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Practices and awareness toward contact lens wearing and care post-COVID-19 pandemic: A cross-sectional study

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ABSTRACT

Contact lens (CL) is an optical device with a thin layer applied directly to the cornea of the eye. CL primarily corrects refractive errors. Despite the advantages, it can cause serious complications if CL Wearer (CLW) fail to clean, disinfect and store them appropriately. Thus, this study aimed to evaluate CLWs' awareness and practices and evaluate the effect of the corona virus-2019 (COVID-19) pandemic on the frequency of CL wearing and hygiene in Saudi Arabia. A descriptive cross-sectional study was directed at individuals wearing a CL in Saudi Arabia. A total of 1468 participants were involved in the investigation between February 2022 and October 2022. The participants completed a well-structured, Arabic-based, validated questionnaire. Participants' mean age was 26.6 ± 8.9 years. Of the participants, 84% were female and 89.1% had university-level education. Regarding hygiene practices, 86.6% of the participants washed their hands before CL use and 55.4% washed CLs daily before use. Approximately 15.2% of the participants reported that they share CLs with others and 10.5% wear them even while sleeping. Approximately 48.2% of the participants reported that their CL use decreased during the COVID-19 pandemic. In addition, 40.1% reported that the frequency of washing hands before and after using CLs increased during the COVID-19 pandemic. The results of this study show that the majority of the participants had good CL-related hygiene practices and awareness of CL. Hence, during the COVID-19 pandemic, most participants reported a decrease in CL use and an increase in hand washing before and after CL use.

Keywords: Contact lens, Awareness, Practice, Hygiene, COVID-19.

1. INTRODUCTION

Contact lens (CL) is a thin layered optical device placed on the ocular surface in immediate contact with the eye's cornea. Wearing CLs has been prescribed

for decades and their usage rate has dramatically increased (Boqursain et al., 2021; Ibrahim et al., 2018). CLs have extensive applications, including refractive, prosthetic, cosmetic and therapeutic modalities for corneal pathologies, diagnostic and theranostic purposes (Abahussain et al., 2020). The primary purpose of wearing CL is to correct vision problems and signs of refractive errors such as myopia, hyperopia and astigmatism (Boqursain et al., 2021; Falahati-Marvast et al., 2021; Moreddu et al., 2019). Despite the advantages of using CL, severe ocular complications can occur if CL Wearer (CLW) fail to clean, disinfect and store their CLs as recommended (Boqursain et al., 2021; Ibrahim et al., 2018). Adverse reactions of varying severities may occur, ranging from mild complications such as redness and discomfort to serious eyesight threatening complications such as microbial keratitis, which is one of the most severe complications of CL use (Boqursain et al., 2021; Stapleton et al., 2008). Therefore, adherence to CL care can reduce the risk of related complications.

The coronavirus disease-2019 (COVID-19) has spread rapidly worldwide, prompting the World Health Organization to declare it a pandemic in March 2020 (Vianya-Estopa et al., 2021). Respiratory transmission is the primary route of COVID-19 infection, whereas some researchers suggest the ocular surface would play a role in transmission (Bakkar and Alzghoul, 2021; García-Ayuso et al., 2021). During the COVID-19 pandemic, different studies have provided conflicting advices on the use of CL, as it was found to be safe in some studies. However, other studies have considered it hazardous and recommended the cessation of CL use to reduce the risk of COVID-19 (Bakkar and Alzghoul, 2021). Accordingly, to avoid CL-related issues, the COVID-19 pandemic has underlined the need for proper hand hygiene when handling CLs and to stop wearing CLs if they are sick, especially with cold or flu symptoms (Vianya-Estopa et al., 2021).

Patients' attitudes about CL wearing and care during the COVID-19 pandemic were investigated in a recent study in the UK and Spain and the majority of participants in these countries reported that they stopped wearing CL throughout the pandemic (Bakkar and Alzghoul, 2021; García-Ayuso et al., 2021). However, in Jordan, patients continued wearing CL during the pandemic (Vianya-Estopa et al., 2021). According to previous studies, non-compliance among CLWs is still an issue in non-pandemic times. However, after the COVID-19 pandemic, there is no evidence of CLW's behaviors, attitudes, or concerns in Saudi Arabia. Therefore, this study aimed to evaluate CLW awareness and practices and evaluate the effect of the COVID-19 pandemic on the frequency of CL wearing and hygiene in Saudi Arabia.

2. MATERIALS AND METHODS

The study used a web-based descriptive cross-sectional design. It was executed between February 2022 and October 2022. An online questionnaire was sent to individuals wearing a CL in the five regions of Saudi Arabia to evaluate the effect of the COVID-19 pandemic on the frequency of CL wearing and hygiene. Individuals who wore CLs and aged ≥14 years were included in the study. According to the OpenEpi version 3.0 calculator, the sample size should be ≥385 participants to enable the generalization of the results. In total, 1468 participants met the inclusion criteria and completed the study questionnaire. The questionnaire consisted of sections, including the consent form, socio demographic data (age, sex, and educational level), general information about CL use, practices associated with CL use, hygiene practices regarding CL use, CL use during the COVID-19 pandemic and complications related to CL use.

After data extraction, data were revised, coded and fed into IBM SPSS Statistics for Windows version 22 (IBM Corp., Armonk, NY, USA). All statistical analyses were completed using two-tailed tests. A P value of <0.05 was considered statistically significant. Descriptive analysis based on frequency and percent distribution was performed for all variables including participants' demographic data, general data regarding CL use, hygiene during CL use and complications related to CL use. Moreover, participants' practices of using CLs were graphed with the CL use during the COVID-19 pandemic. Cross-tabulation was used to assess relations between CLW-associated complications with the duration and daytime. Relations were tested using Pearson's chi-square test and exact probability test for small-frequency distributions.

3. RESULTS

Demographic data

A total of 1468 participants fulfilling the inclusion criteria completed the study questionnaire. The mean age of the participants was 26.6 ± 8.9 (range, 14–64) years. Among the participants, 84% were women and 89.1% had university-level education, whereas 9.3% had a post-graduate degree (Table 1).

Table 1 Demographic data of study participants

Demographic data	No	%
Age in years		
< 20	188	12.8%
20-24	649	44.2%
25-29	260	17.7%
30-39	223	15.2%
40+	148	10.1%
Gender		
Male	235	16.0%
Female	1233	84.0%
Education		
Below university	24	1.6%
University	1308	89.1%
Postgraduate	136	9.3%

Participants' general information regarding CL use

Approximately 44.8% of the study participants reported that they use CLs for cosmetic reasons, 28.5% used CLs for medical reasons and 26.8% used CLs for both. A total of 34.5% of the participants used CLs for more than 5 years, 32.2% for 1-5 years. As regards the frequency CL use, 21.9% reported daily use of CLs, whereas 30.2% rarely use CLs. Considering use of CLs at daytime, 54% wear CLs for <8 h daily, whereas 36.2% wear CLs 8–12 h daily (Table 2).

Table 2 Participants' general information regarding contact lens use

General data of CL use	No	%
Why do you wear contact lenses?		
Medical reason	418	28.5%
Cosmetic	657	44.8%
Both of them	393	26.8%
Duration of using lenses		
< 6 months	234	15.9%
6 m-1 year	255	17.4%
1-5 years	472	32.2%
> 5 years	507	34.5%
Frequency of wearing lenses		
Rarely	444	30.2%
Sometimes	702	47.8%
Daily	322	21.9%
Day time of wearing lenses		
< 8 hours	792	54.0%
8-12 hours	532	36.2%
> 12 hours	144	9.8%

Practices associated with CL use

Of the participants, 27%, 15.2%, 12.3% and 10.5% wear CLs while performing exercises, during bathing, swimming and while sleeping, respectively (Figure 1).

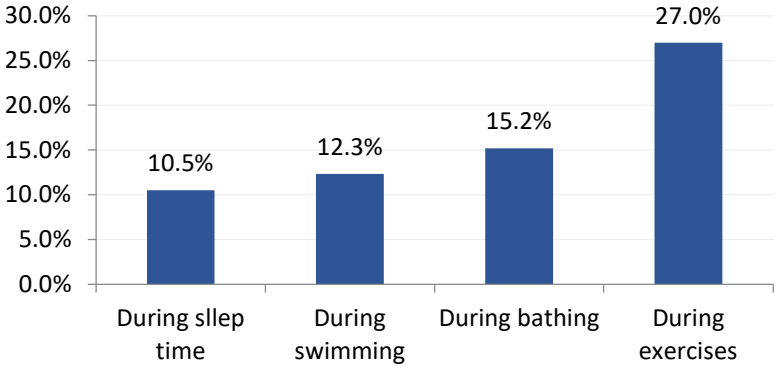

Figure 1 Practice associated with contact lenses use among study participants

Participants' hygiene practices during CL use

Approximately 86.6% of the study participants wash their hands before CL use, 55.4% wash CLs daily before use, 92% wash CLs with their intended solution, 28.2% wash CLs by rubbing them and 27.8% wash them with water. Approximately 15.2% of the participants reported sharing CLs with others (Table 3).

Table 3 Participants' hygiene during using contact lenses

Hygiene during CL use	No	%
Do you wash your hands before using contact lenses?		
Yes	1271	86.6%
No	197	13.4%
Do you wash the lenses with water?		
Yes	408	27.8%
No	1060	72.2%
Do you wash the lenses with their solution?		
Yes	1351	92.0%
No	117	8.0%
Do you wash your lenses by rubbing them?		
Yes	414	28.2%
No	1054	71.8%
Do you clean the lens case?		
Yes	1194	81.3%
No	274	18.7%
Do you wash the lens every time before using it?		
Rarely	159	10.8%
Sometimes	495	33.7%
Usually	814	55.4%
Do you share your lenses with others?		
Yes	223	15.2%
No	1245	84.8%

CL use during the COVID-19 pandemic among study participants

Approximately of 48.2% of the study participants reported that their CL use was decreased during the COVID-19 pandemic, but 11% reported an increase. Moreover, 40.1% reported that the frequency of washing hands before and after CL use increased during the COVID-19 pandemic but decreased in 11.4% of them (Figure 2).

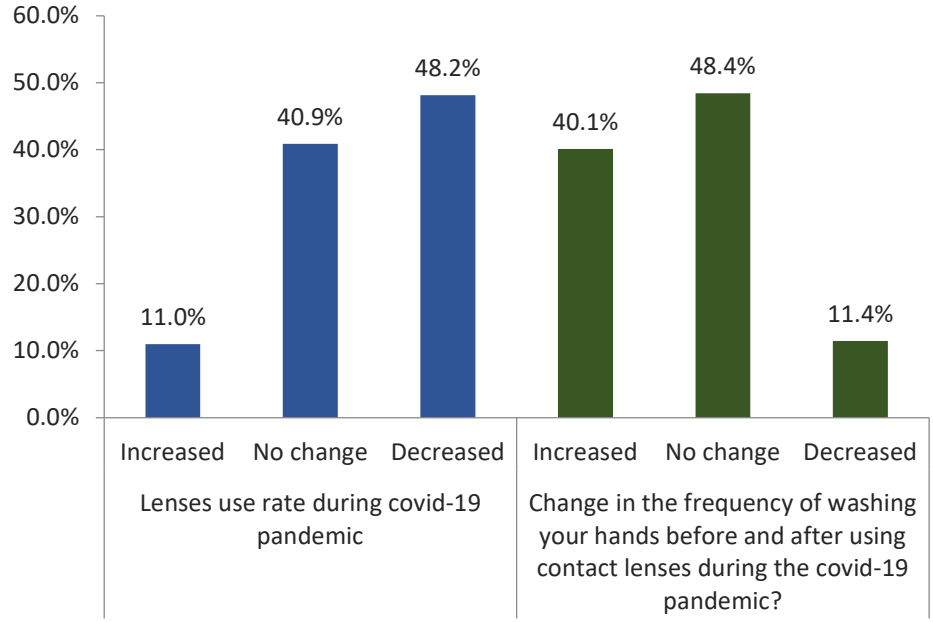

Figure 2 Contact lenses use during COVID-19 pandemic among study participants

Complications of CL use

The most common complications were dryness (55.8%), followed by redness (54.6%), burning sensation (49.5%), itching (47.3%), and blurred vision (46.6%) (Figure 3).

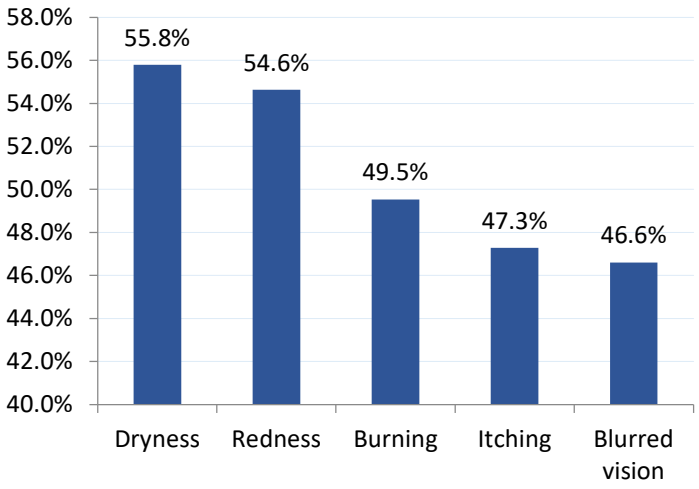

Figure 3 Complications of contact lens among users of study participants

Relationship between the duration of CL use and associated complications

Significantly higher rates of different complications were found with more prolonged duration of CL use, except for redness (Table 4).

Table 4 Relation between duration of using contact lenses and associated complications

Complications	Duration of using lenses								p-value
	< 6 months		6 m-1 year		1-5 years		> 5 years		
	No	%	No	%	No	%	No	%	
Dryness	111	47.4%	141	55.3%	255	54.0%	312	61.5%	.003*
Redness	113	48.3%	145	56.9%	264	55.9%	280	55.2%	.195

Itching	96	41.0%	135	52.9%	231	48.9%	232	45.8%	.047*
Burning	91	38.9%	130	51.0%	240	50.8%	266	52.5%	.005*
Blurred vision	89	38.0%	108	42.4%	218	46.2%	269	53.1%	.001*

P: Pearson X^2 test ** P < 0.05 (significant)*

Relationship between daytime wearing duration of CLs and associated complications

A higher rate of dryness was significantly associated with CL use for >12 h daily (65.3%) and itching (55.6%). Only burning sensation was significantly higher among those who wear CLs for 8–12 h daily (54.5%) (Table 5).

Table 5 Relation between daytime wearing duration of contact lenses and associated complications

Complications	Frequency of wearing lenses						p-value
	< 8 hours		8-12 hours		> 12 hours		
	No	%	No	%	No	%	
Dryness	405	51.1%	320	60.2%	94	65.3%	.001*
Redness	413	52.1%	308	57.9%	81	56.3%	.110
Itching	345	43.6%	269	50.6%	80	55.6%	.005*
Burning	373	47.1%	290	54.5%	64	44.4%	.013*
Blurred vision	373	47.1%	255	47.9%	56	38.9%	.142

P: Pearson X^2 test ** P < 0.05 (significant)*

4. DISCUSSION

According to researchers, patients' attitudes toward overall healthcare have changed because of the COVID-19 pandemic. Little is known about CL wearing, care and practices after the COVID-19 pandemic. In this study, we investigated this issue in Saudi Arabia and found that CLWs have overall good hygiene practices after the COVID-19 pandemic. Moreover, a correlation was found between CL wear frequency and related complications. A previous study found that approximately 99% of CLWs reported at least one CL hygiene behavior that is associated with increased infection risk (Cope et al., 2015). These results were comparable to the findings of a recent study in Malaysia (Mohd-Ali and Azmi, 2021). In Saudi Arabia, a study showed that daily CL use and improper practices such as sleeping, swimming, or taking showers while wearing CL were significantly associated with complications (Bamahfouz et al., 2016). Moreover, a recent study involving medical students at King Abdulaziz University noted that despite their adequate knowledge of CL care, unhygienic CL-related practices and complications were observed (Ibrahim et al., 2018).

Currently, in the COVID-19 era, fewer studies have stated that the rate of CL use has decreased after the pandemic and in another study, this rate of wearing CL was not changed after the pandemic (Bakkar and Alzghoul, 2021; Vianya-Estopa et al., 2021). In Saudi Arabia, we still believe that CL awareness and practices must be explored. During the pandemic, CLWs are also believed to have been affected, in terms of CL-wearing and care attitudes. Approximately half of our study participants indicated decreased CL use. In addition, 40.1% reported that the frequency of washing hands before and after CL use increased during the COVID-19 pandemic. Studies in the UK and Spain have shown that the majority of their participants had the same decrease in CL use during the pandemic (Vianya-Estopa et al., 2021). The author believes that this shows how the pandemic results in a more hygienic and caring approach to CL use (Figure 2).

The corneal surface is constantly lubricated by the tear film that maintains oxygenation and moisture. Long-term CL use, particularly overnight, can result in hypoxia and hypercapnia in the corneal epithelium. They reported that prolonged use of CLs was associated with eye problems, similar to our finding that wearing CLs for >12 h per day was significantly related to a higher rate of dryness and itching ($P < 0.001$ and $P < 0.005$), whereas burning sensation was significantly associated with wearing CLs between 8 and 12 h per day ($P < 0.013$) (Table 5) (Bamahfouz et al., 2016). Regarding hygiene practices associated with CL use, approximately 10.5%, 12.3% and 15.2% of the participants wear CLs while sleeping, swimming and bathing, respectively. Additionally, 71.8% of the participants do not rub the CLs with their fingers for cleaning and 84.8% do not share their CLs with others. On the contrary, they reported a higher percentage, indicating that our participants have high awareness of bad practices toward CL use (Abahussain et al., 2020).

Therefore, our results revealed that 44.8% of the study participants used CLs for cosmetic reasons, 28.5% used CLs because of medical reasons and 26.8% used CLs for both. They reported similar results in Saudi Arabia and revealed that participants use CLs for refractive correction (29.5%), cosmetic reasons (39.5%) and both refractive correction and cosmetic reasons (31%) (Alharbi and

Sarriyah, 2019). Another study conducted in Saudi Arabia reported that CL was mainly used for vision problems (53.5%), followed by cosmetic reasons (37%) (Abahussain et al., 2020). In our opinion, frequent use of CLs for cosmetic reasons, which considers medically unsupervised practice, will increase the possibility of complications related to CL use. The most reported complications were dryness (55.8%), followed by redness (54.6%), burning sensation (46.6%), itching (47.3%) and blurred vision (49.5%), which agrees with the results, who stated that redness (76.0%), followed by itching (62.0%), dryness (57.7%) and blurred vision (32.2%) (Boqursain et al., 2021).

Regarding the strengths of this study, the sample was large, which allows us to study a large population. We considered including all Saudi Arabia regions to achieve generalizability. The objectives varied by including population awareness, practices toward CL use, practices after the COVID-19 pandemic and complications of CL use. The study has some limitations. First, the study did not include all complications related to CL use. Second, the sample population was primarily women even if most CLWs are women. Third, the questionnaire was electronic, which was quicker, more accessible and required less time and effort, but the results could be unreliable.

Based on the study results, eye care professionals must make an effort to provide CLWs with the right instruction, advice and counseling to improve hygiene issues. Adopting safe habits, especially during the pandemic, is essential. Further multi-national studies are highly recommended to obtain a more comprehensive profile worldwide.

5. CONCLUSION

This study evaluated CLW awareness and practices and evaluated the effect of the COVID-19 pandemic on the frequency of CL use and hygiene in Saudi Arabia. The results show that the majority of participants had good hygiene practices toward CL use. Therefore, during the COVID-19 pandemic, most participants reported a decrease in CL use and increased hand washing before and after using CLs.

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Author Contributions

All authors made substantial contributions to conception, design, acquisition of data, analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

Ethical Approval and Consent to participate

The current study received ethical approval (HAPO-02-K-012-2022-04-1046) from the Biomedical Ethics Committee at the Faculty of Medicine, Umm Al-Qura University (UQU), Makkah, Saudi Arabia. Electronic informed consent was obtained from each participant prior to answering the questionnaire. Participant privacy was ensured and names or phone numbers were not requested from any participant.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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