

Covid-19: Potential Treatment and Vaccination

NJ Shammi^a, MM Hossain^b

^aProfessor, Department of Pharmacology & Therapeutics,, Barind Medical College, Rajshahi, Bangladesh.

^bProfessor, Anatomy, Ad-din Sakina Womens Medical College, Jashore, Bangladesh.

Correspondence to : N J Shammi
nasrin.jahan.shammi@gmail.com

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Coronavirus disease 2019 (Covid-19) is a highly contagious, heterogenous disease caused by SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2). After the first case was reported in Wuhan, Hubei province, China, in late December 2019, SARS CoV-2 rapidly disseminated worldwide. Then World Health Organization (WHO) declare it a global pandemic on March 11, 2020.¹

Coronaviruses are positive sense single stranded RNA (+ssRNA) virus.¹ Structurally and phylogenetically, SARS CoV-2 is similar to SARS-CoV and MERS-CoV (Middle East Respiratory Syndrome Coronavirus) and composed of spike, envelope, glycoprotein, nucleocapsid and membrane protein. It's spike is crown like. Coronavirus gains entry into host cell by binding spike to the angiotensin converting enzyme-2 (ACE-2) receptor in the respiratory epithelium. These receptors are also found in other organs such as upper oesophagus, enterocytes from ileum, myocardial cells, proximal tubular cells of kidney, urothelial cells of bladder.²

Four genera of coronavirus is identified to date. Alpha coronavirus,

first variant was described in United Kingdom in late December 2020. Beta coronavirus first reported in South Africa in December 2020. Delta variants is reported in India in December 2020, Gamma variantsis found in Brazil in early January 2021.³ Bats and rodents are source of alpha & beta variants and avian species seems to be the source of delta and gamma coronavirus. Coronaviruses are advanced from bats to intermediate hosts such as pangolins and minks and then to humans.⁴

Spread of COVID-19 occurs from person to person through breathing droplets during coughing, sneezing. 14 days incubation period is suggested after first exposure.⁵ In the early phase of infection, viral replication results in direct virus mediated tissue damage. In later phase, the infected host cell trigger an immune response and inflammatory response.⁶ Patient presents with fever, cough, shortness of breath, sore throat, anosmia, loss of taste, nausea, malaise, diarrhea, dysgeusia, anorexia, myalgia, headache. Some remains asymptomatic.

They may suffer from respiratory failure requiring mechanical ventilation, septic shock,

multiple organ failure. As of 28 October, 2020, cumulatively 44,322,504 confirmed cases and the death toll of 1,173,189 had been reported in 217 countries and territories globally.⁵ A large meta analysis evaluating clinicopathological characteristics of 8697 patients with COVID-19 in China reported laboratory abnormalities that included lymphopenia (47.6%), elevated CRP (c-reactive protein) level (65.9%), elevated cardiac enzymes (49.4%), abnormal liver function test (26.4%), leukopenia (23.5%), elevated D-dimer (20.4%), elevated procalcitonin (16.7%), abnormal renal function (10.9%).⁷ Therefore, an appropriate treatment plan is needed. RT-PCR (reverse transcriptase polymerase chain reaction) test and antigen test are used for confirming COVID-19. Remdesivir is the only antiviral drug approved by US-FDA (United States Food and Drug Administration) to treat COVID-19. It is nucleotide analog that inhibit the SARS-CoV-2 RNA polymerase. The FDA also approved administration of convalescent plasma containing specific antibodies against SARS-CoV-2 to elimination of infection via directly binding to pathogen and neutralizing them.⁸ Patient with advanced age and comorbid conditions, like diabetes mellitus, chronic lung disease, Cardiovascular diseases, Chronic kidney diseases, Chronic liver diseases, neoplastic conditions are at risk of developing COVID-19. Several COVID-19 vaccines such as the Pfizer-BioNTech and Moderna vaccines use RNA to stimulate an immune response. The United Kingdom was the first western country for approval of Pfizer-BioNTech vaccine on December 2020. Sinovac, Sinopharm,

Oxford-AstraZeneca, Sputnik V are also used.⁹ The development of several highly efficacious vaccines against COVID-19 in less than 1 year from the identification of virus. Despite that, ongoing social distancing, personal protective measure, self isolation, bans on public events, travel restrictions also to be maintained.

SARS-CoV-2 is the main challenge to experts in the field of medicine for development of drugs or vaccine. There should be continued different trials on this sector to get better drugs and treatment guidelines for COVID-19.

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