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**Manuscript:**

Dear Editor,

Coronavirus has long been in our history as a pathogen for infectious disease causing mortality and morbidity. The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes coronavirus disease 2019 (COVID-19), is of utmost concern given its recent pandemic worldwide. Coronaviruses (CoV) consist of different subfamilies of viruses that infect various animal groups, and cause mild to severe respiratory diseases in humans. It wrote the human history and revolutionize the public health specialty in the past decades with extreme contagious pathogens: Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV), and Middle East Respiratory Syndrome Coronavirus (MERS-CoV). They were both of zoonotic origin, and caused major respiratory illnesses on humans with significant mortality.[1] In the first place, animal-to-human transmission occurred, and subsequently the virus is eligible for human-to-human transmission. The widespread prevalence of coronavirus in other organisms such as birds, pangolins, and mammals like cows, pigs, bats etc. makes its transmission across species a public health concern. *Coronaviruses* are classified into three genera: Alpha-coronavirus, Beta-coronavirus and Gamma-coronavirus. Beta-coronavirus is further classified into sub-genera: *Embecovirus, Hibecovirus, Merbecovirus, Nobecovirus* and *Sarbecovirus*. MERS-CoV and SARS-CoV all belong to the Beta-coronavirus classification.

The latest pandemic one caused COVID-19 arises from infection by SARS-CoV-2,[2] a member of the Beta-genus family of the coronaviruses. It contains Spike (S) protein, envelope (E) protein, membrane (M) protein, and nucleocapsid (N) protein; helping its own translation and assemble respectively.[3] The large family of coronaviruses are mostly single stranded positive sense ribonucleic acid (RNA) viruses,[4] and polymerase chain reaction is an effective test for detecting viral RNA which marks the basis of many diagnostic tests, despite it is a time consuming assay. Respiratory disease is the most common presentation of COVID-19, but SARS-CoV-2 can also affect the central nervous system, gastrointestinal and hepatic systems.[5] Infected individuals could be of mild symptoms only, but severely ill cases do happen.

Healthy carriers of the virus are proven to exist in the community, without any symptoms of infection but act as a prime source of transmission. Transmission of the virus is usually through large droplets generated during sneezing and coughing, especially vulnerable through direct contact like staying in close proximity with the infected patients. In addition, the virus can remain viable for several days in favorable atmospheric conditions, thus possible indirect contact transmission from touching tainted surface or fabrics. Luckily, researches pointed out that SARS-CoV-2 can be controlled by the usage of disinfectants. World Health Organization recommends isolation as the most efficacious method for containment of patients that are affected by this virus. Hand hygiene and social distancing are also proven to be one of the most effect way to dampen the transmission.

In conclusion, coronavirus is a big family of disease, and the SARS-CoV-2 is by far the most lethal one on literature warrant our concern. It is likely that coronaviruses will continue to emerge and to evolve owing to their ability to recombine, mutate, and infect multiple species and cell types.

 (489 words)

**References:**

1. Cui J, Li F, Shi ZL. Origin and evolution of pathogenic coronaviruses. Nat Rev Microbiol. 2019;17(3):181-192. doi:10.1038/s41579-018-0118-9
2. Wu JT, Leung K, Leung GM. Nowcasting and forecasting the potential domestic and international spread of the 2019-nCoV outbreak originating in Wuhan, China: a modelling study [published correction appears in Lancet. 2020 Feb 4]. Lancet. 2020;395(10225):689-697.
3. Wong SS, Yuen KY. The severe acute respiratory syndrome (SARS). J Neurovirol. 2005;11(5):455-468.
4. Fehr AR, Perlman S. Coronaviruses: an overview of their replication and pathogenesis. Methods Mol Biol. 2015;1282:1-23.
5. Kumar A, Arora A, Sharma P, et al. Gastrointestinal and hepatic manifestations of Corona Virus Disease-19 and their relationship to severe clinical course: A systematic review and meta-analysis. Indian J Gastroenterol. 2020;39(3):268-284.