



E-mail :info@kistmcth.edu.np | www.kistmcth.edu.np

## Journal of KIST Medical College

### Safe Ophthalmic Practices during COVID 19 Pandemic

Sanjeev Bhattarai

Maharajgunj Medical Campus, Institute of Medicine, Kathmandu, Nepal.

#### ABSTRACT

Corona virus disease (COVID-19) is an ongoing global public health problem mainly affecting respiratory system with life threatening results. Various literatures have suggested that it has some ocular manifestations too that should not be ignored as the ocular surfaces can also be a mode of transmission of the disease. All the ophthalmic equipments should be sterilized using 70% ethyl alcohol or isopropyl alcohol. Breath shields should be mounted on any ophthalmic equipment as far as possible. Special care should be taken in examination of patients suffering from fever and flu like symptoms. Contact lenses wearers need to maintain optimal hygiene practices during the COVID-19 pandemic to minimize its complications.

SARS CoV-2 virus is detected in the tears and conjunctival secretions of the affected individual. Ocular disease may occur during the initial period of infection or during follow up. Among them the most frequently reported ocular findings in COVID-19 are keratoconjunctivitis, tearing, burning, chemosis, photophobia, ocular irritation, subconjunctival hemorrhage and conjunctival hyperemia. Such ocular disorders are usually self-limiting and can be treated with symptomatic treatments.

Though the transmission of virus through the ocular secretion is very low, the clinicians need to take proper precautions during eye examination. Regarding contact lens use, daily disposable lens should be motivated.

**Keywords:** ACE2; Conjunctivitis; Contact lens; Corona virus; COVID-19; Ocular surfaces

**Citation :** Bhattarai , S.Safe Ophthalmic Practice during COVID 19 Pandemic .*Journal of KIST Medical College*.2021;3(2)6:72-76

#### Correspondence:

Dr. Sanjeev Bhattarai

Assistant Professor

Maharajgunj Medical Campus

Institute of Medicine, Kathmandu, Nepal.

Email: [bhattarai\\_sanjeev@yahoo.com](mailto:bhattarai_sanjeev@yahoo.com)

Contact number: 9841509323

**Conflict of interest:** None,

**Sources of the support:** None

#### Article info

Received: 30 May, 2021

Accepted: 15 June, 2021

Published: 31 July, 2021

#### Copyright

JKISTMC applies the Creative Commons Attribution-Non Commercial 4.0 International License (CC BY) to all works we publish. Under the CC BY license, authors retain ownership of the copyright for their article, but authors allow anyone to download, reuse, reprint, distribute, and/or copy articles in JKISTMC, so long as the original authors and source are cited.



## INTRODUCTION

Corona virus disease (COVID-19) has been a global pandemic which emerged from Wuhan province of China for first time around December 2019. It is caused by Severe Acute Respiratory Syndrome Corona Virus-2 (SARS-CoV2), a novel, enveloped single stranded RNA virus.<sup>1</sup> Despite the current review indicating that the eye is unlikely site for SARS-CoV-2 infection, scrupulous eye care and hygiene should be continued. Precautions employed by both eye care practitioners and patients during the COVID-19 pandemic remain necessary to minimize viral transmission via person to person contact.<sup>2</sup> Eye health professionals are at risk to contract COVID-19 because they have to adhere to significant proximity necessary for procedures like ophthalmoscopy, retinoscopy and slit lamp biomicroscopy. So a great care should be taken by them to be in safe condition. So as a preventive measure, eye care providers are recommended to properly wear PPE which include cap, face mask, eye shields and gloves each time they examine a patient.

## OCULAR PATHOGENESIS OF CORONA VIRUS

Corona virus targets the angiotension converting enzyme 2 (ACE 2) receptors in airway epithelium, mainly nose and upper respiratory tract mucosa. Such receptors are present in corneal and conjunctival epithelium as well. But attachment of virus in ocular tissue is minimal because of two reasons. First, the lactoferrin present in the tear film is in such a high concentration that it prevents the virus attachment to ocular epithelium. Secondly SARS CoV 2 receptors i.e. ACE 2 receptors are present in ocular surface but luckily TMPRSS 2 protein which is required to spike proteins of this virus to bind to ACE 2 receptors is absent in the ocular tissue. Corona virus RNA has been found in human tears. But it is not very clear how the virus accumulates in the ocular secretion. It has been assumed that there might be direct inoculation of the ocular surface from the respiratory droplets and aerosolized particles. The virus might migrate from nasal mucosa through nasolacrimal duct and there would be hematogenous spread to the lacrimal gland that might ultimately spreads in the conjunctival fornices.<sup>1,3</sup>

## ASSUMED MECHANISM OF EYE INFECTION WITH COVID-19

According to Erica Hersh, the novel Corona virus can enter our body through our eyes in addition to our nose and mouth.<sup>1,4</sup> If somebody suffering from Corona virus sneezes, coughs or talks, he/she spreads droplets that contain virus. The healthy individuals are now most likely to breathe in those droplets and suffer from Corona virus. A single cough/sneeze can produce up to 3000 droplets. Even in speaking, droplets are emitted in a lower quantity. Another way is that if the virus lands on our hand or fingers and we touch our nose, mouth or eyes, then might contract the virus, though it is less common.

## OCULAR MANIFESTATION OF COVID-19

Langis Michaud in his literature mentions that acute conjunctivitis is the only ocular manifestation of COVID-19.<sup>5</sup> According to him, less than one percent of infected people experience eye irritation in the form of red eye. It can last 10 to 20 days after the first symptoms. Rarely the cornea may also be affected but can be well controlled with the usual treatments without major long term complications. Some literature mention high rates of ocular involvement while other show very little ocular involvement. There are three reports from China with conflicting results. Among them first report from Gaun Wj et al. mentioned only 0.8% of the patients out of 1099 patients had conjunctival congestion<sup>6</sup>. Second report by Wu P et al. showed that up to 31.6% of 38 hospitalized patients had some kind of ocular involvement involving eye chemosis, tearing, increased secretion and ocular redness.<sup>7</sup> The third literature from Xia J et al. mentioned that only one out of 30 patients had red eye (conjunctivitis) and SARS- CoV 2 positive in tear.<sup>8</sup>

Similarly other two reports from Turkey too showed some ocular involvement of Corona virus. One report by Hasan Oncul et al. showed 4.5% of ocular involvement including sub-conjunctival hemorrhage, conjunctival chemosis, conjunctival hyperemia, conjunctivitis and even vitreous hemorrhage.<sup>9</sup> Similarly another literature by BB Ceran et al. mentioned that out of 93 Covid-19 patients, 21.5% had ocular finding with conjunctival hyperemia being the most common.<sup>10</sup> Moreover a case study from Canada by Cheema M et al. reported that Keratoconjunctivitis was the initial medical presentation of novel corona virus.<sup>11</sup> A literature from China by Ruamviboonsuk P et al. suggested that patients who are in ventilators for a long time and treated with high dose of hydroxychloroquine might

develop Bulls Eye Maculopathy later in life.<sup>12</sup> But till now no visual loss has been reported in human but we are yet to see the long term sequelae as far as this disease is concerned. So far in animals, Corona virus has been reported to cause uveitis, retinitis, vasculitis and optic neuritis.

Relating to eyes and vision, there might be mask induced evaporative dry eye during COVID-19 pandemic. The displacement of the mask or its incorrect fitting could disperse air around the eyes and the air leaking could cause rapid evaporation of tears, so, elderly people who have less efficient tears are affected most. To relieve such symptoms, frequent instillation of artificial tear supplements is necessary.<sup>13</sup>

In the recent Corona virus updates for Ophthalmologists, issued by American Academy of Ophthalmology (AAO)<sup>14</sup> recommends for protection of mouth, nose and eye when caring for patients potentially infected with SARS CoV 2. The doctors and all technical staffs should be alert for patients who present with conjunctivitis especially with flu like symptoms and should be suspected for risk of COVID-19. Eye consultation is urgently required only in cases of sudden vision loss, new onset of flashes and floaters, high intra ocular pressure, neo-vascular glaucoma, orbital infection, post operative conditions of complex ocular surgery, papilloedema, optic neuritis, corneal ulcer, keratitis etc. In the same way, Nepal Ophthalmic Society (NOS)<sup>15</sup> has issued clinical safe guides and recommendation for the safety of eye care practitioners. According to NOS, considering eye services, more priority should be given to those individuals who have potential risk to vision, eye and life with impact on the quality of life if not treated in time. Moreover one eyed patient should be kept in more priority. Some urgent and emergent conditions of eye are sudden onset of red eye, any form of ocular injury, flashes and floaters, severe ocular pain, double vision, painful swelling of eye lid, sudden blurring of distant vision, colour haloes around light etc. otherwise all the routine follow up cases without any new problems can be delayed for few months until the COVID-19 is in control. Similarly before evaluation of any patients for any ophthalmic conditions, important general history which includes any history of fever, shortness of breath and flu like symptoms should be taken. Clinicians should be more aware if the patient gives travel history to the

high risk area and further contact with any individual with COVID-19.

Regarding eye care and safe ophthalmic practices, Aravind Eye Hospital, Pondicherry India<sup>16</sup> has issued a clinical protocol for clinicians and patients to prevent COVID-19. It advised that only emergency clinical scenarios in which delay in care would lead to immediate loss of vision should be taken for surgical procedures. Significant patient history and chief complaints are asked before sitting at the slit lamp. A durable barrier shield should be instilled on each slit lamp, keratometer etc. for safety. All the eye care practitioners including doctors, optometrists, technical staffs, nurses should be in full PPE which include a disposable cap, face shield, gloves during eye examination and other ophthalmic procedures. All eye surgeries and procedures should be directed as day care services whenever possible and should be attempted under local anesthesia. All the patients with red eye (conjunctivitis) new and follow up should be seen in isolated room or in an emergency room.

Safety precautions during ophthalmic evaluations: According to various hospitals and academy's protocol<sup>14-16</sup>, there are some common clinical guidelines for safe ophthalmic practices during COVID-19. Though the transmission of virus in the ocular secretion is very low, we still need to take proper precautions while examining the patients. Ophthalmic equipments like trial frames, Gonio lens, laser lens, B scan probes, 20D and 90D lenses, Tonometer tip etc should be disinfected after each use. During the pandemic, potentially aerosol generating procedures like non contact air puff tonometry, syringing, irrigation of conjunctival sac should be avoided. Age related cataract surgery and visual field testing can be deferred for regular follow up cases. If such procedures are to be done then proper recommended precautions should be taken and there must be few hours interval between two patient examinations.

### **CONTACT LENS AND ITS USE DURING COVID-19**

Contact lens is a very effective and safe way to correct vision which is a thin, optical device that rest on the surface of the cornea to correct the refractive error of an individual.<sup>17</sup> A few recent literatures<sup>18,19</sup> have suggested that contact lens users might be potentially more susceptible to infection for basically three reasons. First our hands can bring the virus to the

eyes. Another factor when the infected person nearby (less than 1.5 meter) coughs or sneezes, it can carry the virus on the contact lens through the droplets emitted into the air. Third reason is the conjunctiva, which is one of the preferred ways of penetration for the virus into the body.

Safety clinical tips for contact lens practitioners and users: Preferably promptly sanitized spectacles should be used and postpone the contact lens fitting activities until the risk of corona virus contamination ceases. But if the contact lenses are really in a need, all the precautions regarding its uses and disinfection techniques should be followed. Contact lens users should not touch the nose and mouth with unwashed hands as far as possible. Various published literatures on contact lens during COVID-19 have given some ophthalmic guidelines for safe wear, care and maintenance of contact lenses<sup>20-23, 25</sup>. They recommend that before handling contact lenses, both hands should be washed for at least 20 seconds with soap and water and dry with clean paper or cloth. Afterwards, contact lenses should be cleaned by rubbing it with multipurpose contact lens solution and rinsed with it. Fresh solution should be used every time to disinfect and store contact lenses. The contact lens case or kit should be replaced at least once every 3 months. In cases of daily disposable lenses, it should be disposed after each wear. For reusable lenses, it should be cleaned and disinfected. When someone is having illness, he/she should stop contact lens wear until healthy again. Similarly contact lenses should be removed from eyes when we are taking showers and before going swimming. The contact lens user should avoid rubbing or touching their eyes during contact lens wear. But if it is needed, protective eye shields or any suggested devices should be used along with contact lenses. The contact lens user should avoid rubbing or touching their eyes during contact lens wear. Consultation with an Optometrist or Ophthalmologist is required in cases of any unusual signs and symptoms.

Considering contact lens practices, Elise Kramer has advised to wear surgical masks for protection of mouth and nose in all clinical settings until further notice.<sup>26</sup> According to Kramer, for disinfection of soft contact trial lenses, it should be done with 3% hydrogen peroxide solution followed by complete

neutralization with 0.9% sodium chloride solution for 15 minutes or lens can be stored overnight in isotonic saline. It needs four hours for complete neutralization. Hydrogen peroxide (3%) is highly acidic with pH of 3 to 4. For rigid gas permeable lenses, disinfection of trial lenses can be done by storing the lenses overnight or 4 to 6 hours in multipurpose solution formulated for RGP lenses. According to American Academy of Optometry<sup>24</sup>, specialty products like rigid gas permeable (RGP) lenses, Scleral lenses, Ortho-K lenses trial sets should be disinfected using 3% hydrogen peroxide. For hard contact lenses, trial lenses must be stored dry for a week before trying on the next patient. Similarly, to minimize contact time between patient and examiner soft copy of the instruction sheet can be forwarded to the new patients and follow up examinations should be done only if they are an absolute must. Tele consulting may be tried, and the patients can be taught to take the photograph of the eye with lens on way of instructional video.

#### SUMMARY

Eye examinations pose the risk of contagion between an asymptomatic patient and any medical staffs due to close proximity. So washing of hands with alcohol based detergents and disinfecting the used ophthalmic instruments are mandatory. Since the droplets from a cough or sneeze of an infected individual can travel up to six feet, the main ophthalmic equipments like slit lamp, keratometer, biometer, tonometer etc should be provided with protective plastic shields which act as a barrier to droplets. All the ophthalmic medical/non medical staffs should wear PPE including N95 masks, protective goggles or face shields, gloves and cap. In cases of refractive errors, regular spectacles wear should be motivated contact lens fitting should be postponed. If already using contact lenses, it should be suspended in a case with eye redness and any flu like symptoms. Preferably daily disposable contact lenses should be provided and contact lens users should follow all hygiene rules given by eye care practitioners.

**ACKNOWLEDGEMENT:** I am highly obliged with late Professor Dr. Poojyashree Karki, Head of department of Ophthalmology, KIST Medical College, Gwarko, Lalitpur, Nepal who motivated me to prepare this type of manuscript as an optometrist before announcement of public lockdown situation in the Kathmandu valley.



## REFERENCES

1. MDP Wilcox, K Walsh, JJ Nichols, PB Morgan, LW Jones. The ocular surface, coronaviruses and COVID-19. *Clin Exp Optom*. 2020 July; 103(4): 418-424. doi: 10.1111/cxo.13088
2. World Health Organization. Corona virus disease 2019(COVID-19)- situation report-89. 2020
3. Noemi Guñemes-Villahoz, Barbara Burgos-Blasco and Beatriz Vidal-Villegas et. al. Novel Insights into the Transmission of SARS-CoV-2 through the Ocular Surface and its Detection in Tears and Conjunctival Secretions: A Review. *Adv Ther* <https://doi.org/10.1007/s12325-020-01442-7>
4. Hersh E. Can wearing contact lenses increase your risk of COVID-19? Healthline. Google
5. Michaud L. Does wearing contact lenses put you at greater risk of getting COVID-19? THE CONVERSATION. Google
6. Gaun Wj, Yi Ni Z, Hu Yu, Liang WH, Quan Ou C, Xing He J. Clinical characteristics of coronavirus disease 2019 in China. *N Eng J Med*. 2020 Apr 30; 382(18):1708-1720. doi: 10.1056/NEJMoa2002032. Epub 2020 Feb 28.
7. Wu P, Duan F, Luo C, Liu Q, Qu X, Liang L. Characteristics of ocular findings of patients with corona virus diseases 2019(COVID-19) in Hubei Province, China. *JAMA Ophthalmol*. 2020 May; 138(5):575-578. . doi: 10.1001/jamaophthalmol.2020.1291
8. Xia J, Tong J, Liu M, Shen Y, Guo D. Evaluation of coronavirus in tears and conjunctival secretions of patients with SARS- CoV-2 infection). *J Med Virol*. 2020 Jun; 92(6): 589-594. DOI: 10.1002/jmv.25725
9. Oncul H, Oncul FY, Alakus MF, Caglayan M, Dag U. Ocular findings in patients with corona virus disease 2019 in an outbreak hospital. *Journal of MEDICAL VIROLOGY*. 2020 Aug 10. <https://doi.org/10.1002/jmv.26412>
10. Ceran BB and Ozates Serdar. Ocular manifestation of coronavirus disease 2019. *Graefe archive for clinical and experimental Ophthal*. 2020 September; 258(9): 1959-1963. DOI: 10.1007/s00417-020-04777-7
11. Cheema M, Aghazadeh H, Ting A, Hodges J, McFarlane A, Kanji JN. Keratoconjunctivitis as the initial medical presentation of novel corona virus disease 2019(COVID-19). *Can J Ophthalmol*. 2020 Aug; 55(4): e125-e129. doi: 10.1016/j.cjco.2020.03.003
12. Ruamviboonsuk P, Lai TYY, Chang A, Lai C, Mieler WF, Lam DSC. Chloroquine and Hydroxychloroquine retinal toxicity consideration in the treatment of COVID-19. *Asia Pac J Ophthalmol (Phila)*. 2020 Apr 29; 9:85-87. . doi: 10.1097/APO.0000000000000289
13. Giannaccare G, Vaccaro S, Mancini A, Scorcia V. Dry eye in the COVID-19 era: how the measures for controlling pandemic might harm ocular surface. *Graefe's Archive for Clinical and Experimental Ophthalmology*. 2020, 1-2.
14. American Academy of Ophthalmology. Important Coronavirus (COVID-19) Updates for Ophthalmologists. Online on Sunday, April 5, 2020.
15. Nepal Ophthalmic Society COVID-19 Ophthalmology Practice Guidelines. By- Nepal Ophthalmic Society Kathmandu, Nepal. April, 2020.
16. Aravind Eye Hospital, Pondicherry, India. Suggested Clinical Protocols to prevent COVID-19. 2020.
17. Denniston A, Murray P. *Oxford Handbook of Ophthalmology*. First Ed. New York: Oxford University Press; 2006:626.
18. Olivares-de Emparan JP, SardiCorrea C, Lopez-ulloa JA, Viteri JS, Pennicook JA, Jimenez-Roman J. COVID-19 and the eye: how much do we really know? A best evidence review. *Oftalmologia*, 2020; 83(3):250-61. DOI:10.5935/0004-2749.20200067
19. Zeri F and Naroo SA. Contact Lens practice in the time of COVID19. *Cont Lens Anterior Eye* 2020; 43:1935. doi: 10.1016/j.clae.2020.03.007. Epub 2020 Mar 19
20. Estopa MV, Wolffsohn JS, Beukes E, Trott M, Smith L, Allen PM. Soft contact lens wearer's compliance during the COVID-19 pandemic. *Cont Lens Anterior Eye*. 2020 Aug 14; 101359 doi: 10.1016/j.clae.2020.08.003.
21. BCLA: Contact Lens Wear and coronavirus (COVID-19) guidance 2020. The new guidance from NHS England.
22. Jones L, Walsh K, Wilcox M, Morgan P, Nichols J. The Covid19 pandemic: Important considerations for contact lens practitioners. *Cont Lens Anterior Eye*. 2020 June; 43(3):196203. doi: 10.1016/j.clae.2020.03.012.
23. CDC guidelines for contact lens wear during COVID19. Available from: <https://www.cdc.gov/contactlenses/index.html>. [Last accessed on 2020 Jun 24]
24. American academy of optometry & American Optometry association: In office disinfection of multipatient use diagnostic contact lenses. Available from: [https://www.aaopt.org/docs/covid19/aao008disinfectionofcontactlenseschart.pdf?Sfvrnsn=a7f2a31\\_2](https://www.aaopt.org/docs/covid19/aao008disinfectionofcontactlenseschart.pdf?Sfvrnsn=a7f2a31_2).
25. Boyd K. How to take care of contact lenses. American Academy of Ophthalmology. Online on March 04, 2021
26. Kramer Elise. Contact lens practice in the time of COVID-19. *Healio Optometry*. Online on July 23, 2020.