Study Of Ocular Surface Staining, Schirmer's, TBUT in Normal Eyes

A PROJECT REPORT

Submitted by

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In partial fulfillment for the award of degree

Of

BACHELOR OF SCIENCE IN OPTOMETRY

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V PRASAD EYE INSTITUTE

&

ARKA JAIN UNIVERSITY , JAMSHEDPUR, JHARKHAND

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BAUSH AND LOMB SCHOOL OF OPTOMETRY

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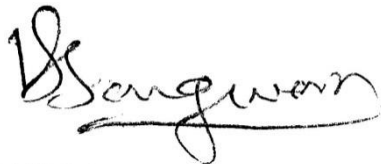
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BONAFIDE CERTIFICATE

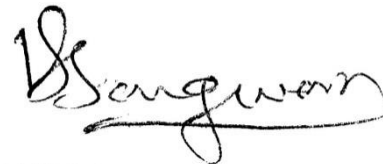**Certified that this project report**

"STUDY OF OCULAR SURFACE STANING, SCHIRMER'S, TBUT IN NORMAL EYES "

Is bonafide work of "CHANCHAL KUMARI " who carried out the project under my supervision .

Dr. Virender S Sangwan

HEAD OF THE DEPARTMENT

Dr. Virender S Sangwan

SUPERVISION

STATEMENT

I hereby declare that the work emboided in this report is the result of the study

Done by me in LV PRASAD EYE INSTITUTE, HYDERABAD KAR CAMPUS under supervision of **DR.KOMAL AGARWAL**

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CONTENTS

ABSTRACT

PURPOSE: The aim of study is to assessment of Schimer's, tear film break – up time tests and ocular surface staining fluorescein and rose Bengal in normal eyes.

METHODS: It is a prospective study included 92 normal volunteers with no ocular symptoms or ocular surface disorders. Schirmer's and tear film break-up time and Ocular surface staining tests were assessed in right eye of each subject.

RESULTS: There is no significant difference between mean TBUT values of male and female subjects, but there is significant difference between the mean Schirmer's values of male and female subjects.

CONCLUSIONS: Our results reveal that there is a decline in the tear function test values, especially the tear film break-up time with advancing age.

Signature of Student

Signature of Moderator

1.INTRODUCTION

The precorneal tear film is a mixture of secretions of a number of glands located in the ocular adnexa. This trilaminar structure of an innermost layer of mucin lying on the bodies of squamous cells of corneal epithelium, a superficial lipid layer, and a middle aqueous layer. Any deficiency of any component of these layers may result in tear film instability, which may cause dry eye syndrome.

Blinking serves to spread the tear film over the cornea. This prevents surface evaporation from the eye, assists in corneal metabolism, and helps to make the cornea a better optical surface by smoothing over irregularities on the corneal surface. Individuals with an abnormal tear film, either in rate of production of tear fluid or chemical composition, are often diagnosed as having a dry eye.

Definition of Dry Eye Disease: Dry eye is a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tears film instability with potential damage to the ocular surface. It is accompanied by increased Osmolarity of the tear film and inflammation of the ocular surface. Dry-eye symptoms may develop by exposure to unfavorable environmental conditions such as increased air turbulence and decreased humidity. Such environmental factors may influence by increasing the rate of water evaporation from tear film" For such a reason, dry eye is considered a frequently encountered problem in some countries that have dry climates. Currently dry eye syndrome or KCS is seen all age group population. An estimate of tear film and ocular surface abnormality is regarded as an important aspect of dry eye diagnosis. The population-based studies revealed that dry eye syndrome, an important health problem, is seen throughout the world with a frequency of up to 33%" The Schirmer and tear film BUT tests are commonly used tests in the diagnosis of dry eye. It has been observed that, so far, most of the work on the tear film stability and abnormality has been reported from Western countries normal values in Indian subjects. In view of this, the present study is designed to establish the normal values of TBUT, Schirmer's test and ocular surface Staining Pattern in our normal eyes.

2. LITERATUR REVIEW

Studies show that, age of subjects should be taken into the consideration in the evaluation of tear function test results'. The same study revealed that gender is not significant factor. A similar study of BUT values for subjects living in Western countries ranged from 25 to 30 seconds. Till now studies reported normative values of TBUT and Schirmer's are higher in western population compare data from Asian countries. The Break Up Time in young range from 10-60 seconds. Studies show that with advancing age the lid laxicity, pre corneal exposure will lead to evaporation of tear film which leads to decrease in the TBUT values. Similar study environmental conditions do not affect the tear film evaporation. Chopra et al[3] have reported mean values of BUT in normal Indian population, even less than 10 seconds (males 8.9 seconds and females 6.98 seconds). Norn reported that females tend to have shorter BUT. Lemp et al' and shapire& Marin revealed that gender is not significant factor. Study on Schirmer's test Henderson, Parme and Prough reported higher values in females and Parme suggested that these higher values are due to the hormonal influences. But Norn" found that Schirmer's test results are higher in men, rather than in women.

3. MATERIALS AND METHODS

3.1 **Study Location:**

The study was carried out in LV.Prasad Eye Institute, Hyderabad.

3.2 **Study Design:**

Prospective study

3.3 **Sample Size:**

Tear film break-up-time measurement and Schirmer's test-1 and 2 were performed in 92 normal healthy subjects under similar environmental conditions. The study was carried out during the period November to February. (when the weather conditions are more or less identical. Further, the tests were conducted in a room where the temperature and humidity remained relatively constant and without obvious ventilatory currents.)

3.4 **Inclusion Criteria:**

a) Subjects their ages ranged from 20 to 60 years with no evidence of Ocular surface diseases.
b) Subjects underwent a complete ophthalmic examination including corrected visual acuity, anterior segment examination (which include TBUT, Schirmer's, &Ocular surface staining) and fundus examination.

3.5 **Exclusion Criteria:**

a) Any history of ocular surgery or ocular trauma,any ocular surface disorder,current contact lens use, any topical or systemic drug use, any systemic disorder, such as Sjogren syndrome giving rise to dry eye, or cutaneous disorders, such as contact dermatitis..b) History of recurrent redness, watering, itching, pain & foreign body sensation.

3.6 **Methodology**:

This study was conducted in Bausch and Lomb School of optometry & L V Prasad eye Institute KAR campus Hyderabad. Between December to February. Tear film break-up- time measurement and Schirmer's test-I and 2 were performed in 92 normal healthy subjects under similar environmental conditions. (when the weather conditions are more or less identical. Further, the tests were conducted in a room where the temperature and humidity remained relatively constant and without obvious ventilatory currents.')

TEAR FILM BREAK-UP-TIME:

A Fluorescein strip moistened with distilled water was applied to the inferior bulbar conjunctiva. The patient was asked to blink several times to distribute the fluorescein evenly and then to stare directly ahead without blinking; the eye lids were not held. The eye was then examined on a slit lamp with a cobalt blue filter. The time taken for the first dry spot to appear on the cornea was measured using a stop watch. This test was repeated 3 times in each eye, and the average was taken as BUT.

Schirmer's test (The filter paper 5mm wide and 35mm long)

Schirmer's test determines whether the eye produces enough tears to keep it moist. This test is used when a person experiences very dry eyes or excessive watering of the eyes. It poses no risk to the subject.

Test procedure

Schirmer's test uses paper strips inserted into the eye for several minutes to measure the production of tears. The exact procedure may vary somewhat. Both eyes are tested

At the same time. Most often, this test consists of placing a small strip of filter paper inside the lower eyelid (conjunctival sac). This test can be done either 5min. there are two procedures can be followed. One without anesthetic, Second with anesthetic. Without anesthetic will measure reflex and over all secretion, with anesthetic measure basal tear secretion. With anesthetic followed by these steps, Instill a drop of anesthetic in right eyes, wait for 2 minutes and instill a second drop. Wait for a minute, then depress the lower lid exposing the fornix. Roll a wick from soft absorbent tissue and place it like the test strip at the junction of the middle and outer third of the lower lid into the inferior fornix to blot excess tears. The eye is closed for 3-5 seconds and then opened and the wick removed. Repeat this for the other eye. The eye is gently dried with tissue paper over closed eye lids to mop up any excessive secretion. The filter paper wide and 35mm long) is folded 5mm from one end and inserted at the Junction of the middle and outer third of the lower lid. The patient is asked to Keep the eye closed and not to speak or move the eye unnecessarily. After 5 Minutes the filter paper is removed and the amount of wetting is measured. In the same way without applying anesthetic drops procedure one to Performed. In our study we did without anesthetic first next with anesthetic.

Interpretation of result

A normal test over 10mm without topical anesthesia (slightly less with anesthesia) between 5 to 10mm is indicative of borderline dry eye and anything <5mm at the end of the minutes is a sign of pathological dry eye.

Fluorescein Staining

This is the premier method of staining for diagnosis of corneal epithelial defects. Staining is concentration-dependent. A contemporary grading scale should be used. Sequential staining can be used, usually instillation of fluorescein thrice over five minutes. This can reveal defects that may otherwise be missed. Minimal fluorescein staining (? Grade I) has been seen in normal population. Grade 3 or 4 staining is indicative of a probable dry eye disorder. The Oxford grading scale is a standardized method to asses ocular surface staining.

Rose Bengal Staining

Rose Bengal stains dead and degenerated cells. It is the premier method to diagnose KCS. Current understanding states that Rose Bengal stains cells not protected by mucin layer. Rose Bengal staining of the interpalpebral (open eye) area of the conjunctiva and cornea is usually associated with moderate to severe aqueous deficiency as occurs in KCS. The Oxford grading scale is a standardized method to asses ocular surface staining.

4. Results

Out of 92 subjects mean age was 35.91 ± 12.28 with 40.2% are females, mean values of the tear film break-up-time observed were 12.51±4.56seconds (range from 5 to 26 sec) Schirmer's 127.01±7.96mm/5min,(range from 8 to 35mm/5min)Table I shows the mean and standard deviation of TBUT for all subjects in the study. **Tablel 1: Values of**

TBUT of Subjects (N = 92)

TBUT(sec)	No of eyes	Mean(sec)	SD(sec)
5-9	29	7.7	1.2
10-14	37	12.1	1.3
15-19	20	17.1	1.2
>20	6	22.6	2.4

Figure I is a bar graph illustrating the distribution of mean TBUT in all 92 subjects (eyes).

Figure 1 Distribution of mean TBUT(N=92)
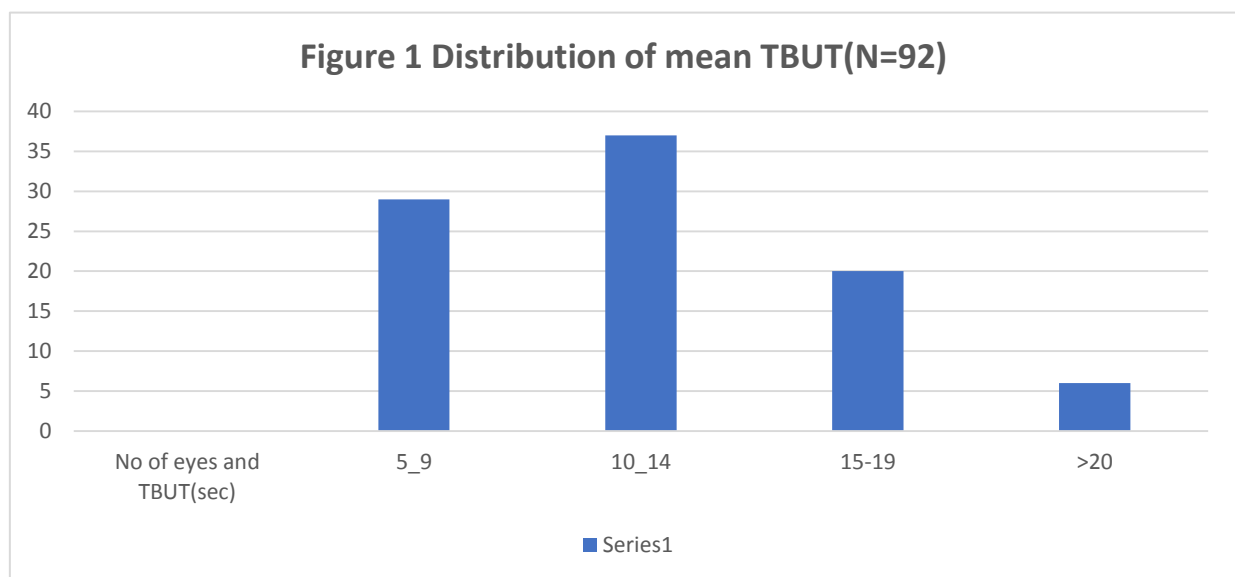
It is interesting to note that, in this study, there were 29 eyes (31.5%) with TBUT <9Sec.40.2% fell in the borderline TBUT 10-14Sec.28.2% fell in normal range. Application of a T-test there is no significant difference between the mean TBUT values of the male and female subjects at the 5% level (t = -0.27, df = 90, p = 0.078) Table 2 shows a summary of Results According to Gender (TBUT).

Table 2 shows a summary of results According to Gender (Schirmer's 1).

Gender	No of eyes	TBUT(sec)			Schirmer's (mm)		
		Mean	SD	Range	Mean	SD	Range
Male	55	12.41	4.81	5.7-26.0	25.42	8.53	8-35
Female	37	12.67	4.21	5.3-20.7	29.38	6.45	12-35

Table 3 shows the mean and standard deviation of Schirmer's 1 for all subjects

In the study. **Value of Schirmer's 1 of Subjects (N=92)**

SCHIRMER'S	No of eyes	Mean	SD
<15	11	12.6	2.6
16-20	14	18.1	1.4
21-25	9	24.7	1
26-30	21	28.3	1.5
31-35	37	34.5	1.1

Figure 2 is bar graph illustration the the distribution of mean Schirmer's in all

92 subjects

Figure 2 Distribution of mean Schirmer's (N=92)
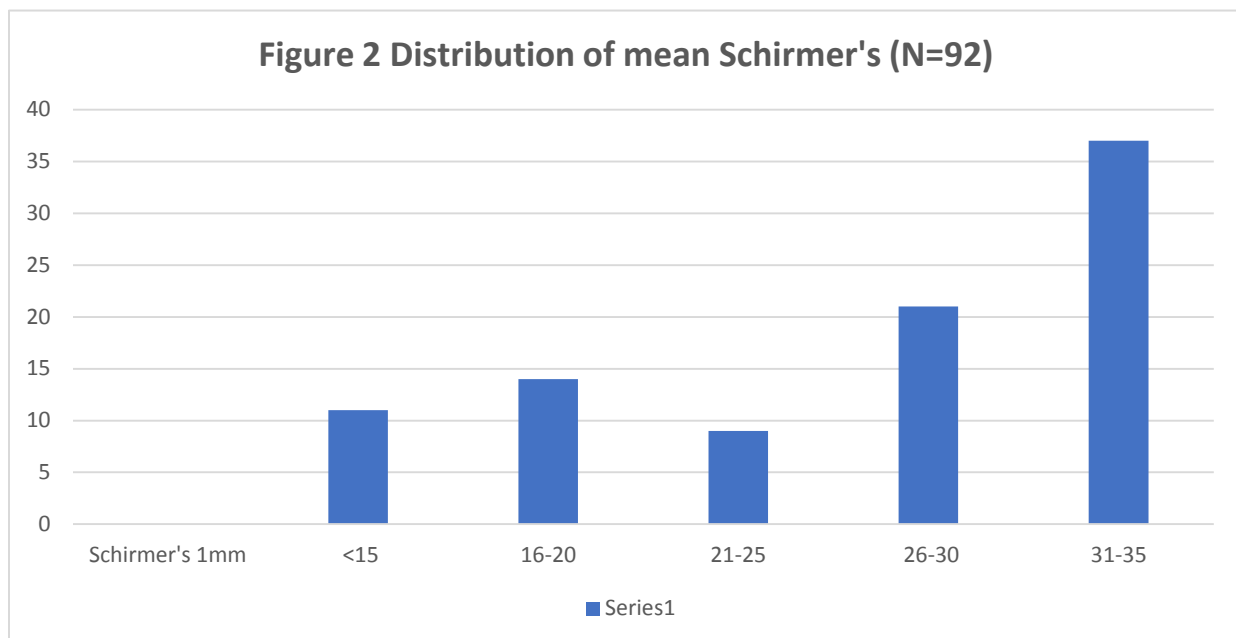
Majority of the subjects 40.22% fell in (31-35) mm. Application of a T-test there is significant difference between the mean Schirmer's values of the male and female subjects at the 5%level (t=-2.39, df = 90, p = 0.019)

Figure 3 shows the regression graph,The relation between TBUT and age for the

South Indian population can be described by the following equation:

TBUT = 17.16 + Age (-0.13)

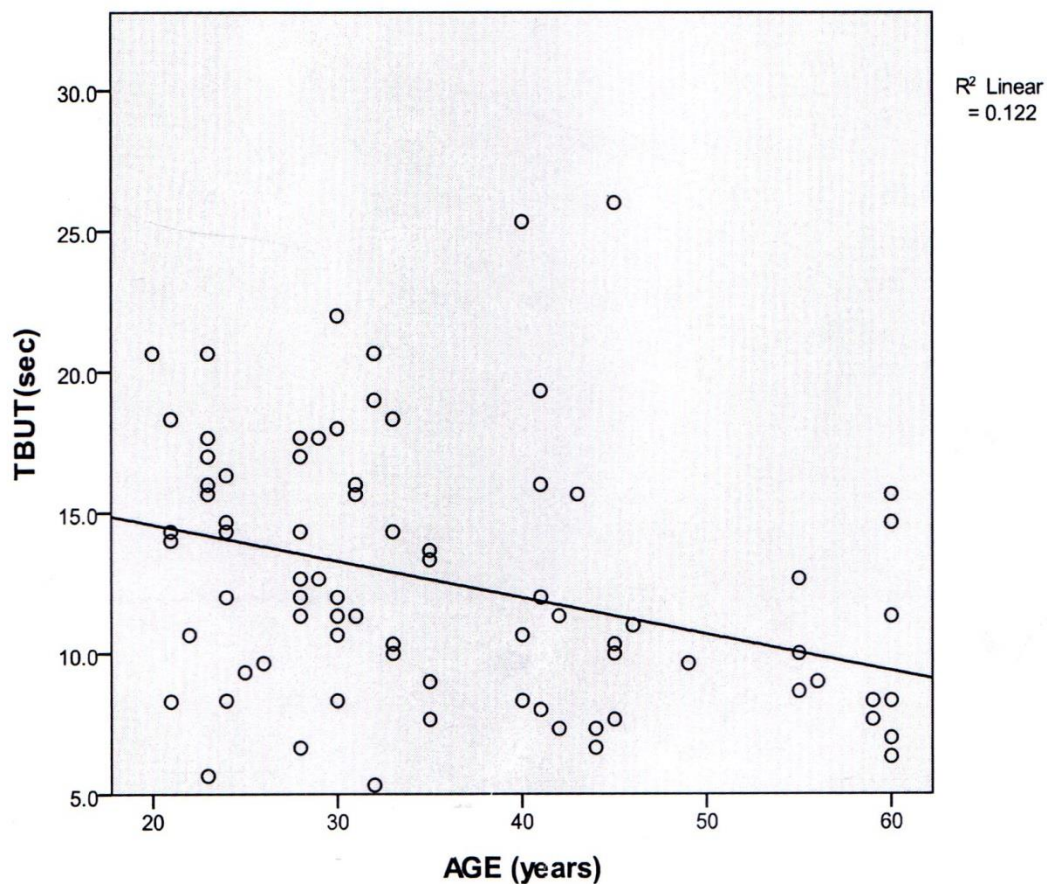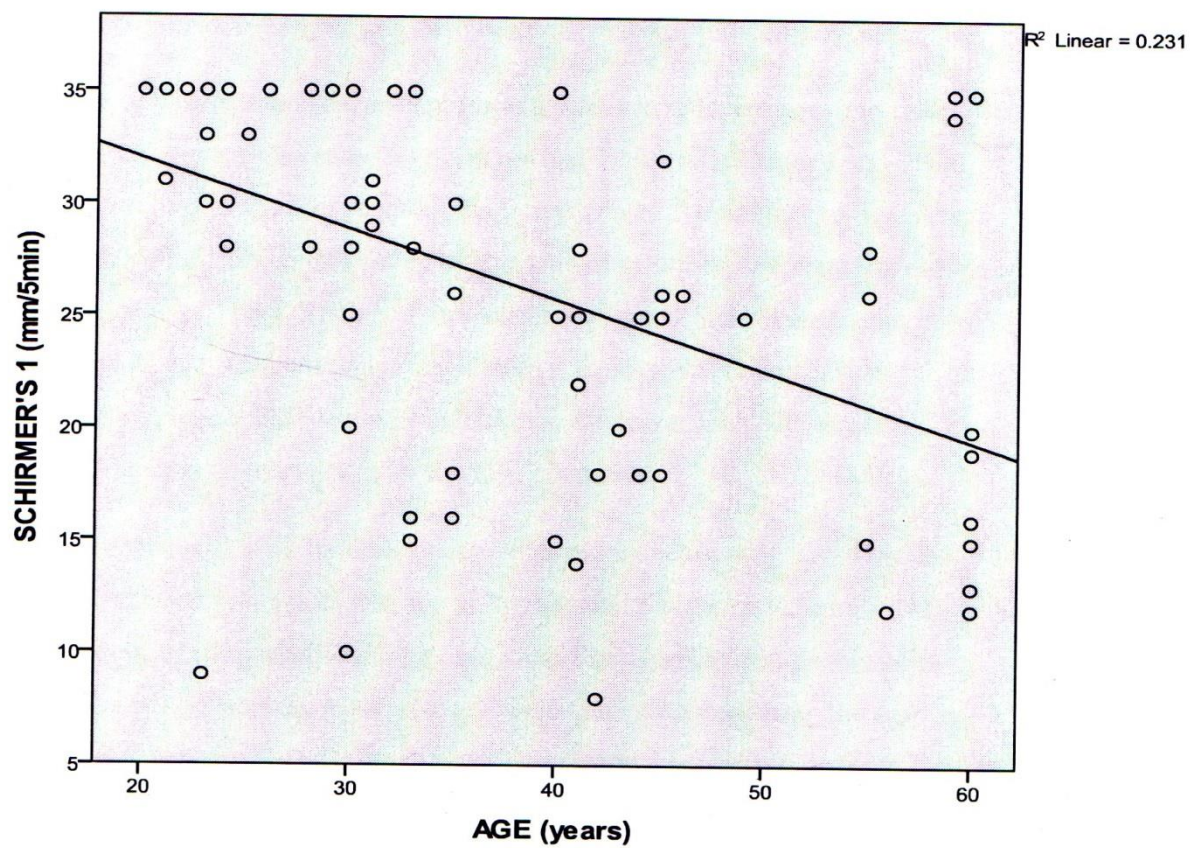With r^2 = 12.2% (p = 0.0000)

Figure 3 :

Figure 4 shows the regression graph, relation between Schirmer's1 and age for the South Indian population can be described by the following equation:

Schirmer's1 = 38.2 + Age (-0.312)

With r^2= 23.1% (p= 0.000)

Figure 4

5. Discussion

Dry eye syndrome is a clinical condition characterized by deficient tear production or excessive tear evaporation. The population- based studies revealed that dry eye syndrome, an important health problem, is seen throughout the world with a frequency of up to 33%, The Schirmer's and TBUT tests are most commonly used tests in the diagnosis of dry eye. The Basal Schirmer's test quantitatively evaluates the basic tear production. The Tear film BUT test reflects tear stability and composition.

The diagnostic tests may have dive"se normal values in different ages and sexes. To our knowledge, it is not well known how the normal values of Schirmer's and TBUT tests change according to age and gender. The Schirmer's test' is influenced by the type of paper used, and TBUT is influenced by the type of solution used. In the present study the mean value of TBUT & Schirmer's I observed was 12.51±4.56sec (range from 5 to 26 sec) and 27.01± 7.96mm/5min, (range from 8 to 35mm/5min). In 30% of the healthy subjects the values of BUT were even less than the lower limit for normal BUT suggested by various workers from western countries" 7.10

Similar low values of BUT have also been reported by Sukul et al' and Tiwariet alt Probably, these low values are due to the topical climatic conditions in India against the temperature climate of Western countries. Due to greater exposure to the hot and arid climate which increase the tear evaporation rate thus rendering the tear film unstable. But Amiram Shapiro et al'shown that Gradual seasonal changes in climatic factors, such as temperature, humidity, visibility, and barometric pressure, seem to have no appreciable effect on the Schirmer's test and BUT.

Lamba et al in their study-evaluation of pre-corneal tear film in leprosy, have taken cut off values of BUT as 15 seconds. Our observations militate against their

view we suggest a cutoff point of 10 seconds for BUT in the Indian population. Chopra et al have reported mean values of BUT in normal Indian population, even less than 10 seconds (males 8.9 seconds and females 6.98 seconds). However, most of the Indian

Worker[13] consider BUT values less than 10 seconds as abnormal. Norn[8,9] reported that females tend to have shorter BUT, however, Lemp et al[7] and shapire& Marin[14] could find no statistically significant difference in the BUT values of the two sexes. Result of this study shows no effect of gender on TBUT. This support the study by Stella T. Briggs[14,15]TBUT was found to decline with age. This agrees with other studies[4]. Result obtained in this study show a gradual decline with age. This is similar to data reported by Brown[2]. According to patel and Farrell[18] the TBUT decrease with age is due to a combination of factors involving changes in tear osmolality, ocular surface, and the effectiveness of the eyelid in maintaining the tear film.

The mean value of Schirmer's 27.01 ± 7.96mm/5min. (range from 8 to 35mm/5min) The mean Levels noted in males 25.42.females 29.38 were higher than in the males. Henderson and Prough also reported higher values in females. Parme suggested that this higher values due to the hormonal influences. But Norn[12] found that Schirmer's test results are higher in men, rather than in women. Studies shown there is no statistical significant difference between men and women schirmer's value, but in this study we found that there is a significant difference in schirmer's value in men and women.

6. CONCLUSION

Tear film break up time was studied in 92 eyes of 92 normal subjects under standard environmental conditions. The normal value of the TBUT was found lower than the Western reports. Ocular surface staining showed gradel were the minimal 3-4 spots can be seen in normal eyes. It is advocated that this test should be utilized more frequently in the diagnosis and management of dry eye syndrome. Our results reveal that there is a decline in the tear function test values, especially the tear film break-up time with advancing age.

7.LIMITATION

The main limitation of the study is :

Study should have included more number of subjects.

8. RECOMMENDATIONS AND SUGGESTIONS

1.Schirmer's test should be done & compared with different room temperatures.

2.Large Sample Size.

3.We suggest that the age of the patient should also be taken into consideration when the results of Schirmer's and TBUT tests are evaluated in the diagnosis and follow-up of dry eye syndrome

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