

Letter to the Editor

## Airborne SARS-CoV-2: Weighing the Evidence for Its Role in Community Transmission

Samuel Pecho-Silva<sup>1</sup>, Kovy Arteaga-Livias<sup>2,3</sup>, Alfonso J. Rodriguez-Morales<sup>3,4</sup>

<sup>1</sup>Hospital Nacional Edgardo Rebagliati Martins, Lima, Peru; <sup>2</sup>Faculty of Medicine, Universidad Nacional Hermilio Valdizán, Huánuco, Peru; <sup>3</sup>Clinical Epidemiology and Biostatistics, Universidad Científica del Sur, Lima, Peru; <sup>4</sup>Public Health and Infection Research Group, Faculty of Health Sciences, Universidad Tecnológica de Pereira, Pereira, Colombia

Dear Editor,

We read with great interest Bae's recent publication on the incubation period of severe acute respiratory coronavirus 2 (SARS-CoV-2) and its infectivity [1]. However, we would like to launch a further discussion on the infectivity of SARS-CoV-2 and the controversy regarding concerns about airborne SARS-CoV-2 transmission.

Of the seven coronavirus species that infect humans, three are zoonotic and have been linked to epidemics. However, unlike its two predecessors (SARS-CoV and MERS-CoV), SARS-CoV-2 is more contagious, with a higher speed of transmission, but a lower case fatality rate (currently 3.1%) [1-3]. As of May 22, 2020, a total of 5 121 639 infected people and 333 382 deaths have been registered worldwide. To date, there is no specific vaccine or treatment.

The known route of transmission of SARS-CoV-2, as for other respiratory viruses, is through droplets with an average diameter of 5 µm to 10 µm and through contact with fomites, which are contaminated surfaces that serve as a temporary "reservoir" of infectious particles that can remain viable for hours to days depending on the material and the environmental conditions

[1-3]. The transmissibility of SARS-CoV-2 is so high that up to 66% of family members in close proximity to a confirmed case are likely to be infected by one of these two routes [1-3]. Transmission via aerosols (airborne particles less than 5 µm also called "droplet nuclei") is also known to be possible when these particles are generated during certain medical procedures such as nebulization, mechanical ventilation, endotracheal intubation, and bronchofibroscopy, among others. To date, insufficient scientific evidence exists to support the conclusion that SARS-CoV-2 can be transmitted through the air through small particles that remain floating for hours in the environment.

In the study of Ong et al. [2], out of a total of 75 465 cases of coronavirus disease 2019 (COVID-19; the disease caused by SARS-Cov2), no cases of airborne transmission were reported. In the study by Cheng et al. [3], a patient with a high viral load both in nasal swabs and in saliva was asked to speak, breathe normally, breathe deeply, and say 1, 2 or 3 consecutive sentences, while researchers collected the exhaled air at a distance of 10 cm. Their analyses found no detectable viral load in the samples taken from the exhaled air. Although this sampling was carried out in a room that simulated a well-ventilated room, it was possible to detect SARS-CoV-2 in an environmental sample taken from near the patient's bed, indicating that contact transmission, but not airborne transmission, was possible [3]. Other published reports of hospitalized patients with SARS-CoV-2 infection have also found no viral load in air samples taken from their environments [3].

Although van Doremalen et al. [4] reported that viable viral loads could be detected in the air for up to 3 hours (the time

**Corresponding author:** Alfonso J. Rodriguez-Morales, MD, MSc Clinical Epidemiology and Biostatistics, Universidad Científica del Sur, 385 Cantuarias, Miraflores, Lima 15046, Peru

**E-mail:** [arodriguezm@utp.edu.co](mailto:arodriguezm@utp.edu.co)

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the sample collection lasted), it is important to keep in mind that in their study, aerosols were generated in an attempt to simulate the possible aerial transmission of SARS-CoV-2 employing high-powered nebulizers (“three-jet collision nebulizers”) that do not reflect the droplets generated by human beings under actual coughing conditions. Thus, their findings may demonstrate that airborne transmission of SARS-CoV-2 is possible, but under non-physiological conditions. As previously mentioned, there are some medical procedures, such as aerosol-generating nebulization, that are recognized as sources of nosocomial airborne transmission of SARS-CoV-2. However, this study does not demonstrate that SARS-CoV-2 is airborne in the community.

If SARS-CoV-2 is airborne, then we must analyze two vitally important hypothetical questions: (1) What is the ideal protective method for the general population to use in crowded places? The current information indicates that homemade and cloth masks do not provide sufficient protection from acquiring an infection by a respiratory virus [5]. Although surgical masks may protect the wearer, prior training is necessary to make them effective, instead of risky [2-5]. Therefore, the general population should be recommended to wear at least one surgical mask. (2) Would the extensive use of surgical masks be enough to avoid airborne transmission of SARS-CoV-2? We know that in Asian countries, the use of masks has been prevalent during the COVID-19 pandemic. However, the role of mask-wearing in the containment of the pandemic is limited, and any observed associations may even be coincidental, because so far, the evidence supporting the use of masks in the community is also scarce [2-5].

As long as we continue not to have sufficient high-quality scientific evidence of airborne transmission of SARS-CoV-2 in the community, we must continue to consider droplet transmission and contact transmission as the main transmission routes of SARS-CoV-2, and we should therefore take appropriate steps when implementing the necessary preventive measures and educate the general public accordingly.

## CONFLICT OF INTEREST

The authors have no conflicts of interest associated with the material presented in this paper.

## ORCID

Samuel Pecho-Silva <https://orcid.org/0000-0002-7477-9841>  
Kovy Arteaga-Livias <https://orcid.org/0000-0002-0182-703X>  
Alfonso J. Rodriguez-Morales <https://orcid.org/0000-0001-9773-2192>

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