



The Open Food Science Journal

Content list available at: <https://openfoodsciencejournal.com>



PERSPECTIVE ARTICLE

COVID-19 from Food Safety and Biosecurity Perspective

Samara Bin Salem¹ and Premanandh Jagadeesan^{1,*}

¹Abu Dhabi Quality and Conformity Council, Abu Dhabi, United Arab Emirates

Abstract: Most recently emerged pneumonia of unknown cause named COVID-19 has a devastating impact on public health and economy surpassing its counterparts in morbidity and mortality. Asymptomatic spread appears to be prevalent in China from where it is originated, lacking a clear and precise understanding of the transmission dynamics. Precautionary approach on certain ethnic food from mammalian sources like bats and its possible transmission source has been presented. Biosecurity measures should also be considered. The application of accurate predictive modeling in the alleviation of infectious diseases has also been discussed. The COVID-19 outbreak seems to be an alarming lesson to the global community to start preparing for an open, transparent, and coordinated action by all relevant stakeholders.

Keywords: COVID-19, Biosecurity, Asymptomatic, Virus, RT-PCR, Epidemiology.

Article History

Received: March 11, 2020

Revised: March 26, 2020

Accepted: March 28, 2020

1. VIEWS AND OPINION

Free and frequent movement of goods and people across geopolitical boundaries has created both global opportunities for better living and public health consequences, as exemplified by infectious disease epidemics. Between 2011 and 2018, the World Health Organization (WHO) tracked 1483 epidemic events in 172 countries [1].

Most recently, emerged pneumonia of unknown causes in the Hubei Province of China had a devastating impact on public health and economy. Named as COVID-19, it has already surpassed its counterparts in morbidity and mortality. As of March 6, 2020, more than 100,000 confirmed cases had been reported with a mortality rate of around 3.5%, taking away the lives of 3486 individuals [2]. So far, more than 90 countries have reported confirmed cases of the COVID-19, of which most of the death toll seems to be from China, where it has originated.

Initial epidemiological studies trace to the Huanan seafood market where almost half of the infected had a history of exposure to the market, and most patients visited or came in close contact with individuals from Wuhan except for one suggesting possible active viral transmission [3]. Although asymptomatic spread appears to be prevalent in China, a clear and precise understanding of the transmission dynamics is lacking. The case fatality rate has been estimated to be lower when compared to other HCoV (SARS and MERS) with a higher infectivity rate [4].

Our previous experience with outbreaks of siblings of COVID-19 (MERS-CoV, SARS-CoV) suggests that transmission through food is unlikely. Still, precautions are necessary to avoid exposure to agents that are likely the source of harboring the viral agents. For instance, Bats are recognized as natural reservoir hosts of Coronavirus. To date, over 200 novel coronaviruses have been identified in bats [5]. To this end, they are favorite indigenous protein culinary in many countries in Asia, Africa, and islands of Oceania, and hunting for consumption as bushmeat and medicine is widespread in these countries [6]. In the absence of explicit scientific knowledge on the transmission mode of the virus, precautionary measures to avoid contact with likelihood sources like bats and other rodents should be considered. Because virus introduction could occur from many routes, including the legal trade of food products and illegal trade of bushmeat. Therefore, as a precautionary measure to avoid contact with virus, ban on bushmeat should be considered. Moreover, beta coronaviruses are highly variable and may undergo recurrent interspecies transmissions, as reported in the case of the HCoV-OC43 outbreak among wild chimpanzees [7].

Surprisingly, a very recent study reported the detection of viral nucleic acids from oral, anal swabs, and blood. Although the study reported conflicting results from a molecular and serological point of view, it was evident that buccal swabs having a better detectability during the early stage of infection, while more anal swabs were positive during a later stage of infection [8]. It is thought that viruses affecting the respiratory system are known to replicate in the respiratory tract and get transmitted through respiratory secretions [9]. However, a recent study published reported the presence of virions in the

* Address correspondence to this author at the Abu Dhabi Quality and Conformity Council, P.O. Box 853, Abu Dhabi, United Arab Emirates; Tel: 971 2 4954513; Fax: 971 2 4066677; E-mail: jpanandh@yahoo.com

gastrointestinal tract and the detection of viral RNA from feces even after the negative conversion of the viral RNA from the respiratory tract [10]. Further studies are required in the case of COVID-19, and it is worthwhile to consider screening procedures on water and food samples. Although viral transmission through food is quite unlikely due to relatively low stability of the virus in the environment, it is worth monitoring and screening food and water samples from most affected areas to rule out the possibility.

The recent evacuation of Japanese from COVID-19 affected Wuhan city to Japan reported that most of the individuals with a positive result for RT-PCR appeared asymptomatic [11]. This finding is very alarming from both prevalence and biosecurity perspective, where future threats to global health can be either natural or intentional, especially with viruses having the potential to cause catastrophic pandemics. Previous studies have demonstrated that beta coronaviruses frequently cross species boundaries, leading to recombination and the emergence of intermediate forms [12]. Thus, in a globalized inter-dependent world, a common, coordinated mechanism and action to prepare for such unforeseen eventualities are essential. Implementation of early warning systems to detect disease outbreaks can mitigate morbidity and mortality associated with epidemics. The application of artificial intelligence (AI) to predict the spread of infectious diseases before they happen has been studied by many researchers across the globe [13]. Successful implementation of accurate predictive modeling could play a crucial role in the epidemiology of infectious diseases. Nevertheless, human interventions are required to understand both man and machine.

Instantaneous research focusing on the development of broad-spectrum antiviral agents is very crucial. The COVID-19 outbreak seems to be an alarming lesson to the global community to start preparing for an open, transparent, and coordinated action by all relevant stakeholders.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the support and

encouragement of the Abu Dhabi Quality and Conformity Council. Gratitude is also extended to the management of Central Testing Laboratories for invaluable assistance.

REFERENCES

- [1] WHO Health Emergencies Programme, unpublished data. 2019.
- [2] WHO Corona virus disease situation report 47. 2020.
- [3] Hui DSI, I Azhar E, Madani TA, *et al.* The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health - The latest 2019 novel coronavirus outbreak in Wuhan, China. *Int J Infect Dis* 2020; 91(26): 264-6. [<http://dx.doi.org/10.1016/j.ijid.2020.01.009>] [PMID: 31953166]
- [4] Gentile I, Abenavoli L. COVID-19: Perspectives on the potential novel global threat. *Rev Recent Clin Trials* 2020. [<http://dx.doi.org/10.2174/1574887115999200228100745>] [PMID: 32116200]
- [5] Chen L, Liu B, Yang J, Jin Q. DBatVir: the database of bat-associated viruses. *Database (Oxford)* 2014; 2014bau021 [<http://dx.doi.org/10.1093/database/bau021>] [PMID: 24647629]
- [6] Mildenstein T, Tanshi I, Racey PA. Exploitation of bats for bushmeat and medicine InBats in the Anthropocene: conservation of bats in a changing world. *Cham: Springer* 2016; pp. 325-75. [http://dx.doi.org/10.1007/978-3-319-25220-9_12]
- [7] Szczepanski A, Owczarek K, Bzowska M, *et al.* Canine Respiratory Coronavirus, Bovine Coronavirus, and Human Coronavirus OC43: Receptors and Attachment Factors. *Viruses* 2019; 11(4): 328. [<http://dx.doi.org/10.3390/v11040328>] [PMID: 30959796]
- [8] Zhang W, Du RH, Li B, *et al.* Molecular and serological investigation of 2019-nCoV infected patients: implication of multiple shedding routes. *Emerging microbes & infections* 2020; 1;9(1): 386-9.
- [9] Kutter JS, Spronken MI, Fraaij PL, Fouchier RA, Herfst S. Transmission routes of respiratory viruses among humans. *Curr Opin Virol* 2018; 28(28): 142-51. [<http://dx.doi.org/10.1016/j.coviro.2018.01.001>] [PMID: 29452994]
- [10] Kutter JS, Spronken MI, Fraaij PL, Fouchier RA, Herfst S. Transmission routes of respiratory viruses among humans. *Curr Opin Virol* 2018; 28: 142-51. [<http://dx.doi.org/10.1016/j.coviro.2018.01.001>] [PMID: 29452994]
- [11] Nishiura H, Jung SM, Linton NM, *et al.* The extent of transmission of novel coronavirus in Wuhan. *China* 2020.
- [12] Bolles M, *et al.* SARS-CoV and emergent coronaviruses: viral determinants of interspecies transmission *Curr Opin Virol* 2011; 1: 624-34.
- [13] Rodríguez-González A, Zanin M, Menasalvas-Ruiz E, *et al.* Public Health and Epidemiology Informatics: Can Artificial Intelligence Help Future Global Challenges? An Overview of Antimicrobial Resistance and Impact of Climate Change in Disease Epidemiology. *Yearb Med Inform* 2019; 28(1): 224-31. [<http://dx.doi.org/10.1055/s-0039-1677910>]