JOJ Ophthalmology
ISSN: 2473-5477

Juniper Publishers
key to the Researchers

Opinion
Volume 8 Issue 4 - April 2021
DOI: 10.19080/JOJO.2021.08.555744

JOJ Ophthalmol

Controversial Roles of Eyes in Covid-19

P D Gupta*

Founder Director, Former Director Grade Scientist, Centre for Cellular and Molecular Biology, India

Submission: March 04, 2021; **Published:** April 14, 2021

***Corresponding author:** P D Gupta, Former Director Grade Scientist, Centre for Cellular and Molecular Biology, India

Abstract

According to CDC guidelines to prevent spreading of SARS-CoV2 virus one should take extra precaution to protect first line of defense mucus secreting organs, such as, nose, mouth, and eyes. Once a person gets infection eyes become a source of infection. The eye and its tear drainage apparatus can track the SARS-CoV-2 from the eye into the respiratory tract of the patient.

Keywords: Respiratory Tract; Human eye; Blood; Spleen; Bone Marrow; Brain; Blood Vessels; Muscle

Introduction

It is a well-known fact that eyes take part in spreading of microbes responsible for conjunctivitis [1]. Recently introduced virus SARS-CoV_2 from Wuhan (China) also causes conjectivitis in the human eyes [2]. The fast-growing studies on interaction of SARS-CoV_2 with the eye revealed many surprising new results. Because of the peculiar nature of the newly evolved virus [3], In this short communication we are mentioning diagonally opposite but important roles of the human eye, i.e., in the prevention and spreader of the covid-19 disease caused by the SARS-CoV_2virus.

Specific choice of the tissues

It was noticed that SARS-CoV_2 virus did not infect only lungs and associated organs of upper respiratory system, but it manifested even the small intestine, testis, kidneys, heart, thyroid, and adipose tissue, and were the lowest in the blood, spleen, bone marrow, brain, blood vessels, and muscle also [4]. Infect the spick proteins of the virus bind to ACE_2 and therefore wherever ACE_2 present it can bind. The expression levels of ACE_2 are 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 therefore the spread and retention of the virus depends on the density of ACE_2.

Ocular manifestation

Recent studies have described conjunctival congestion in 0.8% of patients with laboratory confirmed severe acute respiratory syndrome coronavirus (SARS-CoV_2), and there has been speculation that SARS-CoV_2 can be transmitted through the conjunctiva. However, it is currently unclear whether conjunctival epithelial cells express ACE_2 and its cofactors or not. Nevertheless, for the first time, Clemens Lange, and Julian Wolf [5] showed the presence of receptor ACE_2 in the cornea of human eye.

The receptor ACE_2 and its cofactors including $TMPRSS_2$, ANPEP, DPP_4, and ENPEP protein (s) expression was assessed in eight healthy conjunctival samples using immune histochemistry [6,7]. To confirm the binding sites of the virus in human ocular cells focus eas drawn on two major receptors of SARS-CoV-2, ACE_2 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-CoV_2 infection in ocular tissue is reviewed [9,10].

The potential ocular presence of the SARS-CoV-2 in the eye of a patient can target ACE_2 receptors in the endothelium of the conjunctival vessels and use the lacrimal sac a potential space to evade immune detection and clinical isolation. The recently reported case of COVID-19 after the acquisition of SARS-CoV-2 from a COVID-19 patient should alert the healthcare professionals dealing with COIVD-19 patients as wearing masks alone cannot guarantee protection against infection transmission [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 female [14].

Further, 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, suggesting that daily wearers of eyeglasses may be less susceptible to COVID-19 [15].

Eyes may play a role in spread

Transmission through infected ocular tissue or fluid has been controversial. Novel coronavirus has been detected in tear samples in a small number of cases. Given the presence of viral particles, it is, therefore, possible to transmit COVID-19, although the risk is likely low. However, the infectivity or clinical significance is not known, and additional studies are needed at this time. 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 ACE_2 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]. 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 [12-16]

Figure1: The "Red eye" and Tearing Eye.

Preventive role

The mucosal immune system provides three main functions: serving as the body's first line defense from antigens and infection, preventing systemic immune responses to commensally bacteria and food antigens [17]. The human eyes produce mucus throughout the day. It is an essential part of normal tear production. This mucus — or discharge — helps to remove waste from the eyes and keeps the eyes lubricated. If the tear ducts become blocked, mucus can accumulate in the corner of the eyes and spread.

References

1. Azari AA, Barney NP (2013) "Conjunctivitis: a systematic review of diagnosis and treatment". JAMA 3 10(16): 1721-1729.
2. Gupta P D, Sood PP Covid-19 (2020) Manifestation in The Adult and Paediatric Eyes. Clin J Ophthalmol Care Res 2(1): 1005.
3. Gupta P D Carona Gyan (2020) Capricorn publishing House, Jaipur, India
4. Li Meng-Yuan, Li Lin, Zhang Yue, Wang Xiao-Sheng (2020) Expression of the SARS-CoV-2 cell receptor gene ACE2 in a wide variety of human tissues Infect. Dis Poverty 9(1): 45.
5. Clemens Lange, Julian Wolf (2020) Expression of the COVID-19 receptor ACE2 in the human conjunctiva. 92: 10 Special Issue on New coronavirus (2019-nCoV or SARS-CoV-2) and the outbreak of the respiratory illness (COVID-19): Part-VI 92(10):2081-2086.
6. Rafael S Grajewski, Alexander C Rokohl, Martina Becker (2020) A missing link between SARS-CoV-2 and the eye?: ACE2 expression on the ocular surface. J Med Virol 93(1).
7. Lange C, Wolf J, Auw-Haedrich C, Claudia Auw-Haedrich, Anja Schlecht, Stefaniya Boneva et al. (2020) Expression of the COVID-19 receptor ACE2 in the human conjunctiva. J Med Virol 92(10):2081-2086.
8. Yan- PingLia, YaMab, Ningli Wang, Zi-Bing (2021) Eyes on coronavirus Stem Cell Research 51: 102200. 51(102200).
9. Gupta PD, Sood PP (2020) Covid-19 Manifestation in The Adult and Paediatric Eyes. Clin J Ophthalmol Care Res 2(1): 1005.
10. Ivan Seah, Rupesh Agrawal (2020) 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 28:3 391-395.
11. Baig AM, Ahmad S, Khaleeq A, Rafique H, Rajput S, et al. (2020) Ocular COVID-19: Eyes as a reservoir to conceal and spread SARS-CoV-2. Infect Disord Drug Targets.
12. PD Gupta, K Johar Sr (2005) Sex hormone receptors in the human eye Survey of ophthalmology. 50(3): 274-284.
13. Roxanna Pirhadi, Vikram Sinai Talaulikar (2020) Could Estrogen Protect Women From COVID-19? J Clin Med Res 12(10): 634-639.
14. Gupta P D (2020) Who overpowers, you or corona? J Cell Tissue Res 20(1): PV 2 2020
15. Zeng W, Wang X, Li J (2020) Association of Daily Wear of Eyeglasses with Susceptibility to Coronavirus Disease 2019 Infection. JAMA Ophthalmol 138(11): 1196-1199.

How to cite this article: P D Gupta. Controversial Roles of Eyes in Covid-19. JOJ Ophthalmol. 2021; 8(4): 555744. DOI: 10.19080/JOJO.2021.08.555744

16. Noemi Güemes-Villahoz, Barbara Burgos-Blasco (2021) Detecting SARS-CoV-2 RNA in conjunctival secretions: Is it a valuable diagnostic method of COVID-19? J Med Virol Jan 93(1): 383-388.

17. Gupta P D (2021) Immune response by the human body to SARS-CoV2 infection MOJ Biology and Medicine 6(1).

DOI: 10.19080/JOJO.2021.08.555744