



Research Article

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THE IMPACT OF CONTACT LENS DURATION ON OCULAR DISCOMFORT

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Abstract

Objectives: To compare contact lens discomfort (CLD) using the Contact Lens Dry Eye Questionnaire-8 (CLDEQ8) in short and long-term CL wearers.

Materials and Methods: This prospective study included 98 patients who applied to the Department of Ophthalmology of Ufuk University between January 2020 and January 2021 and had a history of wearing contact lenses for over a month. Participants who wore contact lenses (CL) for six months or less were categorized as short-term CL users, while those who wore them for more than six months were categorized as long-term CL users. Contact lens compliance and the CLDEQ-8 questionnaire results were compared between the groups.

Results: The mean age was 21.70 ± 2.81 years in 55 short-term CL wearers, and 80% were female. In 43 long-term CL wearers, the mean age was 28.69 ± 8.48 years, and 86% were female (respectively, $p < 0.001$, $p = 0.592$). The duration of CL wear was 2.36 ± 1.06 months in short-term CL wearers and 10.11 ± 5.6 months in long-term CL wearers ($p < 0.001$). The mean CLDEQ-8 score was 11.52 ± 6.59 in short-term CL wearers and 14.37 ± 6.55 in long-term CL wearers ($p = 0.015$). In addition, 40% of short-term and 65.1% of long-term users had a CLDEQ-8 score greater than 12 ($p = 0.016$).

Conclusion: Long-term CL wearers experienced much more CLD, and several considered removing their lenses at various times. Contact lens discomfort has to be investigated, especially in long-term CL users, and solutions should be developed to avoid CL dropout.

Keywords: Contact lens, long-term contact lens users, contact lens discomfort, CLDEQ-8.

Introduction

Contact lenses (CL) have several benefits over glasses, such as more excellent peripheral vision, use while playing sports, allowing the wearing of sunglasses, and improved quality of life status compared to glasses.¹ Because of these advantages, soft CL is among the most widely used means of correcting refractive problems, and evolving lens technology raises CL users' expectations and prevalence.²

Ocular surface discomfort and dry eye have increased in frequency due to lifestyle changes, increased use of digital screens, climate changes, and the impact of the coronavirus pandemic and have more negative effects on life quality.³⁻⁶ The prevalence of discomfort and dryness among soft CL wearers is higher than those of similar age who were not using CL.⁷ Contact lens discomfort (CLD) is a term that encompasses several adverse ocular sensations, such as perception, awareness, and sensation of the CL on the ocular surface.⁸ Contact lens wearing time can be restricted due to CLD, which may influence the success of treatment and even lead to discontinuation of CL wear.⁹

The Contact Lens Dry Eye Questionnaire (CLDEQ) was developed to measure dryness symptoms among contact lens wearers, and CLDEQ-8 is a short version of the CLDEQ questionnaire, which allows a quick standardized means to measure symptom-based condition from the wearer's point of view and to screen CL-related dry eye.^{10,11}

The study aimed to compare CLD using the CLDEQ-8 questionnaire in short- and long-term CL wearers.

Materials and Methods

This prospective study was conducted in the Department of Ophthalmology of Ufuk University between January 2020 and January 2021. Approval was obtained from the local ethics committee, and all of the study procedures were conducted in accordance with the Declaration of Helsinki.

All CL wearers who used CL regularly for more than one month were included in the study. The patients with ocular surface diseases, including dry eye, orbitopathy or eyelid diseases, and those using medications that can cause dry eye or those using eye drops with preservatives were excluded.

All participants underwent ophthalmological examination. Their contact lens use habits were questioned, and they were asked to fill out the Turkish version of the CLDEQ-8 questionnaire. Participants who wore CL for six months or less were categorized as short-term CL users, while those who wore them for more than six months were categorized as long-term CL users. The cut-off value for the CLDEQ-8 sum score was accepted as 12.¹²

Descriptive and statistical analysis was performed using IBM SPSS Statistics 21. Normality was tested with the Shapiro-Wilk test. Age, duration of CL wear, and CL wearing time were presented as mean and standard deviation. Independent variables were evaluated with Mann-Whitney U and categorical variables with the Chi-square test. Statistical significance was accepted as a p-value of 0.05 or less.

Results

Ninety-eight CL wearers have been included in the questionnaire. The mean age of the participants was 24.77 ± 6.90 years, and 82.6 % were female. Most participants hold an undergraduate university degree (28.5%) or are pursuing an undergraduate degree (62.2%). Of 84.7% of patients who wore spherical CL, 8.2% toric CLs, 4.1% multifocal spherical CL, 1% multifocal toric CL and 2% did not answer the question.

The mean age was 21.70 ± 2.81 years in 55 short-term CL wearers, and 80% were female. In 43 long-term CL wearers, the mean age was 28.69 ± 8.48 years, and 86% were female (respectively, $p < 0.001$, $p = 0.592$). The duration of CL wear was 2.36 ± 1.06 months in short-term CL wearers and 10.11 ± 5.6 months in long-term CL wearers ($p < 0.001$). Contact lens wearing time was 11.52 ± 5.10 hours per day and 6.16 ± 1.15 days per week in short-term CL wearers, 11.76 ± 3.07 hours per day and 6.25 ± 1.32 days per week in the other group (respectively, $p = 0.185$, $p = 0.357$).

None of the participants reported that they wore their CL overnight. Among short-term CL wearers, 81.8% change solutions in the CL case daily or every other day, and 81.8% rinse the CL case at least once a week. 86% of long-term CL wearers change solutions in CL cases daily or every other day, and 79% rinse CL cases at least once a week. The two groups had no statistically significant difference regarding these behaviors (respectively $p = 0.784$, $p = 0.80$). All participants used a multipurpose solution to rinse their CL case and CL. The optician was the primary source of CL for the participants in both groups (89% of short-term, 73.8% of long-term CL wearers, $p = 0.176$).

The mean CLDEQ-8 score was 11.52 ± 6.59 in short-term CL wearers and 14.37 ± 6.55 in long-term CL wearers ($p = 0.015$). In addition, 40% of short-term and 65.1% of long-term users had a CLDEQ-8 score greater than 12 ($p = 0.016$). When the responses to the questionnaire's questions were analyzed, there was an essential difference in response to question 5. While 60% of short-term CL users never thought they should take out their contact lenses when doing something, this rate was 10% for long-term CL users. The CLDEQ-8 questionnaire is given in Table 1.

Table 1. Contact lens questionnaire-8 (CLDEQ-8)

Questions	Response
1-Questions about EYE DISCOMFORT	a. During a typical day in the past 2 weeks, how often did your eyes feel discomfort while wearing your contact lenses? 0 Never 1 Rarely 2 Sometimes 3 Frequently 4 Constantly
	b. When your eyes felt discomfort with your contact lenses, how intense was this feeling of discomfort at the end of your wearing time? 0 Never have it 1 Not at all intense 2 3 4 5 Very intense
2-Questions about EYE DRYNESS	a. During a typical day in the past 2 weeks, how often did your eyes feel dry? 0 Never 1 Rarely 2 Sometimes 3 Frequently 4 Constantly
	b. When your eyes felt dry, how intense was this feeling of dryness at the end of your wearing time? 0 Never have it 1 Not at all intense 2 3 4 5 Very intense
3-Questions about CHANGEABLE, BLURRY VISION	a. During a typical day in the past 2 weeks, how often did your vision change between clear and blurry or foggy while wearing your contact lenses? 0 Never 1 Rarely 2 Sometimes 3 Frequently 4 Constantly
	b. When your vision was blurry, how noticeable was the changeable, blurry, or foggy vision at the end of your wearing time? 0 Never have it 1 Not at all intense 2 3 4 5 Very intense
4-Question about CLOSING YOUR EYES	During a typical day in the past 2 weeks, how often did your eyes bother you so much that you wanted to close them? 0 Never 1 Rarely 2 Sometimes 3 Frequently 4 Constantly
5-Question about REMOVING YOUR LENSES	How often during the past 2 weeks, did your eyes bother you so much while wearing your contact lenses that you felt as if you needed to stop whatever you were doing and take out your contact lenses? 1 Never 2 Less than once a week 3 Weekly 4 Several times a week 5 Daily 6 Several times a day

Discussion

CLD is episodic or persistent adverse ocular sensations related to contact lens wear, either with or without visual disturbance, resulting from reduced compatibility between the contact lens and the ocular environment, which can lead to decreased wearing time and discontinuation of contact lens wear.¹³ Risk factors for CLD can be categorized as contact lens-related, patient-related or associated with contact lens hygiene or replacement, and patient-related factors are the most difficult to assess and improve.¹⁴ In the present study, long-term CL wearers experienced much more CLD, and several considered removing their lenses at various times. In contrast, a meta-analysis showed that increasing age was associated with increased lens fit in experienced contact lens wearers.¹⁵ Considering long-term users, lens dropout, which might be a bias factor, might be the source of the difference between these two outcomes. The mean lens wear time of long-term users in the study was 10 months and which was less than two years, which is the mean dropout time for long-term users.¹³

CLD is one of the causes of contact lens dropout.¹⁶ A study investigating the reasons for lens dropout in neophytes reported that half of those who left CL was discontinued within the first two months, and 21% of the causes of lens dropout were reported as CLD.¹⁷ Among the causes of lens dropout in long-term contact lens wearers, CLD is more prominent.¹³ In line with the literature, while 60% of short-term users never considered removing their CL due to CLD, most long-term users stated that they thought about occasionally removing their CL with varying frequency in the present study. However, since participants who dropped out of CL were not included in the study, such a difference may have been detected, as people who used contact lenses for a short period and then dropped out might have been ignored.

Contact lens wear can impact the morphology and functioning of the meibomian glands. A decrease in functional meibomian glands is proportional to the duration of CL wear.^{18,19} Changes in meibomian gland function might impact tear film and cause symptoms of ocular discomfort. The CLDEQ-8 is an essential tool for evaluating patients who are symptomatic but have no clinical findings. A study showed that patients with a high CLDEQ-8 score but without clinical signs have a loss of meibomian glands in the lower lid.²⁰ In our study, although there were no clinical findings in the patients, the CLDEQ-8 score was significantly higher in long-term CL users. These results may be due to a subclinical meibomian gland dysfunction. Although the alterations in the morphology and function of the meibomian gland with advanced age are also known²¹, despite the significant age difference in our study, the effect of age can be ignored because the mean age of long-term users is young (mean age=28). The increase in the CLDEQ-8 score may alter meibomian gland function due to the long duration of CL wear.

Prolonged contact lens wearing time has been reported as one of the causes of CLD.²² In this context, the present study found no significant difference between the two groups. No significant relationship has been reported

between compliance factors and CLD.²² In line with the literature, both groups had similar CL compliance in the current study.

One of the study's limitations is that the two groups are different in age. However, this situation may be insignificant since the two groups were in the same decade. Another limitation of the study was the relatively short mean lens wear time of long-term users (mean ten months). The study's strength is that most patients had similar educational statuses and created a homogeneity in daily activities that may affect CLD, such as digital screen usage and reading habits.

Contact lens discomfort is more common in long-term contact lens wearers. In long-term CL users, CLD needs to be questioned, and remedies should be sought to prevent CL dropout.

Ethical Considerations: Ethical approval for this study was obtained from Ufuk University's non-interventional ethics committee (App. No: 02022017-4).

Conflict of Interest: The authors declare no conflict of interest.

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References

1. Kandel H. Quality-of-life outcomes of long-term contact lens wear: A systematic review. *Cont Lens Anterior Eye*. 2022;45(1):101521.
2. Moreddu R, Vigolo D, Yetisen AK. Contact Lens Technology: From Fundamentals to Applications. *Adv Healthc Mater*. 2019;8(15):e1900368.
3. Koh S, Rhee MK. COVID-19 and Dry Eye. *Eye Contact Lens*. 2021;47(6):317-22.
4. Jaiswal S, Asper L, Long J, Lee A, Harrison K, Golebiowski B. Ocular and visual discomfort associated with smartphones, tablets and computers: what we do and do not know. *Clin Exp Optom*. 2019;102(5):463-77.
5. Jung SJ, Mehta JS, Tong L. Effects of environment pollution on the ocular surface. *Ocul Surf*. 2018;16(2):198-205.
6. Martinez-Perez C, Monteiro B, Soares M, Portugues F, Matos S, Ferreira A, Alvarez-Peregrina C, Sánchez-Tena MÁ. Influence of Face Masks on the Use of Contact Lenses. *Int J Environ Res Public Health*. 2021;18(14):7407.
7. Guillon M, Maissa C. Dry eye symptomatology of soft contact lens wearers and nonwearers. *Optom Vis Sci*. 2005;82(9):829-34.
8. Nichols KK, Redfern RL, Jacob JT, Nelson JD, Fonn D, Forstot SL, Huang JF, Holden BA, Nichols JJ; members of the TFOS International Workshop on Contact Lens Discomfort. The TFOS International Workshop on Contact Lens Discomfort: report of the definition and classification subcommittee. *Invest Ophthalmol Vis Sci*. 2013;54(11):TFOS14-9.
9. Sulley A, Young G, Hunt C. Factors in the success of new contact lens wearers. *Cont Lens Anterior Eye*. 2017;40(1):15-24.
10. Chalmers RL, Begley CG, Moody K, Hickson-Curran SB. Contact Lens Dry Eye Questionnaire-8 (CLDEQ-8) and opinion of contact lens performance. *Optom Vis Sci*. 2012;89(10):1435-42.
11. Nichols JJ, Mitchell GL, Nichols KK, Chalmers R, Begley C. The performance of the contact lens dry eye questionnaire as a screening survey for contact lens-related dry eye. *Cornea*. 2002;21(5):469-75.
12. Chalmers RL, Keay L, Hickson-Curran SB, Gleason WJ. Cut-off score and responsiveness of the 8-item Contact Lens Dry Eye Questionnaire (CLDEQ-8) in a Large daily disposable contact lens registry. *Cont Lens Anterior Eye*. 2016;39(5):342-52.
13. Pucker AD, Tichenor AA. A Review of Contact Lens Dropout. *Clin Optom (Auckl)*. 2020;12:85-94.
14. Stapleton F, Bakkar M, Carnt N, Chalmers R, Vijay AK, Marasini S, Ng A, Tan J, Wagner H, Woods C, Wolffsohn JS. CLEAR - Contact lens complications. *Cont Lens Anterior Eye*. 2021 ;44(2):330-367.
15. Truong TN, Graham AD, Lin MC. Factors in contact lens symptoms: evidence from a multistudy database. *Optom Vis Sci*. 2014;91(2):133-41.

16. Pritchard N, Fonn D, Brazeau D. Discontinuation of contact lens wear: a survey. *Int Contact Lens Clin* 1999;26(6):157-62
17. Sulley A, Young G, Hunt C. Factors in the success of new contact lens wearers. *Cont Lens Anterior Eye*. 2017;40(1):15-24.
18. Osae EA, Jones L, Nichols JJ. The impact of contact lenses on meibomian gland morphology. *Ocul Surf*. 2022;24:148-55.
19. Arita R, Itoh K, Inoue K, Kuchiba A, Yamaguchi T, Amano S. Contact lens wear is associated with decrease of meibomian glands. *Ophthalmology*. 2009;116(3):379-84.
20. Blanco-Vázquez M, Arroyo-Del-Arroyo C, Novo-Diez A, Cañadas P, López-de la Rosa A, González-García MJ. Is contact lens discomfort related to meibomian gland morphology? *Cont Lens Anterior Eye*. 2022:101743.
21. Yoon CH, Ryu JS, Hwang HS, Kim MK. Comparative Analysis of Age-Related Changes in Lacrimal Glands and Meibomian Glands of a C57BL/6 Male Mouse Model. *Int J Mol Sci*. 2020;21(11):4169.
22. Papas EB, Chiem A, Zhang G, Mobeen R, Lee L. Temporal considerations in contact lens discomfort. *Cont Lens Anterior Eye*. 2021;44(1):14-7.