Diagnostic And Therapeutic Strategies for COVID-19

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Abstract— The outbreak and spread of global pandemic of corona virus disease 2019 [COVID-19] which caused by severe acute respiratory syndrome corona virus 2 [SARS -COV -2], can be consider as the common and vary important global issue. Which increases high morbidity and mortality rate around the world. On the 11th Feb 2020 the World Health Organization [WHO] designated Novel Corona virus SARS-Cov-2 as Covid 19.

Since, then 2 understand perniciousness of Covid-19, our scientific and clinical communities collaborating to develop effective strategies for new vaccines and another therapeutic options. However, conventual drug treatment and the vaccine development also going on for developing physical defenses and immunity against Covid-19 the alternative Herbal drugs, Medicines including Ayurveda, Unani and Homeopathy have also used therapeutic strategies. All considered, in this review we describe Diagnostic and Therapeutic strategies that will aid in fight the global pandamic.

I. INTRODUCTION

The novel human corona virus disease was first reported in Wuhan China. In Dec 2019 COVID-19 subsequently spread worldwide. After 1918 flu pandamic the novel human coronavirus has become the fifth documented pandemic. On 30 January 2020 the world health organization (Who) declared the covid 19 outbreak is a public health emergency and Pandemic on 11 March 2020.Around the world more than 4,70,000 confirmed cases of COVID-19 up to 26 March 2020 and more than 20,000 deaths touching every continent save Antarctica, As of 9 July 2021 there were more than185,291,530 cases of COVID-19 around the world and more than 40,10,834 deaths.

The covid-19 spread from bat to human. The covid-19 is spread by inhalation or contact with infected droplets and incubation period range from 2 to 14 days. The symptoms of covid-19 are usually fever, sore throat, cough, breathlessness, fatigue, malaise and others. With the Covid-19 disease majority people have minor symptoms, while about 20% present with moderate to serve disease. Remaining 5% of people may progress to pneumonia, multi-organ dysfunction and acute respiratory distress syndrome.

The full impact of global pandemic corona virus disease on social, health and economic welfare of human kind is yet to be determined. [1]

1.1 Current treatment strategies for COVID-19

Just like SARS-CoV and MERS-CoV [2], there is currently no clinically proven specific antiviral agent available for SARS-CoV-2 infection. The supportive treatment, including oxygen therapy, conservation fluid management, and the use of broad-spectrum antibiotics to cover secondary bacterial infection, remains to be the most important management strategy [15]. According to the research on molecular mechanisms of coronavirus infection [3] and the genomic organization of SARS-CoV-2 [6], there are several potential therapeutic targets to repurpose the existing antiviral agents or develop effective interventions against this novel coronavirus.

1.2 Virally targeted inhibitors

Remdesivir, an adenosine analogue that can target the RNA dependent RNA polymerase and block viral RNA synthesis, has been a promising antiviral drug against a wide array of RNA viruses (including SARS/MERS-CoV) infections in cultured cells [4], mice and nonhuman primate models [6,7]. The Washington Department of Health administrated remdesivir intravenously first and found that remdesivir might have potential protection from SARS-CoV-2 infection [8]. Then remdesivir and chloroquine have been demonstrated to inhibit SARS-CoV-2 effectively in vitro [9]. Hence, other nucleoside analogues, such as favipiravir, ribavirin and galidesivir [10], may be potentially clinically applicable against SARS-CoV-2. Chymotrypsin-like (3C-like protease, 3CLpro) and papain-like protease (PLP) are non-structural proteins, which have an essential function for coronaviral replication and can inhibit the host innate immune responses [11]. So 3CLpro inhibitors, such as cinanserin [11] and flavonoids [13], and PLP inhibitors, such as diarylheptanoids are other attractive choices to fight against SARS-CoV-2. ACE2 mediates SARS-CoV-2 entry into the cell as a functional receptor of coronaviruses. So blocking the binding of S protein with ACE2 is also a meaningful strategy against SARS-CoV-2 infection [10].

1.3 Antibody and plasma therapy

It has also been reported that there are many convalescent patients donating plasma against SARS-CoV-2, just as SARS-CoV [15] and MERS-CoV trials. It has preliminary acquired favourable results in acute, severe SARS-CoV-2 patients. Moreover, the generation of recombinant human monoclonal antibody (mAb) is a fairly straightforward path to neutralize SARS-CoV. CR3022, a SARS coronavirus-specific human monoclonal antibody, can bind potently with the receptor-binding domain (RBD) of SARS-CoV-2 and has the potential to be developed as candidate therapeutics of SARS-CoV-2 infections [17]. Other monoclonal antibodies neutralizing SARS-CoV, such as m396, CR3014, could be an alternative for the treatment of SARS-CoV-2 [18].

1.4 Vaccines

COVID-19 is an epidemic of unprecedented proportions in modern human history. Under 18 Since the outbreak of the pandemic, nearly two hundred million have been confirmed cases and 4 million deaths worldwide. There have also been huge efforts directed towards Finding safe and effective vaccines. By July 2021, there were 105 COVID-19 vaccine candidates in clinical development, 184 in preclinical development, and 18 approved emergency vaccines Used by at least one regulatory body. These vaccines include live attenuated whole virus or Inactivated, protein, viral, and nucleic acid vaccines. The administration of vaccine is called vaccination. By mid-2021 three billion Doses of the COVID-19 vaccine have been administered all over the world, mostly high-income people Countries. Vaccines are biological preparations that provide active acquired immunity to a specific infectious disease. To achieve immunity against the virus and stop sending Vaccine development has been accelerated. The vaccine development is very long and tedious process. But in Covid-19 pandamic whole vaccine development completed in 12 – 18 months.

Effective SARS-CoV-2 vaccines are essential for reducing disease severity, viral shedding and transmission, thus helping to control the coronavirus outbreaks. There are several vaccination strategies against SARS-CoV, MERS-CoV tested in animals, including a live-attenuated virus, viral vectors, inactivated virus, subunit vaccines, recombinant DNA, and proteins vaccines [19]. These studies are in progress, but it requires months to years to develop the vaccines for SARS-CoV-2.Currently, there may be many promising targets for SARS-CoV-2,but more laboratory and clinical evidence still should be explored. The WHO is working with Chinese scientists to launch more than 80 clinical trials on potential treatments for SARS-CoV-2. Traditional Chinese medicine seems to have some effects in the supportive treatments. Some new pharmaceutical drugs, including HIV drugs and stem cells, were testified in those clinical trials.

II. DIAGNOSTIC STRATEGIES FOR COVID-19

Rapid and accurate diagnosis of COVID-19 is of considerable significance for controlling outbreaks in the communities and hospitals [19]. Technologies such as polymerase chain reaction (PCR), reverse-

transcription polymerase chain reaction (RT-PCR), real-time RT-PCR (RT-PCR), and reverse transcription loop-mediated isothermal amplification (RT-LAMP) have been leveraged as ideal diagnostic tests for CoVs [20,21]. To date, the frontline reaction to the SARS-CoV-2 outbreak has been PCR testing. As the gold standard for diagnosing the source of infection, PCR holds the preponderance that the primers required for such assays can be generated relatively quickly once the viral sequence is identified (Fig. 4) [22]. Soon after the virus was identified, the first quantitative RT-PCR assays to detect SARS-CoV-2 were inaugurated and distributed in January 2020 by WHO. Nevertheless, this test protocol was complicated and high-priced, and is primarily applicable for large centralized diagnostic laboratories. As for the diagnostic criteria currently formulated by the China National Health Commission, nasopharyngeal cancer and oropharyngeal swab tests have ripened into the standard evaluation for the diagnosis of COVID-19 infection. So far, three new RT-PCR tests targeting 8 Asian Journal of Pharmaceutical Sciences 16 (2021) 4–23 the RNA-dependent RNA polymerase (RdRp)/helicase (Hel), nucleocapsid, and spike genes of SARS-CoV-2 had been inaugurated, with extremely lower detection limit in vitro [23]. The SARS-CoV E gene detection was superior to the RdRp gene test combined with the one-step RT-PCR system. The E gene PCR was adequate for diagnosing SARS-CoV-2 infection, but the RdRp protocol was endorsed to verify positive results [24]. Remarkably, a new FDA-authorized COVID-19 test using the Abbott ID NOW diagnostics platform has been developed, which can produce results in just 5 minutes cutting down on wait times both in terms of getting tested and receiving a diagnosis. As gene detection of SARS-CoV-2 might provide false negative results, it can be complemented by antibody detection, especially to better screen asymptomatic patients. Clinically, for those who are recently suffering from fever, fatigue, sore throat, cough or dyspnea due to exposure, the diagnosis of COVID-19 infection should be conducted with typical chest computerized tomography (CT) characteristics regardless of negative RT-PCR outcomes [25].Most of the COVID-19 cases shared similar characteristics on CT images, presenting bilateral distribution of patchy shadows and ground-glass opacity, sometimes presenting a circular shape and peripheral lung distribution [26]. Some of the data published from China showed that in 21 primal chest CT scans, a large proportion of patients (86%) developed frosted glass opacity, affecting more than one lung lobe (71%) (bilateral involvement) [27]. It is also worth noting that lung cavitation, pleural effusions, discrete pulmonary nodules, along with lymphadenopathy were absent [27]. In addition to imaging technology, a recent study displayed that the Cas13-based SHERLOCK (specific high-sensitivity enzymatic reporter unlocking) platform can be harnessed for diagnosis of SARS-CoV-2. In this system, RNA-targeting Cas13 enzyme is deployed to identify specific genetic targets. The Cas13 can cleave nearby RNAs, a 'collateral' feature useful for amplifying a reporter signal in the diagnostic test. However, such a system needs to be further verified in clinical tests. Overall, combined with immunochromatography, colloidal gold, and other biotechnologies, associative detection strategies have been progressed swiftly.

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