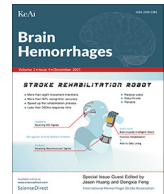




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## Case Report

## Ocular surface: A route for SARS CoV-2 transmission- a case report

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## ABSTRACT

SARS-CoV-2 infections are transmitted through droplets or through direct contact with secretions from an infected person. The transmission of the virus through tears and other body secretions remains controversial. PCR detection of Covid-19 in the samples/swabs taken from nasopharynx, CSF fluid, and tears, clarifies that the virus may be transmitted through the modes other than aerosol droplets or direct contact. In order to control and prevent this infectious disease, cutting-off the route of transmission will be one of the most important steps. SARS-CoV-2 RNA has been detected in tears and conjunctival samples of patients. The ocular tropism of Covid-19 is still uncertain but contentious.

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## 1. Introduction

Being an epicenter of this catastrophic pandemic, much of the clinical knowledge and experience has been delivered by China to the world. In addition to different factors, the potential of SARS-CoV-2 virus to get transmitted through various routes and modes, would have considerably contributed to the current alarming situation around the globe.

The available data has reported that besides respiratory, cardiovascular, neurologic and GI symptoms, SARS-CoV-2 can even result in ocular manifestations, with the symptoms varying from dry itchy eyes, epiphora, heperemia, chemosis, conjunctivitis or foreign body sensation.

Colavita et al.<sup>1</sup> has reported a case in which the viral replication was observed for over 20 days in the conjunctiva of the infected patient, that advocates the established fact that the survival time of virus can be longer than expected on several surfaces. In such a case, the possibility of a potential site for viral replication and transmission of the eye cannot be ruled out. Ocular surface, being exposed can acquire respiratory droplet infections and can serve as a gateway in their transmission. In a study, a few cases reported conjunctivitis to be the initial presentation of Covid-19 patients.<sup>2</sup>

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But the chances remain low, as per clinical observation. This case report describes the patient infected with Covid-19, confirmed by PCR of the nasopharyngeal swab in whom SARS-CoV-2 RNA was detected in tears. Infected patient confirmed by real time-PCR by samples taken from nasopharynx, in whom, the virus has been detected conjunctiva as well, who developed ischemic stroke during their hospital stay.

## 2. Case report

A 70-year-old male, known diabetic, with no recent travel history, presented to emergency room (ER) with complain of fever, cough and bodyaches for the past 10 days and shortness of breath for 01 day. His receiving vitals were Temp: 98° F, B.P: 110/80 mmHg, Pulse: 88 bpm, Respiratory rate: 25/min with 80% oxygen saturation on room air and 94% @ 15L via facemask. Neurological examination was GCS: 15/15, pupils bilateral equal and reactive to light, moving all four limbs. Systemic enquiry revealed bilateral coarse crepitations on chest auscultation, leaving rest of the examination unremarkable. Soon initial management, he was taken over by the covid-Isolation ward after PCR detected SARS CoV-2 infection in nasopharyngeal swab. Inflammatory markers including CRP, Serum ferritin, D-dimers, IL-6, Pro-calcitonin were sent along with all other baseline investigations (Table 1). HRCT was consistent with the findings of classic covid and showed large areas of ground glass opacities with septal thickenings in bilateral lungs, more pronounced in lower

**Table 1**  
Laboratory Findings.

Laboratory Findings	Normal Range	Day 1	Day 5	Day 10	Day 15	Day 20	Day 24	Day 28
WBCs	(4.8–10.8 K/ $\mu$ L)	13,360	10,370	10,400	9280	9730	7680	6750
Neutrophils	(1.4–6.5 K/ $\mu$ L)	92.6	92.7	93.2	94.9	95.2	84.6	92.1
Lymphocytes	(1.2–3.4 K/ $\mu$ L)	5.6	5.3	5.4	2.8	2.9	8.5	5.8
Platelet Count	(130–400/ $\text{mm}^3$ )	258	229	147	176	173	314	219
Hemoglobin	(12–16 g/dL)	14.9	13.5	13.9	13.9	14.6	13.2	14.3
Albumin	(3.5–5.2 g/dL)	1.9	–	2.8	–	2.0	–	3.2
ALT	(0–41 U/L)	188	170	101	65	48	28	38
LDH	(50–242 U/L)	711	606	693	507	497	342	200
Creatinine	(0.7–1.5 mg/dL)	1.7	1.4	0.9	1.2	1.0	0.6	0.7
PT	(9.95–12.87 s)	14.62	–	13.70	–	12.59	–	12.07
D-Dimers	(0–230 ng/mL)	4552	4500	2133	1500	982	746	367
Ferritin	(15–150 ng/L)	2460	2541	2219	1944	1752	1616	483
CRP	(0.00–0.40 mg/dL)	212	149	80	37.53	3.63	1.73	0.61
Procalcitonin	(0.1–0.25 ng/ml)	1.2	–	0.89	–	0.16	–	0.05
IL-6	(<7 pg/ml)	136.4	–	129.8	–	74.3	–	22.6

lobes. EKG was unremarkable. For the peak covid stage, he was treated on the lines of Acute respiratory distress syndrome (ARDS) and was started on Injectables (Azithromycin 500 mg BD, Tocilizumab 600 mg (two doses), Tazobactam + piperacillin 4.5gm QID, Linezolid 600 mg BD, Enoxaparin 60 mg BD (S/C)) and for his glycemic control, insulin was started (Inj. Insulin regular 20+18+18 & NPH 24+24). By that time, Remedesvir was not approved by FDA so was not given to him. By 14th day of his admission, his nasopharyngeal samples detected no virus and his condition started to improve progressively and gradually. SARS-CoV-2 RNA was also detected in the tear samples of the same patient and the results were same for the next 28 days (tear samples being taken every alternate day upto 28th day of illness), after which the SARS-CoV-2 became undetectable. All the strivings and efforts turned out to be fruitful as the patient was discharged successfully on his 28th day of admission, after he was able to maintain oxygen saturation on room air and all other symptoms were settled.

### 3. Discussion

The first ever case of SARS-CoV-2 infection in Pakistan was reported in February 2019. At that time, it was considered that the mode of viral transmission is either respiratory droplets or direct contact. Till then, the other routes of transmission were not explored. One of the important steps for the effective containment of this global pandemic is the identification of all the possible routes and modes through which the virus can get transmitted. Because the minimum yet unknown dose of replication-competent virus is delivered to vulnerable anatomical site in a susceptible host in order to infect with SARS-CoV-2.

A study revealed that SARS-CoV-2 was detected in conjunctival specimens of 2 out of 33 (6.0%) and 3 out of 35 (8.5%) in two different studies carried out separately, all the included covid-positive patients had no ocular manifestations.<sup>3,4</sup> Different methodology and varying definitions of conjunctivitis, timings of sample collection and several other factors may contribute to the varying incidence of ocular manifestations. Also, the few exfoliated cells collected from ocular swabs can make the virus less evident. There is a chance that the RT-PCR kits are lack the sensitivity.

Abrishami M et al.<sup>5</sup> carried out a study in Iran that demonstrated the increased risk of developing chemosis amongst the patients with SARS-CoV-2 in ICU.

The anatomical relationship between ocular and respiratory systems is provided by the nasolacrimal duct, that bridges the two.<sup>6</sup> Beyond this, the cellular receptors e.g. angiotensin converting enzyme-2 (ACE-2) receptors also provide the doorway to all the coronaviruses including SARS-CoV-2 that can bind to it and then get distributed to various issues and cell types, including the conjunctiva.<sup>7</sup> Sun et al. found ACE-2 receptors in cornea and conjunctival tissues. They also found that ACE-2 expression has

been found to be located more in the cytoplasm of conjunctiva and corneal cells than on the cell membrane.<sup>8</sup> The potential portal of entry for SARS-CoV-2 to cause an infection could be the eye, also the virus can be shed via ocular secretions and tears. Eyes can harbor the virus and then can act as a carrier.

This can be dangerous transmission mode and thus is of great consideration in order to protect clinicians especially ophthalmologists.

### 4. Conclusion

Based on the current evidence and analysis, the potential of SARS-CoV-2 transmission through ocular surfaces exists. Though the risk could be lower than that for respiratory tissues, but not inescapable. In order to curb the spread of SARS-CoV-2, the exact routes of transmission need to be explored further. And for protection and minimizing the transmission, eye protection should be one of the essential safeguards.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Ethics approval and consent

The study was approved by the institutional review board.

### Consent for publication

Patient consented for the study and publication.

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