

# ***Effect of the COVID-19 pandemic on contact lens wear in Greece***

**Aristeidis Chandrinou<sup>1</sup> and Dorotheos-Dimitrios Tzamouranis<sup>1</sup>**

*<sup>1</sup>Department of Biomedical Sciences, Division of Optics and Optometry,  
Laboratory of Optical Metrology, School of Health and Welfare,  
University of West Attica, Egaleo Park Campus, Athens, Greece.*

## ***Authors' contributions***

*This work was carried out in collaboration between both authors.  
Author AC designed the study and the literature searches of the study,  
and wrote the first draft of the manuscript.  
Author DDT wrote the protocol and performed and managed  
the statistical analysis,  
Both authors read and approved  
the final manuscript.*

***Purpose:*** This study demonstrates the actions that took over the contact lens (CL) wearers in Greece after the COVID-19 pandemic.

***Methods:*** The study includes nameless web-based survey used to measure participants demographics, CL wear history, and custom wear activity of CL in a stage of noticeable risk of infection due to CL wear during the COVID-19 pandemic.

***Results:*** During the lockdown A' in Greece about half of the participants (42.5 %) believe that the perception risk of infection using CL was extremely effective (29 %) and very effective (13.5 %). Only a minority (18 %) of the participants do believe that the use of CL increases the risk of COVID-19 infection. Another population (43 %) do not agree with this opinion and more than a third of them (39 %) resemble that are not affected by this opinion or are less informed.

## ***Conclusion:***

This study presents the likelihood of reducing or ceasing the use of CLs during the COVID-19 pandemic lockdown and a relationship between the perceived risk of infection and CL use. There was also a predisposition to alter the frequency of CL wear. All eye care practitioners should give more advice to their patients that continue to wear CL and assist them to act in accordance with the new rules of handling and in favour of occasional CL wear.

***Keywords:*** Public Health, COVID-19 pandemic, Infection risk, Contact Lenses, Eye Care.

## **1. Introduction**

The occurrence of COVID-19 pandemic, emerged in China by the end of 2019, and quickly spread to the rest of the planet, changed the everyday life to millions of people all over the world. The World Health Organization (WHO) declared, on 11 March 2020, the COVID-19 outbreak a global pandemic, with many countries in Europe to implement constraint measures to control the pandemic [1,2].

Some countries like Italy or Spain (2,3) were mostly affected. Although Greece was not influenced much by the pandemic, like in other European countries the government adopted restrictions to eliminate the spread of the virus and the overcharging of hospitals, but going so far, even in nowadays, the risk of COVID-19 pandemic is still present.

These unusual measures that placed for many weeks during pandemic led the entire country in lockdown, with some exceptions for necessary activities such as supermarkets or pharmacies [2]. And consequently, took place significant changes in admission to local eye care [4]. To access eye care practices during lockdown you ought to have a personal appointment with the practitioner.

The European Centre for Disease Prevention and Control stated, "COVID-19 is mainly transmitted from human-to-human via respiratory droplets that can be inhaled, when people interact in closeness" [5,6]. On the other hand, a number of authors believe that ocular surfaces are likely to be entrance for COVID-19 virus [8-11]. Finally, a few publications support the attitude that COVID-19 was found in ocular system and tears [11,16,17]

## **2. Methods**

### *2.1. Participants*

The study sample included CL wearers  $\geq 18$  years of age who were invited to participate in an online survey to assess the impact of the COVID-19 pandemic on their CL wear during lockdown. Participation in the study was voluntary.

### *2.2 The questionnaire*

This descriptive study employed online data collection using an anonymized web-based questionnaire hosted on "SurveyMonkey" Europe, Dublin, Ireland. The authors developed the questionnaire. A group of CL wearers was invited in order to evaluate all the questions in terms of clarification and time management to answer all of them.

The feedback form was made available via an online link on social networks from 15 September to 15 October 2020, when CL wearers could easily evaluate the consequences of the last national lockdown and to realize the reasons of possible alterations in CL use due to pandemic.

All questions were organized into broad-spectrum demographic information (age, gender, education level and geographical area of habitation), basic questions related to CL history (i.e. type and modality of CL, wearing time per day or contact lens experience), the perceived risk of infection due to CL wear during the pandemic and CL wear or limited use during the pandemic, with a total of 22 questions. All data was exported to Excel spreadsheets (Microsoft Excel, Microsoft Corporation, Redmont, WA, USA).

### 2.3. Statistical analysis

Only the completed surveys were used in the analyses. Data were analysed using the statistical Package for Social Sciences (SPSS) software version24 (International Business Machine Corp. IBM, Chicago, IL, USA).

## 3. Results

### 3.1. Participants' demographics

From a total of 1676 survey participants, 1037 were CL users and completed the online questionnaire. Of them, 76.7% (795) are female and 23.3% (242) male. Participant's demographics are shown in Table 1.

**Table 1**

Demographic characteristics of the participants (n=1037).

<b>Characteristics</b>		<b>N (%)</b>
<b>Gender</b>	Female	795 (76.7 %)
	Male	242 (23.3 %)
<b>Age</b>	18 – 34	707 (68.2 %)
	35 – 54	278 (23.4 %)
	55 – 74	50 ( 4.8 %)
	75 and over	2 ( 0.2 %)
<b>Education</b>	Primary	8 ( 7.5 %)
	Secondary	197 (18.9 %)
	Undergraduate	601 (57.9 %)
	Postgraduate	231 (22.3 %)
<b>Residence region</b>	Attica	706 (68.0 %)
	Central Greece	25 (2.4 %)
	Thessaly	26 (2.5 %)
	Epirus	23 (0.2 %)
	West Macedonia	8 ((0.8 %)
	Central Macedonia	62 (6.0 %)
	Peloponnese	43 (4.1 %)
	Ionian Island	14 (1.3 %)
	West Greece	22 (2.1 %)
	North Aegean Islands	7 (0.7 %)
South Aegean Islands	47 (4.6 %)	

	Thrace	20 (1.9 %)
	Crete	34 (3.3 %)

### 3.2. Contact lens wear profile and behaviours

**Table 2**

CL wears profile of participants (n=991) 46 skipped the answer.

Information	N (%)	
<b>CL experience</b>	< 6 months	49 (4.9 %)
	6 – 12 months	37 (3.7 %)
	12 – 24 months	82 (8.3 %)
	> 24 months	823 (83.0 %)
<b>Type of CL</b>	Soft CL	965 (97.4 %)
	Gas permeable CL	8 (0.8 %)
	Other	18 (1.9 %)
<b>Type of Soft CL</b>	Monthlies	853 (86.1 %)
	Dailies	112 (11.1 %)
	Other	36 ( 3.6 %)
<b>Place of purchase</b>	Eye care practitioner	791 (79.8 %)
	Internet	67 (6.8 %)
	Both options	126 (12.7 %)
	Other	7 (0.7 %)
<b>CL wearing days per week</b>	0-3 days per week	214 (21.6 %)
	3-5 days per week	217 (21.9 %)
	Every day	560 (56.5 %)
<b>CL wearing time per day</b>	< 6 h	178 (18.0 %)
	6 – 12 h	534 (53.9 %)
	> 12 h	279 (28.1 %)

The CL wear profile of participants (n = 991, as 46 skipped the answer) is shown in Table 2. The majority of the population in this study (83 %) stated more than two years of soft CL wear and that 79.8 % purchased their CL from their eye care practitioner. More than half of them (56.5 %) wore their CL every day before the announcement of the COVID-19 pandemic, and most of them (84 %) wore their CL for more than 6h per day (Table 2). Their motivation to wear CL was primarily cosmetics (26 %) or to get better vision (27 %), and secondarily dislike for spectacles (19 %) or practitioner recommendations (1 %) only (Fig. 1).

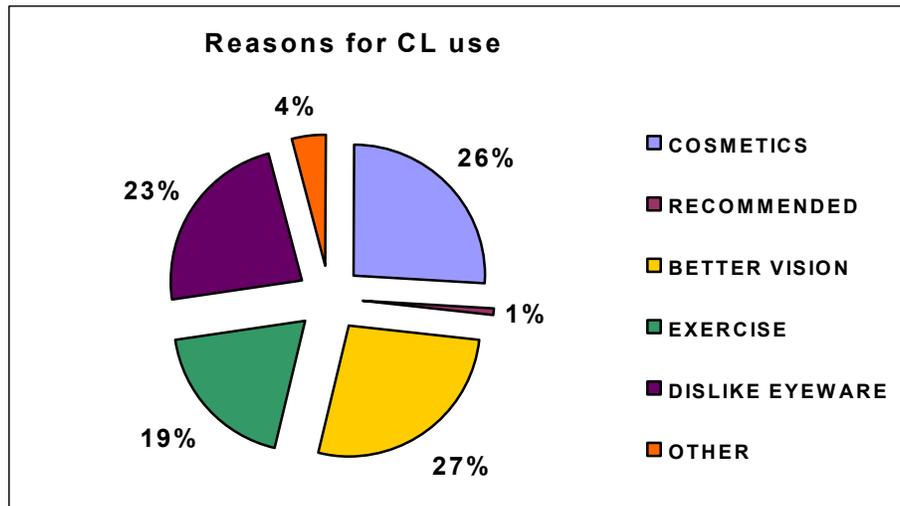


Figure 1. Reasons for CL use (n=991, 46 skipped the answer).

**Table 3**

Perceived risk of infection of CL use, during lockdown A', (23 March-4 May 2020) (n=972, skipped 65).

Perceived risk of infection during pandemic	N (%)		
	Female	Male	Total
Extremely effective	229	53	282 (29.0 %)
Very effective	100	30	130 (13.5 %)
Somewhat effective	113	33	145 (14.9 %)
Not so effective	94	43	137(14.1 %)
Not at all effective	215	62	277 (28.5 %)

### 3.3. Perceived risk of infection during the COVID-19 pandemic

A number of 972 participants (65 skipped the answer) believe that during pandemic lockdown A' in Greece (23 March-4 May 2020), the perception risk of infection using CL was extremely effective (29 %) and very effective (13.5 %) as noticed in Table 3. On the other hand, about the same population (28.5 %) feels that risk was not at all effective. It is interesting the fact that female and male participants have about the same proportion in perceived risk of infection (Table 3).

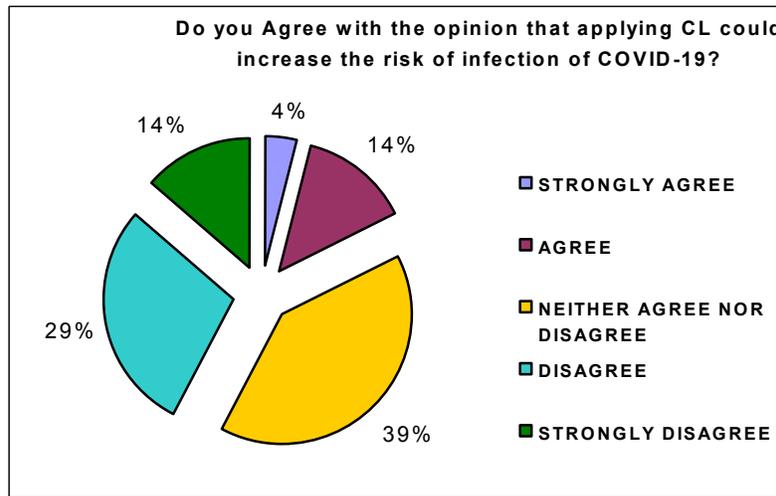


Figure 2. Agree or disagree with the opinion that applying CL could increase the risk of infection of COVID-19

Population of 959 of participants (78 skipped the answer) answered the question if agree or disagree with the opinion that by wearing CL is possible to increase the risk of COVID-19 infection (Fig.2). Disagree 33 %, neither agree or disagree 39 % and only 18 % agree with that opinion.

**Table 4.**

Drawback in use of CL during pandemic Lockdown A' in Greece. (n=972, skipped 65).

Drawback in use of CL	N(%)		
	Female	Male	Total
Stopped	295	63	358 (36.9 %)
Reduced	287	92	379 (39.0 %)
Continued	156	62	218 (22.4 %)
Other	13	4	17 ( 1.7 %)

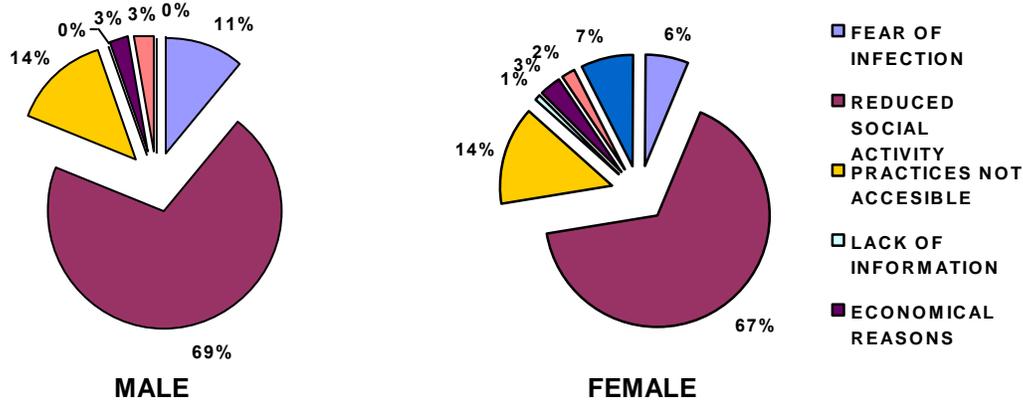


Figure 3. Reasons for drawback in CL use in male (left) and female (right) during pandemic Lockdown A in Greece (answered 370, skipped 667)

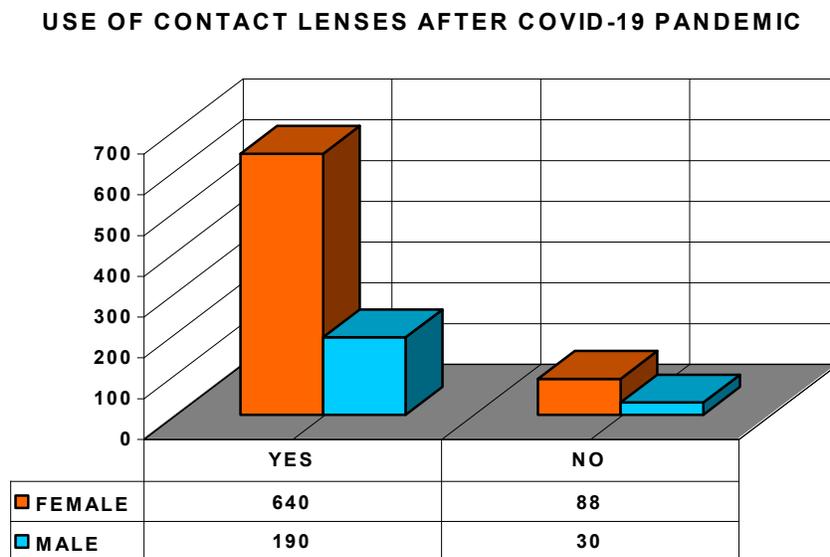


Figure 4. CL use after COVID-19 Pandemic lockdown A; in Greece (N=959, skipped =78)

#### 4. Discussion

The COVID-19 pandemic has unexpectedly changed all people daily life. Even if present facts propose that there is no association connecting CL wear and an increased risk of COVID-19 infection [13], there is a concern and sometimes fear that may be a risk. In Table 4 we notice that 36.9 % of the population of survey stopped using CL during the Lockdown A; in Greece, although 22.4 % continued. The main reason to stop or reduce CL use for Greek wearers was the restricted social activity (Fig.3), including working from home, restrictions in sports and exercise and exclusion of social events (theaters, cinemas, restaurants and bars). Anxiety associated to CL wear included the fear that CL wearers must touch their face to apply and remove CL and the same time the likely presence and transmission of the virus via the ocular surface [8], which cannot be completely excluded [10,11].

Without a doubt, if handling is believed to be a starting place for contamination of CL [12], the main worry with CL wear could therefore be that SARS-CoV-2 could be transferred to CL by hand contact during handling [13,14,15], and after that from the CL to the ocular surface. Consequently, as more is known about the COVID-19 pathogenesis to find out whether the ocular pathway is a means of virus transmission, eye care practitioners should make greater efforts to improve compliance with CL care and handling instructions given to their patients [19], which actually would minimize the risk of COVID-19 infection and CL-related complications [13,20,21] requiring clinical care, and therefore could contribute to avoid the overcharge of the health care system in nations with necessary lockdown, like in Greece during April 2020 [22].

As a final point, although only 22.4 % of the survey participants that were wearing CLs during the COVID-19 pandemic did not think about to cease CL wear during the pandemic and continued using them, the 36.9 % ceased CL use and 39 % reduced CL wear. These results (Table 4) in practice show that 8 of 10 CL wearers had probably the fear of virus infection at the back of their head.

According to figure 3, only 1% of female participants stated lack of information about COVID-19 virus and none of the male ones. So, we can say general speaking that Greek CL wearers were at list well informed during the pandemic lockdown. These data highlight that either Greek eye care practitioners have good level of communication with their patients or the modern technology and the social media helped them to be well informed.

At some point in circumstances like the current pandemic, when CL users might be afraid that may be infected, by using daily disposable CLs would most likely reduce the rate of CL failure and offer many advantages to patients [23]. As a result, is the COVID-19 pandemic a good reason to change the type of CL use? Then another question arises, is possible the majority of CL wearers to switch from monthly replacement lenses to daily disposable lenses? Certainly it is not so easy.

In conclusion, this study presents the likelihood of reducing or ceasing the use of CL use during the COVID-19 pandemic lockdown and a relationship between the perceived risk of infection and CL wear. There was also a predisposition to alter the frequency of CL wear. Further more is essential that all eye care practioners should give more advice to their patients who continue to wear CL and assist them to act in accordance with the new rules of CL handling and in favour of occasional CL wear.

#### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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