



## Original Research Article

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**BEHAVIORS, ATTITUDES AND CONCERNS TOWARD CONTACT LENS WEAR AND CARE DURING COVID-19 PANDEMIC IN WESTERN REGION OF SAUDI ARABIA.**

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**ABSTRACT**

**BACKGROUND:** Coronavirus disease 2019 is a global pandemic. Several reports provided conflicting recommendations regarding contact lens use during this pandemic, which could affect compliance with contact lens wear and care. Therefore, this study aims to identify the effect of the Coronavirus disease 2019 pandemic on behaviors, attitudes, and concerns of contact lens wearers in the western region of Saudi Arabia.

**MATERIALS AND METHODS:** A cross-sectional study was conducted from July 2021 to March 2022 using a pre-designed electronic questionnaire distributed through social media applications among the general population in the western region of Saudi Arabia.

**RESULTS:** Out of 690 participants, 98.2% were females aged 21 to 30, and 34.1% were living in Medina. The main source of information about the Coronavirus disease 2019 was social media applications. 16.5% of the participants stopped using contact lenses during the pandemic, while 42.3% reduced the frequency of their use, and 41.2% continued using them. The most common reason for contact lens discontinuation was decreased social activity participation. The most observed change in attitude was increased hand washing before lens wear. Moreover, being female, having a lower educational level, and being a contact lens user for a longer duration were associated with higher rates of continuing contact lens wear.

**CONCLUSION:** Most participants continued wearing contact lenses during the pandemic, and most had changed their attitudes regarding contact lens care. Eye care practitioners should be encouraged to use online educational tools to ensure compliance with lens wear and care during the pandemic.

**KEYWORDS:** Coronavirus disease 2019, contact lens, behaviors, attitudes, concerns.

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## INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). At the end of 2019, a few cases appeared in China, and then the number of infections increased worldwide. On 11 March 2020, the World Health Organization (WHO) declared the novel coronavirus outbreak a global pandemic [1].

The first case in the Kingdom of Saudi Arabia (KSA) was detected on 2 March 2020. The Ministry of Health has undertaken many educational campaigns on hand hygiene and social distancing measures [2]. Between March and June 2020, the government implemented long curfew hours and lockdowns in most regions of the KSA [3].

There are many routes of transmission of COVID-19 infection. The direct routes include the inhalation of airborne droplets, which is considered the primary route of transmission, together with handshaking. On the other hand, the indirect routes include touching the eyes, mouth, or nose after interacting with a contaminated surface or object [4]. A case-series study conducted among confirmed COVID-19 patients in Iran revealed that 7% of patients had positive tear reactions for SARS-CoV-2; however, the role of ocular secretions in the transmission of the infection is still controversial [4,5].

Regarding contact lens (CL) wear, there have not been studies reporting the ability of the COVID-19 virus to adhere to CL [6]. There is no evidence that CL wearers are at an

increased risk of contracting COVID-19 compared to spectacle wearers [7]. While some studies considered it safe to wear CL with the recommended precautionary measures, reports by others, such as the American Academy of Ophthalmology, have advised that CL wear be reduced or stopped to minimize touching of the eyes and transmission of the virus [6,8,9].

Compliance with CL wear and care seems to be an issue with CL wearers. A study conducted among the Saudi Arabian community (SA) found poor compliance in most aspects of CL wear. However, the study was performed pre to the COVID-19 pandemic [10]. In addition, there is a lack of studies reporting on CL wearers' attitudes and concerns during the COVID-19 declaration in the population of SA. Therefore, the present study aimed to explore the effect of the COVID-19 pandemic on the behaviors, attitudes, and concerns of CL wearers in the western region of SA.

## MATERIALS AND METHODS

**Ethical Considerations:** The ethical approval of the study was obtained from Taibah University Scientific Research Ethics Committee, College of Medicine. Participants were aware of the purpose of the study, and their informed consent was obtained at the start of the online questionnaire, considering the privacy and confidentiality of the information.

**Study Design And Sampling Technique:** A cross-sectional study was conducted from

July 2021 to March 2022 using a pre-designed electronic questionnaire via a Google form® survey, which was shared online throughout different social media applications, including WhatsApp, Twitter, and Telegram, among the general population in the western region of SA. Eligible participants included CL users aged 18 years and above and residents in the western region of SA. The study used a convenience non-probability sampling method with a further snowball sampling technique to achieve maximum participation.

**Questionnaire and Data Collection:** A semi-structured validated online questionnaire was translated into Arabic from a survey distributed in Jordan [4]. The questionnaire consisted of 19 questions divided into four main sections. First, sociodemographic characteristics such as age, gender, residency, and educational level. Second, the CL wearer's profile and experience, including the type and modality of CL, reasons for using CL, and duration of wearing them. Third, attitudes and practices regarding CL wear and care during the era of COVID-19, such as the method of buying CL after the COVID-19 announcement, reasons for CL wear discontinuation, and changes exerted in attitudes toward CL wear and care during the pandemic. Fourth, concerns regarding CL wear during the COVID-19 pandemic, such as the mode of transmission through the eye or contamination of CL with the virus itself. The survey was open from 12 September to 21 November 2021.

**Statistical Analysis:** The Statistical Package for the Social Sciences (SPSS) version 23

(IBM Corp., Armonk, NY, USA) was used to analyze the data. The categorical variables were represented using frequency and percentages. The presence of an association between the categorical variables was tested using a chi-square test. A p-value less than 0.05 was considered statistically significant.

## RESULTS

**Participants' Demographic Data:** A total of 690 participants were included in this study. Table 1 demonstrates the participants' sociodemographic characteristics. Most of the respondents, 361 (52.3%), were between 21 and 30 years old; the majority of them, 640 (92.8%), were female, and 50 (7.2%) were male. Regarding residence, 235 (34.1%) were living in Medina, 161 (23.3%) in Makkah, 146 (21.2%) in Jeddah, and 148 (21.4%) in Yanbu.

**CL Wearers' Profiles and Experience:** Table 2 demonstrates the participants' general experience wearing CL. The study found that 82.5% of participants use soft CL, 39.1% use lenses that are replaced every 3 to 6 months, and 78.7% use multipurpose CL solution. The commonest reason for wearing CL was cosmetic (for the color; 60.3%), followed by myopia, hyperopia, astigmatism, and keratoconus.

Regarding the duration of CL use, most participants (51.7%) had used CL for more than two years, and 45.5% used CL for 6 to 12 hours daily. For CL purchased before the COVID-19 declaration, the most common

**Table 1.** Participants' sociodemographic characteristics (n = 690)

Demographic Characteristics	n	%
<b>Age</b>		
18-20 years	169	24.50
21-30 years	361	52.30
31-40 years	117	17.00
41 years and older	43	6.20
<b>Gender</b>		
Male	50	7.20
Female	640	92.80
<b>Education</b>		
Elementary/Primary education	13	1.90
High school	108	15.70
College	492	71.30
Higher education	77	11.20
<b>City</b>		
Medina	235	34.10
Makkah	161	23.30
Jeddah	146	21.20
Yanbu	148	21.40

source was an eye care practitioner (62%), followed by the internet (27.4%). Other sources included pharmacies, optical shops, and cosmetic shops. On the other hand, for CL purchased after the COVID-19 declaration, eye care practitioners and the internet were still the most common sources, but the percentages were different (52.2% and 37.7%, respectively).

***Wearing CL During The COVID-19 Pandemic:*** Figure 1 illustrates the participants' decisions about CL use after the COVID-19 declaration. The proportion that stopped wearing CL after the COVID-19 declaration was 16.5%, 42.3% reduced their CL wear frequency, and 41.2% continued wearing CL.

***Discontinued Wearing CL During The Pandemic:*** Table 3 demonstrates the reasons for CL wear discontinuation during the COVID-19 pandemic. The most commonly observed reasons among participants were reduced social activities during the pandemic, such as visiting, working, and sports (56.14%), restricted access to a purchasing site for CL and care solution replacement during the lockdown (29.82%) and being afraid of the risk of infection by COVID-19 (28.95%).

***Attitudes Toward CL Wear and Care During The COVID-19 Pandemic:*** Table 4 illustrates the attitudes toward CL wear and care during the COVID-19 pandemic. The most observed attitude was increased hand washing prior to CL wear (60.7%), decreased CL wear time during the day (42.2%), avoiding rubbing the eyes with or without wearing CL (41.6%) and paying more attention not to prolong the life of the CL more than what is recommended (28.3%).

***Factors Associated With CL Wear Continuation During The Pandemic:*** Table 5 presents the factors associated with participants' choices regarding CL use after the COVID-19 declaration. Gender was significantly associated with the participants' preferences ( $p=0.017$ ): a higher proportion of females than males continued using CL (42.7% vs. 22%). Education was also significantly associated with participants' choices ( $p<0.001$ ): the highest rate of continued use of CL was in participants with primary/elementary education (57%), whilst the lowest rate was seen in participants with high school education (29.8%). The duration

**Table 2.** Participants' experiences regarding CL wear (n = 690)

Question	n	%
Q1/ What type of CL do you use?		
Soft CL	569	82.5
Gas permeable CL	79	11.4
Rigid CL	42	6.1
Q2/ Which modality of CL do you wear?		
Daily disposable wear	131	19
Monthly replacement	169	24.5
3-6 months	270	39.1
Yearly replacement	120	17.4
Q3/ If you wear reusable CL, what type of solution do you use? (n = 559)		
Multipurpose CL solution	440	78.7
Hydrogen peroxide	84	15
No solution	35	6.3
Q4/ What are the reasons for using CL? (More than one can be chosen)		
Myopia	227	32.9
Hyperopia	98	14.2
Astigmatism	103	14.9
Keratoconus	37	5.4
Cosmetic (coloured) CL	416	60.3
Q5/ How long have you been wearing CL?		
Less than 6 months	83	12
Between 6 months and 1 year	95	13.8
Between 1 and 2 years	155	22.5
More than 2 years	357	51.7
Q6/ How many hours did you use CL per day before the COVID-19 announcement?		
Less than 6 hours	301	43.6
6-12 hours	314	45.5
More than 12 hours	75	10.9
Q7/ Where did you usually buy your CL before the COVID-19 declaration?		
Eye care practitioner (ECP)	428	62
Via Internet	189	27.4
Pharmacy	46	6.7
Optical shops	20	2.9
Cosmetics shops	7	1
Q8/ Where do you usually buy your CL since the COVID-19 announcement?		
Eye care practitioner (ECP)	360	52.2
Via Internet	260	37.7
Pharmacy	40	5.8
Optical shops	20	2.9
Cosmetics shops	5	0.7
I have not bought CL	5	0.7

**Table 3.** Reasons for CL wear discontinuation during the COVID-19 pandemic (n = 114)

Question	n	%
Q1/ What are the reasons for CL wear discontinuation during the COVID-19 pandemic? (More than one answer can be chosen)		
Decreased social activities during the COVID-19 pandemic (visit, work, sport).	64	56.14
Limited access to purchase sites for CL and care solutions replacement during the lockdown.	34	29.82
Fear of risk of infection by COVID-19	33	28.95
Financial concerns, i.e. can't afford to pay for new lenses or lens care solution.	24	21.05
Certainty that spectacle wear provides a protection shield for the eye and the face from the infection.	23	20.18
Other	4	3.51

of CL use was also significantly associated with the participant's choice ( $p < 0.001$ ): a longer duration was associated with a higher rate of continued CL use following the pandemic announcement.

### ***Participants' Knowledge About COVID-19:***

In all, 46.2% of participants believed that the eye or contaminated CL with the virus itself could serve as a route for transmission of COVID-19, 22.2% did not believe the eye or CL was involved in the transmission of the virus, and 31.6% do not have any information in this context. In addition, 76.4% reported social media applications as their source of information, 14.8% TV, and 8.8% family and friends.

## **DISCUSSION**

Patients' attitudes regarding healthcare issues have been impacted by the COVID-19 pandemic. In March 2020, the KSA began taking precautionary measures. For example, all inbound and outbound flights have been suspended, and schools and universities have been closed. Umrah visas were also postponed. In addition, long curfew hours were imposed by the government to restrict the spread of the virus [11].

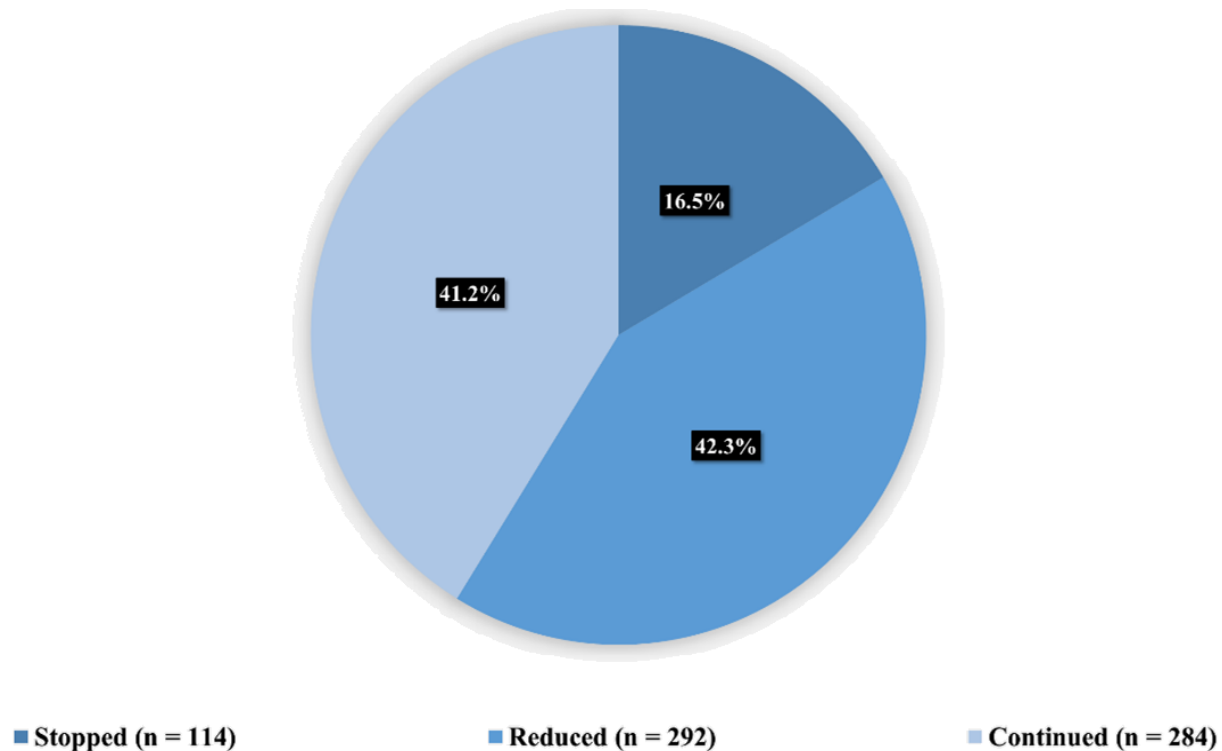
In addition, ophthalmological care has been limited as a result of the pandemic; non-urgent cases and surgeries, for instance, have been postponed and rescheduled. Precautionary measures during the clinic include wearing surgical masks, eye protection, and gloves for the patients and the healthcare workers. Standard measures of disinfecting and sanitizing all ophthalmic equipment have been applied, including slit lamps, tonometers, contact lenses, and any surfaces the patient touched after the patient has been examined [12]. Therefore, this research was conducted to study the effect of the COVID-19 pandemic on the behaviors, attitudes, and concerns of CL wearers in the western region of SA.

A prospective case-series study was performed on cases of confirmed coronavirus infection in China, and it has not been found that CL wearers were at a higher risk of being infected than spectacle wearers. On the other hand, the virus can get transmitted to CL through contaminated hands when applying or removing them [13]. Moreover, further research reported no association between COVID-19 infection and wearing CL [6,14]. In this study, most of the respondents reported that social media applications were mainly their source of information on

**Table 4.** Attitudes and practice toward CL wear and care during the COVID-19 pandemic (n = 690)

	n	%
What are the changes in attitudes and practice have you undertaken toward CL wear and care during the COVID-19 pandemic?		
I have done more hand washing before lens wear during the COVID-19 than before.	419	60.7
I have reduced CL wear time during the day.	291	42.2
I have avoided rubbing my eyes, whether or not I was wearing CL, more during COVID-19 than before.	287	41.6
I pay more attention for not to extend the life of my CL (longer than recommended) during COVID-19 than before.	195	28.3
I have done more cleaning of the lens case during COVID-19 than before.	194	28.1
I have done more cleaning of the lens through "rub and rinse" during COVID-19 than before.	172	24.9
I have changed my CL to another type.	140	20.3
I have changed my CL care solution to another type.	128	18.6
I have replaced my CL case more frequently during COVID-19 than before.	109	15.8
I have changed my means of purchasing CL during COVID-19.	90	13
I have more frequently contacted eye care practitioner regarding my CL during COVID-19 than before.	54	7.8

COVID-19, and 46.2% believed in the possibility of disease transmission owing to ocular or CL involvement. Patients can receive information related to CL care effectively through non-conventional means



**Figure 1:** Participants decisions about contact lens use after COVID-19 declaration

of communication other than verbal or written instructions. Therefore, the pandemic provides a good opportunity to encourage different means of communication with eye care practitioners to enhance appropriate CL wear and care practices through the lockdown and during circumstances with similar instances.

Regarding CL wear discontinuation, in the present study, there were significant differences in the CL wear frequency during the COVID-19 era. The current data showed that 16.5% of participants discontinued wearing CL. This is consistent with a previous cross-sectional study conducted among CL wearers in Jordan, which showed that less than half of the individuals had stopped wearing CL during the pandemic [4].

The discontinuation rate, on the other hand, was higher in studies conducted in the United Kingdom (UK) and Spain, which revealed that most participants stopped using CL during the pandemic [15-17]. Comparing the outcomes of different studies is a challenge, as the period in which these studies were conducted differed. These studies were conducted between April and May 2020, when the lockdown was strengthened in Spain and the UK. The higher rate of CL discontinuation in these studies could be explained by the decreased need to wear CL while at home.

From the data provided by the participants in the present study, the most reported reason for CL wearing cessation is reduced participation in social activities such as social



**Table 5.** Factors associated with participants' choices regarding CL use after the COVID-19 declaration

Factor	Participants' Choices Regarding Contact Lens Use after the COVID-19 Declaration			p-value
	Stopped	Reduced	Continued	
Age				0.277
18-20 years	32 (18.9%)	71 (42%)	66 (39.1%)	
21-30 years	52 (14.4%)	148 (41%)	161 (44.6%)	
31-40 years	21 (17.9%)	50 (42.7%)	46 (39.3%)	
41 years and older	9 (20.9%)	23 (53.5%)	11 (25.6%)	
Gender				0.017*
Male	11 (22%)	28 (56%)	11 (22%)	
Female	103 (16.1%)	264 (41.3%)	273 (42.7%)	
Education				< 0.001*
Elementary/Primary school	28 (11.9%)	73 (31.1%)	134 (57%)	
High school	34 (21.1%)	79 (49.1%)	48 (29.8%)	
College	26 (17.8%)	67 (45.9%)	53 (36.3%)	
Higher education	26 (17.6%)	73 (49.3%)	49 (33.1%)	
City				0.359
Medina	4 (30.8%)	2 (15.4%)	7 (53.8%)	
Makkah	18 (16.7%)	51 (47.2%)	39 (36.1%)	
Jeddah	80 (16.3%)	203 (41.3%)	209 (42.5%)	
Yanbu	12 (15.6%)	36 (46.8%)	29 (37.7%)	
How long have you been wearing CL?				< 0.001*
Less than 6 months	19 (22.9%)	42 (50.6%)	22 (26.5%)	
Between 6 months and 1 year	17 (17.9%)	50 (52.6%)	28 (29.5%)	
Between 1 and 2 years	33 (21.3%)	74 (47.7%)	48 (31%)	
More than 2 years	45 (12.6%)	126 (35.3%)	186 (52.1%)	

\*Significant at the 0.05 level

gatherings, working, and sports. This is in line with the latest evidence about the reasons for discontinuing CL during the COVID-19 pandemic [4,15-17]. Other reasons for

reduced CL wear included restricted access to purchasing sites for CL and care solution replacement during the lockdown and fear of COVID-19 infection risk. Although, the



recent reports indicated no relationship between increased risk of COVID-19 infection and wearing CL [16].

Regarding CL wear continuation, the current study revealed that most participants continued using CL during the COVID-19 pandemic. In all, 42.3% reduced their use of CL, and 41.2% continued their regular use with no change. In comparison to the state before the pandemic, participants who continued using CL changed their attitudes toward CL wear and care. The most observed changes in attitude were increased hand washing before lens wear, reduced CL wear time during the day, avoiding rubbing the eyes, and paying more attention not to exceed the recommended wear life of CL, in 60.7%, 42.2%, 41.6% and 28.3% of participants, respectively. Since hands are considered a vector of transmission of respiratory infection, the risk of contracting the virus can be reduced by measures like washing hands and avoiding rubbing the eyes, and touching the nose and mouth with contaminated hands, as the Centers for Disease Control and Prevention (CDC) and WHO recommend [6]. These attitude changes are predictable, especially with the media advocating for personal hygiene measures during the pandemic. In a previous study on CL wear and care in SA before COVID-19, most of the participants had good compliance with hand washing before CL wear; however, compliance in other aspects such as solution replacement during CL storage and CL case replacement after a long period of use was poor [10].

According to this study, the decision to continue CL wearing throughout the pandemic is associated with different factors.

First, female participants had higher rates of CL use during the pandemic than males, 42.7% and 22%, respectively. This could be explained by the fact that most participants were females and were more concerned with the cosmetic use of CL. Furthermore, education level was significantly related to the participants' decisions to use CL during the pandemic, with the highest rate being among participants with elementary school education (57%), while participants with high school education had the lowest rate of CL use during the pandemic (29.8%). This could result from having a higher awareness and better understanding of the pandemic. Moreover, participants who used CL for more than two years had higher rates of continued CL wear (52.1%), which might be attributed to having a better experience in using CL, as well as better compliance with the standard precautions and care of CL.

The strengths of this study are that it was the first study conducted among the general population in the western region of SA, and the sample size was adequate while compared to other studies in the literature [4,15,17]. On the other hand, this research has several drawbacks, including the nature of the cross-sectional study, in which establishing a causal relationship between the exposure and the outcome is difficult [18]. Moreover, the study used an electronic survey, which might be associated with the possibility of self-report bias. In addition, the researchers did not report the CL compliance levels of the participants before the pandemic was declared. Therefore, further studies are needed to assess CL compliance differences before and after the COVID-19 pandemic in Saudi Arabia.

## CONCLUSION

This study demonstrated the perspectives regarding CL use during the COVID-19 pandemic in the western region of SA. The decrease of participation in social activities was cited as the most common reason. Attitude changes and improvement of personal hygiene measures have been exerted in most of the participants continuing lens wear. Ophthalmologists and optometrists should be encouraged to provide the best advice to their patients to ensure the proper adherence of CL wearers to hygienic habits and precautions during the pandemic.

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