Relation of Tear Film Function with Monocular Pterygium

Abstract:

Background: Pterygium appears as triangular fold of vascularized conjunctiva andcanspread to the corneal limbus and beyond. Generally, it is asymptomatic but may cause dryeye symptoms such as redness, irritation, and blurred vision resulting from alteration of tearfilm function.

Objective:To find out the relation of thepre-cornealtear filmfunctionineye withpterygium.

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

Results: This study showed the average age of the patientswas 39.80±8.89 years.Out of50 patients, 48% were male and 52% were female.Symptoms of patients with pterygiumwere 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 lowerin eyes withpterygium than eyes without pterygium which were 5.44 ± 1.60 mm vs 10.12 ± 1.93 mmrespectively and also the mean ± SD of Tear film break up time was significant lower ineyeswithpterygiumthaneyeswithoutpterygiumwhichwere7.92±1.63secondsand 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 andTear film break up time (TBUT) test in the eyes with pterygium. So, tear film function wasfoundabnormal in eyeswith 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 *at al*.1999)

There is a worldwide distribution of pterygium, butmore commonly it is found in theareasofwarmanddryclimate(Begley*etal.*2006). Cameron(1983)mentioned"Pterygium belt'' where pterygium is commonly seen. Pterygium is a common oculardisorder in many parts of the world with prevalence rate from 0.3 to 29% (Moran *et al.*1984;Taylor*et al.* 1992).

Pterygiumismostlikelyrelatedtoultravioletradiation(240-400nm)whichcausesmutation in limbal basal stem cells and alters expression of p-53 protein, tissue growthfactorβandmatrixmetalloproteinases (Chan *et al.*2002; Shiroma*et al.* 2009).

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

Tear film consists of three layers (Essentials of Ophthalmology.Samar K. Basak.)The most superficial layer of the tear film is lipid layer,whichisproducedbythemeibomianglandsandthatis0.11µmthick (Essentials of Ophthalmology.Samar K. Basak). Themiddlelayeristheaqueouslayerproducedby themainlacrimalglandandalsofromaccessorylacrimal glands of Krause and Wolfring andthickness of which is 7.0 µm (Essentials of Ophthalmology.Samar K. Basak). Deficiency ofaqueous tear is the most common cause of dry eyes (Essentials of Ophthalmology.Samar K. Basak). Aqueous layer constitutes over90%of the tear film (Essentials of Ophthalmology.Samar K. Basak).The layer most close to the cornea is the

mucin layer which isproducedbyconjunctival goblet cellsand 0.02-0.05 µm thick (TiffanyJ.M. 2008).

Balogun*etal*.(2005)suggestedassociationoftearfilmabnormalitiesineyewithpterygium. Another study showed risk of development of pterygium in unstable tear filmwhichis3.28timeshigherthanineyewithoutpterygium(RokaandShrestha2013). However, another study had shown that tear function was normal in pterygium(ErginandBozdogan 2001).

Several clinical tests are available for detection of tear film abnormalities. Three tests areused routinely which are Schirmer's test, Tear film break up time (TBUT) and RoseBengal test. Rose Bengal test is used in presence of corneal sign in severe dry eye (Rokaand Shrestha 2013). Onkar *et al.* (2017) also evaluated additional fluroscein lower tearmeniscus height (LTMH), LTMH imaging with anterior segment spectral domain opticalcoherence tomography (OCT) and conjunctival smear impression cytologywith abovethree procedures. As shown in a study, Schirmer test withanesthesiaisthemostpopulartestasitiseasytoperformwithoutanyadditionalequipmentan ditindicatestheabnormalityoftheaqueouslayerofthetearfilm(Chaidaroonand Pongmorgot 2003).

The objective of the present study was to find out the relation of the tear film functionineyes withpterygium. 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?

1.4 **HYPOTHESIS**

Tear film function decrease in eyes with monocular pterygium

1.5 **Objectiveofthestudy**

1.5.1 Generalobjective:

- To find out the relation of tear film functionwith monocularpterygium.

1.5.2 Specificobjectives:

- To evaluate the relationof tearfilmfunctionbetweeneyewithpterygiumandcontralateral normaleye.
- Toobserveanydifferenceintearfilmfunctionofdifferentlengthandstage sofpterygium by Schirmer`s test.
- To find outanyassociation between abnormal tearfilmfunction withpterygium by Schirmer`s test.

1.6

Variables:Demographic

variables

- Age
- Sex
- Occupation

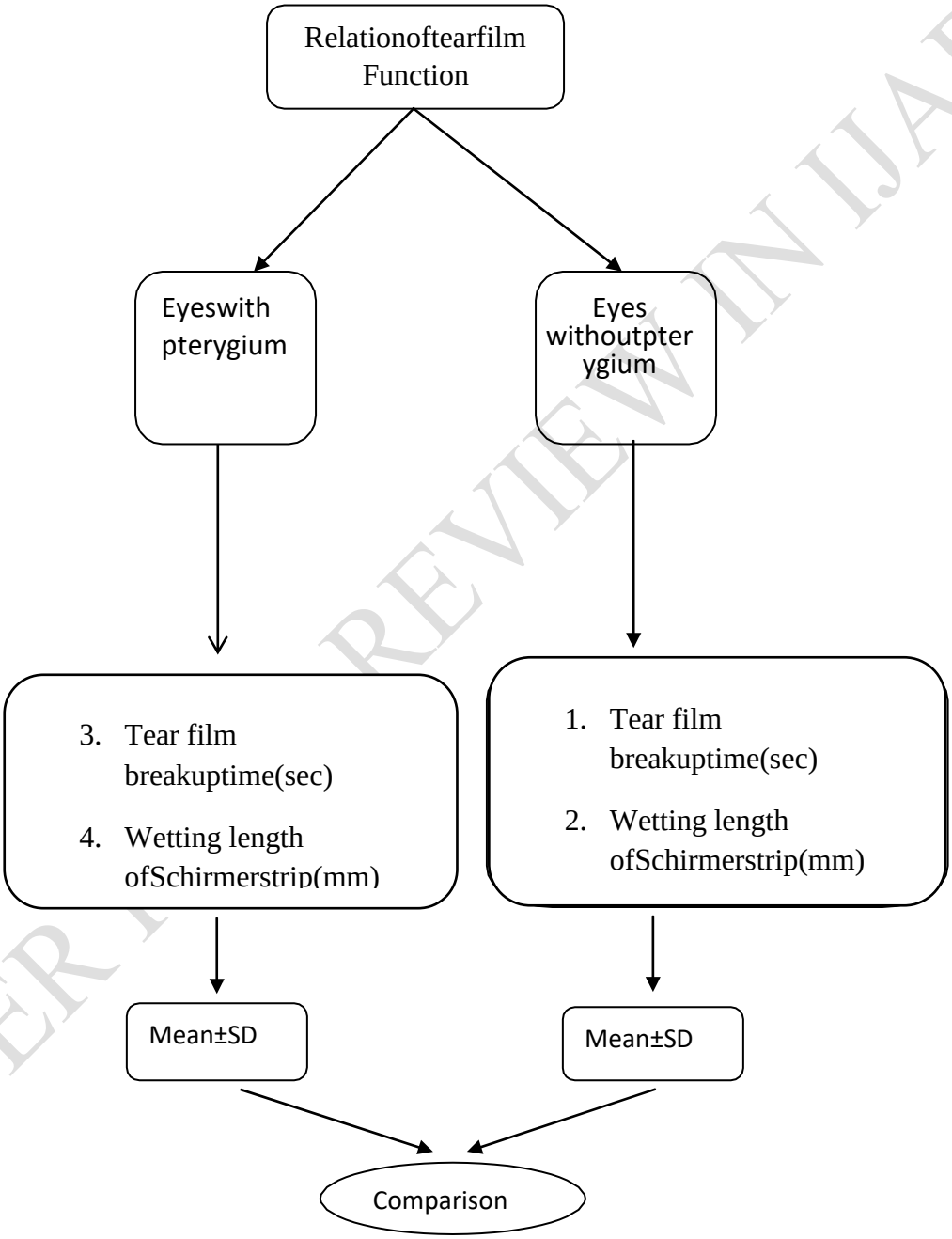
Variablesrelatedto pterygium

- Sizeofpterygium
- Stagesofpterygium

Variablesrelatedtotearfilmfunction

- Tearfilmbreakuptime(sec)
- WettinglengthofSchirmerfilterstrip (mm)

1.6.1 Conceptualframe work:



1.6.2**Operationaldefinitionof variables:**

Pterygium:

Pterygium is defined as a triangular fibrovascular subepithelial ingrowth of degenerativebulbarconjunctivaltissueoverthelimbusontothecorneawhichproliferatesasvascularized granulation tissue to infiltrate the cornea destroying the superficial layers ofstromaand bowman'smembrane(Bowling2015;Sihotaand Tendon 2011).

Tearfilmbreakup time:

Fluoresceinstripmoistened withnon-preserved saline isinstilled into the lower fornix.The patient is asked to blink several times. The tear film is examined at the slit lampwith broad beam using cobalt blue filter. After an interval black spots or lines appear inthe fluorescein stained film indicating the formation of dry areas. The Tear film break up time (TBUT) is the intervalbetween the last blink and appearance of first randomly distributed dry spot. A break uptimeofless than 10 seconds is suspicious (Bowling2015).

Schirmertest: This method involves measuring the pressure necessary to balance the Laplace pressure, which manfilter paper(5×35 mm). The test can be performed with or without anesthesia. When performed withanesthetic basic secretion is measured. After application of topical anesthetic agent, theexcess should be removed from the inferior fornix with filter paper. The filter paper isfolded 5 mm from one end and inserted at the junction of middle and outer third of lowerlid. The patient is askedto keep the eyesgently closed. After 5 minutes amount ofwetting from the fold measured. Less than 6 mm with topical anesthesia is consideredabnormal(Bowling2015).

2. LITERATUREREVIEW

A study was conducted at postgraduate department of Ophthalmology of GMC Jammuover a period of one year. Ninety pterygium patients and180 age and sex matchedpatients without pterygium were included. Redness 57 (63.33%) was the most frequentlyoccurring 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 anesthesiavalues were 9.88±3.39 seconds, 13.17±4.57 mm and 10.11±4.81 mm in patients withpterygium and 14.22±3.99 seconds, 16.40±5.21 mm and 12.19±5.05 mm in the controlgroup respectively. There was a statistically significant difference in tear film functionresults between the pterygium patients and control groups ($p<0.001$). Abnormal tear filmfunction was found in 53patients with pterygium. The odd's ratio between unstable tearfilm and pterygium was 3.83. The prevalence of unstable tear film in pterygium patientswas 58.89% which suggested that there was a strong clinical correlation between unstabletearfilm and pterygium(Manhas*etal.* 2017).

Antony*etal.*(2017)studiedoverhundredpatientswithunilateralpterygiumwhoattended ophthalmology outpatient department at a tertiary care hospital. Out of the 100patients, 59 were men, while 41 were women. The median age was 51.5 years. The meanof tear film breakup time, Schirmer test without anesthesia andSchirmer test withanesthesiawere7.6seconds,12.4mmand9.1mminpterygiumeyesand11.2seconds, 17.0mmand14.6mmincontralateraleyesrespectively.There wasa statisticallysignificant difference in the tear film function test results between the pterygium eyesand the contralateral eyes (p value < 0.05). The relationship of pterygium parameters(thickness,size)betweentearfilmbreakuptimeandSchirmertestswereevaluated.T ear film break up time was significantly reduced in thick pterygium. Both tear breakup timeand Schirmertest results had no correlation with the horizontal size of pterygium. Oncomparisonofpterygiumeyewithcontralateraleye.Oddsratiowas10.44showingincreased risk of unstable tear film in pterygium. There was a significant associationbetween pterygium and altered tear film function. Pterygium leads to abnormal tear

filmanddevelopment of dryeye.

Acomparative studyofbotheyesof102patientswithunilateralpterygiumwas conducted in between March 2011 to December 2012. The study comprised of seventymales and thirty-two females in the age range 28-76 years. The mean TBUT, meanSchirmer test value in the normal eyes were 12.3 ± 1.9 seconds and 13.4 ± 2.5 mmrespectively.Thecomparablevaluesineyeswithpterygiumwere8.2±1.4secondsand 9.2 ± 2.4 mm respectively. Both TBUT and Schirmer test values were comparativelysignificantdecreasedinbetweeneyeswithpterygiumandnormaleyes.Thisstudy revealed that tear film abnormalities played a role in etiology of pterygium (Onkar *et al.*2017).

El- Sersy (2014) studyevaluated in 60 patients with ageranging between 25 to 70 yearshaving 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 wassignificantly reduced in the eyes with pterygium. The mean TBUT of control eyes andeyes with pterygium were 11.70± 2.16 secondsand 5.91 ± 1.95 seconds respectively.The mean Shirmer test result was 13.76 ± 2.06 mm inhealthy eyes and 5.85 ± 1.86 mmin the eyes of patients with pterygium. The difference was statistically significant inbetweentwogroups. Oculardrynesswas found ineyes withpterygium.

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 tothe 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 patientsreported either one or more ofdry eye symptoms. Redness was the most common (67%)symptomreported.ThemeanSchirmertestwithoutanesthesia,Schirmertestwithanesthesiaandmean tear film breakup time (TBUT)valueswere16.19mm,10.01mmand10.56secinpterygiumcasesand20.22mm,13.25 mmand26.25secondsinthe controlgrouprespectively. There was a statistically significant difference in the results of tear filmfunction test between the pterygium cases and the normal group ($p < 0.05$). The odds ratiobetweenpterygiumandunstabletearfilmwas3.28.Unstabletearfilmwaspresentin54% of

the pterygium eyes. There was a strong relationship between unstable tear film andpterygium (Rokaand Shrestha2013).

CHAPTER-3 METHODOLOGY

3. Methodology

3.1 Typeofthestudy:

Itwas a cross-sectional study

3.2 Placeofthestudy:

ThisstudywasconductedattheDepartmentofcornea, Ispahani Islamia Eye Institute and Hospital, Bangladesh.

3.3 Period of thestudy:

Thestudywas conductedfromSeptember, 2022 to February,2023.

3.4 Studypopulation:

All the out-patient's department (OPD) with monocular pterygium attendedin Departmentofcornea, Ispahani Islamia Eye Institute and Hospital, Bangladesh.

3.5 Samplingmethod:

Purposivesamplingtechnique.

3.6 Selectioncriteria:

3.6.1 Inclusioncriteria:

- Age:20years and above
- Any (Male & Female) patientpresentingwithuniocular pterygium
- Patient having pterygium with contralateralnormaleye.
- Patientdifferentstagesofpterygium
- Patient gave consent for participation to research work

3.6.2 Exclusioncriteria:

- Subjects with systemic diseases diabetes mellitus (DM), Thyroid disease, Sjogren's syndrome andsubjects on systemic medication (e.g. diuretics, psychotropic, antihistamines etc.)thatlead to ocular drying.
- Subjectswithpterygium inbotheyes andalsorecurrentpterygium.
- Subjectswith previous historyof dryeye.
- Contactlensusers.
- Subjectshavingotheradnexaldisease,anteriororposteriorsegmentdiseasewhichaltert ear secretionand stability.
- Historyofoculartrauma, chemicalormechanicalinjury.
- Patientshavingrecentocularsurgery(e.g.cataract surgery,glaucomasurgery).
- Patientsontopicalmedications(e.g.Timolol,Brimonidine,Olopatadine,Banzalkoniu mchloride etc.)that leads toocular drying.

3.7 Samplesize Calculation:

Thesamplesizewasdeterminedby
thefollowingformula(Differencebetweentwomeans):
$n= (Z_\alpha+Z_\beta)^2\times(\sigma_1^2+\sigma_2^2) / (\mu_1-\mu_2)^2$

n=sample size
μ_1=Mean of wetting length of Schirmer strip in contralateral healthy eye (16.40 mm)σ_1=SDofwettinglengthof Shirmer strip incontralateralhealthyeye(5.21mm)
μ_2 = Mean of wetting length of Schirmer strip in eye with pterygium (13.17 mm)σ_2=SDofwettinglengthofSchirmer strip in eyewith pterygium (4.57mm)
(Menhas*etal.*2017)

Z_α=Zvalue ofstandardnormal distribution= 1.96
(at5%levelofsignificanceor95% confidencelevel)
Z_β = Z value of standard normal distribution =
0.85(at80%power)
Puttingthe values intheaboveequation
$n =(1.96 + 0.85)^2\times(27.14 + 20.88)/ (16.40 - 13.17)^2$
$=7.89 \times48.02 / 10.43$
$=503.72 /10.43$
$=48.35$

So,the samplesizewas48 byrounding.
Forprecise studysamplesizewas increased to
48+10%
=48+ 4.5/5
=53.
Forprecise studysamplesizewas considered to50

3.8 Ethicalconsideration

AresearchprotocolwasapprovedbytheethicalreviewcommitteeoftheBangladesh Open university (BOU) and Ispahani Islamia Eye Institute and hospital, Bangladesh-administrative reviewcommittee.

a. Thepurposeand procedureshadbeen brieflyexplainedto all participants.

b. Therewasno chanceof physicalrisk.

c. Nomoneyhadbeengiventothe participantsofthestudy.

d. Asignedinformedconsentwastakenafterconvincingallthestudysubjectsthattheirconfidentialitysafeguarded and privacywas maintained.

e. To maintainconfidentialityeachof studysubjectwasgiven a specialIDnumberwhichhad been followed duringeachandeverysteps ofthe studyprocedure.

f. Privacywasmaintainedduringphysicalexamination&interviewandalsoatthetimeofprocedure.

g.Theparticipantshad righttoacceptand withdrawtoparticipatein thestudy.

3.9 Datacollection:

3.9.1 Datacollectioninstruments

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

3.9.2 Datacollectiontechnique

- Detailedhistoryofstudysubjectwasrecordedbytakinginterviewasperquestionnaire.
- Routinegeneralphysicalandsystemicexaminationsofsubjectweredonetoexcludesystemicdiseases.

- Everysubjectwithunilateralprimarypterygiumunderwentvisualacuityassessment, detailed slit lamp and ophthalmoscopically examination torule outadnexal,anteriorand posterior segment diseases.
- Followingexaminationsofpterygiumwereconducted bySlitlamp and recorded.

    a. The presence of fibrovascular tissue extending from bulbar conjunctiva ontothecorneaeither nasallyor temporally.
    b. Differentstagesofpterygiumwereobserved.

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

- Followingspecial testswereperformed forevaluation of tearfilm function.

1. Tearfilmbreakuptime test:

Fluroscein strip moistened with preservative free artificial tear drop was instilled into thelowerfornix of eye having pterygium.Thepatientwasaskedtoblinkfor severaltimes.Thetearfilmwasexaminedattheslitlampwithbroadbeamusingcobaltbluefilter. Afteranintervalblack spots or lines appeared in the fluroscein stained film indicating the formation of dryareas. The time for tear film break up was measuredthe interval between the last blinkand appearance of first randomly distributed dry spot by stop watch. A break up time oflessthan 10 seconds wastaken as abnormal.

2. Schirmertestwithanesthesia:

Schirmertestwithanesthesiawasperformedaftertheinstillationoftopical0.4%Oxybuprocaine and wiping the lower fornix of the effected eye with cotton.Schirmer filter stripwas folded5 mm from one end. Folded strip was placed gently over the lower palpebral conjunctivaat the junction of lateral 1/3rd and medial 2/3rd. The patient was instructed to keep
eyesgentlyclosed.After5minutesamountofwettingfromthefoldmeasured.Lessthan6mmwith topical anesthesiawas 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

TableI:Distribution ofpatientsaccordingto 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 20-30years age group, 17(34%) were in 31-40 years age group, 21(42%) were in 41-50 yearsagegroupand4(8%) werein>50yearsage group.Meanage was39.80±8.89years.

Gender Distribution

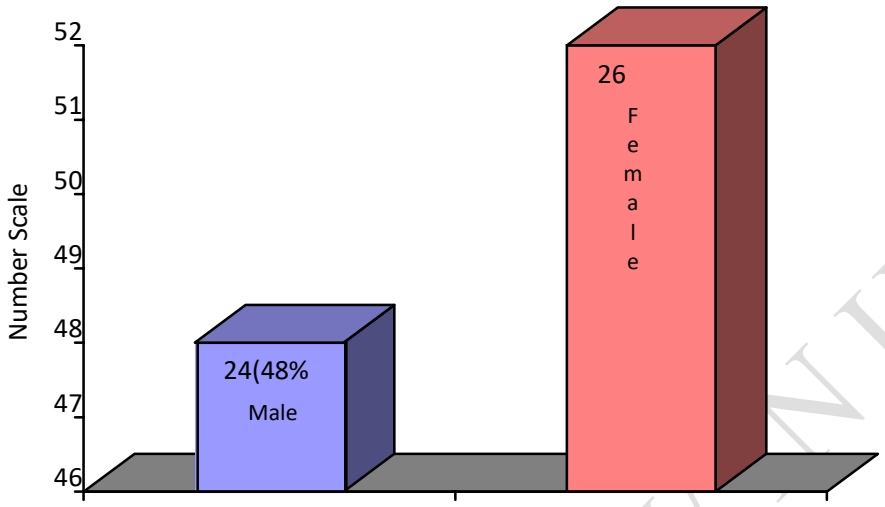


Fig.1:Bardiagramshowingdistributionofpatients according to gender(n=50)

Figure1demonstratedgenderdistributionofthestudysubjects.Among(50)patientshavingunio cular pterygium, 24weremalesand26 werefemales.

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
Total	**50**	**100**

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

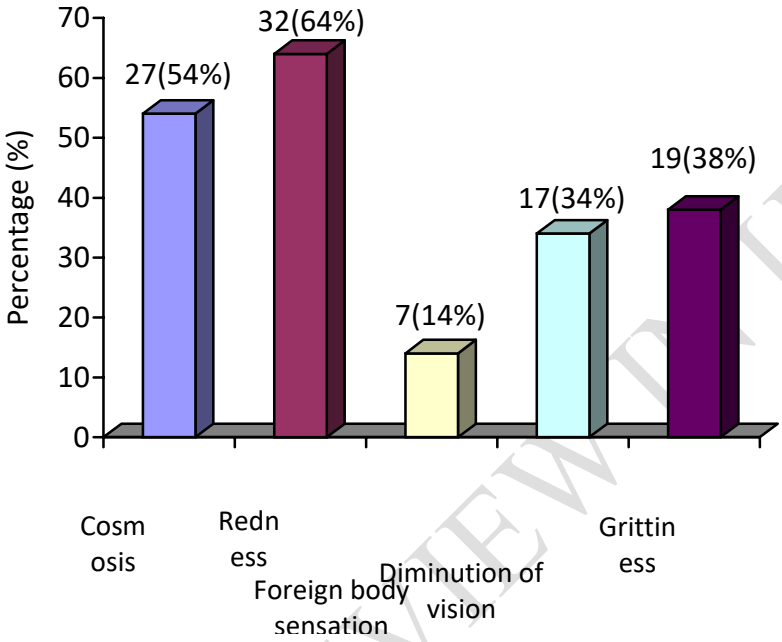


Fig.2:Bardiagramshowing frequencyof symptomsin studysubjects (n=50)

Figure2showedsymptomsofpatientshavinguniocularpterygium. It was found that the patients had complains of rednessin32cases(64%), cosmesis in 27 cases (54%), grittiness in 19 cases(38%), diminution ofvision in17cases(34%) andforeign bodysensationin 7 cases(14%).

TableIII:Distributionof patientsaccordingto characteristicsof pterygium (n=50)

Characteristics	Numberof 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 showednasal site of pterygium was found in 44 cases (88%)andtemporal siteof pterygium was found in 6 cases (12%). Most of patients (68%) presented with 2-4 mmlengthofpterygium andprogressivestageof pterygiumwasfoundmore(54%).

TableIV:Distributionof tearfunctionabnormalityofuniocularpterygium

	Frequency	Percentage(%)
Wettinglengthoffilterstrip ofSchirmertest(mm)		
<6	30	60.0
≥6	20	40.0
Tearfilmbreakuptime (sec)		
<10	37	74.0
≥10	13	26.0

Table IV showed wetting length of filter strip ofSchirmertest<6 mm was found in 30cases (60%) and≥6 mm was found in 20 cases (40%) ofuniocular pterygium. In tearfilm break up time, <10 seconds was found in 37 cases (74%) and ≥10 seconds was foundin13 cases (26%) ofuniocularpterygium.

TableV:Meandistributionofwettinglengthoffilterstripof Schirmertestand 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(sec)	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).

TableVI:Meandistributionofwettinglengthoffilter strip of Schirmer test according to different stages ofpterygium

Stagesof pterygium	**Wetting length offilterstrip 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 wereanalyzed usingone-wayANOVA test

TableVIshowedwettinglengthoffilterstripofSchirmertestwassignificantlylowerinprogressivestage ofpterygium(P<0.05).

TableVII:MeandistributionofTearfilmbreakuptimeaccordingtostages of pterygium

Stageof pterygium	**Tearfilmbreakuptimesec (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 wereanalyzed usingone-wayANOVA test

TableVIIshowedtearfilmbreakuptimewassignificantlylowerinprogressivestageofpterygium (P<0.05).

TableVIII:Meandistributionof wettinglengthoffilterstripofSchirmertest accordingto sizeofpterygium

Size of pterygium(mm)	**Wettinglengthoffilterstripmm (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 wereanalyzed usingone-wayANOVA test

TableVIIIshowedwettinglengthoffilterstripofSchirmertestwassignificantlylowerinhigher sizeofpterygium>4mm (P<0.05).

TableIX:MeandistributionofTearfilmbreakuptimeaccordingtosizeofpterygium

Size of pterygium(mm)	**Tearfilmbreakuptimesec (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 wereanalysed usingonewayANOVAtest

TableIXshowedtearfilmbreakuptime wassignificantly lowerinhighersizeofpterygium >4 mm (P<0.05).

TableX:Testresultsoftearfilmfunctionineyeswithpterygiumandeyeswithoutpterygium(n=50)

Test	Eyes withpterygium(no)	Presentence (%)	Eyes withoutpterygium(no)	Presentence (%)
Normal TBUT,NormalSchirmer	14	28	35	70
Abnormal Schirmer,NormalTBUT	4	8	5	10
Abnormal TBUT,NormalSchirmer	8	16	6	12
Abnormal TBUT,AbnormalSchirmer	24	48	4	8
Total	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.

TableXI:Relationshipoftearfilmfunctionand pterygium

Test result(Tearfilmfunction)	**Pterygium**		**Total**	P value
	Eyes withpterygium	**Eyes withoutpterygium**		
Abnormal	36(72%)	15(30%)	51(51%)	P<0.001
Normal	14(28%)	35(70%)	49(49%)	
Total	50(100%)	50(100%)	100(100%)	

Datawereanalyzed usingChi square test

Table XIshowed association ofabnormal tear film function in eyes with pterygium was statistically significant(P<0.001).

CHAPTER-5 DISCUSSION

5.1DISCUSSION

A Total50patientswho hadprimary uniocular pterygiumandcontralateralhealthy eyewere 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)theyfoundmost of patientswerein40 to 50years agegroup.

In the present study, among all 48% were male and 52% were Male and female. pterygium wasmore commoninmales.

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

In this study, nasal location of pterygium(88%)was found more than temporal (12%).This finding was consistent withthe other research work (Onkar *et al.* 2017) where71.6% of the pterygium was found on nasal side and 20.6% on the temporal side. Antony*etal.* (2017)also foundpterygiummorein nasalside than temporal.

Inthisstudy,itwasfoundthatmajority(60%)hadschirmertestabnormalityandmajority (74%) showed tear film break up time abnormality in eyes with pterygium.Onkar*etal.*(2017)found52.9%Schirmertestabnormalityand37.3%TBUTabnormality in eyes with pterygium. Abnormal TBUT test was found47.78% in eyeswith pterygium from another study (Menhas*et al.* 2017). Roka and Shrestha (2013)hadreportedpositiveTBUT test in 43.42%eyeswithpterygium.

Inthisstudy,themean±standarddeviationofwettinglengthoffilterstripofSchirmertest with anesthesia results in pterygium eyes and the opposite normal eyes were 5.4±1.60mmand10.12±1.93mmrespectivelyanddifferencebetweentwogroupswasstatistically significant($p<0.001$).Therefore,thefindingsofthestudyareinwellagreement with the

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

In present study, the mean ± standard deviation of tear breakup time in pterygium eyeswas7.92±1.63secondsand11.10±1.58secondsincontralateralnormaleyesanddifference between two groupswas statistically significant (p <0.001). Therefore, thefindings 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 and11.2±1.8secondsincontralateralnormaleyes(pvalue<0.001).Astudyconductedby

Onkar *et al.* (2017) in eyes with pterygium and normal eyes where showed mean tear filmBUT of 12.3 ±1.9 seconds in normal healthy eyes while in pterygium eyes it was reducedto 8.2 ± 1.4 seconds. But another study (Ergin A. and Bozdogun O. 2001) found nodifference of mean values of tear film breakup time between eyes with pterygium andoppositenormal eyes.

ThisstudyfoundbothtearbreakuptimeandSchirmertestresultshadsignificantcorrelation with pterygium size(P<0.05). ButKampitak andLeelawongtawun(2014)and Antony *et al.* (2017)reported both tear film breakup time and Schirmertest resultshadno correlation with pterygiumsize. From this study, prevalence of abnormal tear filmin eye with pterygium was 72 %andsignificant relationship was found between unstable tear filmand pterygium(P < 0.001).Antony *et al.* (2017) reported abnormal tear filmwas present in81 % of eyes withpterygium. Menhas A. *etal.* (2017) also found strong relationship between unstable tearfilmandpterygiumandunstabletearfilmwasfoundin58.89 %ineye with pterygium.

CHAPTER-6 CONCLUSION,LIMITATION, &RECOMMENDATION

6.1 CONCLUSION

This study revealed significant abnormality in Tear film break up time (TBUT) andSchirmertest inthe eyes with pterygiumthan contralateral normal eyes. Sounstabletear film was foundin eyes with pterygium. This study demonstrated that therewasastrongrelationshipbetween tear filmfunctionabnormalityand pterygium.

6.2 LIMITATIONS

- Samplesizeof thestudywas 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 carriedoutdue tolackoflogistic support instudyplace.
- In this study, comparison of tear film function was not done between patients withpterygium andage &sexmatched healthyindividual withoutpterygium.
- 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.

6.3 RECOMMENDATIONS

- Furtherlarge- scale studyonthesameissueisrecommendedtoobtainmoreaccurateand acceptableoutcome.
- Same study is recommended in patients with pterygium and age & sexmatchedindividual withoutpterygium.
- Study on same issue is proposed by performing other procedures (RoseBengalstain, 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 ineyes with pterygium. So, two tests should be advised to every patient with pterygiumforevaluation oftearfilm function.

CHAPTER-7 REFERENCES

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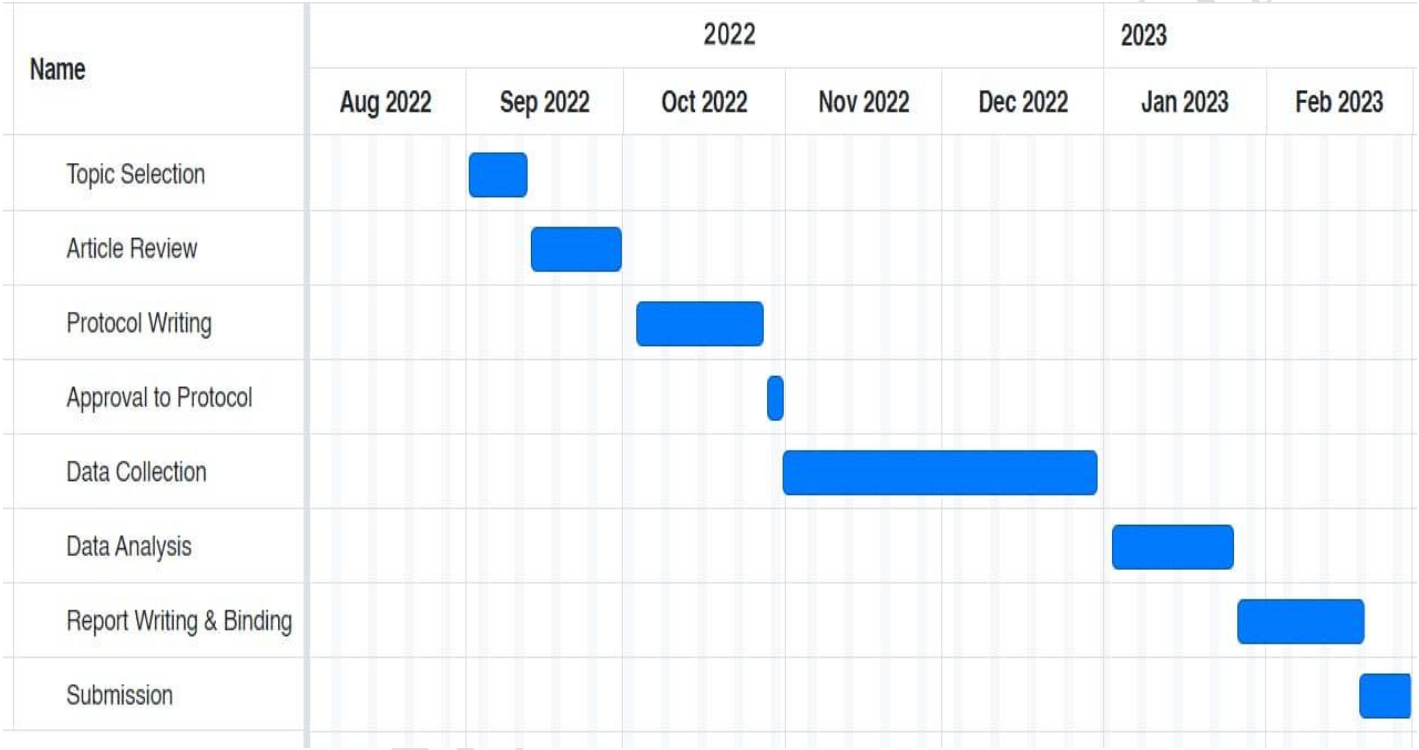
APPENDIX I

WorkSchedule



APPENDIXII (a)

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

ICMH
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 27th 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 1st 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.

22 AUG 2022

Ispahani Islamia Eye Institute & Hospital ★ Dhaka ★

APPENDIXIII

INFORMEDCONSENTFORM

(VerballytranslatedintoBengali)

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

Signature/ThumbimpressionDate:

Cell No:

অবগতিক্রমেসম্মতিপত্র

শিরোনামে

Relation of tear film function with monocular pterygium

আমিসজ্ঞানেএবংস্বেচ্ছায়ফারুকআহমেদপরিচালিতউপরোক্তশিরোনামেরগবেষণারকার্যক্রমেঅংশগ্রহনকরিতেছি।এইগবেষণায়তিনিআমাকেপরীক্ষাকরিবেনএবংরোগসম্পর্কেকিছুপ্রয়োজনীয়প্রশ্নকরিবেন।ইহাতেআমাকেকোনআর্থিকসুবিধাপ্রদানকরাহইবেনা।তিনিআশ্বস্তকরিয়াছেনযে

এইগবেষণায়অংশগ্রহনেআমারশারীরিকঅথবামানসিককোনক্ষতিহইবেনা।যেকোনসময়আমিস্বেচ্ছায়ইহাহইতেঅবমুক্তহইতে পারিবোএবংএইগবেষণাআমার [illegible] কোনপ্রভাবিতকরিবেনা।আমারসমস্ততথ্যকঠোরভাবে [illegible] রাখা

রোগীরস্বাক্ষর স্বাক্ষীরস্বাক্ষর সাক্ষাতকারগ্রহণকারীরস্বাক্ষর

তারিখ তারিখ তারিখ

মোবাইলনং -

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:

- Ofoculardiseases,ocular therapy,traumaor surgery.
- Ofsystemicdiseaselikediabetes,hypertension,etc.

Drug history:

- Ofrelevantocularorsystemicdiseases.
- Family History-Yes No

Personal history: YesNo

PHYSICALEXAMINATION:
A. General:

- 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)-		
Slitlampbio-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

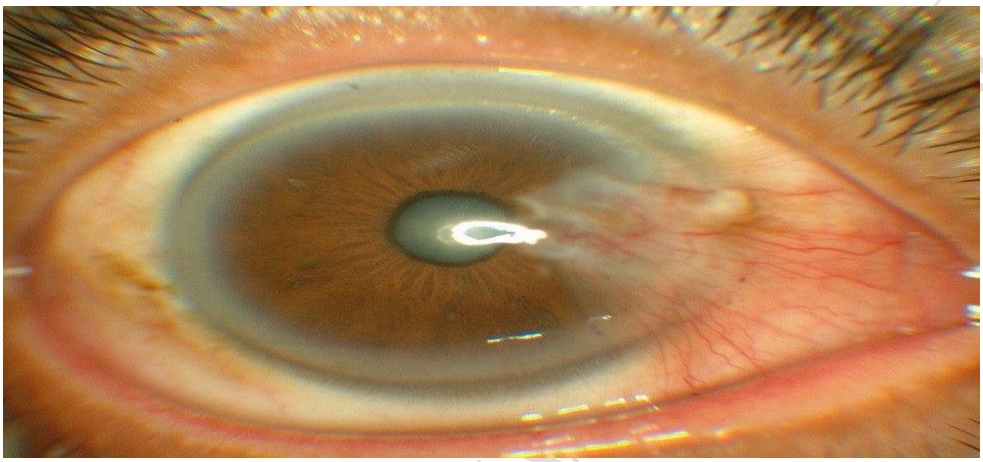


Figure:1.1Nasalpterygium

Figure:1.2Bothnasalandtemporalpterygium

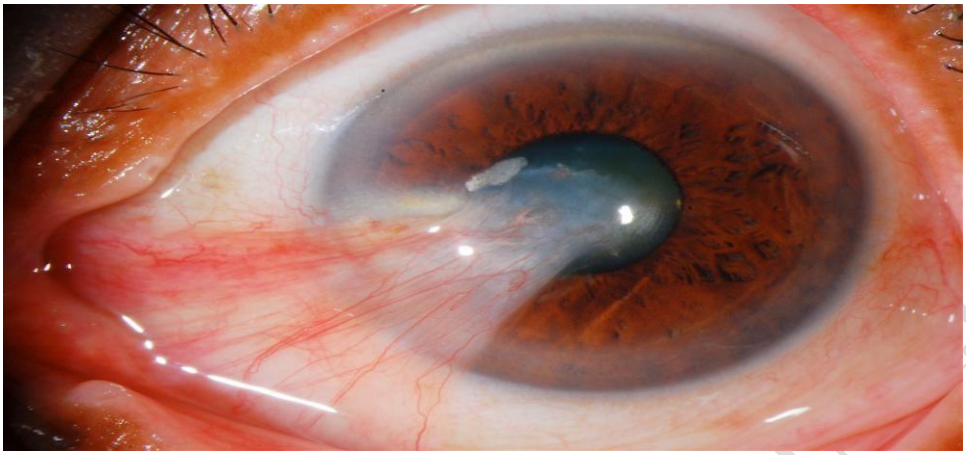


Figure:1.3largenasalpterygium

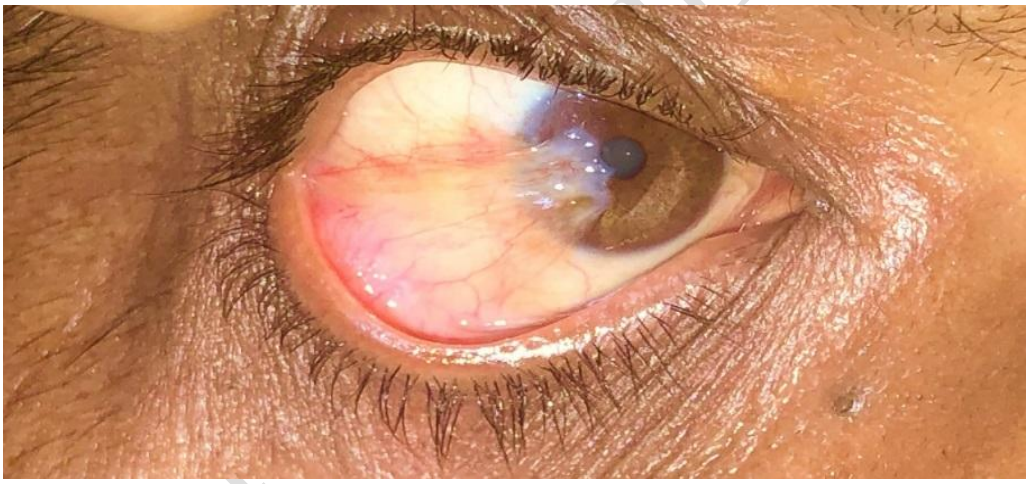


Fig. 4: Recurrency of temporal pterygium with symblepharon near lateral canthus in right eye following 15

Figure:1.4Schirmer'steartestfilterstrips andtest

Figure: Application of Fluorescein strip test

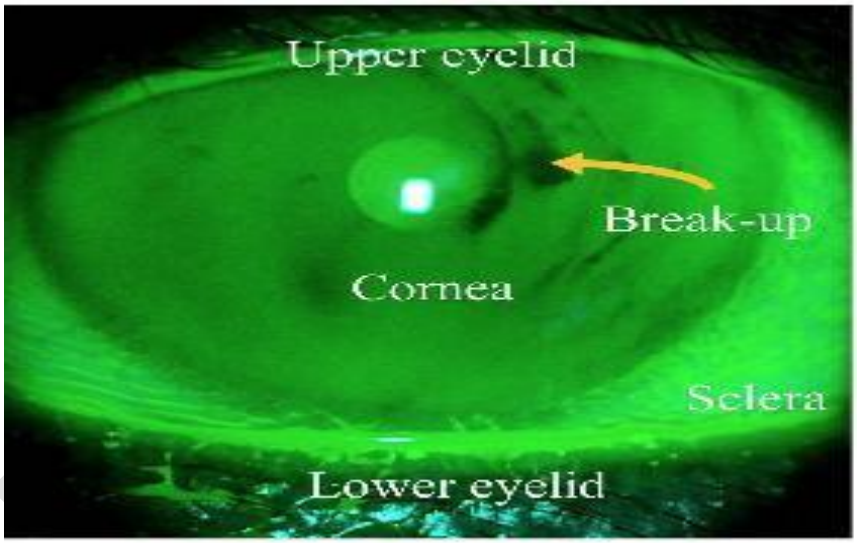


Figure:1.6Tearfilm breakup