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A Review on Biodisaster Novel Coronavirus



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ABSTRACT

On 31st December 2019, a new virus was found & it is known as 2019-nCoV (temporarily named). It is nearly similar to SARS-CoV occurred in Wuhan City, China. Within short time it is spread in all cities of China as well as in other regions and continents. On 11th February 2020 WHO named that new virus as COVID-19. Coronavirus is a single stranded and positive-sense RNA genome. It belongs to family *coronaviridae*. COVID-19 is highly transmittable and pathogenic viral infection caused by SARS-CoV-2. Genomic analysis revealed that SARS-CoV-2 is phylogenetically related to SARS like bat viruses therefore bats could be primary reservoir. There is no antiviral drug and vaccines are available to be used against COVID-19.



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INTRODUCTION:

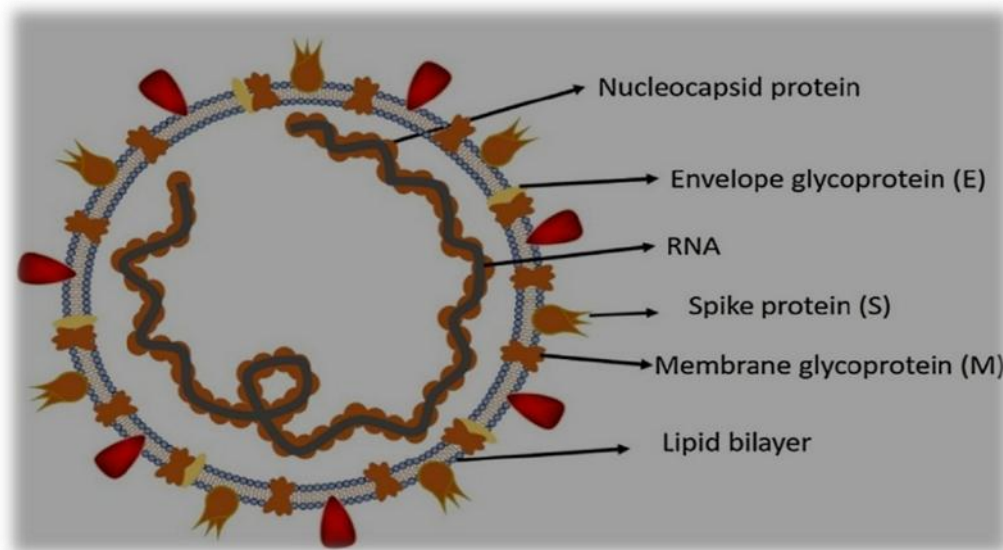
In December 29, a series of acute atypical respiratory disease occurred in Wuhan China. This rapidly spread from Wuhan to other areas. It was soon discovered that a novel coronavirus was responsible. The novel coronavirus was named as the Severe Acute Respiratory Syndrome (SARS). Corona virus-2 due to its high homology to SARS- COVID, which cause Acute Respiratory Distress Syndrome (ARDS). The considered to have originally started *via* zoonotic transmission associated with seafood market in Wuhan, China. It was recognized that human to human transmission played a major role in subsequent outbreak.

The disease caused by this virus was called coronavirus disease (COVID-19). And a pandemic was declared by the World Health Organization (WHO). COVID-19 has been impacting a large number of people worldwide being reported in approximately 200 countries and territories. SARS COVID 2 virus primarily affects the respiratory system although other organ system are also involved. Lower respiratory tract infection related symptoms including fever, dry cough, breathing difficulties, shortness of breath and sever conditions infection cause by pneumonia patient even dead reported in the initial case series from Wuhan, China.

I. Anatomy and Pathophysiology & Structure of CoV:

Coronavirus is a group of related RNA viruses. Average diameter of the virus particles is 125 nm. The coronavirus surface spikes are homotrimers of the S protein, which is composed of an S1 and S2 subunit. In humans, these viruses cause respiratory tract infections such as mild to lethal. Mild illnesses include some cases of the common cold, more lethal varieties can cause SARS, MERS, and COVID-19. Symptoms in chickens, they cause an upper respiratory tract disease, while in cows and pigs they cause diarrhea. There are as yet no vaccines or antiviral drugs to prevent or treat human coronavirus infections. The virus having nucleocapsid protein in it and made up of two layers outer is envelope glycoprotein and insider is lipid bilayers. And membrane glycoprotein is connected to two layers and the spike proteins are on outside of virus. This virus is very harmful for every living being. The envelope bears club-shaped glycoprotein projections. The virus enters the host cell, and the uncoated genome is transcribed and translated. The mRNAs form a unique nested set sharing a common 3' end. New versions form by budding from host cell membrane. Transmission is usually *via* airborne droplets to the nasal mucosa. Virus replicates locally in cells of the

ciliated epithelium, causing cell damage and inflammation and the patient are infected by this virus and in severe cases patient cause death.



II. Types:

Coronavirus belongs to the subfamily of Coronavirinae. Coronavirus actually having current two types they are Middle East Respiratory Syndrome (MERS) & Severe Acute Respiratory Syndrome (SARS). Corona Virus having a large family, according to Scientist in china there are many unknown viruses are present in Wild animals. We are now facing COVID-19 which was spread because of bats so better we found kind of this viruses are present in other animals. This coronavirus is kind of pneumonia and it actually attacks on the breathing system. SARS-CoV-2 is a member of the family Coronaviridae and order Nidovirales. The family consists of two subfamilies, Coronavirinae and Torovirinae and members of the subfamily Coronavirinae are subdivided into four types:

- (a) Alpha coronavirus contains the human coronavirus.
- (b) Beta coronavirus includes Severe Acute Respiratory Syndrome human coronavirus (SARS-HCoV) and Middle Eastern respiratory syndrome coronavirus (MERS-CoV);
- (c) Gamma coronavirus includes viruses of whales and birds.
- (d) Delta coronavirus includes viruses isolated from pigs and birds. SARS-CoV-2 belongs to Betacoronavirus together with two highly pathogenic viruses.

DISCUSSION:

I. How it is spread?

COVID-19 spreads mainly by droplets produced as a result of coughing and sneezing of COVID-19 infected person. It spreads in following two ways:

a) Direct close contact:

The one can get the infection by being in close contact with covid19 patients. Especially if they do not cover their when coughing and sneezing.

b) Indirect Contact:

The droplets survive on surfaces and clothes for many days therefore, touching any such infected surfaces or clothes and then touching ones mouth nose or nose.

II. Etiology:

Corona Virus (CoV) are positive stranded RNA viruses with a crown like appearance under an electron microscope due to the presence of spike glycoproteins on the envelope. The subfamily orthocoronavirinae of the coronaviridae family. Genomic characterization has shown that probably bats and rodents are the gene sources of α -CoVs and β -CoVs. On the contrary, avian species seen to represents the gene sources of δ -CoVs and γ -CoVs. Members of this large family of viruses can cause respiratory, enteric, hepatic, and neurological diseases in different animal species including camels, cattle, cats and bats. In general, estimates suggest that 2% off the population are healthy carriers of a CoV and these viruses are responsible for about 5% to 10% of acute respiratory infections. The potential amplifying mammalian host, intermediate between bats and humans is, however not known. Its single stranded RNA genome contains 29891 nucleotides encoding 9860 amino.

III. Treatment:

Antiviral treatment, On the basis of preliminary clinical trial data, the COVID-19 Treatment. Antiviral agent remdesivir for the treatment of COVID-19 in hospitalized patients with severe disease defined as $SPO_2 \leq 94\%$ on ambient air (at sea level) requiring supplemental oxygen, mechanical ventilation or extracorporeal membrane Oxygenation. The panel does not recommend remdesivir for the treatment of mild or moderate COVID-19 outside of a clinical

trial. Clinical trial data are needed to identify safe and effective treatments for this Disease. Including supplemental oxygen and mechanical ventilating support indicated. There is no specific antiviral treatment for COVID-19. Drugs previously developed to treat other viral infection are being tested to see if they might also be effective against the virus that causes COVID-19.

a) Chloroquine derivative:

Its chemical name is N4 (7-Chloro-4-quinolinyl)-N1, N1-diethyl-4-pentane diamine. The anti-viral anti-inflammatory actions of chloroquine have led to numerous trials urgently in the face of global health emergency. It is anti-malarial, anti-rheumatic in nature. A Chinese study involving more than 100+ patients of COVID-19 found chloroquine superior to the control group in reducing symptom duration. Exacerbation of pneumonia including radiology improvement and promoting virus. This represents the first human trial ever conducted with chloroquine against COVID-19. China already included Chloroquine in the prevention and treatment of COVID-19 pneumonia. Treatment of pneumonia caused by COVID-19 in this study chloroquine was given in dose of 500 mg of chloroquine twice daily in mild to severe COVID-19 pneumonia.

b) Remdesivir:

Remdesivir is an antiviral agent, it's a prodrug of GS-441524 (C-adenosine) prodrug means it's an inactive form of medication and when it's administered into body and it becomes metabolized into an active form of medication. First, it was developed for the treatment of Marburg virus and Ebola virus but now scientists tried this antiviral agent on SARS CoV-2 (COVID-19) *in vitro* and other coronaviruses such as SARS CoV, MERS-CoV patients and it's good to hear that this vaccine is helpful to treat corona patients. It's used as an intravenous administration and it was manufactured by Gilead company. It acts as nucleotide analog to inhibit RNA synthesis. There are adverse effects also such as nausea vomiting. *In-vivo* mice was studied when they applied antiviral agent on mice they have seen some positive effects they have seen remdesivir against MERS-CoV with remdesivir treated mice having low lung damage and all respiratory systems are alright in mice body. And another monkey was infected by COVID-19 they applied this virus on it and the monkey reduces the viral loads and improves lung function.

c) Zingivir:

Zingivir - H - Tablet is an ayurveda medicine clinical trials are going on corona patients. Zingivir-H tablet, which is effective on respiratory infections, acute viral bronchitis, has been found to be effective against the Respiratory Syncytial Virus and Influenza virus during scientific validation. ZingiVir-H has seven ingredients including herbomineral and these have been prescribed in our scientific manuscript. Now let's see how Zingivir effects on corona patients.

d) Favipiravir:

Synonyms of Favipiravir is 259793-96-96-FLUORO-3-HYDROXYPYRAZINE-2 - CARBOXAMIDE T-7056-fluoro-3-oxo-3, 4-dihydropyrazine-2-carboxamide. Its IUPAC name is 5-fluoro-2-oxo-1H-pyrazine-3-carboxamide. Molecular formula of Favipiravir is $C_5H_4FN_3O_2$. It is discovered by Toyama Chemical Co., Ltd. in Japan. Favipiravir is a modified pyrazine analog which use against cases of influenza. Favipiravir has been investigated for the treatment of life-threatening pathogens such as Ebola virus, Lassa virus, now COVID-19. India-based Glenmark pharmaceuticals has approved for the manufacturing and marketing of antiviral drug Favipiravir under the brand name FabiFlu to treat mild to moderate COVID-19. Glenmark said that mild to moderate COVID-19 patients having diabetes and heart disease can also use the drug. In India it is now available 103 Rupees per pill at pharmacies i.e. one strip contains 34 tablets and the cost is 3500 Rupees in Indian currency.

e) Tocilizumab:

It is also known as atilizumab. It works as an immunosuppressive drug. Used in treatment of rheumatoid arthritis and systemic juvenile idiopathic arthritis. The source of Tocilizumab is humanized mouse. It's a humanized monoclonal antibody against interleukin 6 receptor (IL-6R). It was developed by Hoffmann La Roche and Chugai. Hope this medicine works on Coronavirus and it is useful mention above this drug is immunosuppressive drug. China included use of this drug in guideline to treat Coronavirus. In few countries patients treated and they show good improvements.

f) Ivermectin:

Ivermectin is treated on parasite infestation disease. It can have via mouth or use as a topical purpose for external infestations. Formula for Ivermectin is $C_{47}H_{72}O_{14}$ (H2B1b). Use in eye should be avoided because if it is used in eyes it causes red eyes. It is demonstrate that Ivermectin has antiviral action against the SARS-CoV-2 clinical isolate in vitro, with a single dose able to control viral replication within 24–48 hours in human body. Development of an effective anti-viral for SARS-CoV-2, if given to patients before infection, could help to limit the viral load, prevent severe disease and limit person to person transmission.

IV. Risk Factors:

Risk factors for COVID-19 appear to include:

- Recent travel from or residence in an area with ongoing community spread of COVID19.
- Close contact with someone who has COVID-19: such as when a family member or health care worker takes care of an infected person.

V. Complications:

Complications can include:

- Pneumonia in both lungs
- Failure of several organs
- Death

VI. Factors affecting coronavirus:

➤ **Temperature:**

According to many scientists, they proved mostly viruses are spread because of droplets infection *via* mouth and nose. It is very vigorously spread when a infected person comes in contact. Specific effect of temperature is helpful for such respiratory diseases. Which includes changes in host behavior, defense mechanism and virus infectivity. WHO said that corona doesn't live in high degree temperature but it was wrong. That's why temperature matters and that's the important affecting factor on coronavirus.

➤ **Other Factors:**

A major reason for spreading virus transmission is some spread more easily through water; others through air; some are wrapped in layers of fatty molecules. On surface, it remains for 2 hours to 9 days. Some studies on other coronaviruses, including SARS and MERS, found they can survive on metal, glass and plastic for as long as nine days unless they are properly disinfected. Some can even last for up to 28 days in low temperatures. On cardboard up to 24 hours and up to 2-3 days on plastic and stainless-steel surfaces.

VII. Prevention:

- Protect yourself and others around you by knowing the facts and taking appropriate precautions. Follow advice provided by your local public health agency.
- Clean your hands often. Use soap and water, or an alcohol-based hand rub.
- Maintain a safe distance from anyone who is coughing or sneezing.
- Don't touch your eyes, nose or mouth.
- Cover your nose and mouth with your bent elbow or a tissue when you cough or sneeze.
- Stay home if you feel unwell.
- If you have a fever, a cough, and difficulty breathing, seek medical attention. Call in advance.
- Follow the directions of your local health authority.
- Avoiding unneeded visits to medical facilities allows healthcare systems to operate more effectively, therefore protecting you and others.

CONCLUSION:

The pandemic by COVID-19 is live issue affecting people worldwide without fundamental therapeutic intervention current management is to reduce the virus spread and provide supportive care for disease patients. There is an urgent need to develop targeted therapies. Understanding the difference in pediatric and adult responses to this virus may help to direct immune base therapeutics.

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