ABSTRACT

**Purpose:** To compare the morphological changes in the meibomian glands and meibomian glands loss between contact lens and non-contact lenses weares in a young population. The contact lens weares wore C.L. for max 6 years.

**Methods:** Examination of the meibomian gland (MG) by using a corneal topographer CSO MODI 2 incorporating Phoenix-Meibography Imaging software module from January to June 2019. 80 volunteered students of the University of West Attics participated, and all the subjects selected had no obvious ophthalmological symptoms, aged 19 to 22 years.

**Results:** The Arithmetic mean of Meiboscore for those who did not wear C.L. was 1.23 MGL, while for the C.L. weares was 2.53 MGL.

**Conclusion:** This Clinical research compares the meiboscore of contact lens weares at a young age (min. 4 years contact lens weares) and those who never tried to wear. This study showed that there is a relation between meibomian glands loss (MGL) and contact lens wear. Our observations showed that there a small but positive correlation, as the total period of C.L. wear increases the meiboscore increases. In addition, cumulative frequency % showed this slight increase in meiboscore.
Keywords: Meibography; corneal topographer; meibomian glands; meiboscore; contact lens.

1. INTRODUCTION

Meibomian glands are very important for the health of the ocular surface (cornea and conjunctiva). They produce the lipid layer of the tear film [1]. The Meibomian glands are found in the upper and lower eyelids, around 50 and 25 glands respectively, and especially at the rims of the eyelids at the tarsal plate. Their secretion is an oily substance that prevents the tear film to evaporate. The length of each meibomian duct is 3-4mm, where it ends at the lid margin [2].

Fig. 1. Meibomian gland at the edge of the lower lid

The meibum (secretion of the MGs) construct the lipid layer (outer layer), of the tear film. The state and evaluation of the lipid layer gives information of the integrity and stableness of the tear film and in the same time the right function of the MGs. Interferometry is used to evaluate the lipid layer where the creation of interference fringe patterns vary in pattern and color according to lipid layer thickness and integrity [3,4].

Meibomian gland dysfunction (MGD) is a very common cause for dry eye [5] and contact lens drop outs [6,7,8]. These glands present a dysfunction, with this dysfunction prevailing from 40 to 50% in the general population increasing with age [9,10]. It’s characterized by alterations of the gland’s morphology, as well as a diminishing the quality and quantity of gland secretion. The prevalence of MGD varies widely in many research projects from 4% to 70%, [11,12,13] Meibography is a technique that reveals the health and number of MGs at the upper and lower eyelid [14,15].Meibography is a non-contact technique visualizing the morphology and the normal function of meibomian glands [16]. Tapie [17] describe the first technique of meibography, by transilluminating of the eyelid which was reverted. Other researchers used confocal microscopy [18] and video meibography [19].

2. PURPOSE

This clinical study recorded the meibomian glands integrity and the possible score-loss in a young population wearing contact lenses. There was also a comparison between contact lens and non-contact lenses wears. The upper and lower eyelid was examined by using a corneal topographer CSO MODI 2 using Phoenix-Meibography Imaging software module. The research was carried out at the University of West Attica clinic from January to June 2019.

3. METHODS

80 volunteers participated, all the subjects selected had no obvious ophthalmological symptoms, aged 19 to 22 years (mean age 20.9 ±1, 1 year). From the total of 80 subjects, 40 were contact lens users, while the remaining 40 weren’t. The subjects who wear contact lenses had monthly disposable silicon-hydrogel C.L... Subjects with history of allergies, ocular or systemic disease, users of eye- drops for any reason were excluded. The images were analyzed with Phoenix software. The CSO topographer with Phoenix software photographed the upper and lower lid of each participant. Then by using a free-hand tool the area of the MGs was highlighted and finally.

The area of loss was measured by identifying the missing meibomian gland area and its relation to the total area expressed as an MGL percentage. For each eyelid (upper and lower) we had therefore (meiboscore) results as follows [6,7] [20].

- Grade 0 when we had no loss.
- Grade 1 when the loss was less than 35%.
- Grade 2 when the loss was from 35% to 67%.
- Grade 3 when the loss was greater than 67%.

4. RESULTS AND DISCUSSION

The correlation of meiboscore with years of contact lens wear compared to non-contact lens wear was presented. We observe that there seems to be a small but positive correlation, as the total period of contact lenses increases the meiboscore increases. In addition, cumulative frequency % showed this slight increase in meiboscore, as the participants measured were using contact lens for more than one-year time. It
is noteworthy that about 38% of subjects wearing contact lenses showed meiboscore 1 after their first year of use, with a likely upward trend.

Concerning MGL, Paired T-tests were conducted in comparison of meiboscore with and without contact lens wear.

Fig. 2. Meibography of the lower lid. The lower lid area is circled by the red line while the green part pictures the meibomian glands area while the gray part is meibomian glands loss.

Fig. 3. Meibography of the upper and lower lid.

Fig. 4. Correlation of meiboscore with years of contact lens wear.
Without CL the statistics were
Arithmetic mean: 1.23 MGL
95% Confidence for the mean: 1.03 to 1.43
Variance: 0.685
Standard deviation: 0.8115
Standard error of mean: 0.1014

With C.L. the statistics were
Arithmetic mean: 2.53 MGL
95% Confidence for the mean: 1.98 to 3.08
Variance: 4.8562
Standard deviation: 2.2037
Standard error of mean: 0.2735

Paired T-tests between the two population, showed
Mean difference in MGL: 1.2969.
Standard deviation of differences: 1.5500
Standard error of mean differences: 0.1938

We observed that while participants who did not wear contact lenses had MGL near the 5% range, MGL ranged from about 10% to 31% for C.L. users. In addition, it seems that as the total time of wearing contact lenses increased, MGL as well as meiboscore increased. We conclude that meibography is becoming more and more an integral part of the ophthalmological examination, while the evaluation of its results, which help us to tackle the related problems, is at a satisfactory level, but it can be further improved, thus increasing the research interest in this field.

5. CONCLUSION

MGD is a major factor related to dry eye and contact lens drop-outs. The monitoring of Meibomian Glands and their dysfunction is very important to contact lens fitters in order to provide contact lens wearers better monitoring and advise. Meibography is an important technique in the diagnosis and management of MGD. While this tool that the contact lens fitters is used for more than 30 years, it is only that the last 5 years that meibography has reached a point of being a clinical routine for those who wear contact lenses and have problems such as dry eye and discomfort. It is also important to mention that meibography is a non-contact method. Our results of meibography imaging showed a small difference between the contact lens wearers group and the non-contact lenses wearers group. There was only a small difference in gland loss but investigation should continue in order to observe if C.L. time relates to longer time of contact lens wear and if it is related to different kind of C.L. materials.

CONSENT

All authors declare that written informed consent was obtained from the patient (or other approved parties) for publication of this paper.

ETHICAL APPROVAL

As per international standard or university standard ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES