Content available at: https://www.ipinnovative.com/open-access-journals

Indian Journal of Clinical and Experimental Ophthalmology

Journal homepage: www.ijceo.org

Original Research Article

Assessment of ocular hygiene and compliance among contact lens users during COVID-19 pandemic

Srila Sreenivas[1], Sumalath Sai Keerthi Mathukumalli[1]*

[1]*Dept. of Ophthalmology, Dr. NTR University of Health Sciences, Vijayawada, Andhra Pradesh, India*

ARTICLE INFO

Article history:
Received 28-09-2023
Accepted 06-11-2023
Available online 30-03-2024

Keywords:
Contact lens
Eye hygiene
COVID- 19

ABSTRACT

Purpose: The aim of the study is to assess the knowledge, attitude and practice of contact lens users among medical students and professionals in a tertiary hospital regarding eye hygiene and access to Ophthalmological medical services in the pandemic.

Materials and Methods: After obtaining consent, a Questionnaire-based, cross-sectional study was conducted for a period of 2 months among 102 candidates including medical professionals and students in a tertiary hospital using Contact lenses. Chi-square statistics was used to analyze categorical variables, considering p-value<0.05 as statistically significant.

Results: 83 users (81.37%) reported that their contact lens usage has reduced particularly during the pandemic, of whom 55 users (66.26%) stated to have had a fear of being more susceptible to COVID-19'. A significant number of users (n=35; p value=0.0015) even consider that it is necessary for contact lens users to switch to spectacles. A significant number of users (42 users; 41.18%) have confessed to touching their faces and eyes without proper hand washing. Only 16 participants (15.69%) were aware of the guidelines for contact lens usage and only 30 users (29.41%) availed tele-health services.

Conclusion: The existence of poor Contact lens compliance amongst users as reflected by this study and many alike highlights the responsibility of Ophthalmologists to make sure that proper practices are maintained by increasing awareness among the public by addressing their fears and explaining the detrimental effects of unhygienic contact lens usage.

1. Introduction

The global COVID-19 outbreak, declared by WHO as the 6th public health emergency on 30th January 2020, emerged as a Pandemic in March 2020.[1] It led a few permanent paradigm modifications in the socio-economic and health practices nationally and globally. Majority of the population lives in an ocean of misconception regarding the routes of spread, the risk factors, and the basic pathogenesis of the virus. This paved way for meaningless fears and inhibitions among the public which rather can cause more harm than benefit. In this context, the supposedly increased risk of infection in contact lens users has been a topic of discussion lately. Most of them have resorted to discontinuing contact lenses, or worse, avoiding taking them off in fear of infecting them with contaminated hands.

A predominantly respiratory RNA virus, COVID-19 spreads human-to-human via droplets.[2,3] Ocular transmission of the virus is still a topic of controversy. It is believed that conjunctivitis (popularly known as 'pink eye') develops in about 1% to 3% of people with coronavirus.[4] Evidence suggests that coronaviruses are unlikely to bind to ocular surface cells to initiate infection and are hence rarely isolated from tears or conjunctival swabs.

* *Corresponding author*.
E-mail address: sumakeerthi.dr@gmail.com (S. S. K. Mathukumalli).

https://doi.org/10.18231/j.ijceo.2024.025

Additionally, hypotheses that the virus could travel from the nasopharynx or through the conjunctival capillaries to the ocular surface during infection are probably incorrect;[5] associated conditions favourable for viral tropism, for instance, dry eye, are required for even the rather rare ocular manifestations of severe COVID 19 to occur.[6] Speculations that transmission via eyes is possible arise from the known ocular tropism of respiratory viruses and findings suggesting that it is possible to isolate SARS-CoV-2 from tears.[7,8]

However infinitesimal the odds of acquiring the virus via eyes may be, it is not to be completely ignored.[9] Contact lens users must follow some basic precautions to protect themselves against ocular infections because contact lens users touch their eyes at a greater frequency than non-users, and may be at greater risk, but only if coupled with unhygienic practices. It is hence important for users to be aware that poor ocular hygiene coupled with poor contact lens hygiene can worsen the symptoms and increase the ocular insults in the form of a vicious cycle of local inflammations.

The sheer lack of eye care, especially in contact lens users, can lead to the rare ocular manifestations of COVID-19 infection.[5] The best advice that can be given is to maintain the same usual hygiene instructions to be followed without letting routine be affected.

1.1. Purpose

The aim of the study was to assess the knowledge, attitude and practice of contact lens users among medical students in a tertiary hospital regarding eye hygiene, access to Ophthalmological medical services and reliable information from Ophthalmologists during the pandemic.

2. Materials and Methods

Research question of this questionnaire-based, cross-sectional study was what is the knowledge, attitude and practice of medical students regarding contact lens usage and the importance of eye hygiene?

The questionnaire was designed based on the Contact Lens Care Guideline of the American Academy of Ophthalmology.[10] A total of 102 contact lens users among medical students from a tertiary medical college and hospital were approached.

The sample size was calculated based on the reference articles.[11] The minimal calculated sample was 102, P set at 63.55, Q=1-P=36.5, with an allowable error of 15% using the formula $n=4PQ/L^2$.

The Questionnaire, preceded by a consent form, is divided into 3 sections, including a general section (Section 1), a section regarding contact lens usage (Section 2) and one regarding general eye hygiene awareness (Section 3).

Options in sections 2 and 3 are designed based on the 5 or 7-point Likert Scale. With a total of 27 questions to be answered, the estimated time to complete the survey form is about 3-5 minutes.

Inclusion criteria includes Medical students and healthcare workers in a tertiary hospital who are using soft contact lenses and those who have given consent.

Patients with other ocular diseases like dry eye diseases and all contact lens users who previously underwent any ocular surgeries were excluded from our study.

Candidates were approached with survey forms, explained about the study and were questioned or asked to fill the forms themselves after obtaining consent. Forms that were completely filled are considered in the study.

Survey answers were collected in a confidential manner in which identifying information such as name, address, contact number or email address was not collected.

Data variables of all completely-filled questionnaires were entered into Microsoft excel and SPSS 20.0 software. (SPSS Inc., Chicago, IL, USA). Frequencies of variables are reported as percentages. Chi-square statistics were used to analyze categorical variables, considering p-value <0.05 as statistically significant.

3. Results

3.1. Participants' demographics

Totally 102 participated out of which 86 (84.3%) were female and 16 (15.7%) were male (Figure 1).

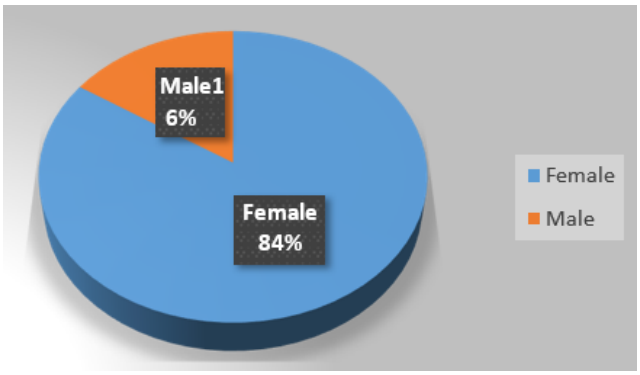

Figure 1: Demographics of contact lens users

The pie chart shows a gender predominance in female contact lens users (84%)

3.1.1. Regarding COVID-19

When enquired about how well they followed COVID isolation protocols, 74 (72.55%) participants stated that they followed precautions rigorously, while 28 (23.45%) followed social distancing advice informally or continued normal existence all together (Figure 2). 25 (24.51%) users reported to have been diagnosed with or suffering from symptoms of COVID-19 (Figure 3).

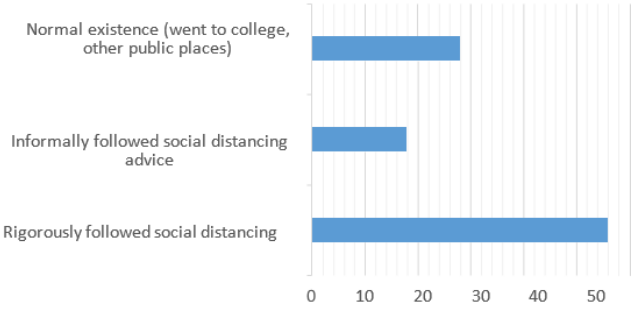

Figure 2: COVID-19 isolation practices among Contact lens users

The chart projects 73.55% of users reported to have followed rigorous social distancing advice.

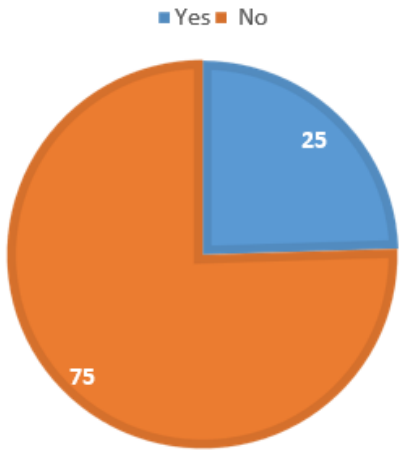

Figure 3: Users diagnosed with or having symptoms of COVID-19. Around 25% users have reported to have suffered from symptoms of or diagnosed with COVID

3.1.2. Related to contact lens usage

Of all the 102 participants, 72 (70.59%) use extended wear lens, 28 (27.45%) use daily wear lens, while 2 (1.96%) users remain blatantly unaware of the type of lens they use (Figure 4).

While cleaning contact lens, 39 users (38.23%) use multipurpose solution, 19 (18.63%) use peroxide-based solution, 2 (1.96%) use water saline whereas 42 (41.18%) are unaware of the type of solution they are using (Figure 5). 83 users (81.37%) reported that their contact lens usage has reduced during the pandemic when compared to prior usage, with a majority of them (96.38%) stating 'less necessity at home' as the main cause (Figure 6). Other reasons for reduced contact lens usage include 'lesser effort to wear spectacles' (30.12%), 'to prevent running out of supplies' (8.43%) and 'to save money' (3.62%) (Figure 7). Among 83 users who reported to have lesser extent of contact lens usage, 55 users (66.26%) stated to have had 'fear of being more susceptible to COVID-19'.

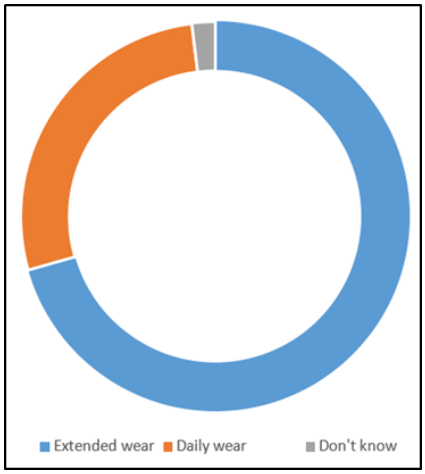

Figure 4: Types of contact lens used by the study population

72 users (70.59%) use extended wear lens and 28 (27.45%) use daily wear.

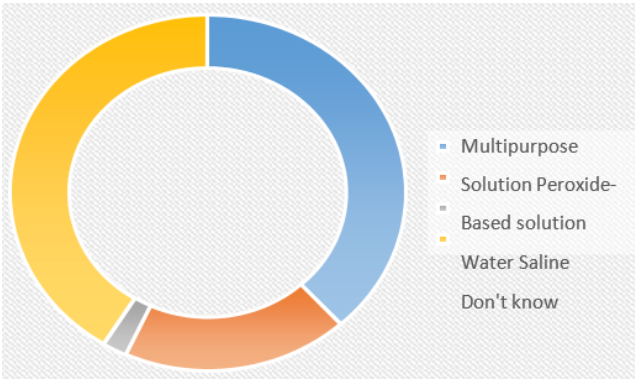

Figure 5: Type of contact lens solution used

While majority of users use multipurpose and peroxide-based solutions, more than $1/3^{rd}$ of users remain unaware of the type of solution they use.

83 users (81.37%) reported that their contact lens usage has reduced during the pandemic when compared to prior usage, with a majority of them (96.38%) stating 'less necessity at home' as the main cause.

The major reason is 'less necessity at home' as stated by 96.38% of users, followed by a 'lesser effort to wear specs' over lenses.

3.1.3. Related to hand washing practices

A significant number of users (42 users; 41.18%) have confessed that they often touch their faces and eyes even before washing their hands. However, on the brighter side, 60 users (58.82%) believe that their hand-washing habits have noticeably improved, in both method and frequency. (Figure 8).

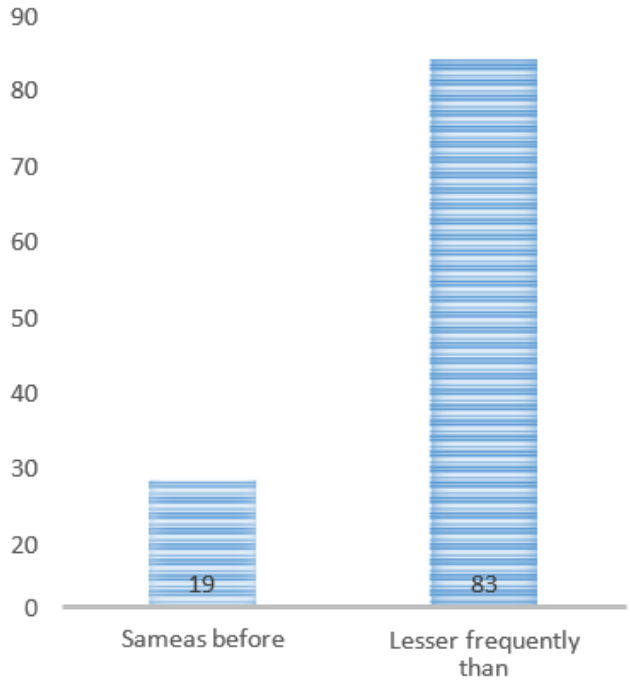

Figure 6: Usage of contact lens during pandemic

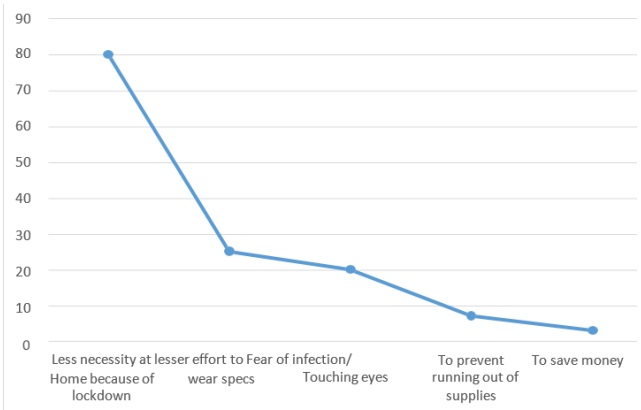

Figure 7: Reasons for discontinuing contact lens usage.

Blue bars represent the 'fear of being susceptible to COVID', with majority of users reportedly having 'very little' fear. Red bars and green bars represent access to eye care information and the extent to which users have improved hand-washing practices during lockdown respectively.

3.1.4. Contact lens hygiene and compliance

30 users (29.42%) admitted to having never cleaned their contact lenses' case after every use. A significant number of users (n=62; p=0.029) are reported to have exceeded the time of contact lens usage while at home during the lockdown, with 67 users (p value=0.00153) having even

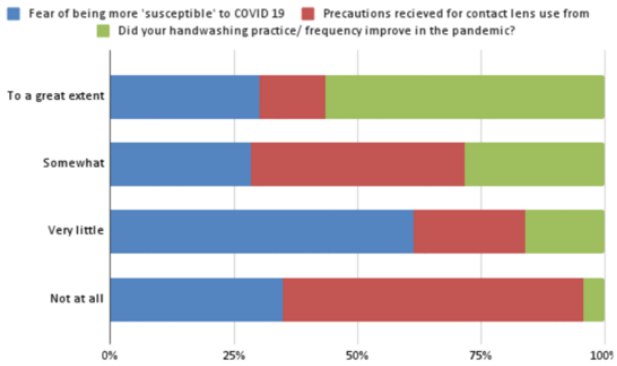

Figure 8: Fearlf susceptibility toCOVID-19 and precautions against infection

showered with contact lenses on and 21 users (20.59%) storing contact lenses in the bathroom as well.

A significant reduction (p value=0.005) in contact lens hygiene and compliance has been observed, with only 37 users (36.27%) having changed them every 3 months as recommended while 65 users (63.73%) stating that they had never changed their contact lens case during the entire lockdown period (Figure 9). Unhygienic practices such as using storage containers other than contact lens cases, storing contact lens in the bathroom and storing them without solution altogether were reported in 28 (27.45%), 21 (20.59%) and 21 (20.59%) users respectively (Figure 10).

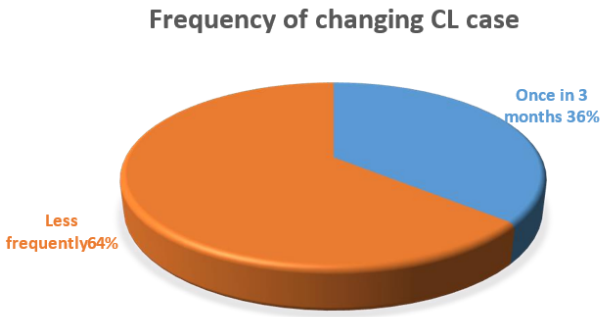

Figure 9: Frequency of contact lenschange

According to this study, only 36% of users change contact lens cases desirably within the suggested 3-month period.

Many users have reportedly extended the usage time of CL 'sometimes' during the lockdown. In context of other practices, users seem to have maintained a hygienic routine of CL usage.

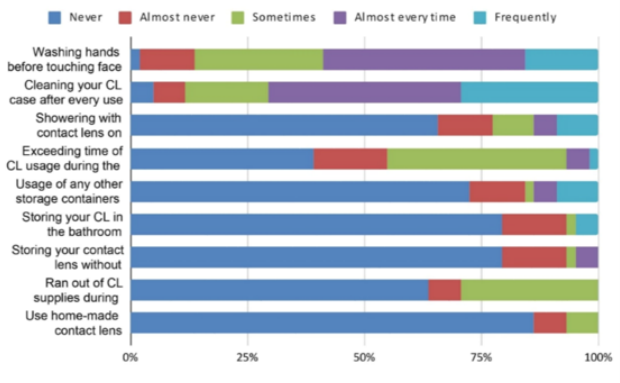

Figure 10: Contact lens hygiene practices among users

3.1.5. Beliefs and fears regarding COVID-19

When enquired about any belief that the risk of COVID-19 infection is more in contact lens users, 30 (29.41%) gave an affirmative response, with a significant number of users (n=35; p value=0.0015) considering that it is absolutely necessary for contact lens users to switch to spectacles. Only 44 (43.14%) users use proper eye protection while visiting hospitals. (Figure 11)

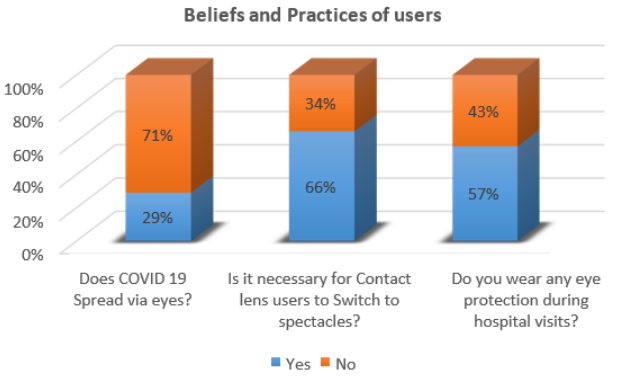

Figure 11: Beliefs and practices of CL users

Despite 29% of users differing from the possibility of COVID 19 spreading via eyes, 66% of them assume it is necessary to discontinue lens and switch to spectacles.

3.1.6. Regarding access to ophthalmology professionals and resources

A significant number of users reported running out of contact lens supplies due to the pandemic, of whom 14 users resorted to using home-made contact lens solutions/ tap water as alternatives. Out of 16 users who were previously on ocular treatments, only 10 users were able to access their medicines and supplies during the pandemic.

Awareness amongst the participants regarding any guidelines for contact lens usage issued by Indian Ophthalmology Associations (such as Optometric Council of India) is remarkably low at 16 (15.69%). (Figure 12)

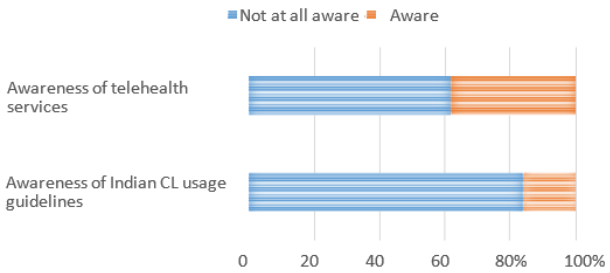

Figure 12: Awareness regarding availability of teleheath services for Ophthalmological ailments and guidelines for usage of contact lens usage among Indian users

Only 39 (38.23%; p value= 0.017) users are aware of tele-health services for eye care, and only 30 (29.41%) users were known to avail them. (Figure 12)

4. Discussion

Contact lens compliance has been a topic of discussion for a long time now, especially in the context of the pandemic. Speculations around ocular mode of transmission of the virus coupled with gross misinformation and poor choices have paved way to significant reductions in optimal lens usage. The demographics from the survey showed majority of the contact lens users (84.3%) being female, as in accordance with a study by Unnikrishnan B et al.[12] Results from the study have revealed that that majority of the users (71%) use daily wear lens while around 27% use extendable wear lens. Regarding COVID- 19 practices, around three-quarters of users (72.55%) followed strict isolation protocols optimally, as did users from Spain (75% users) and UK (79% users) as reported by Vianya Estropa et al.[13,14] Knowledge of the type of contact lens solution is important in view of difference in contact lens hygiene practices. According to Nogueira CL et al,[15] usage of multipurpose solutions with rub and rinse practice is necessary for disinfection against SARS- CoV-2, while in case of peroxide solution rubbing/rinsing are not necessary according to Nichols JJ et al.[16] Owing to the ease in usage, Nichols JJ et al. published the opinion that peroxide systems should be the first line recommendation for wearers of reusable lens. According to our study, 38.8% reported using multipurpose solution, 18.63% peroxide solution, whereas a total of 42 (41.18%) are unaware of the type of solution they use. The study, however, didn't include a specific section about rinsing. These results are in sheer contrast to a study published by Cordana et al. in Spain where 75.7% users were aware of their solution being a multipurpose one.[17] However, regardless of the type of solution used, as of now, 'rinse and rub' is said to be an effective step against SARS-CoV-2 particles known to persist for >16 hours on the contact lens surface.[15,16] Additionally, 81.37% (n=83) users

reported reduced contact lens usage with majority of them stating the main reason to be a lesser necessity at home. However, cessation of lens usage was markedly less in Jordon, where only 38.8% users (n=76) stopped using lenses during the pandemic. Also, a relation was found between participants who reported lesser usage and had perceived an increased risk of COVID infection due to their contact lens usage. Many participants have reportedly improved their hand washing practices during the lockdown which substantiates their belief that poor handling could be a niche to ocular transmission, with virus particles transferred to contact lens by hands and then from there to eyes.[10] But rather counter productively, many users have exhibited sub-optimal behaviour like using contact lens for a prolonged duration, leaving contact lens in the bathroom, without solution, and less frequency of changing the contact lens case. Similarly, Vianya-Estopa et al. reported 26% users from UK showered with their contact lenses on.[14] This highlights the importance of opting measures to ensure improvement of such modifiable behaviors.

5. Conclusion

With a lot of lacunae in research regarding ocular transmission of the Coronavirus as of now, it is the responsibility of Ophthalmologists to make sure that contact lens compliance is maintained by increasing awareness among the public by addressing their fears and making them realize the risk-benefit scenario while option for practices like shift to spectacles. In real, bridging this gap is challenging, with the pandemic proving to be detrimental to patient-practitioner relationships and communication, with around 84% users remaining uninformed about any preventive measures from either eye doctors or National Health bodies. Changing times since the emergence of the Pandemic crisis have opened doors to many new prospects of new ways in the field of education and economics, and to adapt innovative measures like telehealth portals into the medical field is the need of the hour.

6. Source of Funding

None.

7. Conflict of Interest

None.

References

1. WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020 [Internet]. [cited 2022 Sep 16]. Available from: https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19.
2. Adhikari SP, Meng S, Wu YJ, Mao YP, Ye RX, Wang QZ, et al. Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease(COVID-19) during the early outbreak period: a scoping review. *Infect Dis Povert*. 2020;9(1):29. doi:10.1186/s40249-020-00646-x.
3. Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *J Autoimmun [Internet]*. 2020;109:102433. doi:10.1016/j.jaut.2020.102433.
4. Wu P, Duan F, Luo C, Liu Q, Qu X, Liang L, et al. Characteristics of ocular findings of patients with Coronavirus disease 2019 (COVID-19) in Hubei province, China. *JAMA Ophthalmol*. 2020;138(5):575–8.
5. Willcox MD, Walsh K, Nichols JJ, Morgan PB, Jones LW. The ocular surface, coronaviruses and COVID-19. *Clin Exp Optom*. 2020;103(4):418–24.
6. Xia J, Tong J, Liu M, Shen Y, Guo D. Evaluation of coronavirus in tears and conjunctival secretions of patients with SARS-CoV-2 infection. *J Med Virol*. 2020;92(6):589–94.
7. Belser JA, Rota PA, Tumpey TM. Ocular tropism of respiratory viruses. *Microbiol Mol Biol Rev*. 2013;77(1):144–56.
8. Dockery DM, Rowe SG, Murphy MA, Krzystolik MG. The ocular manifestations and transmission of COVID-19: Recommendations for prevention. *J Emerg Med*;59(1):137–40.
9. Lu CW, Liu XF, Jia ZF. 2019-nCoV transmission through the ocular surface must not be ignored. *Lancet*. 10224;395(10224):e39. doi:10.1016/S0140-6736(20)30313-5.
10. Contact lens rule compliance toolkit [Internet]; 2020. 22.Contact lens rule compliance toolkit [Internet]. Available from: https://www.aoa.org/AOA/Documents/doctor%20resources/Contact-Lens-Rule-Compliance-Toolkit.pdf.
11. Bakkar MM, Alzghoul EA. Assessment of contact lens wearers' attitude toward contact lens wear and care during Coronavirus Disease 2019 (COVID-19) pandemic: A cross-sectional online survey. *Cont Lens Anterior Eye*. 2021;44(6):101410. doi:10.1016/j.clae.2021.01.005.
12. Unnikrishnan B, Hussain S. Pattern of use of contact lens among college students: a cross- sectional study in coastal Karnataka. *Indian J Ophthalmol*. 2009;57(6):467–9. [cited 2022 Sep 16].
13. Vianya-Estopa M, Wolffsohn JS, Beukes E, Trott M, Smith L, Allen PM, et al. Soft contact lens wearers' compliance during the COVID-19 pandemic. *Cont Lens Anterior Eye*. 2021;44(4):101359. doi:10.1016/j.clae.2020.08.003.
14. Vianya-Estopa M, Garcia-Porta N, Piñero DP, Mannion LS, Piñero DP, Beukes EW, et al. Contact lens wear and care in Spain during the COVID-19 pandemic. *Cont Lens Anterior Eye*. 2021;44(5):101381. doi:10.1016/j.clae.2020.11.001.
15. Nogueira CL, Boegel SJ, Shukla M, Ngo W, Jones L, Aucoin MG, et al. The impact of a rub and rinse regimen on removal of human coronaviruses from contemporary contact lens materials. *Cont Lens Anterior Eye*. 2022;45(6):101719. doi:10.1016/j.clae.2022.101719.
16. Nichols JJ, Chalmers RL, Dumbleton K, Jones L, Lievens CW, Merchea MM. The Case for Using Hydrogen Peroxide Contact Lens Care Solutions: A Review. *Eye Contact Lens*. 2019;45(2):69–82. [cited 2022 Sep 16].
17. Cardona G, Alonso S, Busquets A. Patient - practitioner communication and contact lens compliance during a prolonged COVID-19 lockdown. *Cont Lens Anterior Eye*. 2021;44(6):101433. doi:10.1016/j.clae.2021.02.019.

Author biography

Srila Sreenivas, UG Student

Sumalath Sai Keerthi Mathukumalli, Associate Professor
https://orcid.org/0009-0008-6358-2315

Cite this article: Sreenivas S, Mathukumalli SSK. Assessment of ocular hygiene and compliance among contact lens users during COVID-19 pandemic. *Indian J Clin Exp Ophthalmol* 2024;10(1):143-148.