



SARS-CoV2 Infects Eye Too

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Abstract

Discovery of SARS-CoV2 belonging to SARS family to begin with confused scientists and clinicians both and they were concentrating only on lung infection. But when it became pandemic and millions of people suffered, clinicians started examine each and every organs of the Covid-19 patients, they found that eyes are also getting infected. The eyes suffered with conjunctiva which is not a very serious diseases but further investigations revealed that the eye can be a potent source of infection.

Keywords: SARS-CoV2; Covid-19; Eye

The virus and mechanism of invasion

Since SARS - CoV2 belonged to SARS family, clinicians and scientists considered that this corona virus will affect lungs and would cause pneumonia type disease as it was known for SARS virus [1]. However, this new virus did not do so. Viruses remain dormant until they invade the host cell where they divide by using host cell components such as nutrients and enzymes. They enter the cell in a very specific manner they first encounter the mucus membrane present in nasal opening, especially those of the respiratory system from nose to the lungs. Infect while studying the mechanism of invading the host cell, researchers found that the new corona virus (SARS-CoV2) binds its spiky surface proteins to receptors on healthy cells through ACE2. Specifically, the viral proteins bust into cells through ACE2 receptors. Until the disease Covid-19 became pandemic people were concentrated only on lung infections [2].

Specific choice of the tissues

However, later it was noticed that it did not infect only organs of respiratory system such as nose, buccal cavity, pharynx, larynx,

trachea, bronchi and lungs alone, but it also find its way even the small intestine, testis, kidneys, heart, thyroid, and adipose tissue. More so, corona invades the blood, spleen, bone marrow, brain, blood vessels and muscle also but at a lower level [3]. It is because ACE2 expression levels are also the highest in the small intestine, testis, kidneys, heart, thyroid, and adipose tissue, and are the lowest in the blood, spleen, bone marrow, brain, blood vessels, However, in a brief review Gupta and Gupta described [4] parts of the brain also have infection of the virus.

Ocular manifestation

Recent studies have described conjunctival congestion in 0.8% of patients with laboratory confirmed severe acute respiratory syndrome coronavirus (SARS-CoV2) and there has been speculation that SARS-CoV2 can be transmitted through the conjunctiva. However, it is currently unclear whether conjunctival epithelial cells express ACE2 and its cofactors or not. Nevertheless, for the first time, Clemens Lange and Julian Wolf [5] showed the presence of receptor ACE2 In the cornea of human eye.

The receptor ACE2 and its cofactors including TMPRSS2, ANPEP, DPP4, and ENPEP protein (s) expression was assessed in eight healthy conjunctival samples using immune histochemistry [6,7]. In order to confirm the binding sites of the virus in human ocular cells focus eas drawn on two major receptors of SARS-CoV-2, ACE2 and CD147 (BSG), and interpret the potential roles of coronaviruses in human ocular tissues and diseases [8].

Clinical entities such as conjunctivitis, anterior uveitis, retinitis, and optic neuritis have been documented in feline and murine models. The current evidence suggesting possible human SARS-CoV2 infection in ocular tissue is reviewed [9,10].

The Covid-19 patient with infected eyes can also target ACE2 receptors in the endothelium of the conjunctival vessels and moves to the lacrimal sac which is potential space for the virus, since it evades immune detection and also the virus is clinically isolated. Therefore, clinicians and health workers should also consider tears as potential source of ASRS-CoV2 infection. In such cases wearing masks alone cannot guarantee the infection from COVID-19 patient to the health care workers; they should alert dealing with COIVD-19 patients [11].

Earlier we have shown the estrogen receptors in the human eye tissues [12], though the mechanism is not very clear but estrogen and other sex steroid protects the host from the infection of the virus [13], there is a possibility why SARS-CoV2 infect to a lesser extent females [14].

Recently it is found that daily wearers of eyeglasses may be less susceptible to COVID-19 [15]. COIVD-19 patients as wearing masks alone cannot guarantee, since it was observed in the patients hospitalized with COVID-19 in Suizhou, China, the proportion of inpatients with COVID-19 who wore glasses for extended daily periods (> 8 h/d) was smaller than that in the general population.

Eyes may become store house for the virus

Once the eyes are infected, they become storehouse for transmission of virus to the other tissues and/or organs or body fluids, through tears and/or by touching eyes with hands and fingers. On analysing tears of some Covid-10 patient occasionally, coronavirus was detected in the samples. Given the presence of viral particles, it is, therefore, possible to transmit COVID-19. Nevertheless since sample size is small either way conclusions cannot be drawn. Therefore, additional studies are needed for conclusive results.

Additionally, the eye and its tear drainage apparatus can track the SARS-CoV-2 from the eye into the respiratory tract of the patient. The potential ocular presence of the SARS-CoV-2 in the eye of a patient can target ACE2 receptors in the endothelium of the conjunctival vessels and use the lacrimal sac (Figure 1) a potential space to evade immune detection and clinical isolation [11].

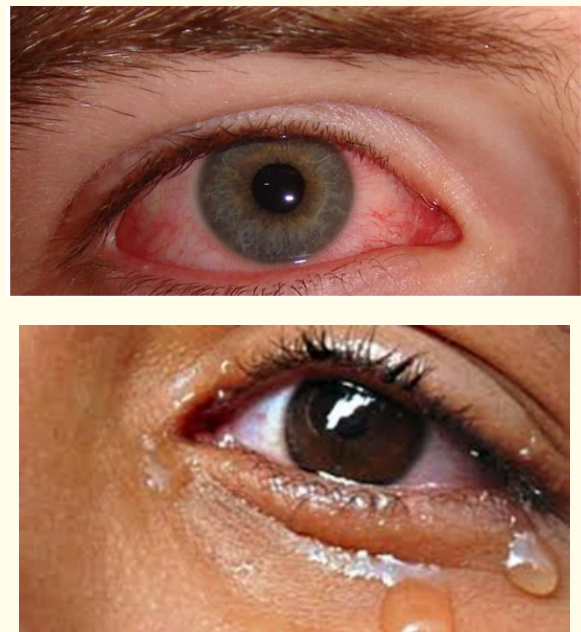


Figure 1: The “red eye” and tearing eye.

Conclusion

On analysis conjunctival swabs the presence of SARS-CoV-2 RNA in ocular samples highlights the role of the eye as a possible route of transmission of the disease [16].

Bibliography

1. Gupta PD. Carona Gyan 2020 Capricorn publishing House, Jaipur, India (2020).
2. Sungnak W, *et al.* “2020 SARS-CoV-2 entry factors are highly expressed in nasal epithelial cells together with innate immune genes”. *Nature Medicine* 26 (2020): 681-687.
3. Li Meng-Yuan, *et al.* “Expression of the SARS-CoV-2 cell receptor gene ACE2 in a wide variety of human tissues *Infect. Dis Poverty* 9.1 (2020): 45.

4. Gupta S and Gupta P. "Neurological manifestation of Covid-19: A review". *Journal Cell and Tissue Research* 20.2 (2020).
5. Clemens Lange and Julian Wolf. "Expression of the COVID-19 receptor ACE2 in the human conjunctiva. 9210 (2020).
6. Rafael S Grajewski., *et al.* "A missing link between SARS-CoV-2 and the eye?: ACE2 expression on the ocular surface". *Journal of Medical Virology* (2020).
7. Lange C., *et al.* "Expression of the COVID-19 receptor ACE2 in the human conjunctiva". *Journal of Medical Virology* (2020).
8. Yan- PingLia., *et al.* "Eyes on coronavirus". *Stem Cell Research* 51 (2021): 102200.
9. Gupta PD and Sood PP. "Covid-19 Manifestation in The Adult and Paediatric Eyes". *Journal of Clinical Ophthalmology and Research* 2.1 (2020): 1005.
10. Ivan Seah and Rupesh Agrawal. "Can the Coronavirus Disease 2019 (COVID-19) Affect the Eyes? A Review of Coronaviruses and Ocular Implications in Humans and Animals". *Ocular Immunology and Inflammation* 28.3 (2020): 391-395.
11. Baig AM., *et al.* "Ocular COVID-19: Eyes as a reservoir to conceal and spread SARS-CoV-2". *Infectious Disorders - Drug Targets* (2020).
12. PD Gupta K Johar Sr., *et al.* "Sex hormone receptors in the human eye". *Survey of Ophthalmology* 50.3 (2005): 274-284.
13. Roxanna Pirhadi., *et al.* "Could Estrogen Protect Women From COVID-19?" *Journal of Clinical Medicine Research* 12.10 (2020): 634-639.
14. Gupta PD. "Who over powers, you or corona?" *Journal of Cell and Tissue Research* 20.1 (2020).
15. Zeng W., *et al.* "Association of Daily Wear of Eyeglasses With Susceptibility to Coronavirus Disease 2019 Infection". *JAMA Ophthalmology* 138.11 (2020): 1196-1199.
16. Noemi Güemes-Villahoz., *et al.* "Detecting SARS-CoV-2 RNA in conjunctival secretions: Is it a valuable diagnostic method of COVID-19?" *Journal of Medical Virology* 93.1 (2021): 383-388.

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