tear is the most common cause of dry eyes (Essentials of Ophthalmology. Samar K. Basak). Aqueous layer constitutes over 90% of the tear film (Essentials of Ophthalmology. Samar K. Basak). The layer most close to the cornea is the

mucin layer which is produced by conjunctival goblet cells and 0.02-0.05  $\mu\text{m}$  thick (Tiffany J.M. 2008).

Balogun *et al.* (2005) suggested an association of tear film abnormalities in eyes with pterygium.

Another study showed risk of development of pterygium in unstable tear film which is 3.28 times higher than in eyes without pterygium (Roka and Shrestha 2013).

However, another study had shown that tear function was normal in pterygium (Ergin and Bozdogan 2001).

Several clinical tests are available for detection of tear film abnormalities. Three tests are used routinely which are Schirmer's test, Tear film break up time (TBUT) and Rose Bengal test. Rose Bengal test is used in presence of corneal sign in severe dry eye (Roka and Shrestha 2013). Onkar *et al.* (2017) also evaluated additional fluorescein lower tear meniscus height (LTMH), LTMH imaging with anterior segment spectral domain optical coherence tomography (OCT) and conjunctival smear impression cytology with above three procedures. As shown in a study, Schirmer test with anesthesia is the most popular test as it is easy to perform without any additional equipment and it indicates the abnormality of the aqueous layer of the tear film (Chaidaroon and Pongmorgot 2003).

The objective of the present study was to find out the relation of the tear film function in eyes with pterygium. Monocular pterygium is a growth of tissue on the eye's surface that can affect vision. The tear film plays a crucial role in maintaining the health of the eye's surface, including the conjunctiva and cornea (Essentials of Ophthalmology. Samar K. Basak). When a pterygium develops on one eye, it can disrupt the tear film and lead to various ocular symptoms and issues, such as: Dry Eye: Pterygium can interfere with the normal distribution of tears across the eye's surface, leading to dry eye symptoms like burning, itching, and discomfort.

**Irritation:** Pterygium can cause irritation, redness, and foreign body sensation in the affected eye, making it more susceptible to discomfort.

**Tear Film Instability:** The presence of a pterygium can disrupt the stability of the tear film, potentially causing blurred vision and fluctuations in visual acuity.

**Tear Film Breakup:** Pterygium can increase the likelihood of tear film breakup, which can result in visual disturbances and discomfort.



**Treatment Challenges:** Managing monocular pterygium may require surgical removal or other interventions, which can further impact tear film dynamics and ocular surface health during the recovery period. In summary, there is a direct relationship between monocular pterygium and the tear film. Pterygium can disrupt the tear film's normal function, leading to various eye discomforts and potential visual disturbances in the affected eye (Kanski and Bowling 2011). Proper management and treatment may help mitigate these issues (Ergin and Bozdogan 2011). The environment of Bangladesh is a risk factor for developing pterygium (Onkar et al. 2017). Patients with pterygium are frequently seen at outpatient department. They present with dry eye symptoms such as irritation, redness, blurred vision. Pterygium causes impairment of vision due to astigmatism or while it crosses visual axis (Kanski and Bowling 2011). So, it is a challenge of an ophthalmologist to relieve dry eye symptoms and also restore vision. Recent evidence suggested that tear film instability developed for pterygium (Onkar et al. 2017) and it was controversial that tear film instability was predisposing factor for developing pterygium (Saleem et al. 2004). Another study suggested there was no change in tear film of eye with pterygium (Ergin and Bozdogan 2011). So, this was essential to conduct study about tear film function in eye with pterygium to find out any change. As this study was conducted in uniocular pterygium, so if any significant change found in tear film function due to pterygium or in normal fellow eye, early intervention can be given to relieve dry eye symptom in eye with pterygium and prevention of developing pterygium in fellow eye

## 1.2 JUSTIFICATION

Evaluating tear film function with monocular pterygium is important for several reasons. A pterygium is an abnormal growth of tissue on the conjunctiva (the thin layer covering the white part of the eye) that can extend onto the cornea (the clear front surface of the eye). This condition can lead to various ocular discomforts and visual disturbances, and evaluating tear film function in these patients is crucial due to the potential impact on their eye health and overall quality of life. Here are some justifications for evaluating tear film function with monocular pterygium:

**Visual Disturbances:** Monocular pterygium can cause irregular astigmatism due to corneal distortion. This irregularity can result in blurred and distorted vision. Tear film evaluation assists in determining whether the visual disturbances are primarily caused by tear film instability or other factors related to the pterygium.

**Surgical Planning:** Surgical removal of the pterygium is often considered if it causes significant discomfort or visual disturbances. Tear film evaluation aids in determining the preoperative tear film status, which is important for surgical planning and postoperative management. It helps in identifying patients who might benefit from tear film optimization before surgery to ensure better surgical outcomes.

**Long-Term Follow-up:** Even after surgical removal of the pterygium, patients might continue to experience tear film instability and dry eye symptoms. Evaluating tear film function during postoperative follow-up visits helps in monitoring the recovery process, identifying any ongoing tear film issues, and providing appropriate interventions.

**Quality of Life:** Dry eye symptoms and discomfort associated with tear film instability can significantly impact a patient's quality of life. By evaluating tear film function, healthcare providers can address these issues, alleviate symptoms, and improve the overall well-being of patients with monocular pterygium.

In conclusion, relation of tear film function with monocular pterygium is justified due to its impact on ocular surface health, visual comfort, and overall quality of life. Assessing tear film stability and quality provides valuable information for diagnosis, management, and treatment planning in these patients.

### 1.3 RESEARCH QUESTION

What is the relation of tear film function with monocular pterygium?

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## 1.4 HYPOTHESIS

Tear film function decrease in eyes with monocular pterygium

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## 1.5 Objective of the study

### 1.5.1 General objective:

- To find out the relation of tear film function with monocular pterygium.

### 1.5.2 Specific objectives:

- To evaluate the relation of tear film function between eye with pterygium and contralateral normal eye.
- To observe any difference in tear film function of different length and stage of pterygium by Schirmer's test.
- To find out any association between abnormal tear film function with pterygium by Schirmer's test.

## 1.6

Variables: Demographic

variables

- Age
- Sex
- Occupation

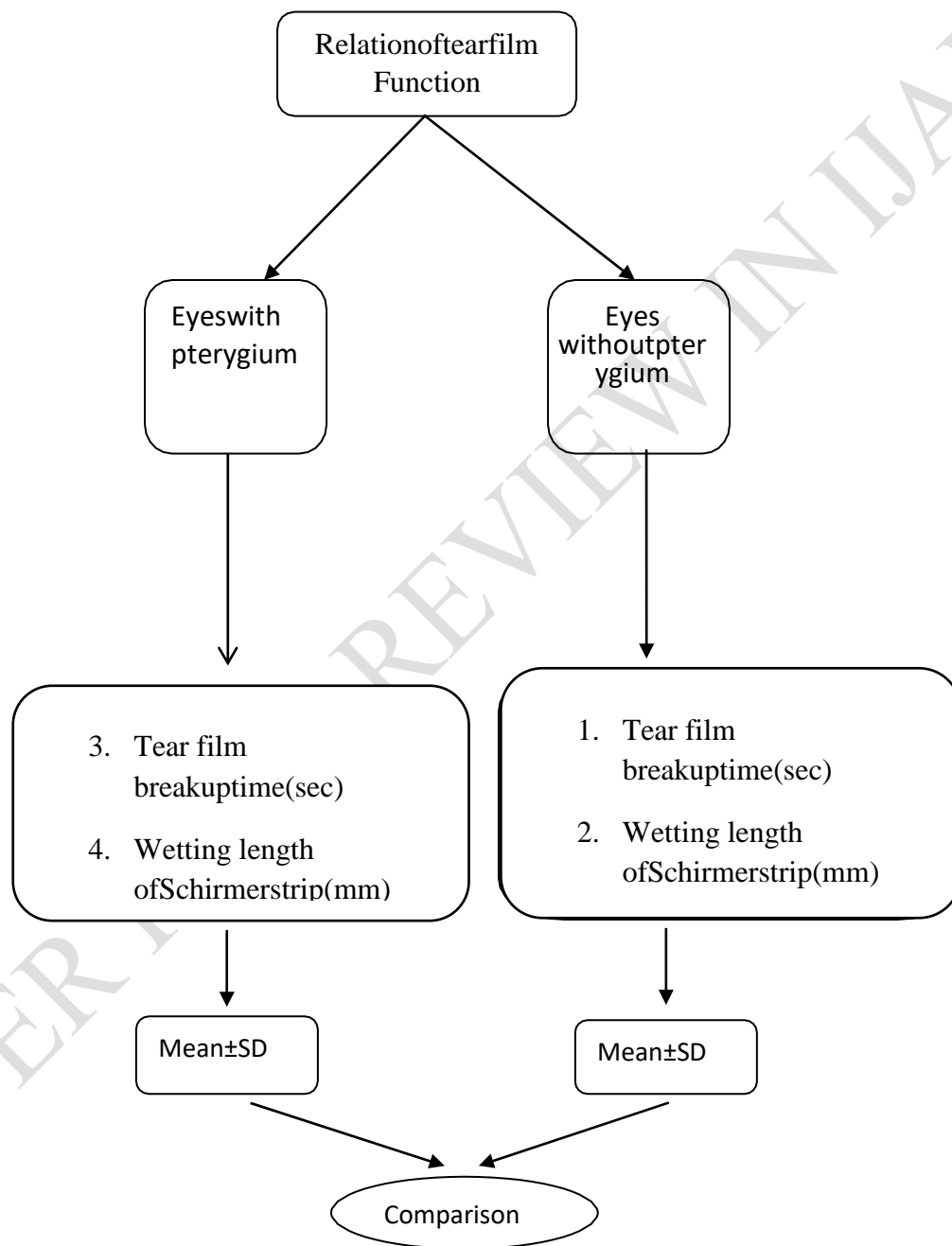
Variables related to pterygium

- Size of pterygium
- Stages of pterygium

Variables related to tear film function

- Tear film break up time (sec)
- Wetting length of Schirmer filter strip (mm)

### 1.6.1 Conceptual frame work:



### 1.6.2 Operational definition of variables:

#### Pterygium:

1 Pterygium is defined as a triangular fibrovascular subepithelial ingrowth of degenerative bulbar conjunctival tissue over the limbus onto the cornea which proliferates as vascularized granulation tissue to infiltrate the cornea destroying the superficial layers of stroma and Bowman's membrane (Bowling 2015; Sihota and Tendon 2011).

#### Tear film breakup time:

3 Fluorescein strip moistened with non-preserved saline is instilled into the lower fornix. The patient is asked to blink several times. The tear film is examined at the slit lamp with broad beam using cobalt blue filter. After an interval black spots or lines appear in the fluorescein stained film indicating the formation of dry areas. The Tear film break up time (TBUT) is the interval between the last blink and appearance of first randomly distributed dry spot. A break up time of less than 10 seconds is suspicious (Bowling 2015).

21 **Schirmertest:** This method involves measuring the pressure necessary to balance the Laplace pressure, which is measured using a filter paper (5×35 mm). The test can be performed with or without anesthesia. When performed without anesthesia, basic secretion is measured. After application of topical anesthetic agent, the excess should be removed from the inferior fornix with filter paper. The filter paper is folded 5 mm from one end and inserted at the junction of middle and outer third of lower lid. The patient is asked to keep the eyes gently closed. After 5 minutes amount of wetting from the fold is measured. Less than 6 mm with topical anesthesia is considered abnormal (Bowling 2015).

## CHAPTER-2

## LITERATUREREVIEW

### 2. LITERATUREREVIEW

A study was conducted at postgraduate department of Ophthalmology of GMC Jammu over a period of one year. Ninety pterygium patients and 180 age and sex matched patients without pterygium were included. Redness 57 (63.33%) was the most frequently occurring symptom in pterygium patients followed by cosmesis 49 (54.44%). The mean Tear film break up time (TBUT), mean Schirmer test without anesthesia and mean Schirmer test with anesthesia values were  $9.88 \pm 3.39$  seconds,  $13.17 \pm 4.57$  mm and  $10.11 \pm 4.81$  mm in patients with pterygium and  $14.22 \pm 3.99$  seconds,  $16.40 \pm 5.21$  mm and  $12.19 \pm 5.05$  mm in the control group respectively. There was a statistically significant difference in tear film function results between the pterygium patients and control groups ( $p < 0.001$ ). Abnormal tear film function was found in 53 patients with pterygium. The odd's ratio between unstable tear film and pterygium was 3.83. The prevalence of unstable tear film in pterygium patients was 58.89% which suggested that there was a strong clinical correlation between unstable tear film and pterygium (Manhas *et al.* 2017).

Antony *et al.* (2017) studied over hundred patients with unilateral pterygium who attended ophthalmology outpatient department at a tertiary care hospital. Out of the 100 patients, 59 were men, while 41 were women. The median age was 51.5 years. The mean of tear film breakup time, Schirmer test without anesthesia and Schirmer test with anesthesia were 7.6 seconds, 12.4 mm and 9.1 mm in pterygium eyes and 11.2 seconds, 17.0 mm and 14.6 mm in contralateral eyes respectively. There was a statistically significant difference in the tear film function test results between the pterygium eyes and the contralateral eyes ( $p$  value  $< 0.05$ ). The relationship of pterygium parameters (thickness, size) between tear film breakup time and Schirmer tests were evaluated. Tear film break up time was significantly reduced in thick pterygium. Both tear breakup time and Schirmer test results had no correlation with the horizontal size of pterygium. On comparison of pterygium eye with contralateral eye, Odds ratio was 10.44 showing increased risk of unstable tear film in pterygium. There was a significant association between pterygium and altered tear film function. Pterygium leads to abnormal tear



film and development of dry eye.

A comparative study of both eyes of 102 patients with unilateral pterygium was conducted between March 2011 to December 2012. The study comprised of seventy males and thirty-two females in the age range 28-76 years. The mean TBUT, mean Schirmer test value in the normal eyes were  $12.3 \pm 1.9$  seconds and  $13.4 \pm 2.5$  mm respectively. The comparable values in eyes with pterygium were  $8.2 \pm 1.4$  seconds and  $9.2 \pm 2.4$  mm respectively. Both TBUT and Schirmer test values were comparatively significant decreased in between eyes with pterygium and normal eyes. This study revealed that tear film abnormalities played a role in etiology of pterygium (Onkar *et al.* 2017).

El-Sersy (2014) study evaluated in 60 patients with age ranging between 25 to 70 years having uniocular pterygium from the outpatient clinic of October 6 University, Cairo, Egypt. The mean age of patient was  $44.17 \pm 9.25$  years. Tear film break-up time was significantly reduced in the eyes with pterygium. The mean TBUT of control eyes and eyes with pterygium were  $11.70 \pm 2.16$  seconds and  $5.91 \pm 1.95$  seconds respectively. The mean Schirmer test result was  $13.76 \pm 2.06$  mm in healthy eyes and  $5.85 \pm 1.86$  mm in the eyes of patients with pterygium. The difference was statistically significant in between two groups. Ocular dryness was found in eyes with pterygium.

A prospective, hospital-based study conducted between January 2009 and May 2010. Seventy-six pterygium cases and 152 age and sex matched normal cases presenting to the out patients department (OPD) of Manipal Teaching Hospital were included. Pterygium was bilateral in 15 (19.7%) and unilateral in 61 (80.3%) patients. Ninety-two (92.1%) pterygium patients reported either one or more of dry eye symptoms. Redness was the most common (67%) symptom reported. The mean Schirmer test without anesthesia, Schirmer test with anesthesia and mean tear film breakup time (TBUT) values were 16.19 mm, 10.01 mm and 10.56 sec in pterygium cases and 20.22 mm, 13.25 mm and 26.25 seconds in the control group respectively. There was a statistically significant difference in the results of tear film function test between the pterygium cases and the normal group ( $p < 0.05$ ). The odds ratio between pterygium and unstable tear film was 3.28. Unstable tear film was present in 54% of

the pterygium eyes. There was a strong relationship between unstable tear film and pterygium (Roka and Shrestha 2013).

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**CHAPTER-3****METHODOLOGY****3. Methodology****3.1 Type of the study:**

It was a cross-sectional study

**3.2 Place of the study:**

This study was conducted at the Department of Cornea, Ispahani Islamia Eye Institute and Hospital, Bangladesh.

**3.3 Period of the study:**

The study was conducted from September, 2022 to February, 2023.

**3.4 Study population:**

All the out-patient's department (OPD) with monocular pterygium attended in Department of Cornea, Ispahani Islamia Eye Institute and Hospital, Bangladesh.

**3.5 Sampling method:**

Purposive sampling technique.

### 3.6 Selection criteria:

#### 3.6.1 Inclusion criteria:

- Age: 20 years and above
- Any (Male & Female) patient presenting with uniocular pterygium
- Patient having pterygium with contralateral normal eye.
- Patient different stages of pterygium
- Patient gave consent for participation to research work

#### 3.6.2 Exclusion criteria:

- Subjects with systemic diseases diabetes mellitus (DM), Thyroid disease, Sjogren's syndrome and subjects on systemic medication (e.g. diuretics, psychotropic, antihistamines etc.) that lead to ocular drying.
- Subjects with pterygium in both eyes and also recurrent pterygium.
- Subjects with previous history of dry eye.
- Contact lens users.
- Subjects having other adnexal disease, anterior or posterior segment disease which alter tear secretion and stability.
- History of ocular trauma, chemical or mechanical injury.
- Patients having recent ocular surgery (e.g. cataract surgery, glaucoma surgery).
- Patients on topical medications (e.g. Timolol, Brimonidine, Olopatadine, Bimatoprost, Mch chloride etc.) that leads to ocular drying.

### 3.7 Sample size Calculation:

The sample size was determined by the following formula (Difference between two means):

$$n = (Z_{\alpha} + Z_{\beta})^2 \times (\sigma_1^2 + \sigma_2^2) / (\mu_1 - \mu_2)^2$$

n = sample size

$\mu_1$  = Mean of wetting length of Schirmer strip in contralateral healthy eye (16.40 mm)  
 $\sigma_1$  = SD of wetting length of Schirmer strip in contralateral healthy eye (5.21 mm)

$\mu_2$  = Mean of wetting length of Schirmer strip in eye with pterygium (13.17 mm)  
 $\sigma_2$  = SD of wetting length of Schirmer strip in eye with pterygium (4.57 mm)

(Menhas *et al.* 2017)

$Z_{\alpha}$  = Z value of standard normal distribution = 1.96

(at 5% level of significance or 95% confidence level)

$Z_{\beta}$  = Z value of standard normal distribution =

0.85 (at 80% power)

Putting the values in the above equation

$$\begin{aligned} n &= (1.96 + 0.85)^2 \times (27.14 + 20.88) / (16.40 - 13.17)^2 \\ &= 7.89 \times 48.02 / 10.43 \\ &= 503.72 / 10.43 \\ &= 48.35 \end{aligned}$$

So, the sample size was 48 by rounding.

For precise study sample size was increased to

48 + 10%

= 48 + 4.5/5

= 53.

For precise study sample size was considered to 50

### 3.8 Ethical consideration

A research protocol was approved by the ethical review committee of the Bangladesh Open university (BOU) and Ispahani Islamia Eye Institute and hospital, Bangladesh-administrative review committee.

- a. The purpose and procedures had been briefly explained to all participants.
- b. There was no chance of physical risk.
- c. No money had been given to the participants of the study.
- d. Assigned informed consent was taken after convincing all the study subjects that their confidentiality was safeguarded and privacy was maintained.
- e. To maintain confidentiality each of study subject was given a special ID number which had been followed during each and every step of the study procedure.
- f. Privacy was maintained during physical examination & interview and also at the time of procedure.
- g. The participants had right to accept and withdraw to participate in the study.

### 3.9 Data collection:

#### 3.9.1 Data collection instruments

- Schirmer strip and Slit lamp.
- Fluorescein strip
- Questionnaire.
- Medical record file.

#### 3.9.2 Data collection technique

- Detailed history of study subject was recorded by taking interview as per questionnaire.
- Routine general physical and systemic examination of subject were done to exclude systemic diseases.

- Every subject with unilateral primary pterygium underwent visual acuity assessment, detailed slit lamp and ophthalmoscopically examination to rule out adnexal, anterior and posterior segment diseases.
- Following examination of pterygium were conducted by Slit lamp and recorded.

a. The presence of fibrovascular tissue extending from bulbar conjunctiva onto the cornea either nasally or temporally.

b. Different stages of pterygium were observed.

c. The size of pterygium was measured in millimeters from corneal limbus to apex of pterygium on horizontal basis.

- Following special tests were performed for evaluation of tear film function.

#### 1. Tear film breakup time test:

Fluorescein strip moistened with preservative free artificial tear drop was instilled into the lower fornix of eye having pterygium. The patient was asked to blink for several times. The tear film was examined at the slit lamp with broad beam using cobalt blue filter.

After an interval black spots or lines appeared in the fluorescein stained film indicating the formation of dry areas. The time for tear film break up was measured the interval between the last blink and appearance of first randomly distributed dry spot by stop watch. A break up time of less than 10 seconds was taken as abnormal.

#### 2. Schirmer test with anesthesia:

Schirmer test with anesthesia was performed after the instillation of topical 0.4% Oxybuprocaine and wiping the lower fornix of the effected eye with cotton. Schirmer filter strip was folded 5 mm from one end. Folded strip was placed gently over the lower palpebral conjunctiva at the junction of lateral 1/3<sup>rd</sup> and medial 2/3<sup>rd</sup>. The patient was instructed to keep

eyes gently closed. After 5 minutes amount of wetting from the fold measured. Less than 6 mm with topical anesthesia was considered abnormal.

### 3.10 Dataanalysis

Collecteddata were checked and then presented using frequency and cross table, bardiagram and text. Data were analysed by SPSS version 24. Test of significance such asStudent's t-test and one way ANOVA for quantitative variables and Chi square test forqualitative variables were done. P value at 95% confidence level less than 0.05 wasregardedas statistically significant.



## CHAPTER-4

## RESULTS

### 4. RESULTS

Table I: Distribution of patients according to age (n=50)

Age(years)	Frequency	Percentage (%)
20-30	8	16.0
31-40	17	34.0
41-50	21	42.0
>50	4	8.0
<b>Total</b>	<b>50</b>	<b>100.00</b>
Mean±SD	39.80±8.89 years	

Table I showed that among (50) patients having uniocular pterygium, 8(16%) were in 20-30 years age group, 17(34%) were in 31-40 years age group, 21(42%) were in 41-50 years age group and 4(8%) were in >50 years age group. Mean age was 39.80±8.89 years.

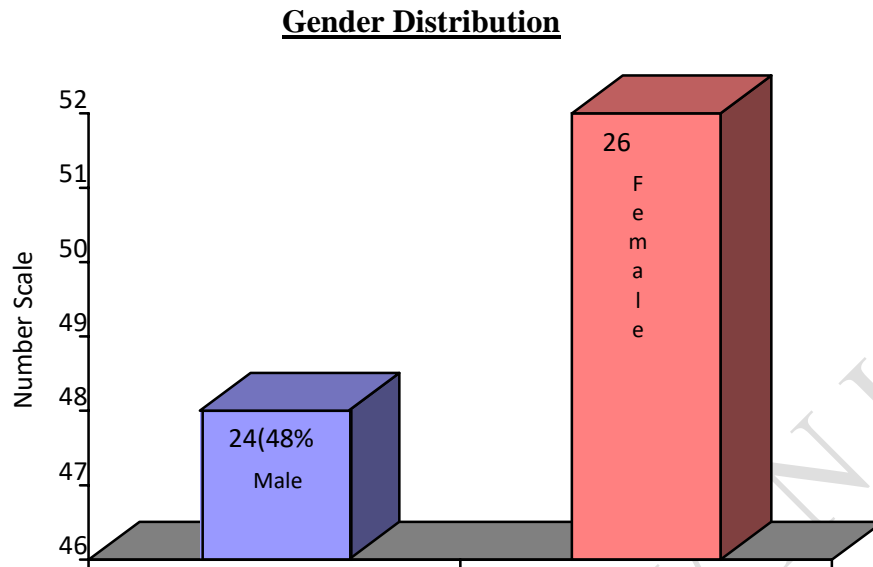


Fig.1: Bardiagram showing distribution of patients according to gender (n=50)

Figure 1 demonstrated gender distribution of the study subjects. Among (50) patients having unicocular pterygium, 24 were males and 26 were females.

TableII:Distributionof patientsaccordingtooccupation (n=50)

Occupation	Frequency	Percentage(%)
Housewife	19	38
Serviceholder	7	14
Driver	6	12
Daylabor	4	8
Farmer	3	6
Hawker	2	4
Others	9	18
<b>Total</b>	<b>50</b>	<b>100</b>

TableIIshowed the distribution ofpatients according to occupation. Among (50)patientshavinguniocularpterygium, 19 (38%)patient ware housewives,serviceholders were 7(14%), driver was 6(12%), day labor was 4(8%), farmer was 3(6%), hawker was 2(4%)andothers was 9(18%).

### Symptoms of Pterygium

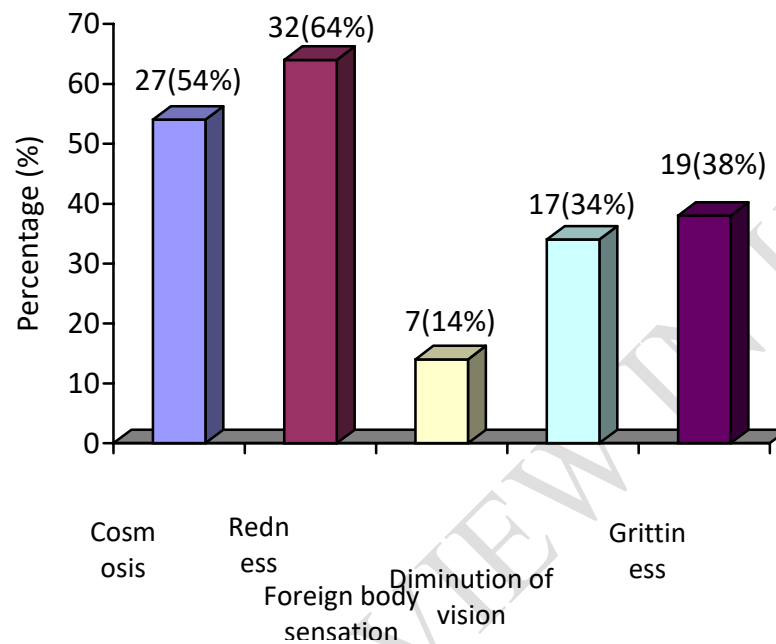


Fig.2: Bar diagram showing frequency of symptoms in study subjects (n=50)

Figure 2 showed symptoms of patients having uniocular pterygium. It was found that the patients had complaints of redness in 32 cases (64%), cosmesis in 27 cases (54%), grittiness in 19 cases (38%), diminution of vision in 17 cases (34%) and foreign body sensation in 7 cases (14%).

Table III: Distribution of patients according to characteristics of pterygium (n=50)

Characteristics	Number of patients	Percentage(%)
<b>Site</b>		
Nasal	44	88.0
Temporal	6	12.0
<b>Size(mm)</b>		
<b>Length</b>		
<2	14	28.0
2-4	34	68.0
>4	2	4.0
<b>Stage</b>		
Progressive	27	54.0
Stationery	16	32.0
Regressive	7	14.0

Table III showed nasal site of pterygium was found in 44 cases (88%) and temporal site of pterygium was found in 6 cases (12%). Most of patients (68%) presented with 2-4 mm length of pterygium and progressive stage of pterygium was found more (54%).

Table IV: Distribution of tear function abnormality of uniocular pterygium

	Frequency	Percentage(%)
Wetting length of filter strip of Schirmertest (mm)		
<6	30	60.0
≥6	20	40.0
Tear film break up time (sec)		
<10	37	74.0
≥10	13	26.0

Table IV showed wetting length of filter strip of Schirmertest <6 mm was found in 30 cases (60%) and ≥6 mm was found in 20 cases (40%) of uniocular pterygium. In tear film break up time, <10 seconds was found in 37 cases (74%) and ≥10 seconds was found in 13 cases (26%) of uniocular pterygium.

Table V: MeandistributionofwettinglengthoffilterstripofSchirmertestand tearfilm

breakuptime betweeneyeswithpterygiumandeyes withoutpterygium.

	Eyes withptery gium (n=50) Mean ±SD	Eyes withoutpter ygium (n=50) Mean ±SD	Statistics	
Wetting length of filterstrip(mm)	5.44±1.60	10.12±1.93	t =13.16 (df=98)	P<0.001
Tearfilmbreakuptime(se c)	7.92±1.63	11.10±1.58	t =9.87 (df=98)	P <0.001

Datawereanalyzedusingstudent's't'test

Table V showed wettinglength of filter strip of Schirmer test was significantly lower ineyeswithpterygiumthaneyeswithoutpterygiumwhichwas5.44±1.60mmvs10.12±1.93 mm respectively. Tear film breakup time wassignificantly lower in eyeswith pterygium than eyes without pterygium which was 7.92±1.63 sec vs 11.10±1.58 secrespectively. Analysis revealed that statistically significant difference between eyes withpterygium and eyes without pterygium in wetting length of filter strip of Schirmer andTearfilm break up time (P<0.05).

Table VI: Mean distribution of wetting length of filter strip of Schirmer test according to different stages of pterygium

Stages of pterygium	Wetting length of filter strip mm (mean $\pm$ SD)	Statistics
Progressive	4.70 $\pm$ 1.46	F=15.28, df=49, P < 0.001
Stationary	7.00 $\pm$ 1.73	
Regressive	6.75 $\pm$ 1.03	

Data were analyzed using one-way ANOVA test

Table VI showed wetting length of filter strip of Schirmer test was significantly lower in progressive stage of pterygium (P < 0.05).



Table VII: Mean and distribution of Tear film break up time according to stages of pterygium

Stage of pterygium	Tear film break up time c (mean $\pm$ SD)	Statistics
Progressive	7.33 $\pm$ 1.90	F=11.26, df=49, P < 0.001
Stationary	9.50 $\pm$ 1.54	
Regressive	10.14 $\pm$ 1.77	

Data were analyzed using one-way ANOVA test

Table VII showed tear film break up time was significantly lower in progressive stage of pterygium (P < 0.05).

Table VIII: Mean distribution of wetting length of filter strip of Schirmertest according to size of pterygium

Size of pterygium (mm)	Wetting length of filter strip (mm) (mean $\pm$ SD)	Statistics
<2	6.85 $\pm$ 1.23	
2-4	5.50 $\pm$ 1.87	F=5.84, df=49, P < 0.05
>4	3.00 $\pm$ 1.41	

Data were analyzed using one-way ANOVA test

Table VIII showed wetting length of filter strip of Schirmertest was significantly lower in higher size of pterygium >4 mm (P < 0.05).

Table IX: Mean and distribution of Tear film break up time according to size of pterygium

Size of pterygium (mm)	Tear film break up time (mean $\pm$ SD)	Statistics
<2	9.71 $\pm$ 1.89	
2-4	8.05 $\pm$ 1.96	F=6.02, df=49, P < 0.05
>4	5.50 $\pm$ 0.70	

Data were analysed using one way ANOVA test

Table IX showed tear film break up time was significantly lower in higher size of pterygium >4 mm (P < 0.05).

TableX:Testresultsoftearfilmfunctionineyeswithpterygiumandeyeswithoutpterygium(n=50)

Test	Eyes withpterygiu m(no)	Presentence (%)	Eyes withoutpteryg ium(no)	Presentence (%)
Normal TBUT,NormalSchirme r	14	28	35	70
Abnormal Schirmer,NormalTBU T	4	8	5	10
Abnormal TBUT,NormalSchirme r	8	16	6	12
Abnormal TBUT,AbnormalSchirme r	24	48	4	8
<b>Total</b>	50	100	50	100

TableXshowedtearfilmfunctionwerenormalin14cases(28%)ofeyewithpterygium and 35 cases (70%) of eyes without pterygium. Abnormal tear film functionwas found in 36 cases(72%) of eyes with pterygium and 15 cases (30%) of eyes withoutpterygium.

Table XI: Relationship of tear film function and pterygium

Test result (Tear film function)	Pterygium		Total	P value
	Eyes with pterygium	Eyes without pterygium		
Abnormal	36(72%)	15(30%)	51(51%)	P<0.001
Normal	14(28%)	35(70%)	49(49%)	
<b>Total</b>	<b>50(100%)</b>	<b>50(100%)</b>	<b>100(100%)</b>	

Data were analyzed using Chi square test

Table XI showed association of abnormal tear film function in eyes with pterygium was statistically significant (P<0.001).

## CHAPTER-5

## DISCUSSION

### 5.1DISCUSSION

A Total 50 patients who had primary uniocular pterygium and contralateral healthy eye were included in this study. Where most common affected age group was 41 to 50 years (42%) and mean age was  $39.80 \pm 8.89$  years. This finding is similar with Onkar *et al.* (2017) they found most of patients were in 40 to 50 years age group.

In the present study, among all 48% were male and 52% were female. Pterygium was more common in males.

In the present study, symptoms of patients with pterygium were redness (64%), followed by cosmesis (54%), grittiness (38%). Therefore, the findings of the study are in well agreement with the findings of the other research work (Manhas *et al.*, 2017). Another study (Roka and Shrestha 2013) also found that redness was the most common (67%) symptom in patients with pterygium.

In this study, nasal location of pterygium (88%) was found more than temporal (12%). This finding was consistent with the other research work (Onkar *et al.* 2017) where 71.6% of the pterygium was found on nasal side and 20.6% on the temporal side. Antony *et al.* (2017) also found pterygium more in nasal side than temporal.

In this study, it was found that majority (60%) had Schirmertest abnormality and majority (74%) showed tear film break up time abnormality in eyes with pterygium. Onkar *et al.* (2017) found 52.9% Schirmertest abnormality and 37.3% TBUT abnormality in eyes with pterygium. Abnormal TBUT test was found 47.78% in eyes with pterygium from another study (Menhas *et al.* 2017). Roka and Shrestha (2013) had reported positive TBUT test in 43.42% eyes with pterygium.

In this study, the mean  $\pm$  standard deviation of wetting length of filter strip of Schirmertest with anesthesia results in pterygium eyes and the opposite normal eyes were  $5.4 \pm 1.60$  mm and  $10.12 \pm 1.93$  mm respectively and difference between two groups was statistically significant ( $p < 0.001$ ). Therefore, the findings of the study are in well agreement with the

findings of the other research work (Antony *et al.* 2017) where mean wetting length of filter strip of Schirmer test values were 9.1 mm in eye with pterygium and 14.6 mm in normal eye. Ishioka *et al.* (2001) showed that result of Schirmer test with anesthesia was decreased than eye without pterygium. But another study (Kampitak and Leelawongtawun 2014) found no difference of mean values of Schirmer test between eyes with pterygium and fellow normal eyes.

In present study, the mean  $\pm$  standard deviation of tear breakup time in pterygium eyes was  $7.92 \pm 1.63$  seconds and  $11.10 \pm 1.58$  seconds in contralateral normal eyes and difference between two groups was statistically significant ( $p < 0.001$ ). Therefore, the findings of the study are in well agreement with the findings of the other research work (Antony *et al.* 2017) where tear breakup time in pterygium eyes was  $7.6 \pm 2.6$  seconds and  $11.2 \pm 1.8$  seconds in contralateral normal eyes ( $p$  value  $< 0.001$ ). A study conducted by

Onkar *et al.* (2017) in eyes with pterygium and normal eyes where showed mean tear film BUT of  $12.3 \pm 1.9$  seconds in normal healthy eyes while in pterygium eyes it was reduced to  $8.2 \pm 1.4$  seconds. But another study (Ergin A. and Bozdogun O. 2001) found no difference of mean values of tear film breakup time between eyes with pterygium and opposite normal eyes.

This study found both tear breakup time and Schirmer test results had significant correlation with pterygium size ( $P < 0.05$ ). But Kampitak and Leelawongtawun (2014) and Antony *et al.* (2017) reported both tear film breakup time and Schirmer test results had no correlation with pterygium size. From this study, prevalence of abnormal tear film in eye with pterygium was 72 % and significant relationship was found between unstable tear film and pterygium ( $P < 0.001$ ). Antony *et al.* (2017) reported abnormal tear film was present in 81 % of eyes with pterygium. Menhas A. *et al.* (2017) also found strong relationship between unstable tear film and pterygium and unstable tear film was found in 58.89 % in eye with pterygium.

## CHAPTER-6

## CONCLUSION,LIMITATION, &RECOMMENDATION

### 6.1 CONCLUSION

This study revealed significant abnormality in Tear film break up time (TBUT) and Schirmer test in the eyes with pterygium than contralateral normal eyes. A stable tear film was found in eyes with pterygium. This study demonstrated that there was a strong relationship between tear film function abnormality and pterygium.

### 6.2 LIMITATIONS

- Sample size of the study was small.
- Other procedures for evaluation of tear film function like Rose Bengal stain, Optical Coherence Tomography (OCT) Lower Tear Meniscus Height (LTMH), Conjunctival impression cytology could not be carried out due to lack of logistic support in study place.
- In this study, comparison of tear film function was not done between patients with pterygium and age & sex matched healthy individual without pterygium.
- This study was done by Institution in Ispahani Islamia Eye institute and Hospital, Bangladesh. If it was done in a number of hospitals, those findings would be more acceptable.

### 6.3 RECOMMENDATIONS

- Further large-scale study on the same issue is recommended to obtain more accurate and acceptable outcome.
- Same study is recommended in patients with pterygium and age & sex matched individual without pterygium.
- Study on same issue is proposed by performing other procedures (Rose Bengal stain, optical coherence tomography (OCT) for lower tear meniscus height (LTMH), Conjunctival impression cytology).
- From this study we found significant abnormality in Tear film break up time (TBUT) and Schirmer test in eyes with pterygium. So, two tests should be advised to every patient with pterygium for evaluation of tear film function.



## CHAPTER-7

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**CHAPTER-8**
**APPENDICES**
**APPENDIX I**
**WorkSchedule**

Name	2022					2023	
	Aug 2022	Sep 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023
Topic Selection							
Article Review							
Protocol Writing							
Approval to Protocol							
Data Collection							
Data Analysis							
Report Writing & Binding							
Submission							

## APPENDIX II (a)



**শিশু-মাতৃ স্বাস্থ্য ইনস্টিটিউট**  
**INSTITUTE OF CHILD AND MOTHER HEALTH**  
Matuail Dhaka-1362, Tel : 7542820-23, Fax : 88-02-7542672  
E-mail : info@icmh.org.bd, Website : www.icmh.org.bd



Promoting health and nutrition of children and mothers through service research and training

**Certificate of Ethical Clearance**

**Reference:** ICMH/IRB- 27DEC2020/006 **Date:** 02/01/2021

**Faruque Ahmed**  
MPH Program  
Bangladesh Open University  
**Batch:** 2019  
**ID No:** 19-2-53-810-003  
**Center:** Institute of Child and Mother Health

The Institutional Review Board (IRB) of the Institute of Child and Mother Health (ICMH) reviewed and discussed your research project titled **“Relation of Tear Film Function with Monocular Pterygium”** on 27<sup>th</sup> December 2020. After discussion and review of your project, the Board approves the project to be conducted in the present form.

The Institutional Review Board expects to be informed about the progress of the study with any change in the protocol or procedures.

The IRB retains the right to withdraw or amend this Ethical Clearance Certificate if any unethical practices are revealed or suspected or relevant information has been withheld or misrepresented.

  
**Professor Dr. M. A. Mannan**  
Executive Director and Chairman  
Institutional Review Board  
Institute of Child and Mother Health  
Matuail, Dhaka-1362



**APPENDIXII (b)**

**Ispahani Islamia Eye Institute and Hospital**  
Bangladesh  
*A Not for Profit Organization*

Date: 22 August 2022

Ref. No: IIEI&H/HR/1107/22

**TO WHOM IT MAY CONCERN**

This is to certify that Mr. Faruque Ahmed has been working at the Ispahani Islamia Eye Institute & Hospital as Optometrist since 1<sup>st</sup> January 2012 to till date.

The management of Ispahani Islamia Eye Institute & Hospital (IIEI&H) is pleased to permission for data collection & do the research work.



Main Hospital		Branch Hospitals	
116/C/2, Monipuripara, Farmgate, Dhaka-1215 T: +88-096 109 98333 (Hot line) E: info@islamia.org.bd, www.islamia.org.bd	IIEI&H Barisal: Barisal Sadar, Barisal T: +88-0431-2176680 E: ombbh@islamia.org.bd	IIEI&H Jamalpur: Jamalpur Sadar, Jamalpur T: +88-0981-64535 E: omjbh@islamia.org.bd	IIEI&H Naogaon: Naogaon Sadar, Naogaon T: +88-0741-61662 E: omnbh@islamia.org.bd
	City Eye Center: M: +88-01750462197		

## APPENDIX III

### INFORMED CONSENT FORM

(Verbally translated into Bengali)

I am, Mr/Miss/Mrs/Ms..... hereby giving well informed consent to participate in the study conducted by Faruque Ahmed. I fully understand that my participation in this study will bring fruitful medical information to be useful for me and for the others in the future. I am convinced that during participation in this study I shall not be exposed to any physical, psychological social or legal risk. My privacy and confidentiality will be safeguarded, any my anonymity will be protected. I will preserve the right to withdraw myself from the study whenever I want. I would not like to be monetarily compensated because of loss of work time.

Signature/Thumb impression Date:

Cell No:

অবগতিক্রমে সম্মতিপত্র

xviii

## শিরোনামে

### Relation of tear film function with monocular pterygium

আমি সজ্ঞানে এবং স্বেচ্ছায় ফারুক আহমেদ পরিচালিত উপরোক্ত শিরোনামের গবেষণার কার্যক্রমে অংশগ্রহণ করিতেছি। এই গবেষণায় তিনি আমাকে পরীক্ষা করিবেন এবং রোগ সম্পর্কে কিছু প্রয়োজনীয় প্রশ্ন করিবেন। ইহাতে আমাকে কোন আর্থিক সুবিধা প্রদান করা হইবে না। তিনি আশ্বস্ত করিয়াছেন যে এই গবেষণায় অংশগ্রহণে আমার শারীরিক অথবা মানসিক কোন ক্ষতি হইবে না। যেকোন সময় আমি স্বেচ্ছায় ইহা হইতে অবমুক্ত হইতে পারিবো এবং এই গবেষণা আমার স্বাস্থ্যের কোন প্রভাবিত করিবেনা। আমার সমস্ত তথ্য কঠোরভাবে রক্ষিত রাখা

রোগীর স্বাক্ষর

স্বাক্ষরকারীর স্বাক্ষর

সাক্ষাতকার গ্রহণকারীর স্বাক্ষর

তারিখ

তারিখ

তারিখ

মোবাইল নং -



## APPENDIXIV

### SemiStructuredQuestionnaireandCheckList

Reg.No

ID.No

#### Particularsofthepatient

- Name :
- Age :
- Sex :
- Religion :
- Occupation :
- Education

:Illiterate/Primaryschool/Secondaryschool/Higher

secondary/Graduation

- Economicstatus :Monthly family income
  - 1. Below 15,000/-
  - 2. Below 15000-25000/-
  - 3. Below 25000-35000/-
  - 4. Above 35000/-
- Address :
- Dateofexamination:

#### Presentingcomplaints:

#### Pasthistory:

- Ofocular diseases,ocular therapy,traumaor surgery.
- Ofsystemic disease like diabetes,hypertension,etc.

#### Drug history:

- Ofrelevantocularorsystemic diseases.
- Family History-Yes No

**Personal history:** YesNo

#### PHYSICALEXAMINATION:

##### A. General:

XX

- Pulse:
- Bloodpressure

### B. Systemic:

- Cardiovascularsystem:
- Respiratorysystem:
- Endocrinesystem:
- Nervoussystem:
- Locomotorssystem:
- Alimentarysystem:
- Genito-urinarysystem:
- Others:

### C. Ocularexamination:

Parameter	R/E	L/E
Visual acuity:		
a. Distantvision		
Unaided-		
Withpinhole-		
Withpatient'sspectacles-		
Withcorrection (newspectacles)-		
b. Nearvision		
Unaided-		
Withpatient'sspectacles-		
Withcorrection (newspectacles)-		
Slitlambio-microscopicexamination:		
Ophthalmoscopicexamination:		
TearfilmbySchirmertest:		
Schirmertest-1		
Schirmertest-2		
Tear FilmBreakUp Time (TBUT):		

### Characteristicsofpterygium:

1. Laterality :Temporal/Nasal
2. Size :a.Lengthofpterygiumfromlimbus(mm):  
b.Breadthofthepterygiumatthelimbus(mm):
3. Classifications: a.Progressive  
b.Stationery  
c.Regressive

**Investigation:**RBS (Random Blood Sugar)

## APPENDIXV

### Photograph

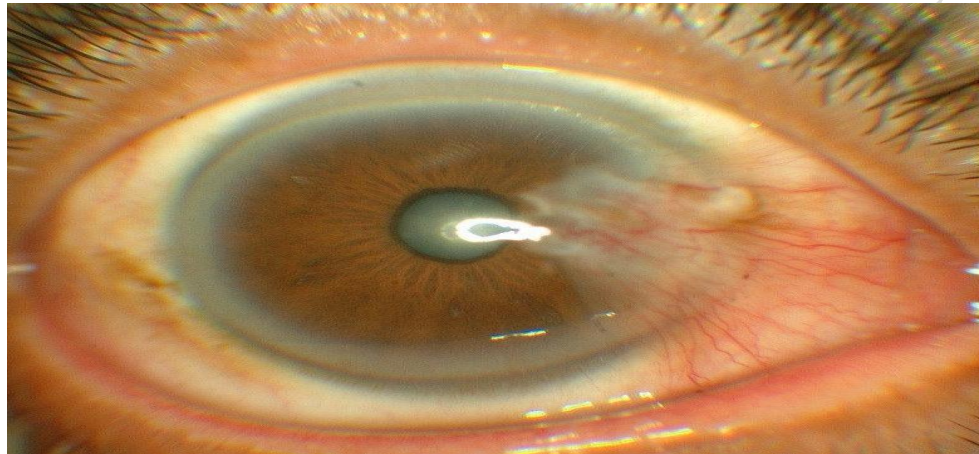


Figure:1.1Nasalpterygium



Figure:1.2Bothnasalandtemporalpterygium

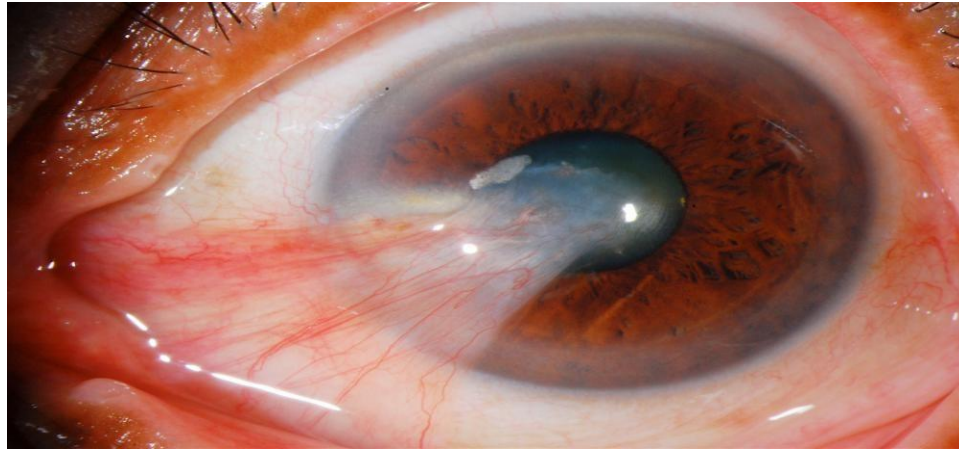


Figure: 1.3 large nasal pterygium

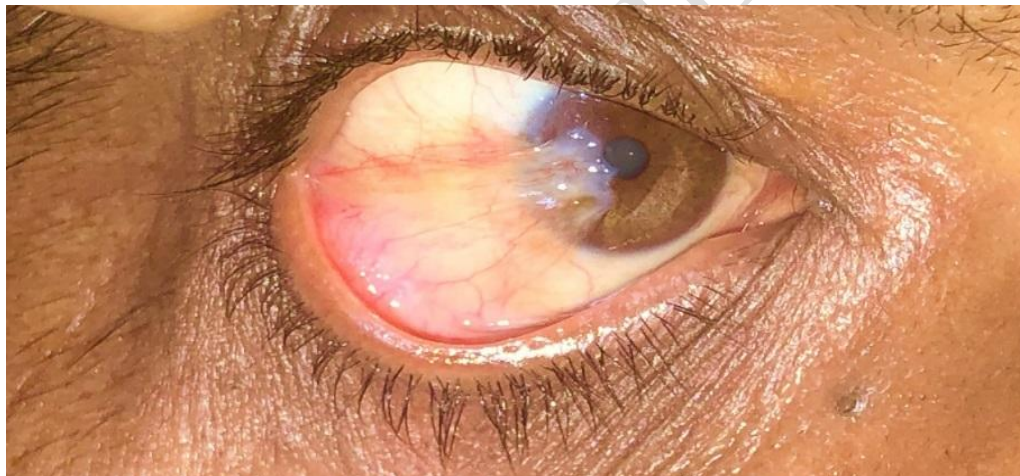


Fig. 4: Recurrence of temporal pterygium with symblepharon near lateral canthus in right eye following 15



Figure:1.4Schirmer'steartestfilterstrips andtest





Figure: Application of Fluorescein strip test

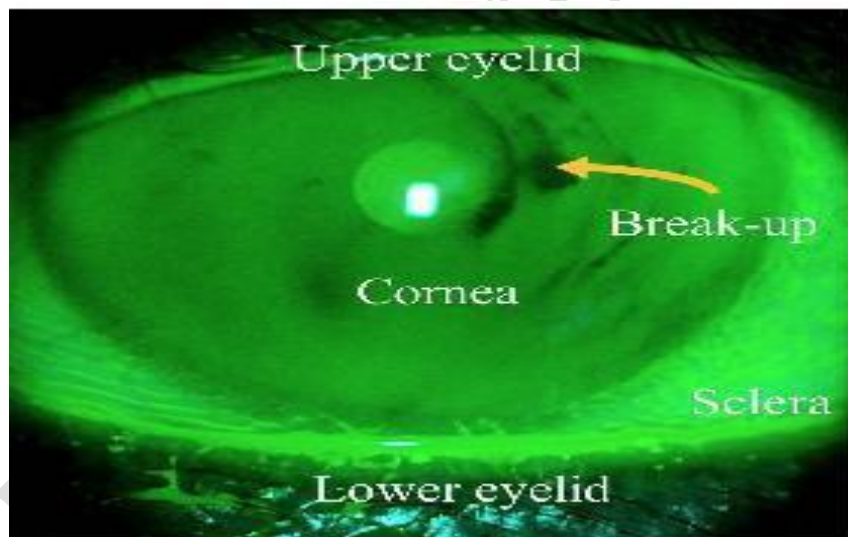


Figure:1.6Tearfilm breakup