



The Effect of Age and Gender on Tear Film Breakup Time

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Abstract:

Background: Dry eye is a very common yet often mis-diagnosed ocular disorder. The stability of the tear film plays an important role in the integrity of ocular surface. Fluorescein Tear Breakup Time FBUT is the most frequently used diagnostic test to determine tear film instability. There is still a debate about whether age and gender affect tear film stability. **Objective:** To study the effect of age and gender on Tear Film Breakup Time. **Patients and Methods:** The study was performed on 100 random individuals (200 eyes) older than 18 years old. Full history taking and thorough slit lamp examination were performed first, followed by FBUT. The results were recorded and analyzed. **Results:** The study showed that there was negative relation between age and FBUT with high significance ($p < 0.001$). The study also showed that there was high statistically significance difference ($p < 0.001$) between male and female as regard FBUT, and that the values of FBUT were higher in males than in females. **Conclusion:** Tear film becomes less stable with age, possibly due to significant changes in the tear lipid layer leading to less protection from evaporation in the aging population. The observed changes are more marked in women than in men.

Keywords: Fluorescein Tear Breakup Time, Tear Breakup Time.

1. Introduction

Dry eye is a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tear 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. ⁽¹⁾

Many epidemiology studies have identified age and female gender as risk factors in dry eye disease. ⁽²⁾

Fluorescein Tear Breakup Time (**FBUT**) is the most frequently used diagnostic test to determine tear film instability. ⁽³⁾

The technique involves applying a fluorescein strip to the inferior cul-de-sac. After several blinks, the patient avoids blinking and the tear film is examined using a broad-beam of slit lamp with a cobalt blue filter. ⁽⁴⁾

Tear Breakup Time (**TBUT**) is the time interval between a complete blink and the appearance of the first break, discontinuity

or dry spot observed in the tear film. ⁽⁵⁾

TBUT less than 10s suggest an abnormal tear film ⁽⁶⁾, with values of 5s to 10s, considered marginal, and less than 5s, indicative of dry eye symptoms. ⁽⁷⁾

2. Aim Of The Work:

To study the effect of age and gender on Tear Film Breakup Time.

3. Patients And Methods:

3.1. Type of Study: This is an observational study.

3.2. Site of Study: This study was conducted at the Ophthalmology Department, Beni-Suef University Hospital.

3.3. Date and Period of Study: This study was conducted between December 2019 and June 2020.

3.4. Study Population: The study was conducted on one hundred random individuals (two hundred eyes) coming for eye examination.

3.5. Inclusion Criteria: Individuals aged above 18 years of age.

3.6. Exclusion Criteria: Patients with corneal pathology that prevents accurate assessment of keratometric or fluorescein tear break up time. Patients with an allergy to fluorescein.

3.7. Method in details: One hundred random individuals, who are presenting at the outpatient clinics to have their eyes examined for different reasons, are asked to undergo further examinations to test for tear film abnormalities and dry-eye detection and evaluation.

3.8. The order of performed procedure: Thorough ocular slit lamp examination. Followed by Fluorescein Breakup Time.

a) Ocular examination: Routine ocular examination was performed using the slit lamp; to detect any ocular surface abnormality or any detectable dry eye signs. Also, the candidates were examined for any signs of Meibomian gland dysfunction MGD; e.g. oil globules at meibomian gland orifices, lid notching, etc. The examination was normally preceded by full patient history taking.

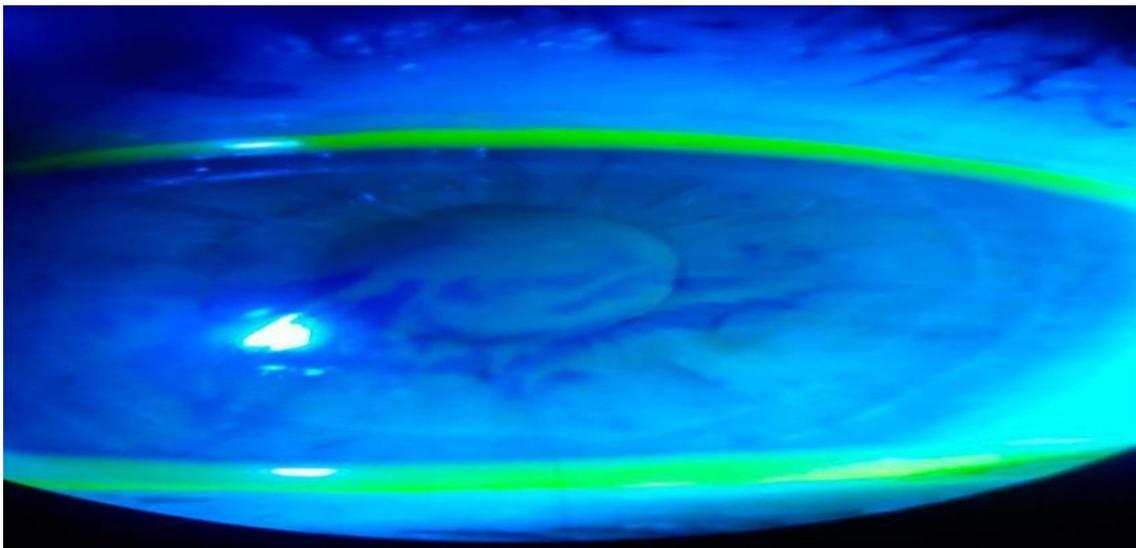


Figure 1: Fluorescein Breakup Time test

b) Fluorescein Breakup Time: (Figure 1)

A fluorescein strip is applied to the inferior cul-de-sac of both eyes of the patient. The patient is told to blink several times to distribute the fluorescein and mix it with the tear film, and when a homogeneously stained film is established at the end of the blink, the patient is asked to stop blinking, and a stopwatch is started. At the first appearance of a distinct breakup in the fluorescein film, the stop watch is stopped, and the time is noted as the breakup time. The same steps are repeated in the other eye. The test is performed 3 consecutive times in each eye simultaneously.

3.9. Statistical Analysis: Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp). The Kolmogorov- Smirnov was used to verify the normality of distribution of variables; Comparisons between groups for categorical variables were assessed using Chi-square test. Student t-test was used to compare two groups for normally distributed quantitative variables while Mann Whitney test was used to compare between two groups for not normally distributed quantitative variables. Pearson coefficient was used to correlate between quantitative variables. Significance of the obtained results was judged at the 5% level.

4. Results:

Table (1): Distribution of the studied cases according to demographic data

Demographic data	No. (%)
Gender (n = 100)	
Male	53 (53%)
Female	47 (47%)
Age (years) (n = 100)	
Mean \pm SD.	32.3 \pm 8.2
Median (Min. – Max.)	32 (19 – 54)
Fluorescein Tear Breakup Time (FBUT) (n = 200)	
Mean \pm SD.	6.7 \pm 3
Median (Min. – Max.)	7 (2 – 14)
MGD (n = 200)	
No MGD	142 (71)
MGD	58 (29)

This table shows that among the studied cases there were 53 (53%) males and 47 (47%) females, the mean age of studied cases was 32.3 (\pm 8.2 SD), with median 32 and range (19 – 54), the mean FBUT of studied cases was 6.7 (\pm 3 SD), with median 7 and range (2 – 14) and there were 58 (29%) with MGD.

Table (2): Correlation between fluorescein tear breakup time (FBUT) and age (n = 200)

Fluorescein Tear Breakup Time (FBUT)		
	r	p
Age	-0.312*	<0.001*

r: Pearson coefficient

*: Statistically significant at $p \leq 0.05$

This table shows that there was negative relation between age and FBUT with high significance ($p < 0.001$)

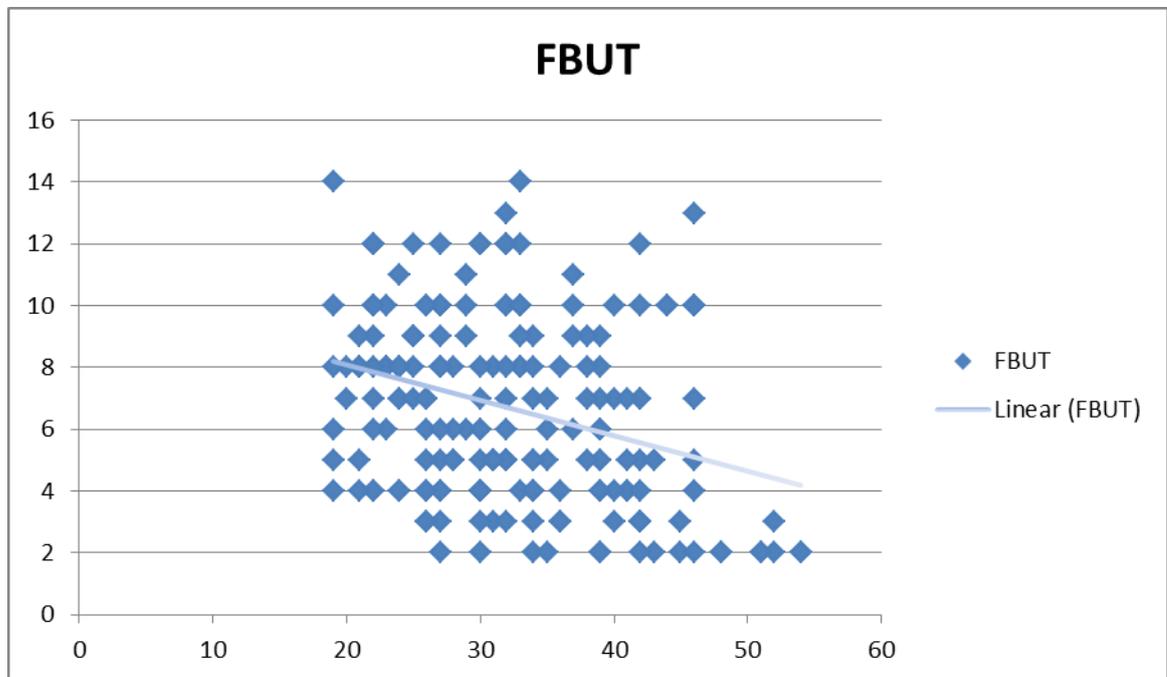


Figure (2): Correlation between fluorescein tear breakup time (FBUT) and age.

Table (3): Relation between gender and fluorescein tear breakup time (FBUT) (n = 200)

Fluorescein Tear Breakup Time (FBUT)	Gender		U	p
	Male (n = 106)	Female (n = 94)		
Mean ± SD	7.6 ± 2.9	5.7 ± 2.9	3224.0*	<0.001*
Median (Min. – Max.)	8 (2 – 14)	5 (2 – 12)		

U: Mann Whitney test

p: p value for comparing between Male and Female

*: Statistically significant at $p \leq 0.05$

This table shows that there was high statistically significance difference ($p < 0.001$) between male and female as regard FBUT (FBUT values were higher in males than in females).

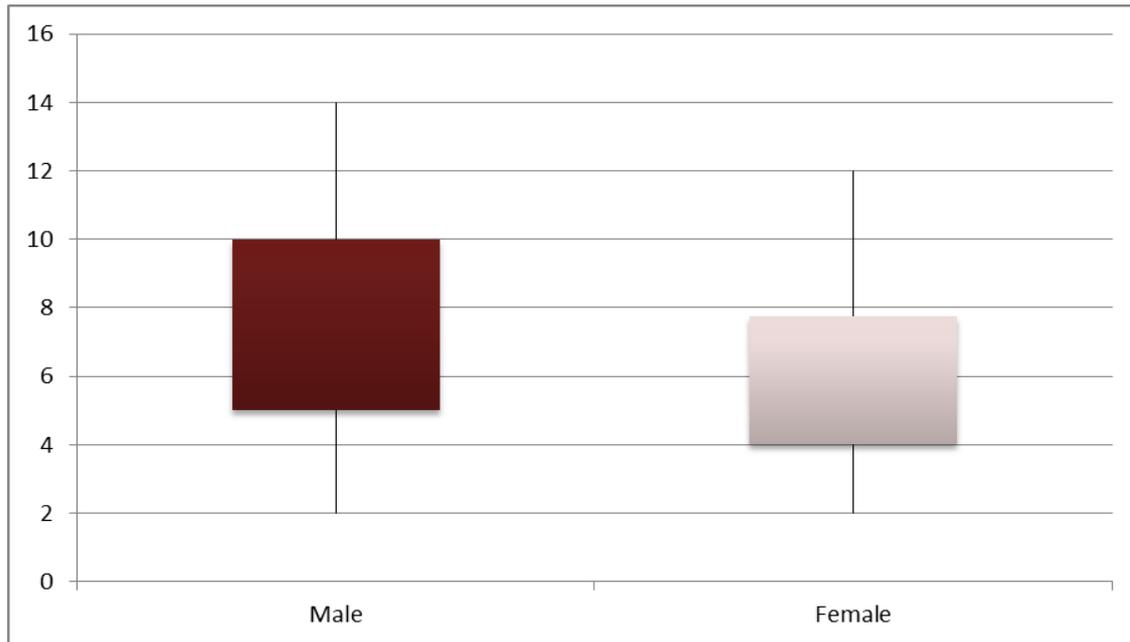


Figure (3): Relation between gender and fluorescein tear breakup time (FBUT).

Table (4): Relation between MGD with gender, age and FBUT (n = 200)

MGD				
	No MGD (n = 142)	MGD (n = 58)	Test of Significance	p
Gender				
Male	96 (67.6%)	10 (17.2%)	$\chi^2 = 41.933^*$	<0.001*
Female	46 (32.4%)	48 (82.8%)		
Age (years)				
Mean \pm SD.	29 \pm 6.4	40.2 \pm 6.6	t= 11.148*	<0.001*
Median (Min. – Max.)	28 (19 – 46)	40 (24 – 54)		
Fluorescein Tear Breakup Time (FBUT)				
Mean \pm SD.	7.7 \pm 2.9	4.3 \pm 1.9	U= 1396.50*	<0.001*
Median (Min. – Max.)	8 (2 – 14)	4 (2 – 10)		

²: Chi square test t: Student t-test U: Mann Whitney test

p: p value for comparing between No MGD and MGD

*: Statistically significant at $p \leq 0.05$

This table shows that there was high statistically significant difference ($p < 0.001$) between the presence or absence of signs of MGD as regard gender (females were found more with MGD), age (age was higher in MGD group) and FBUT (FBUT was lower in MGD group).

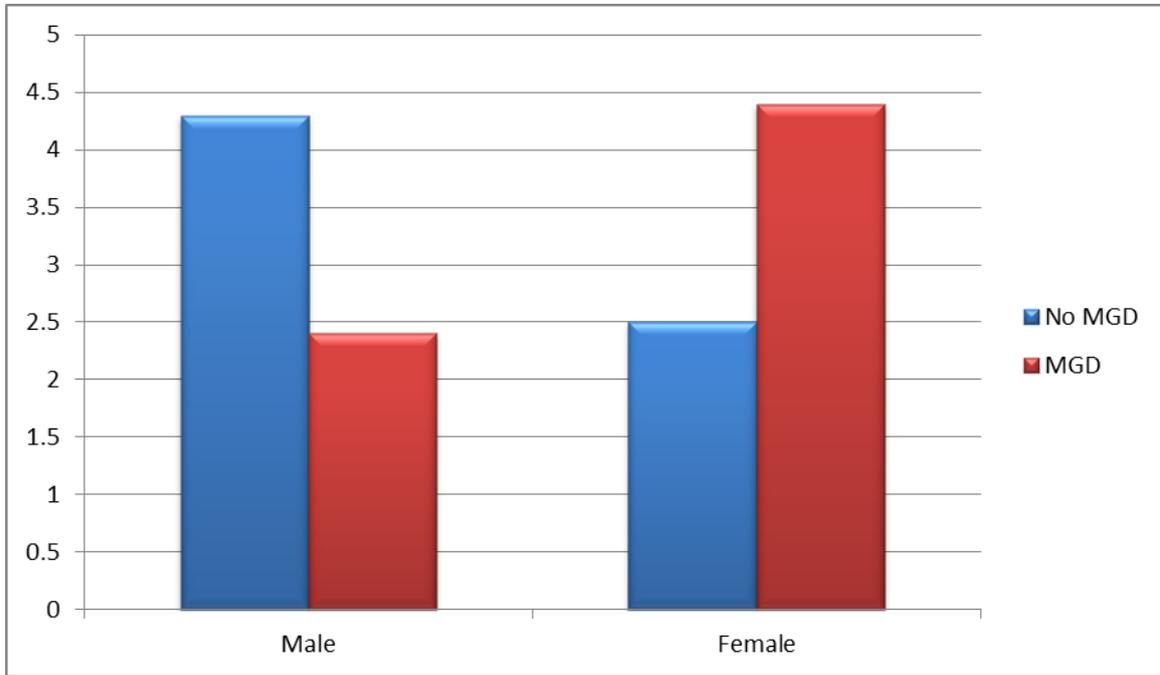


Figure (4): Relation between MGD and gender.

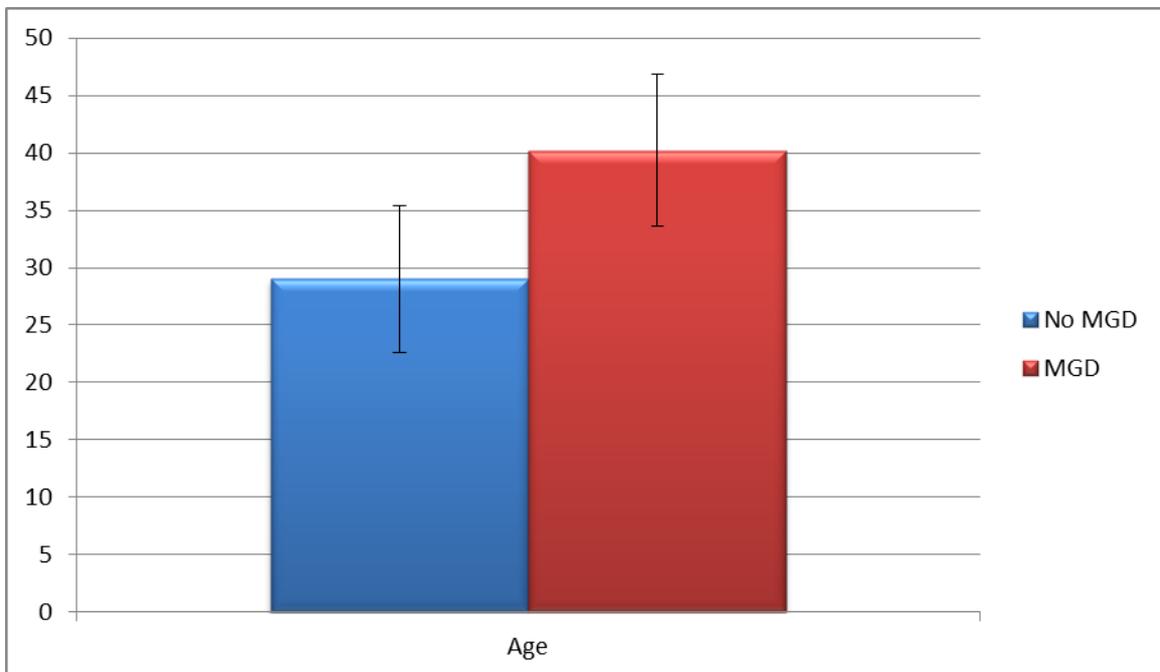


Figure (5): Relation between MGD and Age

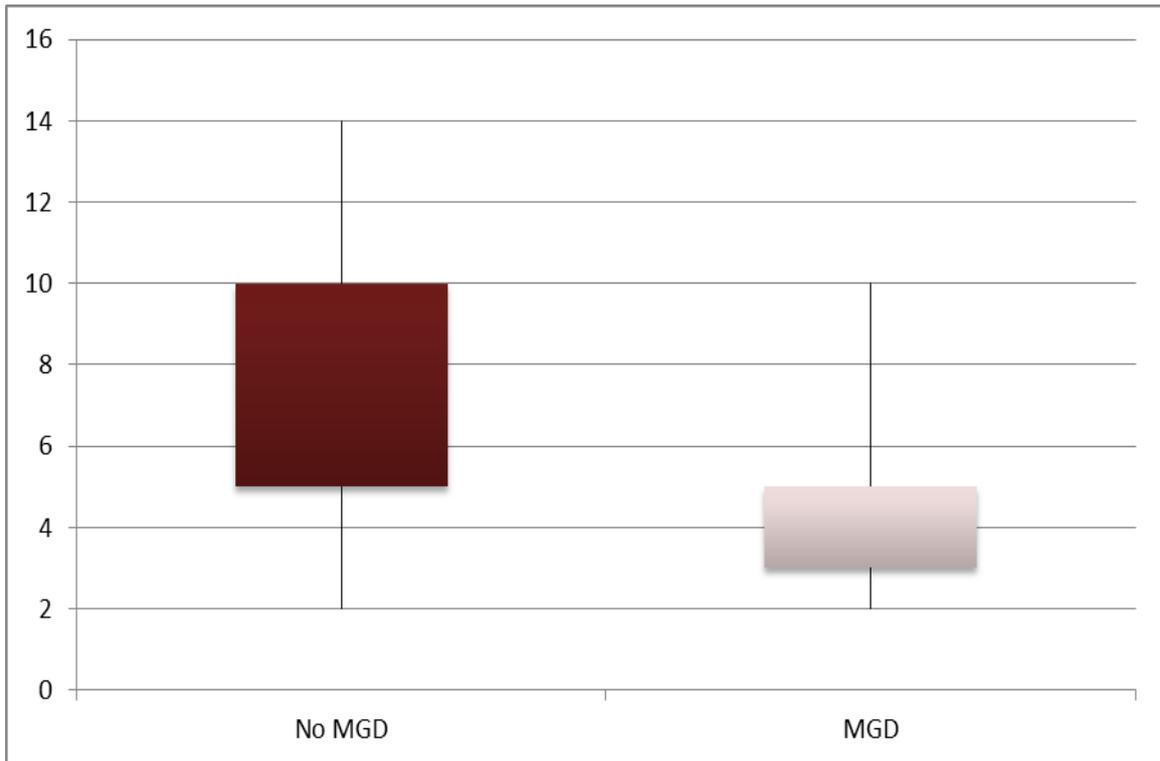


Figure (6): Relation between MGD and fluorescein tear breakup time (FBUT).

5. Discussion:

Dry eye is a very common yet often mis-diagnosed ocular disorder. There is still a debate about whether age and gender affect tear film stability.

The current study established that patients' age and gender are significant factors that influence tear film lipid layer characteristics and tear film dynamics.

The study was performed on 100 random individuals (200 eyes). Thorough ocular slit lamp examination. Followed by Fluorescein Breakup Time.

In this study, we found that among the studied cases there were 53 (53%) males and 47 (47%) females, the mean age of studied cases was 32.3 (± 8.2 SD), with median 32 and range (19 – 54), the mean FBUT of studied cases was 6.7 (± 3 SD), with median 7 and range (2 – 14) and there were 58 (29%) with MGD.

The study showed that there was negative relation between age and FBUT with high significance ($p < 0.001$). Meaning that FBUT declines significantly with age.

The study also showed that there was

high statistically significance difference ($p < 0.001$) between male and female as regard FBUT, and that the values of FBUT were higher in males than in females.

These findings agree with Ozdemir and Temizdemir⁽⁸⁾ where there is a decline in tear film stability in relation to ageing. And also with Yeh et al.⁽⁹⁾ where female sex was associated with a less stable tear film.

On the other hand, according to Bukhari et al.⁽¹⁰⁾ there was no statistically significant association between dry eye with advancing age or gender.

Furthermore, the study proved there was high statistically significant difference ($p < 0.001$) between the presence or absence of signs of MGD as regard gender (females were found more with MGD), age (Age was higher in MGD group) and FBUT (FBUT was lower in MGD group).

6. Conclusion:

Tear film becomes less stable with age, possibly due to significant changes in the tear lipid layer leading to less protection from evaporation in the aging population. The observed changes are more marked in women than in men.

7. References:

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