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A REVIEW ON THE COVID-19

Surendra Sharma
Associate Professor
Amity College of Nursing,
Amity University, Haryana

Abstract

The first novel coronavirus (SARS-CoV-2) in reported in Wuhan, China in December 2019 is a highly contagious disease. The World Health Organization (WHO) has declared the ongoing outbreak as a global public health emergency. COVID-19 is a disease caused by a new strain of coronavirus. 'CO' stands for corona, 'VI' for virus, and 'D' for disease. Formerly, this disease was referred to as '2019 novel coronavirus' or '2019-nCoV.' The COVID-19 virus is a new virus linked to the same family of viruses as Severe Acute Respiratory Syndrome (SARS) and some types of common cold

Keywords

COVID-19,Coronavirus, pneumonia, Respiratory infection

Background

In late December 2019, a case of unidentified pneumonia was reported in Wuhan, Hubei Province, People's Republic of China (PRC). Its clinical characteristics are very similar to those of viral pneumonia. After analysis on respiratory samples, PRC Centers for Disease Control (CDC) experts declared that the pneumonia, later known as novel coronavirus pneumonia (NCP), was caused by novel coronavirus [1]. WHO officially named the disease COVID-19. International Committee on Taxonomy of Viruses (ICTV) named the virus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Designation of a formal name for the novel coronavirus and the disease it caused is conducive to communications in clinical and scientific research. This virus belongs to β – coronavirus, a large class of viruses prevalent in nature. Similar to other viruses, SARS-CoV-2 has many potential natural hosts, intermediate hosts and final hosts. This poses great challenges to prevention and treatment of virus infection. Compared with SARS and MERS, this virus has high transmissibility and infectivity, despite of low mortality rate [2].

3. Transmission of SARS-CoV-2

Previous epidemiological studies have proved that there are three conditions for wide spread of virus, i.e. the source of infection, route of transmission, and susceptibility [3]. There is no exception for SARS-CoV-2.

Bats are considered to be the natural hosts of SARS-CoV-2, while pangolins and snakes are thought to be the intermediate hosts. Studies of Institute Pasteur of Shanghai showed that bats might be the natural hosts of SARS-CoV-2. Furthermore, studies of Peking University [4] suggest that SARS-CoV-2 infection is probably caused by snakes. However, later studies [5] found that no evidence showed that snakes are the hosts of SARS-CoV-2. Study from wuhan institute of virology showed that the similarity of gene sequence between SARS-CoV-2 and bat coronavirus is as high as 96.2% by sequencing technology [6] This also implied that bats are the possible source of SARS-CoV-2. [7]

At present, it is considered that the main infectious source of COVID-19 patients in the population.

4.2. From the perspective of route of transmission

Transmission and close contact are the most common ways of transmission for SARS-CoV-2. Aerosol transmission might also be a way of transmission. In addition, researchers also detected SARS-CoV-2 in the samples of stool, gastrointestinal tract, saliva and urine. Based on bioinformatics evidence indicated that digestive tract might be a potential route of SARS-CoV-2 infection [8]. Consistently, SARS-CoV-2 RNA was also dectected in gastrointestinal tissues from COVID-19 patients [9]. Moreover, SARS-CoV-2 was detected in the tears and conjunctival secretions of covid-19 patients [10]. Meanwhile, a retrospective study based nine pregnant women with COVID-19 had for the first time indicated that the possibility of intrauterine vertical transmission between mothers and infants in the late pregnancy was temporarily excluded [11].

5. Clinical characteristics of SARS-CoV-2 infection

COVID-19 produces an acute viral infection in humans with median incubation period was 3.0 days [12], which is similar to the SRAS with an incubation period ranging from 2–10 days [13]. The presenting features of COVID-19 infection in adults are pronounced. The presenting features in adults are pronounced. The most common clinical symptoms of COVID-19 infection were fever (87.9%), cough (67.7%), fatigue (38.1%), whereas diarrhea (3.7%) and vomiting (5.0%) were rare [12,14], which were similar to others coronavirus. Most patients had some degree of dyspnoea at presentation, because the time from onset of symptoms to the development of acute respiratory distress syndrome (ARDS) was only 9 days among the initial patients with COVID-19 infection [1]. Moreover, severe patients are prone to a variety of complications,

including acute respiratory distress syndrome, acute heart injury and secondary infection [15]. There are already some evidences that COVID-19 can cause damage to tissues and organs other than the lung. In a study of 214 COVID-19 patients, 78 (36.4%) patients had neurological manifestations [16]. In addition, there is already evidence of ocular surface infection in patients with COVID-19 was detected in eye secretions of patient [17]. Some COVID-19 patients have arrhythmia, heart failure , impaired renal function, and abnormal liver function (50.7%) at admission [18].

Diagnosis of COVID-19

The detection of viral nucleic acid is the standard for non-invasive diagnosis of COVID-19. However, the present detection of SARS-CoV-2 nucleic acid was high in specificity and low in sensitivity, so that there might be false negatives and the testing time could be relatively long. The Novel Coronavirus Pneumonia Diagnosis and Treatment Plan (5^{th} trial version) took "suspected cases with pneumonia imaging features" as the clinical diagnostic criteria in Hubei Province [19]. One reason might be to distinguish the flu from the COVID-19. Furthermore, Zhang F of MIT developed a test paper for rapid detection of SARS-CoV-2 in one hour by SHERLOCK technology. Although the clinical verification has not been carried out yet, this technology, once proved, might be conducive to rapid diagnosis of the disease [20].

Treatment of COVID-19

Antiviral medicine treatment

At present, the treatments of patients with SARS-CoV-2 infection are mainly symptomatic treatments. Remdesivir was recently reported as a promising antiviral drug against a wide array of RNA viruses. Holshue et al. for the first time reported that treatment of a patient with COVID-19 used remdesivir and achieved good results [21]. Then, Xiao *et al.* findings reveal that remdesivir effectively in the control of 2019-nCoV infection in vitro. Meanwhile, also found that chloroquine has an immune-modulating activity and could effectively inhibit in this virus in vitro [22]. Clinical controlled trials have shown that Chloroquine was proved to be effective in the treatment of patients with COVID-19 [23]. Remdesivir is undergoing a large number of clinical trials in several hospitals, and the final efficacy of the drug is uncertain. Arbidol, a small indole derivative molecule, was found to block viral fusion against influenza A and B viruses and hepatitis C viruses [24] and confirmed to have antiviral effect on SARS-CoV in cell experiment [25], so that it might be a choice for COVID-19 treatment. The randomized controlled study on treatment of novel coronavirus by Arbidol and Kaletra undertaken at present showed that Arbidol had better therapeutic effect than Kaletra did and could significantly reduce the incidence of severe cases. Apart from the above, lopinavir/ritonavir, nucleoside analogues,

neuraminidase inhibitors, remdesivir, and peptide EK1 could also be the choices of antiviral drugs for COVID-19 treatment [26].

Immunoenhancement therapy

Synthetic recombinant interferon α has proven to be effective in treatment of SARS patients in clinic trials [27]. Pulmonary X-ray abnormal remission time was reduced by 50% in the interferon-treated group compared with the glucocorticoid-treated group alone. Interferon was also found to be an effective inhibitor of MERS-CoV replication [28]. Those findings suggested that interferon could be used in the treatment of COVID-19. Intravenous immunoglobulin might be the safest immunomodulator for long-term use in all ages, and could help to inhibit the production of proinflammatory cytokines and increase the production of anti-inflammatory mediators [29]. Moreover, Thymosin alpha-1 (Ta1) can be an immune booster for SARS patients, effectively controlling the spread of disease . Intravenous immunoglobulin and Ta1 may also be considered as therapeutics for COVID-19[30].

Convalescent plasma therapy

When there are no sufficient vaccines and specific drugs, convalescent plasma therapy could be an effective way to alleviate the course of disease for severely infected patients [31]. In a retrospective analysis, convalescent plasma therapy is more effective than severe doses of hormonal shock in patients with severe SARS, reducing mortality and shortening hospital stays [32]. A prospective cohort study by Hung and colleagues showed that for patients with pandemic H1N1 influenza virus infection in 2009, the relative risk of death was significantly lower in patients treated with convalescent plasma [33]. Moreover, from the perspective of immunology, most of the patients recovered from COVID-19 would produce specific antibodies against the SARS-CoV-2, and their serum could be used to prevent reinfection. At the same time, antibodies can limit the virus reproduction in the acute phase of infection and help clear the virus, which is conducive to the rapid recovery of the disease [34]. Theoretically, viremia peaks during the first week of most viral infections, and it should be more effective to give recovery plasma early in the disease [35]. Therefore, the plasma of some patients recovered from COVID-19 could be collected to prepare plasma globulin specific to SARS-CoV-2. However, the safety of plasma globulin products specific to SARS-CoV-2 deserves further consideration.

Prevention of COVID-19

So far, there are no specific antiviral treatments or vaccines for SARS-CoV-2. And the clinical treatment of COVID-19 has been limited to support and palliative care until now. Therefore, it is urgent to develop a safe and stable COVID-19 vaccine.

Studies have shown that vitamin C may prevent the susceptibility of lower respiratory tract infection under certain conditions [36], while COVID-19 may cause lower respiratory tract infection. Therefore, a moderate amount of vitamin C supplementation may be a way to prevent COVID-19. In addition, the decrease in vitamin D and vitamin E levels in cattle could lead to the infection of bovine coronavirus [37]. This suggests that proper supplementation of vitamin D and vitamin E may enhance our resistance to SARS-CoV-2.

Patients with primary basic diseases, especially those with chronic diseases such as hypertension, diabetes, coronary heart disease and tumor, are more susceptible to SARS-CoV-2 and their risk of poor prognosis will increase significantly after infection, because they have low systemic immunity as a result of the disease itself and treatments [38]. Therefore, it is particularly important to enhance self-resistance. The main way to boost personal immunity is to maintain personal hygiene, a healthy lifestyle and adequate nutritional intake [39]. For individuals, taking protective measures can effectively prevent SARS-CoV-2 infection, including improving personal hygiene, wearing medical masks, adequate rest and good ventilation [12].

At present, it is important to control the source of infection, cut off the transmission route, and use the existing drugs and means to control the progress of the disease proactively.

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