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RESEARCH ARTICLE

RELATION OF TEAR FILM FUNCTION WITH MONOCULAR PTERYGIUM

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

Abstract

Background: Pterygium appears as triangular fold of vascularized conj unctiva 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 breakup 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 wasset at less than 0.05.

Results: This study showed the average age of the patients was 39.80±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 ± 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 ± 1.60 mm vs 10.12 ± 1.93 mm respectively and also the mean ± SD of Tear film break up time was significant lower in eyes with pterygium than eyes without pterygium which were 7.92 ± 1.63 seconds and 11.10 ± 1.58 seconds respectively and difference between two means ± SD was statisticallysignificant (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.

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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 at 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; Taylor 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 β 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 µm 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 µm (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 µm thick (Tiffany J.M. 2008).

Balogun et al. (2005) suggested association of tear film abnormalities in eye with pterygium. Another study showed risk of development of pterygium in unstable tear film which is 3.28 times higher than in eye 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 fluroscein 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.

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.

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

Hypothesis:
Tear film function decreases in eyes with monocular pterygium

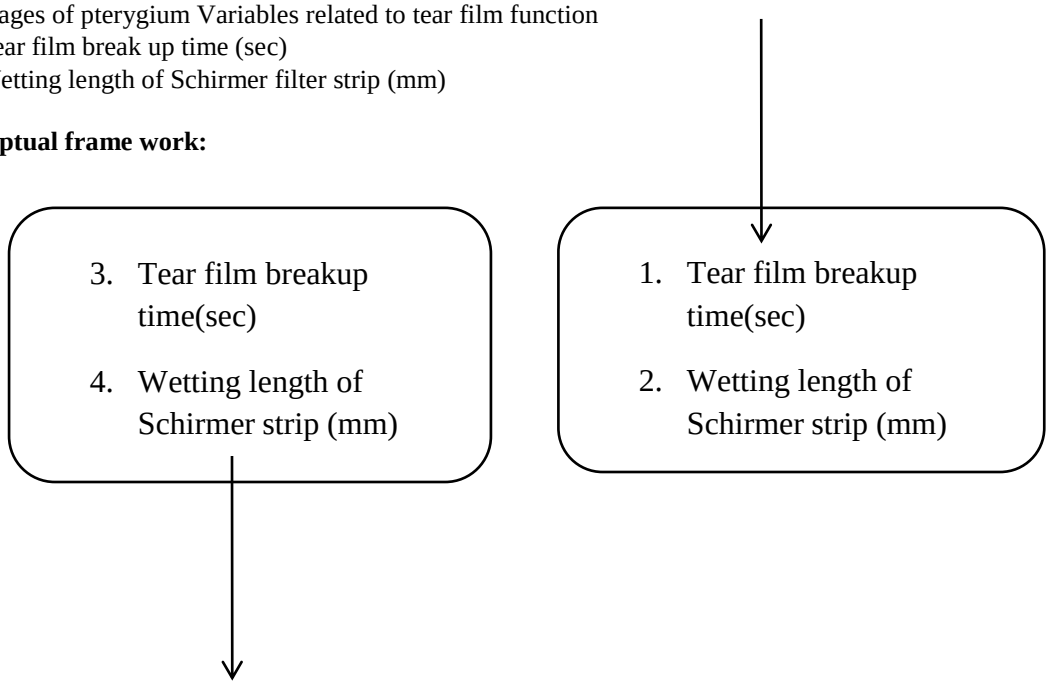
Objective of the study:
General objective:
- To find out the relation of tear film function with monocular pterygium.

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 stages of pterygium by Schirmer`s test.
- To find out any association between abnormal tear film function with pterygium by Schirmer`s test.

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)

Conceptual frame work:



Operational definition of variables:

Pterygium:

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).

Tear film break up time:

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). Schirmer test: This method involves measuring the pressure necessary to balance the Laplace pressure, which man filter paper (5×35 mm). The test can be performed with or without anesthesia. When performed with anesthetic 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 measured. Less than 6 mm with topical anesthesia is considered abnormal (Bowling 2015).

Literature Review:-

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 brack up time (TBUT), mean Schirmer test without anesthesia and mean Schirmer test with anesthesia values were 9.88±3.39 seconds, 13.17±4.57 mm and 10.11±4.81 mm in patients with pterygium and 14.22±3.99 seconds, 16.40±5.21 mm and 12.19±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 break up 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 break up 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 in 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 ± 1.9 seconds and 13.4 ± 2.5 mm respectively. The comparable values in eyes with pterygium were 8.2 ± 1.4 seconds and 9.2 ± 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 ± 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 ± 2.16 seconds and 5.91 ± 1.95 seconds respectively. The mean Shirmer test result was 13.76 ± 2.06 mm in healthy eyes and 5.85 ± 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).

Methodology:-

Type of the study:
It was a cross-sectional study

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

Period of the study:
The study was conducted from September, 2022 to February, 2023.

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

Sampling method:
Purposive sampling technique.

Selection criteria:

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

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, Banzalkonium 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= $(Z\alpha + Z\beta)2 \times (\sigma12 + \sigma22) / (\mu1 - \mu2)2$ n= sample size μ1=Mean of wetting length of Schirmer strip in contralateral healthy eye (16.40 mm) σ1= SD of wetting length of Shirmer strip in contralateral healthy eye (5.21mm) μ2 = Mean of wetting length of Schirmer strip in eye with pterygium (13.17 mm) σ2= SD of wetting length of Schirmer strip in eye with pterygium (4.57mm) (Menhas et al. 2017) Zα = Z value of standard normal distribution= 1.96 (at 5% level of significance or 95% confidence level) Zβ = Z value of standard normal distribution = 0.85 (at 80% power) Putting the values in the above equation n = $(1.96 + 0.85)2 \times (27.14 + 20.88) / (16.40 - 13.17)2 = 7.89 \times 48.02 / 10.43 = 503.72 / 10.43 = 48.35$ 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

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. A signed informed consent was taken after convincing all the study subjects that their confidentiality 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 steps 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.

Data collection:

Data collection instruments:

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

Data collection technique:

- Detailed history of study subject was recorded by taking interview as per questionnaire.
- Routine general physical and systemic examinations 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 examinations of pterygium were conducted by Slit lamp and recorded.

a. The presence of fibrovascular tissue extending from bulbar conjunctiva on to 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.

Tear film break up time test:

Fluroscein 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 fluroscein 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.

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 1/3rd and medial 2/3rd. 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.

Data analysis Collected data were checked and then presented using frequency and cross table, bar diagram and text. Data were analysed by SPSS version 24. Test of significance such as Student's t-test and one way ANOVA for quantitative variables and Chi square test for qualitative variables were done. P value at 95% confidence level less than 0.05 was regarded as statistically significant.

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
Total	**50**	**100.00**
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.

Gender Distribution:-

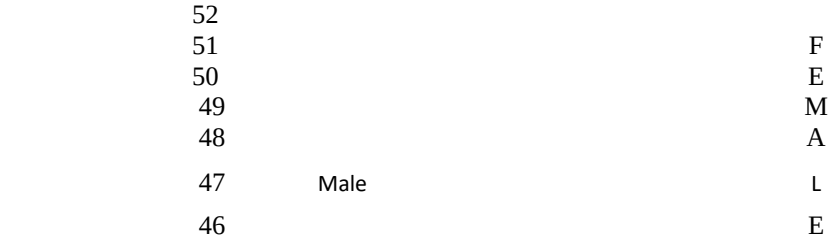


Fig. 1: Bar diagram showing distribution of patients according to gender (n=50)

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

Table II: Distribution of patients according to occupation (n=50)

Occupation	Frequency	Percentage (%)
House wife	19	38
Service holder	7	14
Driver	6	12
Day labor	4	8
Farmer	3	6
Hawker	2	4
Others	9	18
Total	**50**	**100**

Table II showed the distribution of patients according to occupation. Among (50) patients having uniocular pterygium, 19 (38%) patient ware house wives, service holders were 7(14%), driver was 6(12%), day labor was 4(8%), farmer was 3(6%), hawker was 2 (4%) and others was 9 (18%).

Symptoms of Pterygium:

- 70
- 60
- 50
- 40
- 30
- 20
- 10
- 0

1. Percentage (%)
2. Cosmosis
3. Redness
4. Foreign body sensation
5. Diminution of vision
6. Grittiness

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 complains 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 (%)
Site		
Nasal	44	88.0
Temporal	6	12.0
Size(mm)		
Length		
<2	14	28.0
2-4	34	68.0
>4	2	4.0
Stage		
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 Schirmer test (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 Schirmer test <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: Mean distribution of wetting length of filter strip of Schirmer test and tear film break up time between eyes with pterygium and eyes without pterygium.

	Eyes with pterygium (n=50)	**Eyes without pterygium (n=50)**	**Statistics**
	Mean ± SD	**Mean ± SD**	
Wetting length of filterstrip (mm)	5.44±1.60	10.12±1.93	t =13.16 P < 0.001 (df = 98)
Tear film break up time(sec)	7.92±1.63	11.10±1.58	t =9.87 P < 0.001 (df = 98)

Data were analyzed using student's 't' test:-

Table V showed wetting length of filter strip of Schirmer test was significantly lower in eyes with pterygium than eyes without pterygium which was 5.44±1.60 mm vs 10.12±1.93 mm respectively. Tear film break up time was significantly lower in eyes with pterygium than eyes without pterygium which was 7.92±1.63 sec vs 11.10±1.58 sec

respectively. Analysis revealed that statistically significant difference between eyes with pterygium and eyes without pterygium in wetting length of filter strip of Schirmer and Tear film 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±SD)	Statistics
Progressive	4.70±1.46	
Stationery	7.00±1.73	F = 15.28 , df = 49, P <0.001
Regressive	6.75±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 distribution of Tear film break up time according to stages of pterygium

Stage of pterygium	Tear film break up timesec (mean±SD)	Statistics
Progressive	7..33±1.90	
Stationery	9.50±1.54	F = 11.26, df = 49, P <0.001
Regressive	10.14±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 Schirmer test according to size of pterygium

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

Data were analyzed using one-way ANOVA test:
Table VIII showed wetting length of filter strip of Schirmer test was significantly lower in higher size of pterygium >4mm (P<0.05).

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

Size of pterygium (mm)	Tear film break up timesec (mean±SD)	Statistics
<2	9.71±1.89	
2-4	8.05±1.96	F = 6.02, df = 49, P < 0.05
>4	5.50±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).

Table X: Test results of tear film function in eyes with pterygium and eyes without pterygium (n=50)

Test	Eyes with pterygium(no)	Presentence (%)	Eyes without pterygium (no)	Presentence (%)
Normal TBUT, Normal Schirmer	14	28	35	70
Abnormal Schirmer, Normal TBUT	4	8	5	10
Abnormal TBUT, Normal Schirmer	8	16	6	12
Abnormal TBUT, Abnormal Schirmer	24	48	4	8
Total	50	100	50	100

Table X showed tear film function were normal in 14 cases (28%) of eye with pterygium and 35 cases (70%) of eyes without pterygium. Abnormal tear film function was found in 36 cases (72%) of eyes with pterygium and 15 cases (30%) of eyes without pterygium.

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%)	
Total	50 (100%)	50 (100%)	100 (100%)	

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).

Discussion:-

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 ± 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 Male and 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 schirmer test abnormality and majority (74%) showed tear film break up time abnormality in eyes with pterygium. Onkar et al. (2017) found 52.9% Schirmer test 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± standard deviation of wetting length of filter strip of Schirmer test with anesthesia results in pterygium eyes and the opposite normal eyes were 5.4±1.60 mm and 10.12±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 ± standard deviation of tear breakup time in pterygium eyes was 7.92±1.63 seconds and 11.10 ± 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±2.6 seconds and 11.2±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 ±1.9 seconds in normal healthy eyes while in pterygium eyes it was reduced to 8.2 ± 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.

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. So unstable tear film was found in eyes with pterygium. This study demonstrated that there was a strong relationship between tear film function abnormality and pterygium.

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 finding would be more acceptable.

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.

References:-

1. Antony A.T., Mini P.A., Dalia S. (2017). Pterygium and Dry Eye- A Clinical Correlation. JMSCR, vol. 05, no. 06, p. 23654.
2. Balogun M.M., Ashaye A.O., Ajayi B.G., Osuntokun O.O. (2005). Tear break-up time in eyes with pterygia and pingueculae in Ibadan. West Afr J Med, vol. 24, pp. 162-166.
3. Begley C.G., Himebaugh N., Renner D., Liu H., Chalmers R., Simpson T. (2006). Tear breakup dynamics: a technique for quantifying tear film instability. Optom Vis Sci, vol. 83, pp. 15-21.
4. Bowling B. (2015). Dry eye. Kanski's Clinical Ophthalmology. 8thed. Edinburgh: Elsevier, p. 124.
5. Bowling B. (2015). Conjunctiva. Kanski's Clinical Ophthalmology. 8thed. Edinburgh: Elsevier, pp. 131-166.
6. Cameron J.D. (1983). Cellulose acetate impressions of the ocular surface; dry eye states. Arch Ophthalmol, vol. 101, pp. 1869-1872.
7. Chan C.M., Liu Y.P., Tan D.T. (2002). Ocular surface changes in pterygium. Cornea, vol. 21, pp. 38-42. Chan C.M., Liu Y.P., Tan D.T. (2002). Ocular surface changes in pterygium. Cornea, vol. 21, pp. 38-42.
8. Chaidaroon W., Pongmoragot N. (2003). Basic tear secretion measurement in pterygium. J Med Assoc Thai, vol. 86, pp. 348-352.
9. Chaidaroon W., Pongmoragot N. (2003). Basic tear secretion measurement in pterygium. J Med Assoc Thai, vol. 86, pp. 348-352.
10. El-Sersy T.H. (2014). Role of pterygium in ocular dryness. J Egypt Op thalmol Soc, vol. 107, no. 4, pp. 205-208.
11. Ergin A., Bozdogan O. (2001). Study on tear function abnormality in pterygium. Ophthalmologica, vol. 215, pp. 204-208.
12. Ishioka M., Shimmer S., Yagi Y., Tsubota K. (2001). Pterygium and dry eye. Ophthalmologica, vol. 215, pp. 209–211.
13. Kadayifçilar S.C., Orhan M., Irke M. (1998). Tear functions in patients with pterygium. Acta Ophthalmol Scand, vol. 76, pp. 176–179.
14. Kanski J.J., Bowling B. (2011). Conjunctiva. Clinical Ophthalmology. 7th ed. Edinburgh: Elsevier, p. 163.
15. Kampitak K., Leelawongtawun W. (2014). Precorneal tear film in pterygium eye. Med J Assoc Thai, vol. 97, no. 5, pp. 536-539.

16. Lucas D.R. (1989). Conjunctiva, Cornea & Sclera .Greer's Ocular Pathology. 4th ed. Blackwell Science, p. 61.
17. Manhas A., Gupta D., Gupta A., Kumar D., Manhas R.S., Manhas G.S. (2017). Clinical correlation between dry eye and pterygium : a study done at government medical college Jammu, Jammu and Kashmir, North India. Int J Res Med Sci, vol. 5, no. 7, pp. 3087- 3094.
18. Manhas A., Gupta D., Gupta A., Kumar D., Manhas R.S., Manhas G.S. (2017). Clinical correlation between dry eye and pterygium : a study done at government medical college Jammu, Jammu and Kashmir, North India. Int J Res Med Sci, vol. 5, no. 7, pp. 3087- 3094.
19. Moran D.J., Hollows F.C. (1984). Pterygium and ultraviolet radiation: a positive correlation. Br J Ophthalmol, vol. 68, pp. 343–346.
20. Onkar A., Ji Pandey D., Bist H.K., Sen S. (2017). Tear and Pterygium: A Clinico- Pathological Study of Conjunctiva for Tear Film Anomaly in Pterygium. J Eye Cataract Surg, vol. 3, no. 24, pp. 1-8.
21. Rahman A., Yahya K., Fasih U., Waqar-ul-Huda, Shaikh A. (2012). Comparison of Schirmer's test and tear film breakup time test to detect tear film abnormalities in patients with pterygium. J Pak Med Assoc, vol. 62, pp. 1214-12