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REVIEW ARTICLE **OPEN ACCESS**

Influence of Covid-19 on Eye Health

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ABSTRACT
Coronavirus is a group of viruses that are caused due to SARS Cov-2. It was first identified in Wuhan city of China. With the emergence, ocular manifestations of Covid-19 have also been observed. SARS-CoV-2 RNA has been observed in the tears of infected individuals, indicating that the eye surface might act as a gateway and pool for transmission of the virus. Clinically, Mild Conjunctivitis has been associated with Covid-19. Subtle retinal alterations have also been described, including hyperreflective lesions in the inner layers on optical coherence tomography (OCT), cotton-wool patches, and micro hemorrhages. COVID-19 is being treated with several different approaches, but none of them has yet been proven to be safe and effective. This review paper aims to discuss up-to-date information about ocular manifestations of Covid-19 for identifying clinical symptoms and how to manage them.
Keywords: COVID-19, Eye Health, Optical coherence tomography

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INTRODUCTION

SARS-CoV-2 (severe acute respiratory syndrome coronavirus has caused a global epidemic, with over 4 million confirmed cases and 280,000 fatalities thus far. "COVID-19" is the term given to the disease produced by SARS-CoV-2 (1). The pathogen responsible has been identified as a new RNA beta coronavirus. According to evolutionary research, bats may have been the virus's original host. The first sick persons were exposed to live animals being sold at a wet market in Wuhan (2). There are fewer reported ocular manifestations associated with SARS-CoV infection (3). The documented ocular signs of the illness vary significantly and include dry eye, foreign body feeling, itching, blurring of vision, conjunctivitis, chemosis, and photophobia. Conjunctivitis has also been found in several studies as an early indicator of COVID-19 etiology. Knowing the incidence and type of COVID-19 ocular symptoms can help clinicians identify the infection more accurately in the disease's progression. At the time of writing this article Globally there have been 276,436,619 confirmed cases of COVID-19, including 5,374,744 deaths, reported to WHO (4). This paper aims to discuss up-to-date information about ocular manifestations of covid-19 for identifying clinical symptoms and how to manage them. Delta (B.1.617.2 lineage) — This lineage was initially detected in India in December 2020 and had been the most common version worldwide until the advent of the Omicron variant. The Delta variation is more transmissible than Alpha which was more transmissible than previously circulating SARS-CoV-2 lineages. According to data from the United Kingdom, the proportion of SARS-CoV-2 infections caused by Delta increased while that caused by Alpha decreased, and the secondary household infection rate linked with Delta illness was 13.6 percent compared to 9.0 percent for Alpha. In another report of a minor epidemic in the United States, the Delta type was linked to 53% of household attacks. The underlying mechanism for the enhanced transmissibility is unknown (5). Omicron (B.1.1.529 lineage) — In November 2021, this variation was first identified in Botswana and afterward in South Africa. It was linked to an upsurge in regional infections in South Africa, and it was quickly discovered in several other countries. Omicron accounted for the bulk of new infections in the United States as of mid-December 2021. The variation comprises approximately 30 changes in the spike protein, including alterations related to greater transmissibility and lower sensitivity to neutralizing antibodies in other variants of concern (including therapeutic monoclonal antibodies) (6). Early research suggested that ocular symptoms of COVID-19 were uncommon in general. From December 2019 to January 2020, only 9 (0.8 percent) of 1,099 patients from 552 hospitals in 30 provinces in China were reported to have "conjunctival congestion." (7). Recent results, on the other hand, suggest a substantially greater prevalence of ocular signs and symptoms.

Nasiri et al. found a pooled prevalence of all visual symptoms among 7,300 COVID-19 patients as 11.03 percent in a 2021 meta-analysis, with conjunctivitis being the most common ocular condition (88.8 percent). The most common symptoms reported in the same meta-analysis were dry eye or foreign body feeling (16%), eye redness (13.3%), tears (12.8%), and itching (12.6%) (8). A case series reported 38 patients with COVID-19, 12 patients had ocular manifestations, such as epiphora, conjunctival congestion, or chemosis, and these commonly occurred in patients with more severe systemic manifestations. Reverse transcriptase-polymerase chain reaction results were positive for severe acute respiratory syndrome coronavirus 2 in 28 nasopharyngeal swabs and 2 conjunctival swabs, and more significant changes in blood test values appeared in patients with ocular abnormalities. (9)

OCULAR SYMPTOMS OF COVID-19

CONJUNCTIVITIS

Conjunctivitis and keratitis have been documented as COVID-19 common ocular symptoms. COVID-19 conjunctivitis begins as unilateral redness of the eye with the follicular response (inferior palpebral), just like any other viral conjunctivitis (10). It may resolve on its own or proceed to include coarse epithelial keratitis, pseudomembranous conjunctivitis, bilateral hemorrhagic, pseudomembranous conjunctivitis, and keratitis. (11)

SCLERA/EPISCLERA

At least two cases of episcleritis have been recorded in the context of COVID-19 infection. Staff et al. (12) saw a 29-year-old man with unilateral episcleritis as the first sign of SARS-CoV-2 infection, while Mangana et al. saw a 31-year-old female with nodular episcleritis. (13)

RETINA

Retinal changes were also inclined to be associated with covid-19. Optical Coherence Tomography is a non-invasive imaging technology that can detect subclinical retinal changes in systemic diseases including diabetes, as well as numerous viral infections. Optical Coherence Tomography was employed to assess individuals infected with coronavirus 2 that causes severe acute respiratory syndrome. The results of the Optical Coherence Tomography angiography and the study of the ganglion cell complex looked to be normal. On fundus photography, four patients (33%) showed mild cotton-wool patches and microhemorrhages along the retinal arcade. There was no evidence of intraocular inflammation, visual acuity changes, or aberrant pupillary reflexes. The lesions were thought to be caused by either direct inflammatory infiltration of the retina or microangiopathic disease caused by viral infection. (14)

OPTIC NERVE

COVID-19 has been linked to a range of neuro-ophthalmologic symptoms, the majority of which are associated with demyelinating illness. While the cause of these symptoms is uncertain, theories include direct neural invasion, endothelial cell failure leading to ischemia and coagulopathy, or a virus-induced inflammatory called "cytokine storm"(15). Verkuli et al. documented a 14-year-old girl who had pseudotumor cerebri syndrome owing to COVID-19, which manifested as a new right abducens palsy, papilledema with disc hemorrhages, and lumbar puncture with a 36 cm H2O opening pressure (16).

KAWASAKI DISEASE

Kawasaki disease (KD), also known as Kawasaki syndrome, is a febrile sickness with no known cause that mostly affects children under the age of five. Fever, oropharyngeal and extremities alterations, polymorphous rash, and unilateral cervical lymphadenopathy are all symptoms of Kawasaki disease (KD), an acute and typically self-limiting vasculitis of the medium-size arteries that predominantly affects young children. Despite decades of research, the cause of KD has yet to be discovered. However, previous research implies that an infectious agent may set off a chain reaction that results in sickness. A substantial link was discovered between an outbreak of Kawasaki-like disease and COVID-19 in the Italian region of Bergamo, which was heavily impacted by the SARS-CoV-2 pandemic. Some researchers found a 30-fold rise in the occurrence of a severe form of KD, with 80 percent of children testing positive for COVID-19 serology (17). In a 6-month-old female with a fever and minor respiratory symptoms, the first instance of KD with concomitant COVID-19 infection was discovered. The newborn developed limbic sparing conjunctivitis, a large tongue papilla, a blanching, polymorphous, maculopapular rash, and swelling of the hands and lower limbs after testing positive for COVID-19 (18). A comparable outbreak of Kawasaki-like disease is predicted in nations throughout the world as the SARS-CoV-2 epidemic progresses. As a result, ophthalmologists should be aware of any ocular symptoms and, if necessary, consider appropriate therapy.

EYE COMPLICATIONS IN INTENSIVE CARE UNIT

With prone positioning, which is vital in the respiratory care of critically ill patients with COVID-19, ocular problems may worsen. A 17 percent prevalence of acute respiratory distress syndrome (ARDS) has

been documented among COVID-19 patients. ARDS is a life-threatening condition that necessitates critical care unit breathing assistance (ICU) (19).

RARE OCULAR SYMPTOMS

Acute ischemic optic neuropathy, which causes irreversible vision loss, has been linked to prone position breathing. IOP and ocular blood flow affect ocular perfusion, which is influenced by arterial and venous pressure as well as vascular resistance. The prone posture reduces ocular perfusion significantly through two methods. It raises venous pressure while simultaneously raising IOP. After 320 minutes in the prone position, IOP reaches around 40 mmHg. Improperly fitted prone face positioners might potentially aggravate this issue. Furthermore, systemic diseases including diabetes, arterial hypertension, and atherosclerosis can cause an increase in vascular resistance, lowering ocular blood flow even further. As Aa result, patients are more likely to be admitted to the ICU for COVID-19. Horner's syndrome is an uncommon side effect of central venous catheterization. In a prospectively investigated sample of 100 patients, it was shown to occur 2% of the time. It was most likely caused by either direct sympathetic plexus injuries or an enlarging hematoma. A small number of COVID-19 patients who are very unwell might develop classic clinical signs and symptoms of viral sepsis.

MANAGEMENT

MEASURES	WHY IT HAS TO BE FOLLOWED
Touching or rubbing eyes should be refrained.	Prevention of viral contamination
Patients with conjunctivitis should be managed symptomatically.	Further spread of the infection should be stopped
Wear protective eyeglasses	Prevents droplet infection
Contact lens wearers should be safe while using the lens.	Prevents viral transmission and reduces chances of cross-contamination.
Face shields should be chosen appropriately.	Minimize viral transmission.

CONCLUSION

The COVID-19 pandemic's fast spread has posed considerable issues for the general population as well as healthcare professionals all across the world. For the decrease of new cases and the safety of healthcare staff, understanding viral incubation, transmission, and shedding are critical. Patient care has undoubtedly evolved, including from an ophthalmological standpoint. Conjunctivitis may be an ocular sign of SARS-CoV-2 infection, according to multiple reports of eye redness and irritation in COVID-19 patients, both anecdotal and documented. The majority of persons who use artificial breathing may have varying degrees of ocular surface issues. While these episodes may be difficult to treat while the patient is in the ICU, they might result in sight-threatening complications such as bacterial superinfection and corneal abrasions. Other unusual adverse effects of the prone position, which have been demonstrated to be beneficial in treating severe COVID-19 pneumonia, include optic neuritis and acute angle-closure glaucoma. To summarize, health care practitioners are today facing an unparalleled global health crisis that crosses all medical disciplines. Despite the pandemic, we must make every effort to lower infection rates and treat patients as best we can.. Furthermore, larger studies, protocols, and trials should be conducted to evaluate ocular symptoms caused due to Covid-19

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

REFERENCES

1. Nasiri N, Sharifi H, Bazrafshan A, Noori A, Karamouzian M, Sharifi A. (2021). Ocular Manifestations of COVID-19: A Systematic Review and Meta-analysis. J Ophthalmic Vis Res.20;16(1):103-112. DOI: 10.18502/jour.v16i1.8256. PMID: 33520133; PMCID: PMC7841281.
2. Trivedi N, Verma A, Kumar D. (2020). Possible treatment and strategies for COVID-19: review and assessment. Eur Rev Med Pharmacol Sci. ;24(23):12593-12608. DOI: 10.26355/eurrev_202012_24057. PMID: 33336780.
3. Sen, Mrittika; Honavar, Santosh G; Sharma, Namrata; Sachdev, Mahipal S (2021). COVID-19 and Eye, Indian Journal of Ophthalmology: Volume 69 - Issue 3 - p 488-509
4. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, Liu L, Shan H, Lei CL, Hui DSC, Du B, Li LJ, Zeng G, Yuen KY, Chen RC, Tang CL, Wang T, Chen PY, Xiang J, Li SY, Wang JL, Liang ZJ, Peng YX, Wei L, Liu Y, Hu YH, Peng P, Wang JM, Liu JY, Chen Z, Li G, Zheng ZJ, Qiu SQ, Luo J, Ye CJ, Zhu SY, Zhong NS., (2020). China Medical Treatment Expert Group for Covid-19. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med. 30;382(18):1708-1720
5. Wu P, Duan F, Luo C, Liu Q, Qu X, Liang L, Wu K. (2020). Characteristics of Ocular Findings of Patients with Coronavirus Disease 2019 (COVID-19) in Hubei Province, China. JAMA Ophthalmol. ;138(5):575-578.

6. Marinho PM, Marcos AAA, Romano AC, Nascimento H, Belfort R. Jr. (2020). Retinal findings in patients with COVID-19. The Lancet. 395(10237):1610. doi: 10.1016/S0140-6736(20)31014-X.
7. Navel V, Chiambaretta F, Dutheil F. (2020). Haemorrhagic conjunctivitis with pseudomembranous related to SARS-CoV-2. Am J Ophthalmol ;19:100735. Doi: 10.1016/j.ajoc.2020.100735.
8. Otaif W, Al Somali AI, Al Habash A. (2020). Episcleritis as a possible presenting sign of the novel coronavirus disease: A case report. Am J Ophthalmol Case Rep. 20:100917. doi: 10.1016/j.ajoc.2020.100917. Epub 2020 Sep 8. PMID: 32923742; PMCID: PMC7476899.
9. Méndez Mangana C, Barraquer Kargacin A, Barraquer RI. (2020). Episcleritis as an ocular manifestation in a patient with COVID-19. Acta Ophthalmol. 98(8):e1056-e1057. doi: 10.1111/aos.14484. Epub 2020 Jun 1. PMID: 32483943; PMCID: PMC7300696.
10. Paula M Marinho, Allexya A Marcos, André C Romano, Heloisa Nascimento, Rubens Belfort, (2020). Retinal findings in patients with COVID-19, The Lancet, volume 395, Issue 10237, Page 1610
11. Luís ME, Hipólito-Fernandes D, Mota C, Maleita D, Xavier C, Maio T, Cunha JP, Tavares Ferreira J. A Review of Neuro-Ophthalmological Manifestations of Human Coronavirus Infection. Eye Brain. 2020 Oct 30;12:129-137
12. Verkuil LD, Liu GT, Brahma VL, Avery RA. Pseudotumor cerebri syndrome associated with MIS-C: a case report. Lancet. 2020 Aug 22;396(10250):532. doi: 10.1016/S0140-6736(20)31725-6. Epub 2020 Aug 11. PMID: 32795406.
13. Lucio Verdoni, Angelo Mazza, Annalisa Gervasoni, Laura Martelli, Maurizio Ruggeri, Matteo Ciuffreda, Ezio Bonomi, Lorenzo D'Antiga,An outbreak of severe Kawasaki-like disease at the Italian epicentre of the SARS-CoV-2 epidemic: an observational cohort study,The Lancet,Volume 395, Issue 10239,2020,Pages 177,1778,ISSN 0140-6736,https://doi.org/10.1016/S0140-6736(20)31103-X.
14. Veena G. Jones, MD; Marcos Mills, MD; Dominique Suarez, MD; Catherine A. Hogan, MD; Debra Yeh, MD; J. Bradley Segal, MD; Elizabeth L. Nguyen, MD; Gabrielle R. Barsh, MD, PhD, MD; Shiraz Maskatia, MD; Roshni Mathew, MD/ COVID-19 and Kawasaki Disease: Novel Virus and Novel Case/Hosp Pediatr (2020) 10 (6): 537–540.https://doi.org/10.1542/hpeds.2020-0123
15. Rikke Krogh-Madsen, John P. Thyfault, Christa Broholm, Ole Hartvig Mortensen, Rasmus H. Olsen, Remi Mounier, Peter Plomgaard, Gerrit van Hall, Frank W. Booth, and Bente K. Pedersen,A 2-wk reduction of ambulatory activity attenuates peripheral insulin sensitivity, Journal of Applied Physiology 2010 108:5, 1034-1040
16. T. B. Saritas, B. Bozkurt, B. Simsek et al., "Ocular surface disorders in intensive care unit patients," Scientific World Journal, vol. 2013, Article ID 182038, 2013.
17. COVID-19 Treatment Guidelines Panel, (2020). Coronavirus Diseases 2019 (COVID-19) Treatment Guidelines, National Institutes of Health, Bethesda, MD, USA.
18. Chen L, Liu M, Zhang Z, Qiao K, Huang T, Chen M, et al. (2020). Ocular manifestations of a hospitalized patient with confirmed 2019 novel coronavirus disease. Br J Ophthalmol. ;104:748–51.
19. Butty, Z., Gopwani, J., Mehta, S. et al.(2016). Horner's syndrome in patients admitted to the intensive care unit that have undergone central venous catheterization: a prospective study. Eye 30, 31–33. https://doi.org/10.1038/eye.2015.181

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