



Corona Virus Disease (COVID) 2019: A Pandemic that Shook the World!

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Abstract

COVID 19 or novel Corona Virus Disease is a recently declared pandemic which has taken the world by a storm, and not in a good way. It is a rapidly transmissible viral infection which was first reported in Wuhan province of China and has rapidly affected a large part of the world. It has led to a never seen before health crisis at global level and requires urgent attention of one and all. This narrative review aims to summarize the pertinent aspects of this disease and may be helpful in offering a bird's eye view and insight to the present status of COVID-19 in an easily understandable way.

Keywords: Corona Virus; SARS-COVID-2; COVID -19; Novel Corona Virus

Introduction

The recent health crisis faced by the world is the pandemic named COVID 19 which is a pathogenic and rapidly transmissible viral infection, caused by severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2). This infection first emerged in Wuhan, China and is believed to be transmitted from Bats which are the primary reservoir; through some unknown animal carriers to the human beings [1,2]. A very fast human to human transmission has been reported making it highly contagious in nature. However, its fatality rate is reported to be lower than its two ancestors SARS-CoV and Middle East respiratory syndrome coronavirus (MERS-CoV) [3,4].

Structure of corona virus and its historical perspective

Corona viruses are minute in size (65 - 125 nm in diameter) and contain a single-stranded RNA as a nucleic material, size ranging from 26 to 32 kbs in length [1]. There are three known subgroups of corona viruses family viz. alpha (a), beta (b), gamma (c) and delta (d) coronavirus. Acute lung injury (ALI) and acute respiratory distress syndrome (ARDS) are reported to be caused by the severe acute respiratory syndrome coronavirus (SARS-CoV), H5N1 influenza A, H1N1 2009 and Middle East respiratory syndrome coronavirus (MERS-CoV). This may lead to pulmonary failure and result in fatality. These viruses were primarily thought to be infecting only animals until a severe acute respirator syndrome (SARS) outbreak was reported to be caused by SARS-CoV, 2002 in Guangdong, China [1]. Another pathogenic coronavirus, known as Middle East respiratory syndrome coronavirus (MERS-CoV) caused an endemic in Middle Eastern countries almost a decade back. Most recently at the end of 2019, an outbreak of a novel coronavirus was reported in Wuhan, China. It in fact killed more than eighteen hundred and

infected over seventy thousand individuals within the first fifty days its advent. This virus was found to be a member of the Beta group of coronaviruses was named Wuhan coronavirus or 2019 novel coronavirus (2019-nCoV) by the Chinese researchers. The name "Corona" signifies the "crown" like projections on its structure. The International Committee on Taxonomy of Viruses (ICTV) named the virus as SARS-CoV-2 and the disease as COVID-19 [2,3].

On 31st December 2019; World Health Organization (WHO) was notified about the epidemic by China. On 7th January the virus was identified as a coronavirus that had > 95% homology with the bat coronavirus and > 70% similarity with the SARSCoV. The cases were reported to be exponentially raised in the region and the first fatality was reported on 7th of January 2020. The virus spread rapidly throughout the world and soon this epidemic turned in to a pandemic. Till the writing of this article, according to WHO reports; there are 1995983 confirmed cases of COVID19 reported worldwide with more than 213 countries affected and 131037 deaths caused by it [4].

Pathogenesis and clinical features of COVID-19

The pathogenesis of COVID 19 is poorly understood, however the mechanism is speculated to be similar to SARS-CoV and MERS-CoV. Person to person contact is thought to be the main method of transmission for the SARS-COV-2 Virus [5,6]. Infection is generally transmitted through large droplets generated during coughing and sneezing by symptomatic patients but can also occur from asymptomatic people and before onset of symptoms [7,8]. As far as clinical features are concerned, it includes include fever, non-productive cough, dyspnea, myalgia, fatigue, normal or decreased leukocyte counts, and radiographic evidence of pneumonia. In the early stages, the patients reportedly show the acute respiratory infection

symptoms, while some may quickly developed acute respiratory failure and other serious complications. There are few comprehensive studies done on the clinical characteristics of COVID 19, majority of them conducted in China, which report fever and cough to be the most predominant clinical sign in COVID 19 patients. Another clinical feature commonly reported by patients was fatigue and was prevalent in as many as 96% of patients (n = 138) in one of the studies. Another study reports otherwise and quotes fatigue to be present only in 18% of the patients [9-13]. Jun Zheng carried out a combinational analysis of the common recorded signs or symptoms of the reported cases found that fever was observed in around 90% of the patients; the number of patients whereas cough was reported relatively less (68%) [13]. Some other symptoms reported in a proportion of patients included shortness of breath or dyspnea, muscle ache, headache, chest pain, diarrhea, haemoptysis, sputum production, rhinorrhoea, nausea and vomiting, sore throat, confusion, and anorexia. Similar to SARS and MERS, COVID 19 patients present with severe acute respiratory syndrome, however; the estimated fatality rate of COVID-19 (2.3 - 5.98%) is much lower than SARS (~10%) and MERS (~36%) [14,15].

Diagnosis and differential diagnosis of COVID-19 [7,16,17]

Diagnostic tests available today for COVID 19 have been classified in to two major categories according to scientific rationale:

1. Tests detecting the SARS-COV-2 virus: There are two subtypes-those detecting the genetic material of the virus (mainly by Reverse transcription Polymerase Chain Reaction or RT-PCR) and those detecting components of virus such as proteins on its surface (Antigen Tests). These tests are performed characteristically on nasal and throat secretions. RT-PCR are currently the recommended test and is recognized by both World Health Organization and European Center for Disease Prevention and Control.
2. Tests detecting past exposure to the virus: these are the serological tests which detect antibodies in patients' serum on exposure. Its effectiveness in early diagnosis of COVID 19 is quite limited. However, they can be used in large epidemiological screening purposes.

Differential diagnosis of COVID 19 includes Influenza A and B, M. Pneumoniae and respiratory mixed infections.

Current treatment strategies for COVID 19

Considering that this is a novel viral infection, the treatment options are still under trial stage. There are no known vaccines or definitive treatment for COVID-19 infection. Currently most of the countries affected are relying on the prevention to slow down the transmission of the virus, including India. Supportive therapy including oxygen therapy, antibiotic treatment and extra-corporeal membrane oxygenation still remain the mainstay of the therapy [18].

Many chemotherapeutic agents are also being tested with different levels of reported efficacy. These include ribavirin, penciclovir,

nitazoxanide, nafamostat, chloroquine, remdesivir (GS-5734) and favipiravir (T-750). Wand., *et al.* tested the efficacy of these drugs *in vitro* and reported chloroquine and remdesivir demonstrated the most powerful antiviral activities with low cytotoxicity [13,18,19].

Chloroquine is a commonly used drug for treating malaria and some auto-immune diseases with potential broad-spectrum antiviral activities. *In-vitro* studies have suggested that Chloroquine functions at both viral entry and post-entry stages of the SARS-CoV-2 infection in Vero E6 cells. Andrea Cortegani., *et al.* conducted a systematic review on the efficacy and safety of Chloroquine for the treatment of COVID-19. They concluded that there is rationale preclinical evidence for the same. However, the exact efficacy and safety of this drug on long term in COVID-19 patients may be only analyzed by high quality clinical trials [20]. In a clinical study done in Wuhan on 100 patients, chloroquine was showed to be effective in prevention of exacerbation of pneumonia and shortening the disease course. No serious adverse effects were reported. The effectiveness and safety of this agent is now under the open label clinical trial stage [21].

Another drug that has shown some promise is Remdesivir which is currently under development stage for treating Ebola virus infection and is effective to a broad range of viruses including SARS-CoV and MERS-CoV [22,23]. It is reported to terminate the virus transcription in a pre-mature stage by functioning as Adenosine analogue which targets RdRp. In a very recent study conducted by Grein., *et al.* patients received a 10-day course of Remdesivir followed by a smaller dose for next 9 days and clinical improvement was reported in 68% of the patients [24]. Its efficacy again needs to be studied by a randomized placebo-controlled clinical trials. Currently, this drug is also under Phase 3 of clinical trial.

There are some sporadic case reports available in literature recently with alternate medicine, Chinese medicine, interferon, Lopinavir, Ritonavir, Corticosteroids etc. been tried for treating these patients [25,26]. However, more clinical studies are required to prove the efficacy and safety of these agents.

Conclusion

The world is currently facing a health care crisis in form of novel Corona Virus. The disease shows high transmissibility and uncertainty in its treatment and preventive measure. Prevention is truly crucial at the community level right now. In the early stages of this pandemic, appropriated measures shall be taken by the countries to prevent its spread. Stringent clinical trials in future shall warrant an effective and safe cure of this disease. Effective measures are also desired to create awareness regarding this pandemic amongst the common public and limit the future disease outbreaks.

Bibliography

1. Shereen MA., *et al.* "COVID-19 infection: Origin, transmission, and characteristics of human coronaviruses". *Journal of Advanced Research* 24 (2020): 91-98.

2. Cui J., *et al.* "Origin and evolution of pathogenic coronaviruses". *Nature Reviews Microbiology* 17.3 (2019): 181-192.
3. Lai C-C., *et al.* "Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and corona virus disease-2019 (COVID-19): the epidemic and the challenges". *International Journal of Antimicrobial Agents* (2020): 105924.
4. Organization WH. "Laboratory testing for coronavirus disease 2019 (COVID-19) in suspected human cases: interim guidance, 2 March 2020". World Health Organization (2020).
5. Zhong N., *et al.* "Epidemiology and cause of severe acute respiratory syndrome (SARS) in Guangdong, People's Republic of China, in February, 2003". *The Lancet* 362.9393 (2003): 1353-1358.
6. Wang N., *et al.* "Structure of MERS-CoV spike receptor-binding domain complexed with human receptor DPP4". *Cell Research* 23.8 (2013): 986.
7. Singhal T. "A Review of Coronavirus Disease-2019 (COVID-19)". *The Indian Journal of Pediatrics* 87.4 (2020): 281-286.
8. Li Q., *et al.* "Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia". *The New England Journal of Medicine* (2020).
9. Chen N., *et al.* "Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study". *Lancet* 395 (2020): 507-513.
10. Huang C., *et al.* "Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China". *Lancet* 395 (2020): 497-506.
11. Wang D., *et al.* "Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China". *The Journal of the American Medical Association* (2020).
12. Guan WJ., *et al.* "Clinical characteristics of coronavirus disease 2019 in China". *The New England Journal of Medicine* (2020).
13. Zhen J. "SARS-CoV-2: an Emerging Coronavirus that Causes a Global Threat". *International Journal of Biological Sciences* 16 (2020): 1678-1685.
14. Xu X., *et al.* "Evolution of the novel coronavirus from the ongoing Wuhan outbreak and modeling of its spike protein for risk of human transmission". *Science China Life Sciences* (2020).
15. Centers for Disease Control and Prevention (CDC). "Coronavirus Disease 2019 (COVID-19)". Atlanta: CDC (2020).
16. Jin YH., *et al.* "A rapid advice guideline for the diagnosis and treatment of 2019 novel coronavirus [2019-nCoV] infected pneumonia [standard version]". *Military Medical Research* 7 (2020): 4.
17. Chen Z-M., *et al.* "Diagnosis and treatment recommendations for pediatric respiratory infection caused by the 2019 novel coronavirus". *World Journal of Pediatrics* (2020): 1-7.
18. Liu C., *et al.* "Research and Development on Therapeutic Agents and Vaccines for COVID-19 and Related Human Coronavirus Diseases". *ACS Central Science* 6 (2020): 315-331.
19. Li G and Clercq ED. "Therapeutic options for the 2019 novel coronavirus (2019-nCoV)". *Nature Reviews Drug Discovery* (2020).
20. Cortegiani A. "A systematic review on the efficacy and safety of Chloroquine for the treatment of COVID-19". *The Journal of Critical Care* (2020): 30390-30397.
21. Sanders JM., *et al.* "Pharmacological treatments for Corona virus Disease 2019 (COVID 19)". *The Journal of the American Medical Association* (2020).
22. Sheahan TP., *et al.* "Broad-spectrum antiviral GS-5734 inhibits both epidemic and zoonotic coronaviruses". *Science Translational Medicine* (2017): 9.
23. Mulangu S., *et al.* "A Randomized, Controlled Trial of Ebola Virus Disease Therapeutics". *The New England Journal of Medicine* 381 (2019): 2293-2303.
24. Grein J., *et al.* "Compassionate use of Remdesivir for patients with severe COVID-19". *The New England Journal of Medicine* (2020).
25. Nukoolkarn V., *et al.* "Molecular dynamic simulations analysis of ritonavir and lopinavir as SARS-CoV 3CL(pro) inhibitors". *Journal of Theoretical Biology* 254 (2008): 861-867.
26. Zha L., *et al.* "Corticosteroid treatment of patients with corona virus disease (COVID 19)". *Medical Journal of Australia* (2019).

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