EFFECT OF CONTACT LENS CORRECTION ON TEAR FILM:

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Abstract:

Purpose: This study is conducted to find out changes in tear films take place due to use of contact lenses in Irregular corneal astigmatisms. Aim is to evaluate changes in the quantity and quality of tear film with long term use of contact lenses. Method: Slit Lamp Biomicroscopy of the anterior segment (lids, cornea, and conjunctiva) was conducted. During this examination, Bulbar and limbal conjunctiva, lid margins and corneal surface analysis was done. Results: Tear volume:In terms of tear volume Clinically and statistically significant changes are found P= $1.89E^{-12}$Tear film integrity helps to maintain an optically uniform interface between air and the anterior surface on contact lens that would affect visual function. Dogru*et al*.[4]and Mohd-Ali *et al*.[5] reported that keratoconus patients have poor tear stability compared to normal people. Few studies have reported the effect of RGP contact lens wear on the tear film of eyes with keratoconus. Results from this study showed that prolonged RGP contact lens wear had a significant effect on tears quality of keratoconic eyes. This agreed with a study reported by Moon *et al*.[6]who found that tear film changes in keratoconus could be directly related to contact lens wear. In present study it is clear that all other causes of corneal irregularities also show change in tear volume in contact lens wear. All different RGP lenses as well as soft lens users are showing decrease in tear volume after continues use of 6 months. TFBT: Thai et al.[7] who stated that all contact lenses materials significantly and adverselyaffected tear physiology by increasing evaporation rate and decreasing tear thinning timeResults from this study agreed Mohd-Ali et al.[8] who found minimal changes in tear characteristics after 6 months of continuous wear of Dk value above 90. Present study found significant change in TFBT where theAnova calculation gives the P =9.02E-05 which is different from the previous finding. All different RGP lenses as well as soft lens users are showing decrease in TBFT after continues use of 6 months. No significant gender influence was found among the lens wearers. Conclusion: Subjects with irregular corneal astigmatism who wear RGP contact lenses have poor tear stability which needs to be evaluated appropriately during management of such patients; both systemic and ocular signs of dry eye condition should be managed prior and during contact lens wear. In soft lens wearers also tear volume and TFBT shows significant decrease. As per the results practitioner should examine contact lens users in proper follow-up intervals so that if necessary they may manage the tear related alterations if found clinically required. Possible causes could be masking of corneal surface from the lid interactions and reduced sensitivity due to adaptation

Introduction:

The tear plays very important role in optical performance and the metabolic function of the cornea. In contact lens fitting especially in case of RGP lenses it forms tear lens between the lens back surface and the corneal anterior surface, which musk approximately 90% of the total corneal astigmatism.

As per the study by Jason J. Nichols and Loraine T. Sinnott on "Tear Film, Contact Lens, and Patient-Related Factors Associated with Contact Lens–Related Dry Eye"[1] suggests that pre lens tear film may get affected with hydrogel lenses but RGP do not alter the quality or quantity of tear film, as the material does not allow much tear film to evaporate through the lens.

The normal tear film The tear film is, typically, considered to be a three-layered structure, comprising a mucoidal basal layer, an aqueous component and a superficial lipid layer. Functionally, the three major components of the tear film work together to maintain the overall form. The lipid and mucus layers have the most influence on the quality of the tear film, while the aqueous layer provides the quantity of tears needed. Both quality and quantity of tears are important to maintain the bulk hydration and surface hydration of a soft contact lens. The tear film is formed and maintained by blinking. As the eye closes during a blink, the lipid layer is compressed between the lid margins. The mucin, contaminated by lipid from the tear film breaking up, is moved to the upper and lower fornices from where it is excreted through the tear duct. It is replaced by a new layer, which is created by the lids pushing against the eye surface. As the eye opens, a new aqueous layer spreads across the now hydrophilic epithelial surface. As it is formed, the lipid, which has been squeezed into a thick layer during lid closure, spreads out, producing a new monolayer across the aqueous to reduce tear evaporation. The new tear film is a relatively unstable structure. Despite the presence of the lipid layer, there is still some tear evaporation that reduces its thickness. As this occurs, lipids begin to diffuse towards the mucus. The mucus, now contaminated by the lipid, begins to lose is hydrophilicity, and the tear film begins to rupture, leading to isolated islands of tear break-up. This is the stimulus for the blink and the cycle to be repeated. A normal tear break-up time can be longer than the usual inter-blink period. Under non-contact lens wearing conditions, the structure of the tear film can be affected by systemic or ocular medication, general health and a number of ocular conditions, such as keratoconjunctivitissicca. The tears are also affected by age, with changes in both the volume of tear production and stability of the tear film.

Method:

Slit Lamp Biomicroscopy: slit lamp biomicroscopy of the anterior segment (lids, cornea, and conjunctiva) was conducted. During this examination, Bulbar and limbal conjunctiva, lid margins and corneal surface analysis was done.

Tear film evaluation:

To evaluate the tear volume a 35 mm × 5 mmSchirmer test strips was placed at the junction ofmedial 2/3 and lateral 1/3 of the lower lid in the fornix of the patients eye for 5 min, and after that the stripwas removed and the length of moisture part was recorded in millimetres according to tye

(<10 mm) and watery (>15 mm). The test was done for both eyes.[3]Tear film breakup time (TBUT) test was carried usingHaag-Streit slit lamp in a bright light and cobalt bluefilter. The subject's inferior bulbar conjunctiva of theeye was swiped with a saline

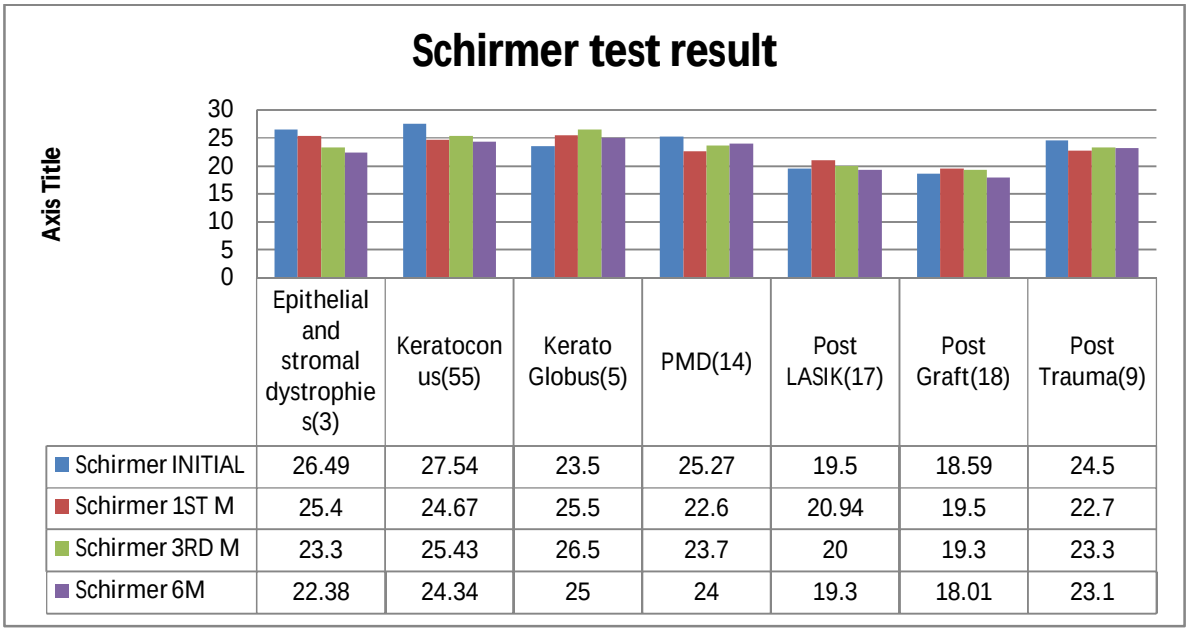
wetted fluorescein strip.The patient was asked to blink several times afterthat he was asked to stop blinking and his eye wasobserved thought the slit lamp. The time between lastblink and the appearance of the spots or streaks in thetear film was taken as the TBUT. Three readings weretaken with stopwatch, recorded, and then the readingwas calculated from the average of these readings.The results were then graded as normal (≥10 s) and abnormal (<10 s).

Statistical Analysis:

One way ANOVA was done with the help of Microsoft excel to compare change in parameters of three follow-up visits,The one-way analysis of variance (ANOVA) is used to determine whether there are any statistically significant differences between the means of two or more independent (unrelated) groups

Result and Discussion:

Tear volume:In terms of tear volume Clinically and statistically significant changes are found P= $1.89E^{-12}$Tear film integrity helps to maintain an optically uniform interface between air and the anterior surface on contact lens that would affect visual function. Dogru*et al.*[4]and Mohd-Ali *et al.*[5] reported that keratoconus patients have poor tear stability compared to normal people. Few studies have reported the effect of RGP contact lens wear on the tear film of eyes with keratoconus. Results from this study showed that prolonged RGP contact lens wear had a significant effect on tears quality of keratoconic eyes. This agreed with a study reported by Moon *et al.*[6]who found that tear film changes in keratoconus could be directly related to contact lens wear. In present study it is clear that all other causes of corneal irregularities also show change in tear volume in contact lens wear. All different RGP lenses as well as soft lens users are showing decrease in tear volume after continues use of 6 months.



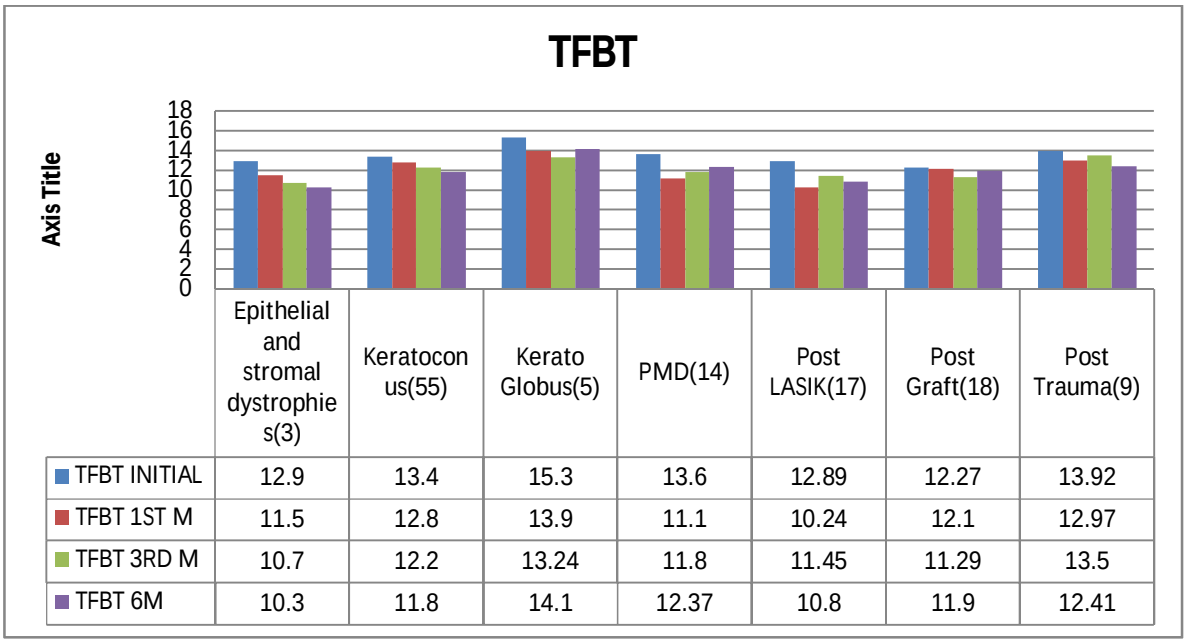
	Epithelial and stromal dystrophies(3)	Keratoconus(55)	Kerato Globus(5)	PMD(14)	Post LASIK(17)	Post Graft(18)	Post Trauma(9)
Schirmer INITIAL	26.49	27.54	23.5	25.27	19.5	18.59	24.5
Schirmer 1ST M	25.4	24.67	25.5	22.6	20.94	19.5	22.7
Schirmer 3RD M	23.3	25.43	26.5	23.7	20	19.3	23.3
Schirmer 6M	22.38	24.34	25	24	19.3	18.01	23.1

Corneal condition	Mean	Stdev

Epithelial and stromal dystrophies(3)	24.3925	1.884876212
Keratoconus(55)	25.495	1.437694914
Kerato Globus(5)	25.125	1.25
PMD(14)	23.8925	1.097979204
Post LASIK(17)	19.935	0.731824205
Post Graft(18)	18.85	0.682690755
Post Trauma(9)	23.4	0.774596669

TFBT, Thai et al.[7] who stated that all contact lenses materials significantly and adverselyaffected tear physiology by increasing evaporation rate and decreasing tear thinning timeResults from this study agreed Mohd-Ali et al.[8] who found minimal changes in tear characteristics after 6 months of continuous wear of Dk value above 90. Present study found significant change in TFBT where theAnova calculation gives the P =9.02E-05 which is different from the previous finding. All different RGP lenses as well as soft lens users are showing decrease in TBFT after continues use of 6 months.

No significant gender influence was found among the lens wearers.



	Epithelial and stromal dystrophies(3)	Keratoconus(55)	Kerato Globus(5)	PMD(14)	Post LASIK(17)	Post Graft(18)	Post Trauma(9)
TFBT INITIAL	12.9	13.4	15.3	13.6	12.89	12.27	13.92
TFBT 1ST M	11.5	12.8	13.9	11.1	10.24	12.1	12.97
TFBT 3RD M	10.7	12.2	13.24	11.8	11.45	11.29	13.5
TFBT 6M	10.3	11.8	14.1	12.37	10.8	11.9	12.41

Conclusion

Subjects with irregular corneal astigmatism who wear RGP contact lenses have poor tear stability which needs to be evaluated appropriately during management of such patients; both systemic and ocular signs of dry eye condition should be managed prior and during contact lens wear. In soft lens wearers also tear volume and TFBT shows significant decrease. As per the results practitioner should examine contact lens users in proper follow-up intervals so that if necessary they may manage the tear related alterations if found clinically required. Possible causes could be masking of corneal surface from the lid interactions and reduced sensitivity due to adaptation.

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