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Could the SARS-CoV-2 Infection be Acquired via the Eye?

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Dear Editor,

The COVID-19 outbreak was first identified in the Hubei province of Wuhan, China, in December 2019. It is caused by SARS-CoV-2. The proposed transmission of SARS-CoV-2 is respiratory droplets < 5 μm in diameter or by indirect or direct human-to-human contact.[1] SARS-CoV-2 may also be transmitted through the eyes. The receptor for SARS-CoV-2 is angiotensin-converting enzyme 2 (ACE-2). SARS-CoV-2 replicates at the binding site on the surface of target cells, such as ocular tissues, leading to the cleavage of the ACE-2 receptor, activation of the spike protein, and inflammation in the form of ocular manifestations such as conjunctivitis, anterior uveitis, retinitis, and optic neuritis. SARS-CoV-2 can cause eye manifestation.[2] ACE-2 is expressed by conjunctival epithelial cells, and the presence of ACE-2 is significantly elevated in conjunctival cells for patients with conjunctivitis, conjunctival nevi, conjunctival papilloma, conjunctival cysts, and conjunctival polyps' epithelial cells compared to control subjects.[3]

It has been reported that ocular surface cells were potential infection sites of SARS-CoV-2. The proteases of ocular surface cells facilitate the binding of SARS-CoV-2 on the viral spike protein to the ACE-2 receptor in the conjunctiva, limbus, and cornea. SARS-CoV-2 might exist in tears since there was an expression of ACE-2 on the transmembrane serine protease 2 (TMPRSS2).[4] Another study found that SARS-CoV-2 was present on conjunctiva swabs from two out of 11 (18.2%) patients tested for SARS-CoV-2 via nasopharyngeal swabs. A common symptom was conjunctivitis, and SARS-CoV-2 could be transmitted by aerosol contact with the conjunctiva.[5]

However, the risk of SARS-CoV-2 transmission through tears was low. In a study of 17 patients, none of the 32 patient tear samples was positive for SARS-CoV-2.[6] The replication of SARS-CoV-2 was much more efficient than that of SARS-CoV in human conjunctiva and the upper respiratory airways. Thus, eyes could be a potential route of SARS-CoV-2 transmission.[7]

All of the above information demonstrates that SARS-CoV-2 might be acquired through the eyes, wearing a face shield could benefit, especially during aerosol-generating procedures.

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