

various measures to limit the spread of the virus and the overcharging of hospitals, going so far the risk of COVID-19 pandemic is still present.

During the pandemic, government officially declared a “state of emergency” over the coronavirus, adopting unusual measures that placed for many weeks the entire country in lockdown, with some exceptions for necessary activities such as supermarkets or pharmacies [2]. Throughout the pandemic probably took place considerable changes in access to local eye care. Consequently, the COVID-19 pandemic has induced daily life.

In accordance with the European Centre for Disease Prevention and Control, the COVID-19 is mainly transmitted from human-to-human via respiratory droplets that can be inhaled, when people interact in closeness. [3,4].

A few authors have also proposed that ocular surfaces as possible targets for COVID-19 infection [6,7]. Also, there are a small number of publications maintaining the view that COVID-19 patients are suffering by conjunctivitis [4,7] and furthermore the SARS-CoV-2 have been detected, although rarely, in the tears and patients’ conjunctival secretions with COVID-19 [4,8].

2. Methods

2.1. Participants

Participation in the study was voluntary. The study sample includes CL wearers ≥ 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.

2.2. The questionnaire

This descriptive study employed online data collection using an anonymized web-based questionnaire hosted on “SurveyMonkey” Europe, Dublin, Ireland. The questionnaire was developed by the authors and further reviewed by a group of CL wearers to make certain understanding and manage the questions with the required time to complete it.

The questionnaire 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 the alterations in CL use due to pandemic.

The questionnaire was organized into general 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 version 24 (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).

| Characteristics | | N (%) |
|-------------------------|----------------------|--------------|
| Gender | Female | 795 (76.7 %) |
| | Male | 242 (23.3 %) |
| Age | 18 – 34 | 707 (68.2 %) |
| | 35 – 54 | 278 (23.4 %) |
| | 55 – 74 | 50 (4.8 %) |
| | 75 and over | 2 (0.2 %) |
| Education | Primary | 8 (7.5 %) |
| | Secondary | 197 (18.9 %) |
| | Undergraduate | 601 (57.9 %) |
| | Postgraduate | 231 (22.3 %) |
| Residence region | 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 (%) |
|---------------------------------|-----------------------|--------------|
| CL experience | < 6 months | 49 (4.9 %) |
| | 6 – 12 months | 37 (3.7 %) |
| | 12 – 24 months | 82 (8.3 %) |
| | > 24 months | 823 (83.0 %) |
| Type of CL | Soft CL | 965 (97.4 %) |
| | Gas permeable CL | 8 (0.8 %) |
| | Other | 18 (1.9 %) |
| Type of Soft CL | Monthlies | 853 (86.1 %) |
| | Dailies | 112 (11.1 %) |
| | Other | 36 (3.6 %) |
| Place of purchase | Eye care practitioner | 791 (79.8 %) |
| | Internet | 67 (6.8 %) |
| | Both options | 126 (12.7 %) |
| | Other | 7 (0.7 %) |
| CL wearing days per week | 0-3 days per week | 214 (21.6 %) |
| | 3-5 days per week | 217 (21.9 %) |
| | Every day | 560 (56.5 %) |
| CL wearing time per day | < 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 %) and to get better vision (27 %), and secondarily dislike for spectacles (19 %) or practitioner recommendations (1 %) only (Fig. 1).

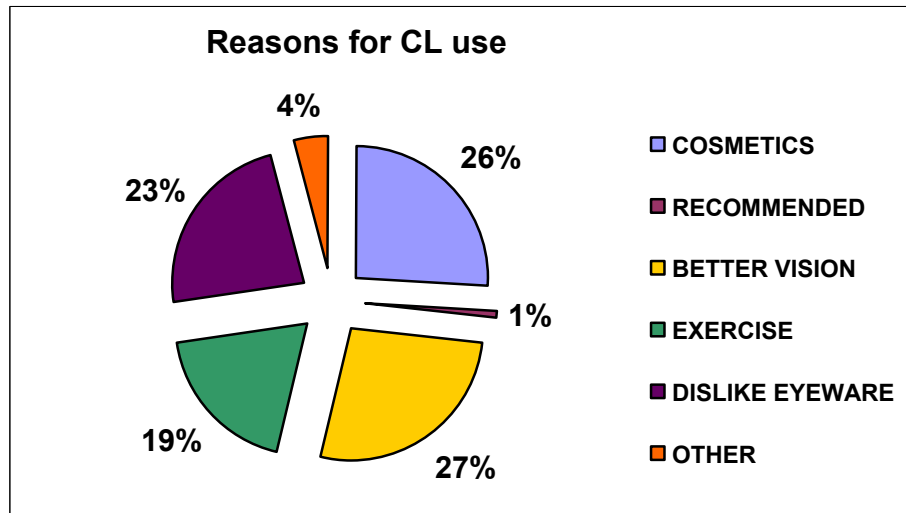


Figure 1. Reasons for CL use (n=991, 46 skipped the answer).

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).

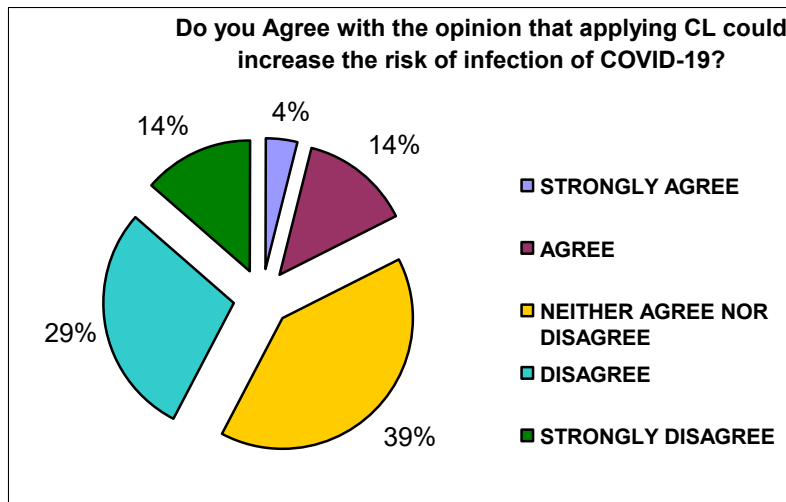


Figure 2. Agree or disagree with the opinion that applying CL could increase the risk of infection of COVID-19

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 %) |
| | | | |

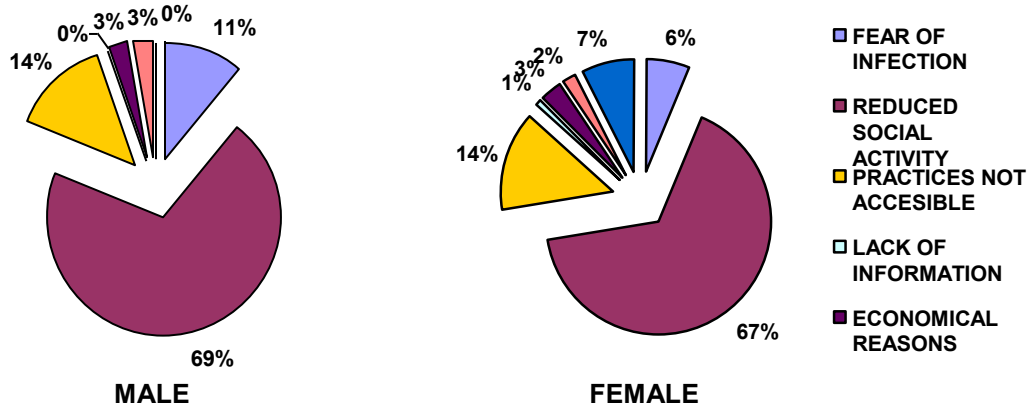


Figure 3. Reasons for drawback in CL use in male (left) and female (right) during pandemic Lockdown A' in Greece (answered 370, skipped 667)

USE OF CONTACT LENSES AFTER COVID-19 PANDEMIC

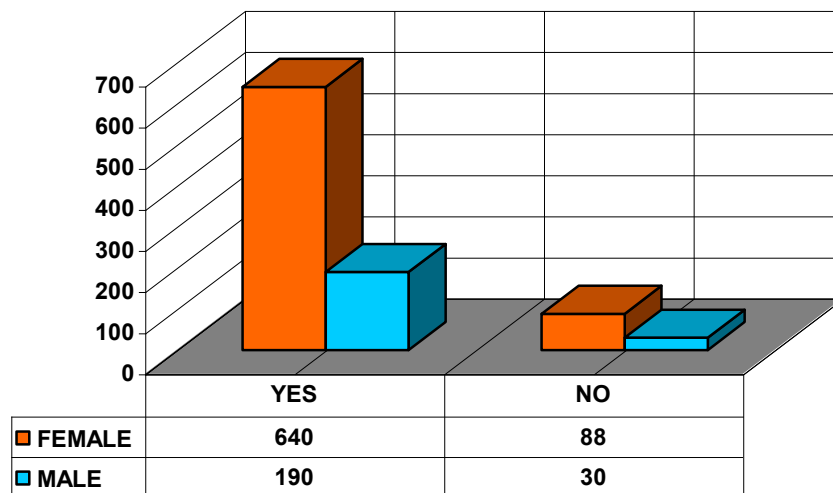


Figure 4. CL use after COVID-19 Pandemic lockdown A; in Greece (N=959, skipped =78)

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 [9], 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 include the fear that CL wearers must touch their face to apply and remove CLs and the same time the likely presence and transmission of the virus via the ocular surface [6], which cannot be completely excluded [10].

Without a doubt, if handling is believed to be a starting place for contamination of CLs [11], the main worry with CL wear could therefore be that SARS-CoV-2 could be transferred to CLs by hand contact during handling [9], 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 [12], which actually would minimize the risk of COVID-19 infection and CL-related complications [9,13] 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.

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 [14]. 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 shows that during the COVID-19 pandemic lockdown there was a relationship between the perceived risk of infection and CL use and that there was a propensity to vary the CL frequency of wear, enhancing the occasional CL wear. The fear that CL wear may be a mode of infection in the ongoing COVID-19 pandemic cannot be continuous, particularly if wearers follow the CL care guidelines that their eye care practitioners should provide.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

FUNDING

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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