

nCovid-19 in 2020: From Despair to Hope



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Abstract: Outbreak mentioned in China in December 2019 has spread rapidly across 220 countries infecting more than 6.8 million people and killing nearly about 0.4 million people across the world and is declared as 'pandemic' by WHO. In this perspective, authors have presented a brief overview of Covid-19 from its origin to transmission and the measures to be taken to restrict the outbreak of this evil virus. Medical diagnosis offers some promising drug combinations for treating the infected patients effectively, although with some side effects. Research is currently in progress, giving us the hope of getting a viable and safe vaccine.

Keywords: Corona virus, pandemic, origin, transmission, symptoms, testing, treatment and management.

1. INTRODUCTION

Outbreak location mentioned in further detail. [1] which has turned from an epidemic into pandemic, affecting more than 6.8 million people and killing around 0.4 million people across the world as of 07th June 2020. World Health Organization (WHO) rephrased the infectious disease as Covid-19, which is caused due to 'Severe Acute Respiratory Syndrome Coronavirus 2' (SARS-CoV-2) [2].

1.1. Etiology and Transmission

Coronaviruses belong to the Coronaviridae family in the Nidovirales order. This particular coronavirus comes under β -subgroup affecting humans being transmitted from animals [3]. It is understood that even though *Bats* seem to be the reservoir hosts for the spread of the novel coronavirus and looking into the ecological distinction from humans, there is a probability that other possible mammalian species such as '*pangolin*' may act as intermediate host (zoonotic transmitter). Possible acquisition of all mutations for effective human transmission could have taken place in the intermediate host [4]. The human-wildlife interface remains an important risk factor for further disease outbreaks across boundaries [5].

The Guangdong pangolin viruses are intimately related to SARS CoV-2 in the receptor-binding domain (RBD), containing all six of the six key mutations thought to shape binding to the ACE2 (angiotensin converting enzyme 2) receptor and expressing 97% amino acid sequence in common [6].

The name Corona has come due to the presence of crown-like spikes on the outer surface of the virus. size ranging from 24 to 35 kbs in length. It has a round or elliptic and often pleomorphic form. Unlike other β -Coronavirus

is minute in size (60-150 nm in diameter) and contains a single-stranded RNA as a nucleic material, the coronavirus that spread during 2002 (SARS-CoV, China) and 2012 Middle East respiratory syndrome (MERS-CoV, Saudi Arabia) limiting to restricting their spread across 30 countries killing around 800 people, each [7]; this novel SARS CoV-2 seem to be much deadlier than the previous subtypes.

The aim of the paper is to enlighten the reader about the origin, transmission and treatment of the deadly SARS CoV-2 virus in a much simpler way.

1.2. Entry Mechanism & Genomic Variations

It is learned that the SARS-CoV-2 has four structural proteins, namely, S (spike), E (envelope), M (membrane), and N (nucleocapsid) proteins; the N protein holds the RNA genome, and the S, E, and M proteins together create the viral envelope (Fig. 1) [8]. Atom level cryogenic electron microscopy studies have shown that the spike protein is responsible for allowing the virus to attach to the membrane of a host cell through angiotensin converting enzyme 2 (ACE2) receptors. The virus can also utilize basigin (BSG) to enter into cell [9].

Initial spike protein priming by trans membrane protease, serine 2 (TMPRSS2) is essential for entry of SARS-CoV-2 via the S-protein [10]. Once this virion attaches to a target cell, TMPRSS2 exposes fusion peptide thus releasing RNA into the cell, tempting replication of virus and it spreads more and more cells. Genome RNA is translated into viral replicase polyproteins pp1a and 1ab, which are then cleaved into small products by viral proteinases [11].

2. SIGNS & SYMPTOMS

In general, symptoms of COVID-19 may be visible 2 to 14 days after getting exposed and the symptoms can be fe-

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ver, cough, shortness of breath and acute respiratory distress syndrome (ARDS) [12]. Other symptoms can include fatigue, aches, pain in the chest, runny nose, bluish lips or face and sore throat. Some people have also felt the loss of smell or taste. The symptomatic changes vary from very mild to severe. In some people, asymptomatic pattern can also exist but they act as carriers which is more dangerous in terms of community spread. As of now (almost 6 months from the first identified case), old people and also people who have chronic health issues such as heart disease, lung disease, diabetes, obesity or with less immune system are more prone to the viral attack. There is no age barrier found as the reported positive cases varied from a few months baby to a dying man, indicating the alarming medical emergency across the world.

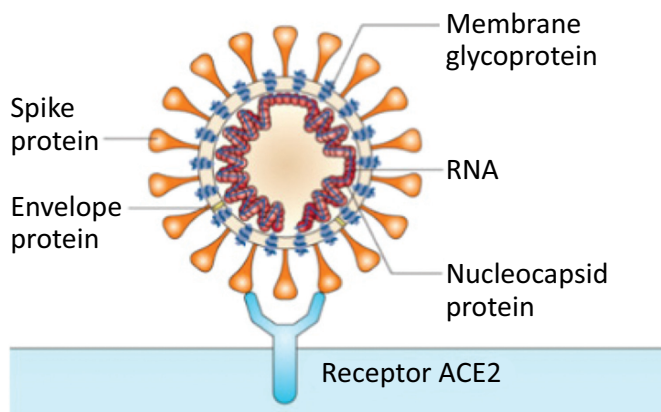


Fig. (1). Illustration of the coronavirus structure and viral receptor ACE2 on the host cell surface.

3. TESTING

There are two types of tests available in the form of viral/molecular (tells about current infection) and antibody/serological tests (tells about previous infection) for Covid-19. It can be diagnosed by using CDC rRT (real time reverse transcriptase)-PCR (polymerase chain reaction) test kit by taking specimens from upper and/or lower respiratory specimens. All testing for SARS-CoV-2 should be conducted in consultation with proper medical advice. Swabs taken should be immediately sterilized and tested as per the guidelines of Centre for Disease Control (CDC).

4. PREVENTION

Like other CoVs, SARS-CoV-2 is sensitive to ultraviolet rays and heat [13]. In addition, the virus can be effectively deactivated by soap, detergent solutions, chlorinating agents, ethanol or isopropanol, etc.

WHO has suggested a few precautions to be taken by every individual, the primary and the most important being ‘‘Stay home and Stay safe’’. Only in need of medical or essential commodities, one has to go out by properly wearing face mask and take care to maintain physical distance of at least two meters from others in order to prevent the contact of the droplets from cough or sneezing. One should take care to see that he/she should not have direct contact with face, eyes, nose or mouth during social exposure. Using hand

gloves, disinfectants or sanitizers while buying required things is advised in order to avoid the risk of getting infected. Another precaution is to wash at least for 30 seconds with luke warm water and soap. In case of sneezing, one should cover his/her mouth inside of elbow and discard the used tissues immediately in a safe zone. If anyone happens to have symptoms of flu, it is better to be isolated and seek medical advice. If anyone is suspicious of having got in touch with affected people, self quarantine for at least two to three weeks is advised. All essential objects which are regularly used such as mobile, computer, utensils, door knobs, electric switches, should regularly be cleaned. It is said that the virus is expected to survive for 4 hours on copper, one day on cardboard and three days on plastic and steel [11]. Accordingly, safety measures need to be taken. Very recent study revealed that contaminated surfaces play a minor role in transmitting the virus. The very important lesson that should be learnt from this pandemic is to respect nature and love for life by limiting our exposure to animal pathogens to the maximum extent.

5. MANAGEMENT

Being a pandemic, the only management procedure is to restrict large gatherings so as to prevent third stage community transmission. Already, several countries are following complete/partial lockdown depending on the severity of the outbreak of the Covid virus. In practice, proper safety kits such as personal protective equipment (PPEs), which include face mask, gown, gloves and N95 respirators must be supplied to the medical/health care staff as specified by (CDC) [14]. Inducing immunity by taking citrus supplements, dry fruits with proper exercise or/and meditation is always the best measure to fight with any infection.

Exposure with health care units, working closely, traveling or living with a covid-19 patient has to be identified and the individual is to be quarantined for a period as per the guidelines given by WHO in frequent intervals.

6. TREATMENT AND PROGNOSIS

As of now, there is no vaccine to cure this deadly nCovid-19. Possible antiviral treatments, antimalarial treatments, immunosuppressants/immunomodulators, cell & plasma based therapy or alternative treatment strategies are being given to patients on trial and error basis subject to FDA’s approval (Table 1), as mentioned by Jean et al and others [15, 19]. It may take a year or so to get a vaccine to effectively treat the person with negligible side effects [16-18]. Around 350 clinical trials are underway. But there is no need to panic and make one’s life miserable. Following social distance, stringent protective measurements and building immunity are the steps to be taken to restrict/contain the spread of this virus until a proper vaccine is found.

Very recently, Sanders *et al.* [20] and Bergman *et al.* [21] have reviewed data for various pharmacological treatments for combatting covid-19. World Health Organization and partners have launched an international clinical trial called ‘solidarity’, to help find an effective treatment for COVID-19 by doing case studies of patients across several countries. It is very essential to evaluate as many vaccines as possible to bring out a safe and effective one. No therapies have

proved to be effective to date. Under solidarity programme, transparent sharing of Covid-19 related research data and technology is initiated by the COVID-19 Technology Access Pool (C-TAP).

Table 1. Mechanisms of action and targets of potential treatment agents for SARS-CoV-2 infections.

Mechanism of Action and Targets	Drugs
Inhibition of the RNA-dependent RNA polymerase	Remdesivir Favipiravir Ribavirin
Inhibition of spike protein on SARS-CoV 2 (non-endosomal pathway)	TMPRSS2 inhibitor (camostat mesylate)
Inhibition of endosomal acidification (early endosomal pathway)	Chloroquine, hydroxychloroquine
Inhibition of viral exocytosis	Interferon-α 2a Interferon-β 1b
Inhibition of papain-like protease and 3C-like protease	Lopinavir/ritonavir
Inhibition of cathepsin L and cathepsin B in host cells (late endosomal pathway)	Teicoplanin (other glycopeptides including dalbavancin oritavancin, and telavancin)
Enhancement of the anti-SARS-CoV-2 activity of hydroxychloroquine	Azithromycin
Modulation of cytokine production	Indomethacin
Inhibit replication of a broad range of respiratory viruses in cell cultures, including SARS-CoV-2	Nitrazoxanide
reduction of viral RNA	Ivermectin

CONCLUSION

In this perspective, authors have discussed in brief the origin, transmission, physiopathology, symptoms, testing and preventive measures for Covid-19, to be taken across the world to restrict the spread. As mentioned, taking preventive measures such as physical distancing, use of protective masks/gloves, immunity boosting, positive mindset and practicing regular exercise or meditation gives hope for containing the virus growth. Recent research studies have shown promising drug combinations for effectively treating the infected patients, although there are some side effects. The death rate among infected patients is very low, ranging from 5-10% on average, which is obviously a positive sign. Actual death toll varies due to limited testing, deaths in homes apart from hospitals or problems in attributing unidentified death cases. Constant monitoring of antigenic drift in divergent geographical places has to be performed to avoid further possible outbreak. Avoiding mammalian wildlife from wet markets is also one big challenge. Hoping that a vaccine comes out soon to effectively wipe out this pandemic with negligible side effects or none. In a forthcoming review, elaborate studies on coronavirus will be presented.

CONSENT FOR PUBLICATION

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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