ABSTRACT

Pneumonia triggered by novel coronavirus (SARS-CoV-2) in Wuhan, China in December 2019 is an extremely contagious disease. The WHO has stated the outbreak of Covid 19 (Corona virus) as a pandemic issue. Currently, the research on this virus is in its primary stage. Based on the existing and available data, this is to enlighten on the epidemiology, its clinical features, diagnosis, treatment and prevention of COVID-19. This review is for the public to effectively recognize and fight with the 2019 novel coronavirus and providing a spark for future studies.

Keywords: Coronavirus; coronavirus disease 2019 (COVID-19); SARS-CoV-2; microbiology; monster.

1. INTRODUCTION

Viruses of the family Coronaviridae consists of a single strand, positive-sense RNA genome ranging from 26 to 32 kb long [1]. Coronaviruses have been found in several avian hosts, [2,3] and in many mammals, including bats, camels, masked palm civets, mice, dogs, and cats. Novel mammalian coronaviruses are frequently identified [1]. For example, an HKU2- associated coronavirus of bat origin was related to a fatal acute diarrhea syndrome in pigs in 2018 [4]. Among coronaviruses that are fatal to humans, most are related to minor clinical changes, [1] with two main variations: severe acute respiratory syndrome (SARS) coronavirus (SARS-CoV), from southern China, in November, 2002, [5] and Middle East respiratory syndrome...
(MERS) coronavirus (MERS-CoV), which was first detected in Saudi Arabia in 2012 [6] following into South Korea [7,8].

Various investigations have identified this to be a new variant of COV [9]. Firstly, this was called as 2019-nCoV. However, the International Committee on Taxonomy of Viruses named it as the SARS-CoV-2 virus [10]. The recent epidemic was initially believed as pneumonia of remote origin in some patients in Wuhan, China. The root of infection was associated to vet markets in the city. As the number of casesare soaring high, it is believed to cause significant damage to the mankind. A novel coronavirus was identified as the potentially fatal causative organism, temporarily named 2019 novel coronavirus (2019-nCoV). Till Jan 26, 2020, greater than 2000 cases of 2019-nCoV infection have been confirmed, most of which involved people residing or visiting Wuhan, and person-to-person transmission was confirmed [10].

On February 11, 2020, the WHO directly announced the disease was caused by coronavirus disease-2019 (COVID-19). The repeated flare-ups of CoVs indicate a great public hazard. This report suggested the chances of animals to humans and humans to human transmission of newly emerged CoVs. The developing changes in the environmental conditions in the world hints the spur of unimaginable diseases in near future [9].

The disease was recognized as a pandemic on 11 March 2020, with global outbreak and costing the lives of millions of people. Most of the evidence for this disease originates from the epidemiological data of China, Italy, Korea, USA and UK [10]. The information from these countries have helped the researchers and enlighten other side of the world.

2. EPIDEMIOLOGY

Still, April 2, 2020, the WHO has confirmed 9, 36, 204 cases worldwide. Of all those confirmed cases, 47,249 patients have surrendered to the virus [10]. From the beginning, most of cases and deaths have been reported in China but over a period of time Italy has overtaken China and reached to 13,155 deaths due to coronavirus as of today(April 2,2020). All the confirmed cases are clinically diagnosed and laboratory-confirmed. As of today 203 countries and territories around the globe have been subjected to this corona virus. Due to the changes in the nature of the pandemic, the cases enrolled and countries involved are subject to variation.

2.1 Transmission Routes of the Virus

The three most common transmission routes [11] include:

- Direct mode (through droplet, cough and sneeze).
- Through oro-nasal route and ocular route and
- Through Aerosols.

Super spreaders (Asymptomatic) of the coronavirus infection are equally capable of transmitting the virus as symptomatic patients [12].

Risk of transmission of the virus is increased in closed spaces due to elevated aerosol concentrations [10]. SARS-CoV-2 has a replication number of 2.2 i.e., infected patient can easily infect two other persons. Current evidence suggests that the virus has an incubation period of three to seven days based on first reported cases [13]. Therefore, further research is required to completely address the transmission procedure and incubation periods.

3. CLINICAL FEATURES AND DIAGNOSIS

COVID-19 manifests with a wide range of clinical problems ranging from asymptomatic patients to septic shock and multiorgan dysfunction [10]. COVID-19 is mainly classified on the basis of severity of the presentation [10,14]. Symptoms are classified into mild, moderate, severe, and critical [15]. The most common type of symptoms include fever (98.6%), fatigue (69.6%), dry cough, and diarrhoea to the patients infected with corona virus [16,17].

Mild cases reported with symptoms of an upper respiratory tract infection which include, dry cough, fever, nasal congestion, sore throat, headache, and fatigue [10,18]. It is characterized by the absence of serious symptoms such as dyspnoea. The majority (81%) of COVID-19 cases are mild [10]. Furthermore, in these patients there is not so much radiographic changes [19].

But in some cases the patients with mild disease are quickly deteriorating into severe or critical illness. Patients with Moderate disease present with respiratory problems such as cough, shortness of breath, and tachypneaa [10]. Clinical
presentations may include the presence of severe dyspnoea, tachypnea (respiratory rate > 30/minute), respiratory distress, SpO2 ≤ 93%, PaO2/FiO2 < 300, and/or greater than 50% lung infiltrates within 24 to 48 hours [10,20]. In severe cases, fever can be absent or moderate. In addition, to this reports suggesting that 5% of patients can develop a critical illness with specific features such as respiratory failure, RN, hypoxia, cardiac injury, septic shock, or multiple organ dysfunction [10,19]. Data from the Chinese health care departments for Disease Control and Prevention (CDC) suggesting that there is a fatality rate for critical patients is 49% [10].

Patients who are having pre-existing systemic problems have a higher fatality rate. These systemic problems include diabetes, respiratory related diseases and cardiovascular disease, hypertension, and other oncological complications [19]. Patients who are not having any kind of systemic conditions have a lower mortality rate when compared to patients having systemic illness [19]. Acute Respiratory Distress Syndrome (ARDS), the development of ARDS indicates new-onset or worsening respiratory failure [21]. The values of PaO2/FiO2 are used to distinguish ARDS based on varying degrees of hypoxia [10]. Such as:

<table>
<thead>
<tr>
<th>PaO2/FiO2</th>
<th>Form of ARDS</th>
</tr>
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<tbody>
<tr>
<td>≤ 100 mm Hg</td>
<td>Severe</td>
</tr>
<tr>
<td>100 mm Hg -200 mm Hg</td>
<td>Moderate</td>
</tr>
<tr>
<td>200 mmHg -300 mm Hg</td>
<td>Mild</td>
</tr>
</tbody>
</table>

Levels such as AST (aspartate transaminase) and ALT (alanine transaminase) at the time of admission of individual should correlate with clinical deterioration to ARDS. Therefore, higher levels at admission of the individual result in rapid clinical deterioration to ARDS [21].

Along with clinical symptoms, chest imaging techniques, such as chest X-ray, computed tomography (CT) scan, and ultrasound of lung can aid in diagnosis. The CT scan findings in these cases includes ground-glass opacity, consolidation, bilateral and peripheral disease distribution [20]. The chest X-ray has a lower sensitivity to detect slight opacities. A CT scan has been effective to detect mediastinal lymphadenopathy, nodules, cystic changes, and pleural effusion, which might be detectable before the onset of symptoms [22].

Sepsis and septic shock patients with COVID-19 are the most critical in relation to other patients. The associated multi-organ failure results as a consequence of impaired host response to infection [10].

Laboratory findings specific to Corona virus includes elevated prothrombin time, LDH (lactate dehydrogenase), D-dimer, ALT, and C-reactive protein (CRP) [19]. It is noted that in the early stages of disease, there is fall in CD4 and CD8 lymphocytes. Patients who are in the intensive care unit are showing the elevated levels of interleukin IL-2, IL-7, IL-10, G-CSF (granulocyte colony-stimulating factor), IP-10 (interferon gamma-induced protein 10), MCP-1 (monocyte chemotactic protein 1), MIP-1A (macrophage inflammatory protein alpha), and TNF-α [22].

Other obnoxious findings include coagulation activation, immune deficiency and myocardial, renal and hepatic injuries [19]. In the severely affected patients, levels of amylase and D-dimer are raised to a significant level [10,19]. Common to those who haven’t survived are elevations in the ferritin, neutrophil count, D-dimer, blood urea, and creatinine levels. But the elevations in the pro-calcitonin levels are not specific features of COVID-19 but can be diagnostic of bacterial pneumonia. Levels of CRP are directly proportional to with disease severity and progression.

4. TREATMENT OF COVID-19

As of now there is a lack of efficient antivirals against COVID-19. Currently, treatment mainly focuses on symptomatic and respiratory support according to the diagnosis and treatment of Pneumonia caused by COVID-19 issued by National Health Commission of the People’s Republic of China. Nearly all patients effected with Covid-19 requires oxygen therapy, and WHO also recommended extracorporeal membrane oxygenation (ECMO) to patients with symptoms of refractory hypoxemia [23]. Rescue treatment along with plasmapheresis and immunoglobulin G are provided to fatal cases based on their need.

5. ANTIVIRAL TREATMENTS

Past knowledge gained from fighting the epidemic SARS-CoV and MERS-CoV, maybe used against coronavirus [24]. Frequently used antivirals and systemic corticosteroids routinely used include neuraminidase inhibitors (oseltamivir, peramivir, zanamivir, etc), ganciclovir, acyclovir, and ribavirin, as well as
methylprednisolone for influenza virus, are not validated in the treatment of COVID-19 [25].

Remdesivir (GS-5734) is a 1'-cyano-substituted adeno-sine nucleotide analog prodrug and shows broad-spectrum antiviral activity against many RNA viruses. Based on the available data collected from in vitro cell line and mouse model, Remdesivir could interfere with the NSP12 polymerase even in the setting of intact ExoN proofreading activity [26]. Remdesivir has been reported to treat the first United States case of COVID-19 successfully [27]. Chloroquine is a repurposed drug with great efficacy to treat COVID-19. Chloroquine has been used in the treatment of malaria over years, [28] with unknown mechanism against some viral infections.

6. SEVERAL POSSIBLE MECHANISMS ARE INVESTIGATED

Chloroquine can prevent pH dependent steps and also replication of many viruses, [29] effective against SARS-CoV infection [30]. Moreover, chloroquine has immuno-modulatory effects, decreasing the release of the pro-inflammatory cytokines TNF-α and IL-6. It has the capability to work as a novel class of autophagy inhibitor, [31] which may impede and halts viral infection and mainly reproduction. Many studies have discovered that chloroquine delayed with the glycosylation of cellular receptors of SARS-CoV and functioned at both entry and at post-entry stages of the COVID-19 infection in Vero E6 cells [32]. A combination of remdesivir and chloroquine was proven to efficiently inhibit the newly surfaced SARS-CoV-2 in vitro.

Scientists formerly established that the protease inhibitors lopinavir and ritonavir, used in the treatment of human immunodeficiency virus (HIV) [33], could improve the outcome of MERS-CoV [34] and SARS-CoV [35] patients. It has reported that β-coronavirus viral loads of a COVID-19 patient in Korea significantly reduced after lopinavir/ritonavir (Kaletra®, AbbVie, North Chicago, IL, USA) treatment [36]. Moreover, clinicians merged Chinese and Western medicine treatment including lopinavir/ritonavir (Kaletra®), arbidol, and Shufeng.Jiedu Capsule (SFJDC, a traditional Chinese medicine) and gained significant improvement in pneumonia associated symptoms in Shanghai Public Health Clinical Center, China [37,21].

7. CONCLUSION

The need of the hour is mainly physical distancing to reduce the spread of the epidemic COVID-19. Especially the elderly and persons with certain systemic complications may require more attention and care. So far, the supporting treatments combination with antiviral drugs have been used with definite effect on treat COVID-19 patients, in the mean while there is so much need of solid data from more clinical experiments or trails are needed. However, more studies are required to explore the spread and pathogenicity mechanism of the coronavirus.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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