



The Pandemic of COVID-19 and the Use of Contact Lenses

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Authors' contributions

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

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ABSTRACT

This review aims to make clear that applying contact lenses is not a risk factor for infection by coronavirus when the users follow the rules of personal hygiene. In December 2019, a coronavirus (CoV) epidemic broke out in China, causing severe acute respiratory syndrome. Today it has become a pandemic of coronavirus 2019 (COVID-19). In today's patient care environment, physicians and their primary care staff are responsible for ensuring that all guidelines and requirements for the care of all patients are strictly adhered to.

Keywords: Coronavirus; COVID-19; SARS-CoV; contact lenses; pandemic; infection; safety.

1. INTRODUCTION

On the 31st of December 2019, the World Health Organization (WHO) was alerted by the Chinese authorities of a cluster of pneumonia of unknown cause [1]. 41 cases of unexplained pneumonia

were identified in Wuhan, Hubei Province, China. The majority of the patients were related with the South China Seafood Market. On 11 February 2020, the WHO officially named infection due to the virus as coronavirus disease 2019 (COVID-19) [2].

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The Coronavirus Study Group of the International Committee on Taxonomy of Viruses named 2019-nCoV severe acute respiratory syndrome-related coronavirus 2, or SARS-CoV-2 [3]. On 7 January 2020, the Chinese Center for Disease Control and Prevention isolated and confirmed this pathogen as a novel type of coronavirus.

On 25 January 2020, the WHO confirmed that the virus was spread via human-to-human transmission and on 31 January 2020, characterized the outbreak as a public health emergency of international concern [4,5].

At present, COVID-19 poses a huge threat to public health worldwide. As of March 2020, we have more than 850,000 cases with more than 44,000 deaths in 178 countries [6,7,8].

From the beginning, the Centers for Disease Control and Prevention (CDC) have said that SARS-CoV-2 is a highly infectious respiratory virus and is mainly transmitted between people through respiratory droplets when symptomatic people sneeze or cough. The large droplets of virus-laden mucus are the primary mode of transmission. Contact transmission is another path of infection. Viral particles emitted from the respiratory tract of an infected person, fall and remain on a surface. Subsequently, another person touches that surface and with a series of unconscious movements touches face nose, mouth and eyes. At the end virus has enter into the body through the mucous membranes.

According to Neeltje van Doremalen et al., the virus can remain viable for up to 3 hours, on copper for up to 4 hours, on cardboard up to 24 hours and on plastic and stainless steel up to 72 hours [9].

On 30 January 2020, the World Health Organization (WHO) issued an emergency international public health warning (PHEIC) [10]. It included a set of recommendations for personal protective equipment (PPE) based on the experience of previous epidemics, such as Previous MERS-CoV [11] and SARS-CoV1 [12,13]. This set of guidelines includes the use of goggles or face shield to protect against eye transmission of CoV. However, it remains interesting that the scientific data on eye transmission have not been thoroughly studied. Of course, from the ophthalmological scientific community, there are some reports indicating that CoVs also affect the eye [13,14,15].

A greater concern to health professionals produced the announcement about a number of cases that have highlighted the RNA presence of the SARS-CoV virus in tears [15]. In 2004, tear samples collected from 36 SARS-CoV patients and were sent for SARS-CoV detection tests. RNA of SARS-CoV was detected in three patients. Of these three, one patient had RNA identified on all samples, respiratory smears and tears. The findings of this study suggest that SARS-CoV may occur in tears and confirm the need to be taken appropriate precautions to prevent transmission through ocular tissues and secretions [15,16]. On the other hand, Ivan Seah Yu Jun and his colleagues (2020), in a study that took place in NUS Medical School in Singapore, investigated 64 tear samples that were collected from 17 COVID-19 patients and between Day 3 to Day 20 from initial symptoms. Neither viral culture nor reverse transcription polymerase chain reaction (RT-PCR) detected the virus, suggesting a low risk of ocular transmission [17].

The common issued guidelines include the use of goggles or face shield to protect against eye transmission of CoV. However, it remains interesting that the scientific data on eye transmission have not been thoroughly studied. Of course, from the ophthalmological scientific community, there are some reports indicating that CoVs also affect the eye [13,14,15].

Furthermore, have been reported some cases of eye infections in the recent CoVid-19 pandemic. On 22 January 2020, Guangfa Wang, a clinician of China's national pneumonia experts' group, while working with only his eyes unprotected, developed conjunctivitis during an inspection of Wuhan, the midpoint of the outbreak. He then tested positive for the new virus, but eventually later he recovered from the infection [18,19,20]. This led to an international awakening for new research on eye infection as a possible alternative transmission route for CoVid-19 [19,21].

Lu et al. reported that the disease can be transmitted through the mucous membranes, including the conjunctiva [21].

Jianhua Xia MM et al. conducted a study at the First Affiliated Hospital of Zhejiang University from 26 January 2020 to 9 February 2020 on 30 confirmed novel coronavirus pneumonia (NCP) patients. Tear and conjunctival secretions were collected twice with disposable sampling swabs for reverse-transcription polymerase chain

reaction (RT-PCR) assay at a period of 2 to 3 days. Only one patient with conjunctivitis found viral RNA in his tear fluid and conjunctival secretion twice. No viral RNA was detected in the tear fluid and conjunctival secretions of the severe or common-type patients without conjunctivitis [22].

Since the epidemic is still in early stages, not much has been published about the pathogenic mechanisms of SARS-CoV-2, especially in regard to ocular tissues infection [23]. However, genetic and structural analyses [24] have been reported that SARS-CoV-2 (the well-known COVID-19) use a similar way of binding to the receptor such as SARS-CoV, which allows to infect host cells through its enzyme-converting angiotensin-2 (ACE2) [25,26].

2. COMMON CONCLUSIONS FOR CoVs AND HUMAN EYE INFECTION

As CoVs can cause eye infection in various animals, the possibility of human eye complications due to SARS-CoV-2 cannot be ignored. However, examples in animals also point out that CoVs are a heterogeneous group of viruses that can cause eye effects through a wide variety of mechanisms [27]. Some of these mechanisms are extremely different from those adopted by CoVs affecting humans [25]. Nevertheless, there are didactic conclusions from the study of these infections. Above all, CoVs are able to produce a wide range of ocular manifestations, ranging from mild pathological conditions of the anterior segment, such as conjunctivitis and anterior uveitis to threatening vision conditions, such as retinal detachment [1, 21]. Subsequently, we must also recognize that CoVs can develop in-vivo mutations that dramatically alter disease manifestations.

As the current pandemic continues, a better understanding of the virus will emerge, hoping that the global scientific community will focus more on research on the relationship between CoVs and the eye. This understanding will not only help with guidelines and control measures for infections, but can also provide the scientific community with information on the suitability of using eye tissue or even tears as diagnostic methods. Meanwhile, vision scientists as well as other healthcare workers should always be careful and continue to take precautions for possible transmission of CoVs through the eye tissue by taking appropriate measures to prevent

the contamination and the spread of the disease [28,29].

3. OPTOMETRISTS, EYEGLASSES, CONTACT LENSES AND FACE MEASUREMENTS

In a statement issued on 18 March 2020, the American Optometric Association (AOA) provides instructions to Optometrists based on recommendations providing basic health care to US Centers for Disease Control and Prevention (CDC). In today's patient care environment, physicians and their primary care staff are responsible for ensuring that all guidelines and requirements for the care of all patients are strictly adhered to.

In addition to the general measures taken by the state to reduce the risk of spreading the disease, such as good hand cleaning with soap or antiseptic, customers can enter the store in pairs and be at least 2 meters apart and not try pointless pairs of glasses, the Panhellenic Association of Optics and Optometrists with a guidelines letter, addressed on March 15, added some more rules:

- The optician or optometrist and all optical store staff are required to wear gloves, a protective mask and goggles during all retail operations.
- Also they must clean and disinfect contact surfaces such as tables, cash desks, door knobs, desks, telephones, handles, tap and sink, as well all items that have come in contact with the customer.
- Also, if the surfaces are dusty, first clean them with detergent or soap and water before the antiseptic.

Of course, remains yet a point that has not been clarified, such as the necessary contact with the patient during the dispensing of glasses on the face and contact lenses on the eye. Of course, in contact with the customer, the Optometrist should wear a surgical-style face mask (such as an N95 mask), water-resistant gloves with long tight-fitting cuffs, and protection goggles or safety spectacles [30]. But also has to follow the general instructions of the responsible for the public health authorities.

However, if you try the Internet search engines, such as Google and for instance type "COVID-19 and use of contact lenses" it is possible that conflicting tips may appear. Moreover, many

newspapers appear with ambitious headlines such as "Can you be infected with coronaviruses from your contact lenses?". On the other hand, there are some organizations that, although advise that "by removing the glasses and using contact lenses we can reduce the number of facial contacts, and therefore the exposure of the eyes to the risk of infection", at the same time easily cause anxiety to users whether the use of contact lenses may not be safe during the COVID-19 pandemic. Nevertheless, some Google search, among other things, presents a few results from contact lens experts, providing reassuring advice, based on collected medical data. So what are the facts that eye professionals and contact lens users need to know? What is the truth and where is the misinformation?

4. WHAT IS FAKE AND WHERE IS THE TRUTH?

Recently, under a joint directive to the eye professionals [31], Lyndon Jones, director of the Center for Eye Research and Education (CORE) at the University of Waterloo (Canada) and Philip Morgan, director of Eurolens Research at the University of Manchester (UK) as well as Jason Nichols, Vice President for Research and Professor at the University of Alabama at the School of Optometry in Birmingham (United States) and Editor-in-Chief of Contact Lens Spectrum, provide the following information.

The use of Contact Lenses is safe [31]. Despite the myths and misinformation that have emerged in recent announcements, the use of contact lenses remains a safe and extremely effective method of correcting vision for millions of people worldwide.

4.1 Before Apply Contact Lenses

A PubMed search on 24 March 2020, found no published evidence that contact lens wearers are more likely to contract COVID-19 than spectacle wearers.

The CDC and WHO recommend advise all people to: Wash their hands often with soap and water for at least 20 seconds followed by hand drying with disposable paper towels, especially after they have been in a public place, or after blowing their nose, coughing, or sneezing, If soap and water are not readily available, they should use a hand sanitizer that contains at least

70% alcohol. They should cover all surfaces of their hands and rub them together until they feel dry, they should avoid touching their eyes, nose, and mouth with unwashed hands for contact lenses users, this must be done before each lens insertion and removal.

4.2 Spectacles Vs Virus

Regular disinfections of eyeglasses are also required. Some viruses, such as COVID-19, can remain on hard surfaces for many hours [9], during which time the virus may be transmitted to the fingers and face of the person wearing glasses. This is more than ever true for reading glasses (for people generally over 40 years old). Most presbyopic people need reading glasses and may put them on and take off many times during the day and expose their face to infection. Then again, this age group seems to be among the most vulnerable populations because they are more severely affected by COVID-19 compared to contact lenses users, which are typically younger.

5. CONCLUSION

Contact lenses need daily disinfections. Users who wear contact lenses must either discard disposable dailies lenses every night or regularly disinfect the monthly or bimonthly lenses, according to the manufacturer's and the professional dispensers' instructions. In today's conditions, proper daily cleaning is not only for the lenses but also for the storage bottles and contact lenses cases, very important [31,32]. A thorough cleaning of instruments used in contact lens practice such as trial frame and ophthalmic trial lenses, chin rest and head rest (slit lamp, keratometer etc.) must be carried out well with water and detergent and applying commonly used disinfectants (such as sodium hypochlorite or 70 % alcohol) [30].

Vision professionals, among other things, should consider advising patients to reduce or eliminate sleeping in their contact lenses. Furthermore, should consider ways to communicate with the patients at this time and decide how to deal with clinical issues when normal clinical settings may not be available.

Continuing the common guideline, the experts recommend to stop using contact lenses only in people who are infected with the virus [31]. At last, did not provided any evidence that glasses offer protection against the virus.

Numerous contact lens suppliers have made similar reassuring statements and are instructing users for a better cleaning and care of contact lenses. Some contact lens manufacturing companies are also organizing videoconference to inform and awaken dispensers and users, as well, in relation to the guidelines for dealing with the current situation of COVID-19.

Recently, various professional bodies around the world have been providing advice, both with recommendations for maintaining safe clinical practice in general and in some cases with the use of contact lenses. These include scientific updates from the American Optometric Association, the Canadian Optometrists Association and the British College of Optometrists. Furthermore, many other professional bodies, like academic institutions and contact lens manufacturers are expected to follow, with similar advice.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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