



An overview of SARS-COV-2 (COVID-19) disease pandemic

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Abstract

A novel coronavirus (SARS-COV-2) overflow event, with its epicenter point in the Wuhan (China), has risen as the health of the public crisis is of global concern. This started as an episode in the December, (2019), and till the 28th of February, (2020), there have about 83,704 committed cases of the SARS-COV-2 (COVID-19) disease at the global level, including 2,859 deaths. This showed overall cases including 3.41% of the fatality rate. At this point more than 58 nations or regions were affected with SARS-COV-2 (COVID-19) disease. As an important role of the worldwide response to manage and contain this pandemic, significant accentuation was put to create research knowledge in order to manage proof based response to carry the infection. This disease was named as severe respiratory syndrome COVID-19 (SARS-CoV-2), owing to its hereditary similarities with the SARS infection. Individual to-individual transmission of the COVID-19 contamination led to the isolation of the patients that were treated with various types of treatments. Various measures have been executed to decrease the individual to-individual transmission of the SARS-CoV-2, to stop the present outbreak. Unique considerations and many efforts ought to be applied in the populations to decrease the transmission of COVID-19 including health care providers, kids and older individuals. The aims of this review were to highlight the epidemiology, transmission, diagnosis and future instructions of COVID-19 to stop spreading of this lethal disease.

Keywords: COVID-19, Epidemic, Severe respiratory syndrome, Pandemic, Epidemiology, SARS-COV-2, Transmission, Diagnosis

1. Introduction

Coronaviruses (COVID-19) represent crucial category of viral infections mainly influencing the humans through zoonotic transmission. Coronaviruses are RNA virus infections which normally cause severe upper respiratory sicknesses. A recent study conducted by [Ramadan and Shaib, \(2019\)](#) highlighted that the

rise of SARS (Severe acute respiratory syndrome) MERS (Middle East Respiratory Syndrome) have focused the worldwide consideration on the clinical significant importance's of coronaviruses. This new viral infection appeared to be extremely infectious and has rapidly spread all over the world. The genome of

coronaviruses generally contains a single-stranded RNA with positive sense (+ssRNA), however it varies in size between ≈ 26 and ≈ 32 kb, which can be isolated from many animal species ([Banerjee *et al.*, \(2020\)](#)). For unknown reasons, these types of viral infections can cross the species obstructions and can cause in human beings sickness that varies from cold to progressively high severe disorder. According to [Burrell *et al.*, \(2016\)](#), coronaviruses (CoVs) are classified into four significant genera: a)-Alpha coronavirus that carry human coronavirus (HCoV) - 229E and HCoV-NL63, b)-Beta coronavirus comprised HCoV-OC43, (which contaminate primarily mammals), c)-Delta coronavirus and d)-Gamma coronavirus (which essentially infects the birds). In most of the human beings, coronavirus generally causes mild to direct upper-respiratory tract diseases. Recently, [Chatterjee *et al.*, \(2020\)](#) reported that coronavirus has been noted as a general wellbeing crisis of universal concern (PHEIC) 9, and currently the pandemic curves are still rising. The objectives of this study were to sum up the clinical and general public health aspects of coronavirus and SARS-CoV-2, and learn the lessons obtained from the worldwide reactions so far.

2. Epidemiology

The place of market named Huanan Seafood that spread the sickness is not clear. According to [Li *et al.*, \(2020\)](#) many starting COVID-19 cases were connected to this market proposing that SARS-CoV-2 was transmitted from animals to humans. At the end, human-to-human transmission through close contact was reported as the secondary reason to cause COVID-19 disease. [Gralinski and Menachery, \(2020\)](#) revealed that the increasing frequency of infected people with no history of exposure to the wildlife or visiting the Wuhan city have been recognized among the clinical experts as well. COVID-19 contamination occurs upon exposure to the viral infection, and both of the ordinary and immunosuppressed population appear to be susceptible. The age of the broad majority of patients is between 35-55 years, with lesser cases recorded among the kids and babies. In a study conducted by [Bai *et al.*, \(2020\)](#), individuals with low

immunity especially old aged individuals and those with renal and hepatic distinction were viewed as the highly hazardous groups. Generally, COVID-19 is known of having high rate of viral pandemic and transmissibility risk than SARS-COV-2, as COVID-19'S have efficacious "R" (reproductive number) of 2.90, which is a higher than the recorded efficacious "R" (reproductive number) of SARS (1.77), as highlighted by [Liu *et al.*, \(2020\)](#). Recently, [Miller *et al.*, \(2020\)](#) reported that the health security authorities of China announced that COVID-19 has a normal incubation time of seven days that ranges from 2-14 days.

3. Risk factors and clinical manifestations

The high rate of SARS-CoV-2 contamination is seen most regularly in the adult male patients with the middle age people between 34-59 years. Moreover, recent work of [Bai *et al.*, \(2020\)](#) added that SARS-CoV-2 more probably infect individuals with chronic comorbidities including; cardiovascular, cerebrovascular disorders and diabetes, with the highest serious cases recorded in adult's ≥ 60 years old. Several studies conducted by [Huang *et al.*, \(2020\)](#); [Wang *et al.*, \(2020a\)](#) revealed that clinical manifestations of COVID-19 contamination have similarities with SARS-CoV, where the most well-known symptomatic side effects include dry cough, fever, chest pain, dyspnoea, fatigue and myalgia. [Huang *et al.*, \(2020\)](#) added that lower common symptoms include; nausea, diarrhoea, vomiting and dizziness. In the initial report by [Huang *et al.*, \(2020\)](#), there were about 425 confirmed cases in the Wuhan; the regular symptoms included fatigue, fever, dry cough, abdominal pain, headache, haemoptysis and diarrhoea. [Bai *et al.*, \(2020\)](#) reported that around 75% of patients were suffering from bilateral pneumonia. Differing from MERS-CoV infections, not many COVID-19 patients showed the prominent respiratory symptoms such as; rhinorrhoea, sore throat or sneezing, thus proposing that viral infection might most probably cause lower respiratory symptoms. [Bai *et al.*, \(2020\)](#); [Wang *et al.*, \(2020a\)](#) highlighted that

non-pregnant and pregnant women have similar characteristics.

4. Diagnosis of COVID-19

Many efforts have been done to break the chain of COVID-19 including; established quarantine institutes, isolation measures, and manage patients clinically, all of which require helpful screening and analytic diagnostic tools. According to [Bai *et al.*, \(2020\)](#), although SARS-CoV-2 is spreading, however other respiratory contaminations might be also increasing commonly in the local community network. A recent study conducted by [Chatterjee *et al.*, \(2020\)](#) demonstrated that infected people who are satisfied with a clinical case definition, and are epidemiologically connected to the history of travelling from the Wuhan city, or have interacted with reverse transcription polymerase chain reaction (RT PCR) affirmed cases, and/or with a patient who is under an investigation for SARS-COV-2, are regarded to be suffering from coronavirus. As the asymptomatic transmissions of the viral infection are built up, people with epidemiological hazardous risk exposure should practice strict steps towards the standard precautionary measures, and should restrict the contact-based transmission. The World Health Organization ([WHO, 2020a](#)) suggested that culture of viral infection could be done in a Biosafety level 3 laboratory (BSL-3 lab), and the RT-PCR must be carried out in a BSL-2 research laboratories. According to the WHO at the 2nd of March, (2020), concerning a person dealing with specimens of SARS-COV-2, he/she must secure that neither the sample nor the health care worker (HCW) is defiled to minimize any dangers, and also should ensure the accuracy of diagnosis. [Chatterjee *et al.*, \(2020\)](#) reported that isolation of coronavirus should be done in cells lines and the diagnosis has to be confirmed using RT-PCR.

5. Laboratory findings

In coronavirus patients, normal laboratory abnormalities including lymphopenia and lactate dehydrogenase were reported by [Wang *et al.*, \(2020a\)](#).

Patients who are admitted to an intensive care unit (ICU), should have many laboratory abnormalities compared to the non-ICU patients ([Chatterjee *et al.*, 2020](#); [Wang *et al.*, 2020a](#)), and they had elevated levels of C-responsive protein, creatine, kinase, creatinine, aspartate aminotransferase. [Huang *et al.*, \(2020\)](#); [Wang *et al.*, \(2020a\)](#) demonstrated typical serum procalcitonin levels in most of the COVID-19 suspected patients. Moreover, [Bai *et al.*, \(2020\)](#) also reported that SARS-CoV-2 patients have significant levels of Interferon gamma (IFN- γ), Interleukin-1-beta (IL1-B), Interferon gamma-induced protein 10 (IP10) and Monocyte chemo-attractant protein-1 (MCP1).

6. Radiology finding

Radiology finding's differs with many factors including; the patient's age, infection progression, comorbidity, immunity status and with starting the medical intervention. In describing an investigation, about 41 patients were suffering from pneumonia detected through irregular discoveries using computed tomography scan (CT-scan) ([Bai *et al.*, 2020](#)). Deformity on chest CT-scan were also found in another study of 6 cases conducted by [Chan *et al.*, \(2020\)](#), where every patient of them showed remarkable multifocal patchy ground-glass opacities by the peripheral region of the lungs. Recently, [Huang *et al.*, \(2020\)](#) demonstrated from the previous studies that typical model of chest CT-scan discoveries are bilateral to the pulmonary opacities, and to the pulmonary parenchymal ground-glass. Two-sided multiple lobular zones of consolidation were typically detected in the chest CT-scan of ICU-admitted patients. Moreover, [Huang *et al.*, \(2020\)](#) reported that among 99 patients, one patient suffered from pneumothorax in the imaging examination.

7. Therapy and vaccines

Like SARS, Covid-19 also utilizes angiotensin-converting enzyme 2, or ACE2 site (receptor site) for passage into the human cell ([Bai *et al.*, 2020](#)). This potentially opens up the chance for utilizing similar therapeutic procedures that were effective in blocking

SARS. Currently, no complete medications are available, although various pharmacological alternatives are being explored. Similar to SARS-CoV and MERS-CoV, there is still now no particular antiviral treatment for coronavirus infection. According to [Habibzadeh and Stoneman, \(2020\)](#), supportive care and patient's isolation, including oxygen treatment, antibiotics treatment and fluid management of secondary bacterial contaminations are highly recommended. A recent study of [Huang *et al.*, \(2020\)](#) highlighted that some of the coronavirus patients progressed quickly to the septic shock and acute respiratory distress syndrome (ARDS), which were finally ended by numerous organs failure. According to [Wu *et al.*, \(2020\)](#), an antiviral medicine such as Oseltamivir drug combined with anti-toxin treatment have been utilized for the beneficiary cure of COVID-19 patients. [Wu *et al.*, \(2020\)](#) added that in US, Remdesivir that is used for treatment of Ebola infection has now been utilized for cure of the coronavirus cases. As reported recently by [Wang *et al.*, \(2020b\)](#) combined treatment with mix of Lopinavir/Ritonavir and Arabidol; a conventional Chinese medication, demonstrated a clinical advantage to three out of four COVID-19 patients. [Habibzadeh and Stoneman, \(2020\)](#) added that there are progressing clinical trials to evaluate the security and adequacy of treating the patients of COVID-19 with interferon- α 2b and Lopinavir-ritonavir. In spite of the fact that research teams all over the world are actively working to investigate key attributes to combat the viral infection; however, proper consideration ought to be drawn on cross-resistance of different vaccines and therapeutic agents. For example, immunizations against different disorders such as rubella and measles can make cross-resistance for COVID-19. This idea of cross-resistance mainly depends on many discoveries that children in China were found less vulnerable to disease when compared to the elder population ([Shereen *et al.*, 2020](#)).

7.1. Corona viral enzyme inhibitors

Chymotrypsin-like (3C-like) and papain-like enzyme (PLP) are coronavirus encoded proteins. They

have a vital role for corona viral replication and have additional role for inhibiting immune responses of the host. Targeting 3C-like enzyme (3C pro) and papain-like enzyme (PL pro) are focused for cure of coronavirus, as suggested by a previous work of [Park *et al.* \(2012\)](#).

7.2. Spike (S) protein- Angiotensin-converting enzyme-2 (ACE2) blockers

Angiotensin-converting enzyme-2 (ACE2) is a type of integral membrane macromolecule that functions as carboxypeptidase and is the 1st homolog of human ACE ([Park *et al.*, 2012](#)). Additionally, ACE2 is a practical receptor of SARS-CoV and prevents viral entry to the cell by binding with the viral Spike (S) protein macromolecule ([Li *et al.*, 2003](#)). COVID-19 uses ACE2 as receptor for entry into the cell, however failed to use alternative COVID-19 receptors such as di-peptidyl enzyme, aminopeptidase N.

7.3. Chloroquine

Chloroquine was commonly known as an antimalarial vaccine since 1934. In addition to its antiprotozoal effects, this drug has several fascinating organic chemical properties and antiviral impact. [Vincent *et al.*, \(2005\)](#) reported that the interaction between S protein and ACE2 receptor site was interrupted by Chloroquine. Interestingly, anti-viral effects of chloroquine were observed both in pre- and post-infection conditions, opening up the possibility of its use as a prophylactic and therapeutic agent. However, hydroxychloroquine showed more in vitro efficacy against SARS-CoV-2 infection ([Wang *et al.*, 2020b](#)).

8. Prevention of transmission

Generally, SARS-CoV-2 spreads by means of respiratory droplets and physical contact ([Jayaweera *et al.*, 2020](#)). Thus it is necessary to practice precautionary steps to prevent the viral transmission ([WHO, 2020b](#)). Standard safety measures comprise utilization of Personal protective equipment (PPE)

hygiene of the hands, respiratory or cough etiquettes. Hand washing following the right correct steps involving the use of cleanser water and soap are sufficient. A recent study conducted by [Chang *et al.*, \(2020\)](#) revealed that clothes towels should be stayed away from the drying hands and dispensable tissue papers are preferred to be used. In addition, PPE should include clinical masks, outfits, gloves, face shield and shoe covers ([WHO, 2020b](#)). For contact-based transmission and droplets, clinical masks or laboratory masks with the straps of the head should be sufficient. People in community network settings suspected of COVID-19 infection and having mild respiratory indications must quarantine themselves ([WHO, 2020b](#)). Moreover, health care workers should wear clinical masks consistently followed by hand cleanliness and proper disposal, as reported by the WHO.

Conclusion

Several lessons are gained from the worldwide reaction to the SARS-COV-2 danger. The current COVID-19 is obviously a global public health issue. Many advances are obtained about knowing the virus, how it infects the cells and causes disorders, and clinical signs of this disease. Because of its quick transmission, all nations in the world should increase the attention about the disease surveillance systems, scale up country readiness and response operations including; establishing fast response teams and improving the capacity to handle the national laboratory system. The situation of the present COVID-19 is a clear universal medical health issue. Many fast advances are achieved related to the pathogen infection, how the virus contaminates the cells and clinical signs of the disease.

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Conflict of interest

The authors declare that there is no conflict of interests.

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