



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Letter to the Editor

Detection of SARS-CoV-2 in ophthalmic secretions

Dear Editor,

We read with great interest the article entitled “COVID-19 and the eye” recently published in this journal.¹ The authors comprehensively evaluated the transmission of SARS-CoV-2 through ocular surfaces and here we present the preliminary data regarding the detection of SARS CoV-2 from the eye swabs.

The epidemic of COVID-19 emerged in Wuhan city, China in December 2019, has now been declared as pandemic of novel SARS-CoV-2 by World Health Organization (WHO) on March 11, 2020.² As of August 11, 2020 over 20 million laboratory confirmed cases and over 0.7 million deaths were reported across the globe.³ Pakistan reported its first case of COVID-19 on February 26, 2020, now the number of total confirmed cases rose to 285,191 including 6112 deaths as of August 11, 2020.³ It is mainly considered that SARS-CoV-2 is transmitted through the respiratory droplet or via direct contact. The other transmission routes such as fecal-oral route or transmission through the ocular secretions have not been determined in detail. The identification of other route of transmission is an important measures in the control and prevention of COVID-19 pandemic. Limited data is available regarding the detection and transmission of SARS-CoV-2 through the ocular secretions. It is indicated that the detection of COVID-19 from the ocular secretions may be the source of infection in hospital settings especially for the clinicians dealing with Eye, ear and nose infection.

From June 6 through June 28, 2020, a total of 35 suspected COVID-19 patients were enrolled for the study and both conjunctival and oropharyngeal swabs samples were collected from all patients admitted in the isolation ward of a tertiary care hospital, Pakistan Institute of Medical Sciences-(PIMS) Islamabad. Written consent was obtained from all patients before the sample collection. Collected samples were transported to the Department of Virology National Institute of Health (NIH) Islamabad for the laboratory confirmation. Study was approved by the internal review board of NIH and PIMS.

Out of total 35 patients, 25(71.4%) were male and 10(28.5%) were female. Age of the patients enrolled for this study was ranging from 20 to 65 years. Symptoms associated with suspected COVID-19 patients, 35(100%) had fever, 21(60%) had dry cough, and 17(48.6%) had difficulty in breathing. Low lymphocytes and platelet count was noted in both group. There was no any significant difference was observed in the hematological and biochemical markers between the both groups. All demographic, clinical and laboratory characteristics of patients are given in the [Table 1](#).

Nucleic acid (RNA) was extracted from all samples including oropharyngeal and conjunctival swabs and were tested by using real-time RT- PCR.

All 35 oropharyngeal swab samples were detected positive for SARS CoV-2, however out of total 35 conjunctival swab samples, 3(8.5%) were detected positive by using real-time RT-PCR. 2(66%) out of 3 conjunctival SARS-Cov-2 positive patients were having dry cough, whereas 3(100%) patients were suffering from fever and difficulties in breathing. There was no ocular manifestation observed among patients with positive conjunctival specimens and similar information has already been reported by the previous study.⁴ Results of the present study support the evidence that ophthalmic secretions may not be the main source of transmission for the novel SARS-CoV-2, but the role of eye in the transmission of this highly contagious virus must not be ignored. Our results are consistent with other reports, although the percentage of positivity is low from ophthalmic secretions as compared to respiratory secretions; this route of transmission cannot be ruled out and needs for further detail investigations.

Previously, coronaviruses are reported as less infectious, causing common cold like symptoms by infecting upper respiratory tract. Because of the previous investigations on coronaviruses it is known that its transmission occurs through infectious respiratory droplets and contaminated fomites. Therefore, the primary source of sampling is the throat/nasal swab, and samples from the lower respiratory tract.⁵ In the current pandemic situation, additional knowledge is required to understand the transmission patterns of SARS-CoV-2 in order to overcome the spread of this newly emerged virus. Tears can be a potential body fluid to harbor coronaviruses, as human eye conjunctiva usually remains exposed to respiratory droplets in air and if rubbed with contaminated hands. In 2004, SARS-coronavirus was detected from tear samples in 37.5% positive cases and in another study, positivity of SARS-CoV-2 from conjunctival swabs was 16.6% which contributed to the evidence of eye as a carrier.^{6,7} It is already reported that many health care workers have been infected by COVID-19 and three ophthalmologists died of COVID-19 in Wuhan China.⁸ Presence of SARS-CoV-2 in the eyes up to 27 days after the onset of infection reported previously⁹ is a matter of great concern. High infection rate and rapid spread of SARS-CoV-2 intrigued the need to investigate the possible role of eyes as shedding route or portal of entry of this SARS CoV-2. However, our study is limited by its small number of cases. Another limitation of our study is lack of long term follow up of patients and unable to collect the sample at multiple time period to check the duration of virus presence in the eyes. The potential for conjunctival transmission of COVID-19 is worth further detail investigations.

Recognizing the risk for viral exposure, all front line medical health care workers including physicians, ophthalmologists and dentists should adopt proper personal protective measures (such as mask PPE and face sheet) to reduce the risk of further transmission of COVID-19 while caring for patients.

Table 1
Demographic, clinical and laboratory characteristics of COVID-19 patients.

Demographic Data	
Age (Years)	30
Locality	Abbottabad, KPK
Gestational Weeks	10
Covid-19 (rRT-PCR positive date)	04-Jun-20
Medical history	None
Delivery Mode	Miscarriage;18-Jun-20
Ultrasound findings	Placental inflammation
Clinical Features	
Fever	99.8 °F
Cough	+
Sore throat	+
Loss of smell and taste	+
Shortness of breath	+
Chest pain	+
Headache	+
Myalgia/Fatigue	+
Nausea/Vomiting	+
Abdominal pain	+
Diarrhea	+
Laboratory Findings	
Hb (g/dL: 11.5 to 16.5)	9.7
WBCs count ($4-10 \times 10^9/L$)	11.7×10^9
Neutrophils ($2-7 \times 10^9/L$)	9.96×10^9
Lymphocytes ($1-3 \times 10^9/L$)	1.26×10^9
Platelet count ($150-400 \times 10^3/\mu L$)	130×10^3
Total Bilirubin (0.2-1.0mg/dl)	0.9
ALT (<50 U/L)	67
ALP (65-306 U/L)	383
Urea (10-52mg/dl)	32
Creatinine (upto 1.0 mg/dl)	0.8
CRP (0-6 mg/L)	37
Hepatitis B,C	Negative
Toxoplasma gondii (IgM/IgG)	Negative
Salmonella (IgM/IgG)	Negative
Rubella (IgM/IgG)	Negative
CMV (IgM/IgG)	Negative
HSV (IgM/IgG)	Negative
Outcomes	
Covid-19 (rRT-PCR negative date)	29-Jun-20
Maternal Outcome	Survived

Hb = Hemoglobin, WBC= White blood cells, ALT= Alanine amino transferase, ALP= Alkaline phosphatase, CRP= C- Reactive protein, Hb= Hemoglobin, CMV= Cytomegalovirus, HSV= Herpes simplex virus, rRT-PCR= Real-time reverse transcription polymerase chain reaction,

Declaration of Competing Interest

We declared that there is no conflict of interest.

Acknowledgements

The authors extend their gratitude to the patients and medical staff of Pakistan Institute of medical sciences (PIMS).

Funding

No funding source

References

- Zhong Y, Wang K, Zhu Y, Lyu D, Yao K. COVID-19 and the Eye. *J Infect* 2020;**81**(2):e122.
- World Health Organization Declares COVID-19 a 'Pandemic'; Available at <https://time.com/5791661/who-coronavirus-pandemic-declaration/>. 2020.
- COVID-19 CORONAVIRUS PANDEMIC; Available at: <https://www.worldometers.info/coronavirus/>.
- Sadhu S, Agrawal R, Pyare R, Pavesio C, Zierhut M, Khatri A. COVID-19: limiting the risks for eye care professionals. *Ocul Immunol Inflamm* 2020;1–7.
- Lee P-I, Hsueh P-R. Emerging threats from zoonotic coronaviruses—from SARS and MERS to 2019-nCoV. *J Microbiol Immunol Infection* 2020.
- Loon S-C, Teoh SCB, Oon LLE, Se-Thoe S-Y, Ling A-E, Leo Y-S, et al. The severe acute respiratory syndrome coronavirus in tears. *Br J Ophthalmol* 2004;**88**(7):861–3.
- Xie H-T, Jiang S-Y, Xu K-K, Liu X, Xu B, Wang L, et al. SARS-CoV-2 in the ocular surface of COVID-19 patients. *Eye Vis* 2020;**7**:1–3.
- Qing H, Yang Z, Shi M, Zhang Z. New evidence of SARS-CoV-2 transmission through the ocular surface. *Graefes Arch Clin Exp Ophthalmol* 2020;1–2.
- Hong N, Yu W, Xia J, Shen Y, Yap M, Han W. Evaluation of ocular symptoms and tropism of SARS-CoV-2 in patients confirmed with COVID-19. *Acta Ophthalmol* 2020.

Yasir Arshad, Nayab Mahmood, Syed Sohail Zahoor Zaidi, Salmaan Sharif, Aamer Ikram, Muhammad Masroor Alam, Muhammad Qaisar Ali, Muhammad Usman, Ribqa Akhtar
National Institute of Health, Islamabad, Pakistan

Muhammad Hassan
Pakistan Institute of Medical Sciences, Islamabad, Pakistan

Muhammad Salman, Naveed Adil, Muhammad Suleman Rana*
National Institute of Health, Islamabad, Pakistan

*Corresponding author at: Department of Virology, National Institute of Health, Park Road, Chak Shehzad, Islamabad-45500, Pakistan.

E-mail addresses: yasirarshad_007@hotmail.com (Y. Arshad), nayabmahmood@hotmail.com (N. Mahmood), sohailz@live.com (S.S.Z. Zaidi), salmaansharif@gmail.com (S. Sharif), maahin1@yahoo.com (A. Ikram), urmasroor@yahoo.com (M.M. Alam), muhhammadqaisaraliqureshi@gmail.com (M.Q. Ali), usmanmlt@yahoo.com (M. Usman), ribqaakhtar@gmail.com (R. Akhtar), drhassaanshafqat2011@gmail.com (M. Hassan), salman14m@gmail.com (M. Salman), naveedbiotech99@gmail.com (N. Adil), ranavirologist@gmail.com (M.S. Rana)

Authors contributions

YA, NM, AI, SSZZ, SS, MS and MSR conceived and designed the study. MQA, NA, RA, MU, MH were responsible for data collection, lab testing, data analysis. YA, NM, MU wrote the manuscript draft.