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Covid-19 (Pandemic): A Review Article

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Abstract:
Coronaviruses are part of the "Coronaviridae family" and can lead to a range of illnesses, spanning from mild colds to more severe conditions like SARS and MERS. These viruses are naturally found in mammals and birds. To date, six coronaviruses capable of infecting humans have been identified. The virus known as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) was initially identified in December 2019 in Wuhan, China. SARS-CoV-2, a new coronavirus belonging to the same family as SARS-CoV and Middle East respiratory syndrome coronavirus, has rapidly spread globally, resulting in the declaration of a pandemic by the World Health Organization. The associated illness, COVID-19, manifests with symptoms resembling the flu and can escalate to severe conditions in vulnerable individuals. This article offers a summary of recognized clinical manifestations and available treatment approaches for COVID-19.

Keywords: COVID-19, SARS-CoV-2, Treatment, Transmission, Prevention

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Introduction:
The human body faces a range of infectious microorganisms like viruses, bacteria, fungi, protozoa, and helminthes, which harm tissues through different methods. Among these, viruses stand out due to their unique ability to manipulate host cells and adapt to various species. A novel coronavirus named SARS-CoV-2 causes COVID-19. The World Health Organization (WHO) discovered this virus on December 31, 2019, after cases of "viral pneumonia" emerged in Wuhan, China. COVID-19 quickly spread across China, leading to a global health crisis. WHO labeled it a global public health emergency on January 30, 2020. India's first COVID-19 case emerged on January 27, 2020, in Kerala. Case reporting varies widely across the country and is based on SARS-CoV-2 antigen testing using RT-qPCR or RAT (Williamson, E. J., et al 2020).

Coronaviruses are part of a viral family that affects mammals and birds. The pandemic virus was originally called "Corona Virus Disease 2019" (2019-nCoV) by WHO. Due to its RNA similarity to SARS, it was renamed as SARS-CoV-2. It belongs to the Orthocoronavirinae subfamily within the Coronaviridae family, Nidovirales order, and Riboviria realm. Under an electron microscope, the virus displays a distinctive appearance resembling a crown, which led to the "Corona" name, derived from the Latin word for "crown" or "halo"(Singh D K., *et al* 2021).

SARS-CoV-2 is the third-generation virus in the coronavirus family, following the 2003 severe acute respiratory syndrome (SARS) that killed nearly 10% of affected patients across 29 locations, and the 2012 Middle East Respiratory Syndrome (MERS) with a 30% mortality rate among infected individuals(Wang C., *et al* 2020).

Characteristic features of SARS CoV-2:
SARS-CoV-2, a beta-coronavirus with a single-stranded positive-sense RNA, is enclosed by an envelope. Its genome spans 29.9 kb. Studies on its genetic makeup indicate an 88% resemblance to bat-SL-CoVZC45 and bat-SL-CoVZXC21 sequences, with a 96.2% match to another bat CoV called RaTG13. However, recent investigations propose the possibility of pangolins, turtles, or snakes - illegally

transported from Malaysia to China - being potential sources of the virus, challenging the assumption of bats as the sole origin (Wu F., *et al* 2020).

Comparing its protein-coding genes, SARS-CoV-2 shares 79.5% similarity with SARS-CoV and 51% with MERS-CoV. Similar to SARS-CoV, the virus uses the Angiotensin-Converting Enzyme 2 (ACE2) receptor to enter cells. This similarity suggests that treatments employed during the SARS-CoV and MERS-CoV outbreaks could potentially be repurposed to manage the SARS-CoV-2 pandemic (Zhou P., *et al* 2020).

Clinical consequences:

Initial symptoms are typically identified as fever, dry cough, rapid breathing, and difficulty breathing. While diarrhea was observed in around 20-25% of individuals with MERS-CoV or SARS-CoV infections, it is uncommon in COVID-19 cases. Confusion, chest pain, vomiting, and nausea were also reported as symptoms in some cases. Other symptoms encompass a sore throat, sneezing, nasal congestion, coughing up mucus, loss of smell, indigestion, skin rash, and discoloration of extremities, along with viral conjunctivitis. Laboratory studies have highlighted the occurrence of cytokine storms, sepsis, and the presence of viral RNA in the blood (Wang C., *et al* 2020).

Clinical chemistry investigations have revealed elevated levels of enzymes like lactate dehydrogenase (LDH), aspartate aminotransferase (AST), alanine transaminase (ALT), C-reactive protein (CRP), creatine kinase (CK), erythrocyte sedimentation rate (ESR), white blood cell (WBC) count, D-dimer, procalcitonin, urea, and creatinine. Conversely, decreases have been noted in hemoglobin, lymphocyte count, eosinophil count, and serum albumin in COVID-19 patients (Cascella M., *et al* 2020).

Common radiological findings entail a ground-glass opacity in the lungs. Additionally, SARS-CoV-2 can impact the cardiovascular and gastrointestinal systems, and lead to acute kidney failure. Evaluation of liver manifestations in 148 COVID-19 patients revealed that over one-third experienced abnormal liver function, often leading to prolonged hospital stays. Notably, a considerable number of asymptomatic individuals can carry the virus. The diverse clinical presentations and outcomes underscore the significance of adhering to hygiene practices and preventive measures, alongside the development of innovative diagnostic techniques and treatment options (Lotfi, M.,*et al* 2020).

MODE OF TRANSMMISION OF COVID 19:

There are two primary ways through which COVID-19 can be transmitted: direct and indirect. In the direct mode, transmission occurs in several ways (Liu Y,. *et al* 2020).

1. Aerosols generated during surgical and dental procedures, as well as respiratory droplet nuclei, can carry the virus.
2. Other bodily fluids like feces, saliva, urine, semen, and tears can also contain the virus.
3. Transmission from mother to child is also possible.

SARS-CoV-2, the virus responsible for COVID-19, is believed to mainly spread through respiratory droplets produced when an infected person talks, coughs, or sneezes. The risk of transmission is higher when the infected individual is within 1 meter of a susceptible person. While fewer cases have shown virus shedding from non-respiratory sources, the potential for transmission through other modes still exists, although the risk is relatively low (Santarpia JL,. *et al* 2020).

Indirect transmission can occur in two ways:

1. The virus can be spread via contaminated surfaces or fomites in the immediate environment of an infected person, such as furniture or fixtures.
2. Objects used on the infected person, like stethoscopes or thermometers, can also carry and transmit the virus.

It's important to note that the significance of some of these transmission modes might be underestimated, potentially contributing to the virus's spread. The objective of this paper is to provide a concise overview of the various ways

SARS-CoV-2 can spread and to suggest measures that can be taken to minimize the risk of transmission among the population and healthcare personnel (Karia R ., *et al* 2020).

Preventation:

Preventive measures are crucial in curbing the spread of COVID-19, given the absence of a definitive treatment. Various steps have been implemented in public health to thwart or slow down the transmission of the virus. These actions encompass isolating infected individuals, tracking and observing their contacts, sanitizing surroundings, and employing personal protective gear (Adhikari, S.P., *et al* 2020).

Furthermore, research has tackled the prevention of infections within medical facilities and the psychological well-being issues linked with COVID-19. Controlling hospital-acquired infections involves enhancing awareness and implementing preventive measures like healthcare personnel using protective masks for the face and eyes, disinfecting equipment, and establishing specific protocols for infectious settings. Concerning mental health, recommendations include offering psychological support to suspected and confirmed cases as well as medical staff (Xu, X..*et al* 2020).

Diagnosis:

The RT□PCR test is a diagnostic method that employs specimens like nasal swabs, tracheal aspirates, or bronchoalveolar lavages (BAL) to detect COVID-19. The preferred approach for diagnosis involves collecting upper respiratory samples through nasopharyngeal and oropharyngeal swabs. Using bronchoscopy for diagnosis is discouraged due to the risk of generating aerosols, which can endanger patients and healthcare staff. Bronchoscopy might be considered for intubated patients when other samples are negative, and clinical management would significantly benefit. However, it should be employed cautiously, adhering to clinical and safety standards, and in cases of uncertainty. Tracheal aspiration and nonbronchoscopic BAL are alternatives for obtaining respiratory samples from intubated patients (Corman VM,. *et al* 2016)

SARS□CoV□2 RNA has been extracted from upper and lower respiratory tract samples. The virus has been cultivated from upper respiratory secretions and BAL samples, though RNA data is limited. Zou *et al*.'s study noted higher SARS□CoV□2 RNA levels in upper respiratory tract samples, especially within the first 3 days of symptom onset. Elevated RNA levels were also found in upper respiratory samples from an asymptomatic patient. Blood and stool samples have shown SARS□CoV□2 RNA presence in various studies. The duration of viral RNA in respiratory and extrapulmonary samples remains uncertain but could persist for weeks, similar to SARS-CoV and MERS-CoV cases. Viable SARS□CoV has been isolated from multiple sample types like respiratory, blood, urine, and stool (Zou L., *et al* 2020).

The RT□PCR test boasts high specificity, although false positives can occur due to swab contamination, particularly in asymptomatic patients. Sensitivity rates are estimated around 66–80%. In asymptomatic individuals with close contact to symptomatic cases, test validity is less clear, possibly yielding up to 50% positivity without symptoms or confirmed infection. A single negative test doesn't rule out SARS□CoV□2 infection, especially in highly exposed individuals, when nasopharyngeal swabs are used early in infection. In such cases, repeating the test or collecting a deeper respiratory sample, like BAL, might be advisable (Zhuang GH., *et al* 2020).

Clinical management:

The primary approach to managing COVID-19 involves providing supportive care to alleviate symptoms and attempting to prevent respiratory failure.An essential aspect of managing the disease is ensuring patient isolation to prevent the spread of the virus to other patients, family members, and healthcare workers. Quarantine measures are crucial for isolating both symptomatic and asymptomatic infected individuals, as well as those who have been in contact with them. Wider populations should

also engage in social distancing and minimize outdoor activities to limit the potential for transmission. For mild cases, self-isolation at home is recommended, accompanied by proper hydration, nutrition, and symptom management like fever, sore throat, or cough. This strategy helps free up hospital beds for more severe cases (Singhal T. 2020).

The available data for pharmacological treatments often draw from medications used during previous SARS-CoV and MERS-CoV outbreaks, as well as in vitro observations. Numerous clinical trials are currently underway to investigate potential treatments for COVID-19, encompassing antiviral, anti-inflammatory, and immunomodulatory drugs, cell therapy, antioxidants, and other therapeutic approaches (Zhao J., *et al* 2020).

Antiviral Drugs:

The effectiveness of specific antiviral medications in treating COVID-19 has been demonstrated through laboratory experiments and animal studies, as well as through anecdotal reports from human patients. These investigations primarily draw on experience with related viruses like SARS-CoV and MERS-CoV. The Italian Society of Infective and Tropical Diseases advises using antiviral drugs for COVID-19 patients with mild symptoms but suggests avoiding them for those with underlying health issues that increase the risk of mortality or for individuals experiencing moderate to severe COVID-19 symptoms (Bartoletti, M., *et al* 2022).

Remdesivir, a nucleotide analog, has been effectively employed in treating COVID-19 patients in China. It works by integrating into the developing viral RNA chain and causing its premature termination. Research on preclinical models of SARS-CoV and MERS-CoV infections indicates that remdesivir is active against these corona viruses by targeting their viral polymerase. In mice infected with MERS-CoV, a study conducted in North America demonstrated remdesivir's effectiveness in reducing viral load and enhancing lung function indicators. Clinical trials are currently underway in China and the USA to assess the use of remdesivir in treating COVID-19 patients(Sheahan TP,. *et al* 2020).

The combination of lopinavir and ritonavir, second-generation antiretroviral drugs, obstructs viral protease activity. This combination is readily available and is known for its well-established safety and drug interaction profiles. Lopinavir/ritonavir's efficacy against SARS-CoV has been verified, and these drugs appear to diminish the viral load in COVID-19 patients. Nevertheless, clinical evidence for this combination therapy is somewhat limited, primarily relying on case reports. Additionally, a study by Cao B,.*et al* 2020 found no added clinical benefits from lopinavir/ritonavir beyond standard care. Numerous randomized controlled trials are ongoing in China to investigate this further. The recommended dosage is 400/100 mg twice daily (BID), without the need for dose adjustments based on kidney function. However, monitoring liver enzymes can be beneficial. Common side effects of lopinavir/ritonavir include nausea, diarrhea, and insomnia. It's important to note that these drugs have various interactions with other medications (Cao B,. *et al* 2020).

Conclusion:

The SARS-CoV-2 pandemic has brought about significant global health and economic repercussions. Despite numerous suggestions for potential therapies, there is currently a lack of targeted solutions for treating COVID-19 or preventing SARS-CoV-2 infection. Presently, the most effective intervention appears to be the implementation of rigorous quarantine measures for the general population, which has demonstrated its ability to reduce the rate of contagion. While scientists are actively searching for a completely reliable drug to definitively treat COVID-19, a fully effective medication for complete recovery remains elusive. Thankfully, the collaborative endeavors of researchers and pharmaceutical firms have led to the approval of numerous potent vaccines by the World Health Organization to curb the spread of this lethal ailment. Nevertheless, the global distribution and administration of these efficacious vaccines to all corners of the world

and populations necessitate a considerable amount of time. In the interim, strict adherence to all the guidelines outlined by the World Health Organization is imperative to mitigate the spread of this illness.

Urgent action is required to conduct specialized randomized clinical trials that can ascertain the most suitable evidence-backed treatment approach for curbing the spread of COVID-19 and mitigating the impact of any future outbreaks.

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