Acta Scientific Veterinary Sciences (ISSN: 2582-3183)

Volume 2 Issue 8 August 2020

Mini Review

Possible Transmission Pathways of COVID-19 Infections

T Kumaran*

Assistant Professor, PG and Research Department of Zoology, Muslim Arts College, Affiliated to Manonmaniam Sundaranar University, Thiruvithancode, Tamilnadu, India

***Corresponding Author:** T Kumaran, Assistant Professor, PG and Research Department of Zoology, Muslim Arts College, Affiliated to Manonmaniam Sundaranar University, Thiruvithancode, Tamilnadu, India.

Received: June 16, 2020

Published: June 27, 2020

Abstract

A novel corona virus (COVID-19) was detected in patients with pneumonia connected to the cluster of acute respiratory illness, several countries were experiencing sustained local transmission, including in India. Most previous studies of transmission pathways in environments have addressed contamina¬tion with bacteria or fungi. Reports on the presence of viral transmission in community are scarce, however, despite the fact that viruses are probably the most common cause of infection.

Keywords: Corona Virus; COVID-19; SARS-CoV

Corona virus

Corona viruses are RNA viruses of the family *Coronaviridae*, known to cause respiratory and enteric disease in humans and animals. Corona viruses are second to RV as a cause for the common cold. They may also cause other respiratory tract infections, such as pneumonia and pharyngitis. The earliest symptom is a sudden onset of high fever, sputum production and acute respiratory distress. Some patients may also have Tasteless feeling, Haemoptysis and headaches. After 3 to 7 days, patients experience cough and breathing difficulties, followed by pneumonia. In late 2002, the syndrome was observed for the first time in China. The disease has now been reported in Asia, America and Europe. COVID-19 is closely related to two bat-derived severe acute respiratory syndrome-like coronaviruses, bat-SL-CoVZC45 and bat-SL-CoVZXC21, but it is more distant from SARS-CoV (~79% similarity) and Middle East respiratory syndrome coronavirus (MERS-CoV) (~50% similarity). Interestingly, COVID-19 uses the same cell entry receptor-angiotensin converting enzyme II (ACE2)-as SARS-CoV [1,2]. The most common mode of transmission is through water droplets generated when an infected person coughs or sneezes. Transmission is thus most likely to occur in close proximity to someone who is infected or by touching a contaminated surface [3].

Disease transmission is determined by pathogen-related factors including:

- An organism's ability to survive or multiply in the environment (some pathogens require the presence of specific intermediate hosts to complete their lifecycles).
- Latent periods (many pathogens are immediately infectious, others may require a period of time before they become infective).
- An organism's ability to infect the host (some pathogens can cause infections when present in small numbers) [4].

Disease transmission is also affected by host characteristics and behaviour, including:

- Immunity (natural or as a result of prior infection)
- Health status
- Sex
- Age
- Personal hygiene
- Food hygiene
- Nutritional status.

Transmission of COVID-19

COVID-19 is a member of coronavirus' family which include hundreds of members infect humans, called common human coronaviruses, namely OC43, 229E, HKU1 and NL63 and other viruses infect animals such as bats, snakes, birds, and others [1]. Actually, it is uncommon for animal coronaviruses to transmit from animals to human and cross the species barrier, a phenomenon called spillover [5]. However, if the infective dose was so high and/or animal coronaviruses got mutations favoring transmission to humans, it is possible to see animal-to-human transmission of a rarely encountered virus to human population [6]. The most possible mode of transmission of COVID-19 by touching a surface or object that has the virus on it and then touching their own mouth, nose, or possibly their eyes, but this is not thought to be the main way the virus spreads [7].

Effects COVID-19 infection

COVID-19 unlike common human coronaviruses, tend to infect lower parts of the respiratory system, namely bronchioles and alveoli, and leads, in 15 - 20% of cases, to severe pneumonia. COVID-19 infects cells by attaching to receptors of Angiotensin converting enzyme-II [8]. What helps COVID-19 to be dangerous is the lack of memory cells in the immune system to generate adequate and timely immune response to tackle the infection quite early. This leads to the possible deterioration of some patients to critical and deadly stages of the disease by developing severe alveolar pneumonitis, or interstitial pneumonia that might be so severe that most of lung tissue is damaged and oxygen level in blood decreases so severely leading to respiratory failure and consequent heart and renal failure [8].

Modes of transmission

- **Zoonoses**: Diseases spread between animals and humans.
- **Aerosol transmission**: Droplets (coughing or sneezing); containing pathogens travel through the air and are inhaled by another animal or human. Virus is transmitted through the air by aerosols within the inspirable size range or smaller; aerosol particles are small enough to be inhaled into the nasopharynx and distally into the trachea and lung.
- **Direct transmission**: Spread of pathogens through contact with open wounds, mucous membranes, or abraded skin contacting an infected animal or its tissues or fluids (e.g. blood, saliva, urine). Inoculation of pathogens can occur from bites or scratches. Virus is transferred by contact from an infected person to another person without a contaminated intermediate object (fomite).
- **Indirect transmission**: Virus is transferred by contact with a contaminated intermediate object (fomite).
- **Reproductive**: A subtype of direct contact that involves pathogens spread by contact with reproductive fluids or tissues. In animals, pathogens may be spread during breeding.
- **Health care work**: Transmission of the COVID-19 virus can occur by direct contact with infected people and indirect contact with surfaces in the immediate environment or with objects used on the infected person (e.g., stethoscope or thermometer) [9].

Conclusion

Viruses are a common cause of infectious diseases, since they can be easily transmitted, especially in crowded environments. Transmission occurs when a person is in close contact (within 1 meter) with someone who has respiratory symptoms and is therefore at risk of having his/her mucosae (mouth and nose) or conjunctiva (eyes) exposed to potentially infective respiratory droplets [10]. No antiviral or other pharmaceutical is currently recommended for the treatment of COVID-19 cases, although clinical trials with the combination lopinavir/ritonavir and the orphan drug redemsivir are ongoing in Asian countries. The use of personal protective measures (i.e. rigorous hand hygiene, cough etiquette, face masks) and maintain social distancing may contribute to reducing the risk of transmitting COVID-19 infections.

Bibliography

1. Coronaviridae Study Group of the International Committee on Taxonomy of, V. "The species Severe acute respiratory syndrome-related coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2". *Nature Microbiology* (2020).
2. Lu R., *et al*. "Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding". *Lancet* 395.10224 (2020): 565-574.
3. Seto WH., *et al*. "Effectiveness of precautions against droplets and contact in prevention of nosocomial transmission of severe acute respiratory syndrome [SARS]". *Lancet* 361.9368 (2003): 1519-1520.
4. Feachem, R.G., *et al*. "Sanitation and disease: health aspects of excreta and wastewater management". World Bank Studies in Water Supply and Sanitation 3, Wiley, Chichester, UK (1983).
5. Hui DS., *et al*. "The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health - The latest 2019 novel coronavirus outbreak in Wuhan, China". *International Journal of Infectious Diseases* 91 (2020): 264-266.

6. Liu K., *et al*. "Clinical characteristics of novel coronavirus cases in tertiary hospitals in Hubei Province. *Chinese Medical Journal* (2020).

7. CDC. "Coronavirus Disease 2019(COVID-19), How it is spread?" (2020).

8. Huang C., *et al*. "Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China". *Lancet* 395.10223 (2010): 497-506.

9. World Health Organization. Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19) 16-24 February 2020 [Internet]. Geneva: World Health Organization (2020).

10. Ong SW., *et al*. "Air, surface environmental, and personal protective equipment contamination by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) from a symptomatic patient". *JAMA* (2020).