ORIGINAL ARTICLE

Effect of Soft Contact Lens Wear on Tear Film Breakup Time

Syeda Rushda Zaidi[1], Ali Ayaz Sadiq[2], Shua Azam[3], Uzma Sattar[4], Samia Iqbal[5], Huma Ejaz[6]
[1-6]*College of Ophthalmology and Allied Vision Sciences, King Edward Medical University, Mayo Hospital, Lahore*

ABSTRACT

Purpose: To study the effect of soft contact lens wear on tear film breakup time (TFBUT).

Study Design: Descriptive Observational study.

Place and Duration of Study: College of Ophthalmology and Allied Vision Sciences, King Edward Medical University, Mayo Hospital, Lahore from January to March 2016.

Material and Methods: Students of King Edward Medical University Lahore wearing soft contact lens for more than 3 months with no known ocular pathology were selected by non-probability convenient sampling technique. Subjects with history of using any eye drops, history of oral drugs, which could cause dry eye and individuals any ocular disease, were excluded from the study. Tear film BUT was tested by using Fluorescein sodium dye and examinig under cobalt blue filter of slit lamp. SPSS version 20 is used to analyze the data.

Results: There were 30 participants with mean age of 24.5 ± 5 years. All were females. Sixty percent were wearing corrective lenses, and 40% were wearing cosmetic lenses. Out of 30 patients wearing contact lenses, only 6.67% had marginal tear film BUT and none of the patients has shown dry eyes. Individuals using contact lenses for 9 – 12 years had decreased BUT as compared to subjects using lenses for 3 – 6 months. 33.33% of extended lens wearers had reduced BUT as compared to disposable and daily wearers of contact lenses. Discomfort with contact lenses was observed in only 4 patients.

Conclusion: As the duration of contact lens wear increases, the tear film break-up time decreases. Individuals using extended wear contact lenses are more prone to develop decreased TFBUT.

Key Word: Soft contact lenses, Dry eye syndrome, Tear breakup time.

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INTRODUCTION

The lacrimal glands tear film and corneal surface play a major role to preserve the integrity of the refractive surface of the eye, counterattack damage and defend the eye contrary to varying biological circumstances. Tear film is protects the palpebral conjunctivae, bulbar conjunctiva and cornea. Consequently, ocular discomfort is due to tear deficiency or excessive tear evaporation[1].

A group of symptoms such as grittiness, irritation and burning are related to dry eyes. However, an inadequate healthy tear layer could lead to over production of the lacrimal gland leading to reflex tearing[2]. Epidemiologic literature has recognized prevalence rates of dry eye from 33% and 7% in Japan and the US respectively[3]. About 33.7% in Taiwan and around 20.7 million people of the total population of the US have dry eye syndrome.[4,5] Likewise; menopausal women are the significant part of the population affected by the dry eye problem[6].

Correspondence to: Syeda Rushda Zaidi
College of Ophthalmology and Allied Vision Sciences, King Edward Medical University, Mayo Hospital, Lahore
Email: rushdazaidi15@live.com

The contact lens absorbs water from the natural tear film due to evaporation of the water from its surface, which is the primary reason to have the symptoms of dry eyes in contact lens wearers[7]. Consequently, the reduced level of tears increases the tear film osmolarity which further irritates the eye in general and produces discomfort in particular.[8] Contact lenses are used as therapeutic device as well as for cosmetic purpose[9]. About 2% of the world population uses contact lenses. The worldwide worth of lens market was around 11.7 billion dollars by 2015[10]. Two third of the population who wear lenses is female, and the average age of soft contact lens wearers was 31 years[11]. The comfort level of lenses depends upon its softness and stiffness[12].

The purpose of this study was to see the effect of soft contact lens wear on tear breakup time and to find out if the duration of contact lens use has any impact on the tear film break up time.

MATERIAL AND METHODS

This was a descriptive Observational study conducted at College of Ophthalmology and Allied Vision Sciences, King Edward Medical University, Mayo Hospital, Lahore from January to March 2016. Students of King Edward Medical University Lahore wearing soft contact lens for more than 3 months with no known ocular pathology were selected by non-probability convenient sampling technique. Subjects with history of using any eye drops, history of oral drugs, which could cause dry eye and individuals with any ocular disease, were excluded from the study. Students with history of Kerato-refractive surgery were also excluded. Tear film BUT was tested by using Fluorescein sodium dye and examinig under cobalt blue filter of slit lamp. SPSS version 20 is used to analyze the data.

RESULTS

There were 30 participants with mean age of 24.5 ± 5 years. All were females. Sixty percent were wearing corrective lenses, and 40% were wearing cosmetic lenses. Out of 30 patients wearing contact lenses, only 6.67% had marginally decreased tear film BUT and none of the participants had dry eyes. However, TF BUT decreased with the increased duration of contact lens wear. Individuals using contact lenses for 9 – 12 years had TFBUT around 10 seconds whereas subjects with duration of contact lenses for 3 – 6 months had high mean value of tear film BUT around 33 seconds (Figure 1).

When TFBUT was compared among different types of contact lens wearers, it showed that 33.33% of extended lens wearers had reduced TFBUT (range 6 – 15 seconds) as compared to disposable and daily wearers who had TFBUT of 35 seconds (Figure 2). Discomfort with contact lenses was observed in only 4 patients. None of the subjects with disposable and daily wear lenses had abnormal TFBUT. Fifteen individuals were using extended wear and only 2 out of 15 had marginal TFBUT.

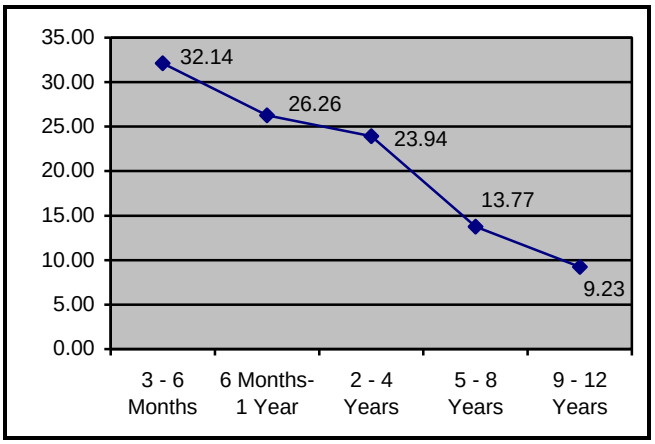

Fig. 1: Tear Film BUT in Comparison with Duration of Use.

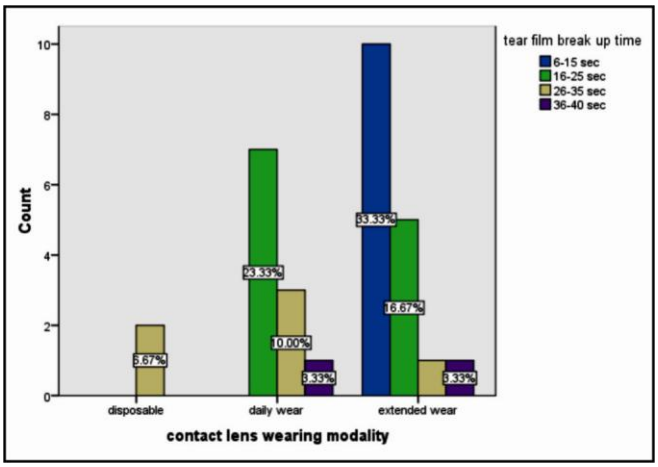

Fig. 2: Tear Film BUT in Comparison with type of Contact Lenses.

Figure 2: 33.33% of extended lens wearers had reduced BUT lying in the range of 6 – 15 seconds as compared to disposable and daily wearers who had TFBUT on average 26 – 35 seconds.

DISCUSSION

The best measure to test relative stability of pre-corneal tear film is the tear film break-up time (BUT)[13]. The tear break up time in patients with dry eyes is shorter and vice versa[14]. Typically > 10 seconds and < 5 seconds are recognized as healthy and low respectively while between 5 to 10 seconds are considered as the marginal TBUT of an eye[15]. Nevertheless, the dryness of eye is due to damage or disease of one of the three layer of the tear film, and the most common disorder is the aqueous tear deficiency[16].

Our primary focus was to discover whether there is a considerable reduction in tear film break up time by wearing soft contact lenses or not. Our results showed that reduction of tear film break up was observed as the duration of wearing contact lenses was increased. Similar results were found in the studies of Stapleton et al[17], Rabia[18] and Pili et al[19]. Decreased tear film stability as measured with tear film BUT occurs with long term use of contact lenses stability. In a recent study, ocular discomfort and other dry eye symptoms were present in contact lens wearers[20]. The reason might be the daily wearing time of soft contact lens induced hypoxia and caused disturbances in pre corneal tear film stability. In addition, soft contact lenses are made of hydrogel material, which can absorb water and other liquids in its structure leading to tear film instability[21]. However, in this study, the symptoms of dry eye were not present in any subject that may be due to the smaller sample size and further, their signs were observed for shorter duration.

The limitation of our study was that we did not compare the results with the age matched controls and there were no males in this study.

CONCLUSION

It is finally observed that patients using contact lenses included in the recent work do not show any symptoms of dry eye. However, the reduction of tear film break up is noticed as the duration of wearing contact lenses is increased.

Ethical Approval

The study was approved by the Institutional review board/Ethical review board.

Conflict of Interest

Authors declared no conflict of interest

Authors' Designation and Contribution

Syeda Rushda Zaidi; Optometrist: *Study design, Data analysis, review of literature.*

Ali Ayaz Sadiq; Assistant Professor: *Study design, final review.*

Shua Azam; Optometrist: *Data Collection, final review.*

Uzma Sattar; Optometrist: *Data Collection, final review*.

Samia Iqbal; Optometrist: *Data Collection, final review*.

Huma Ejaz; Optometrist: *Data Collection, final review*.

REFERENCES

1. **Born K.** Changing trends in the definition and diagnosis of dry eyes. Am J Ophthalmol. 2005; **140:** 507-8.
2. **Baudouin C.** The pathology of dry eye. Surv Ophthalmol. 2001; **45 (Suppl. 2):** 211-20.
3. **Gayton JL.** Etiology, prevalence, and treatment of dry eye disease. Clinical Ophthalmol. 2009; **(3):** 405-412.
4. **Lin PY, Tsai SY, Cheng CY, Liu JH, Chou P, Hsu WM.** Prevalence of dry eye among an elderly Chinese population in Taiwan. Ophthalmology, 2003; **110 (6):** 1096-101.
5. **Albietz J.** Dry Eye: an update on clinical diagnosis, management and promising new treatments. Clin Exp Optom. 2001; **84 (1):** 4-18.
6. **Schaumberg D, Sullivan D, Buring J, Dana R.** Prevalence of dry eye syndrome among U.S. women. Am J Ophthalmol. 2003; **136:** 318-326.
7. **Chang SW, Chang CJ.** Delayed tear clearance in contact lens associated papillary conjunctivitis. Curr Eye Res. 2002; **22 (4):** 253-7.
8. **Pflugfelder, Stephen C.** Tear Dysfunction and the Cornea: LXVIII Edward Jackson Memorial Lecture. Am J Ophthalmol. 2011; **152 (6):** 900-909.
9. **Shah C, Sundar Raj CV, Foulks GN.** The evolution in therapeutic contact lenses. Ophthalmol Clin North Amer. 2003; **16 (1):** 95-101.
10. **Herbaut A, Liang H, Denoyer A, Badouin C, Labbe A.** Tear film analysis and evaluation of optical quality: A review of the literature. J Fr Ophthalmol. 2019; **42 (2):** e21-e35. Doi: 10.1016/j.jfo.2018.12.001.
11. **Sokol, JL; Mier, MG; Bloom, S; Asbell, PA.** A study of patient compliance in a contact lens-wearing population. The CLAO J. 1990; **16 (3):** 209-13.

12. **Gerald EL.** Comparison of hydrogel contact lens patients with and without the symptom of dryness. Intern Cont Lens Clin. 1993; **20 (9):** 191-194.
13. **Eva R, Asbury T, Whitcher JP, editors.** Vaughan and Asbury's General Ophthalmology, USA: McGraw-Hill Medical, 2003; **16th ed.:** 308-310.
14. **Lemp MA, Foulks GN.** Guidelines from International Dry Eye Workshop, 2008 April.
15. **Geoffrey P, Gillbard.** Dry eye disorder. Clinical practice principal and practice of ophthalmology, 1994;**1:** 257-74.
16. **Baron AJ.** The Donye lectures reflections on the tears. Eye, 1997; **11:** 583-602.
17. **Stapleton F, Stretton S, Papas E, Skotnitsky C, Sweeney DF.** Silicone hydrogel contact lenses and the ocular surface. Ocul Surf. 2006; **4 (1):** 24-43.
18. **Rabia, A.** Effect of Contact Lens Wear on Tear Film Break up Time (TBUT) among Contact Lens Users. Pak J Ophthalmol, 2017**; 33 (3):** 182-186.
19. **Pili K, Kaštelan S, Karabatic M, Kasun B, Culig B.** Dry eye in contact lens wearers as a growing public health problem. Psychiat Danub. 2014; **26 (3):** 528-532.
20. **Takashi Kojima.** Contact Lens-Associated Dry Eye Disease: Recent Advances Worldwide and in Japan, Investigative Ophthalmology and Visual Science November 2018; **59:** 1 02-108.
21. **Aurore M, Alain MB, Be´nigne M, Maxime S, Francoise B, Niyazi A, et al.** Ocular surface assessment in soft contact lens wearers; the contribution of tear osmolarity among other tests. Acta Ophthalmol. 2014; **92:** 364–369.
22. **Schein OD, Munoz B, Tielsch JM, Bandeen-Roche K, West S.** Prevalence of dry eye among the elderly. Am J Ophthalmol. 1997; **124 (6):**723-8.