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A Review on COVID-19 Pandemic



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ABSTRACT

COVID-19 is a viral infectious disease caused by coronavirus 2 having Severe Acute Respiratory Syndrome (SARS-CoV-2). This disease patient was first identified in December 2019 in Wuhan city of China. It has been spread globally in short period of time resulting WHO declared it as coronavirus pandemic 2019-2020. Novel Coronavirus Disease 2019 (COVID-19). The virus spreads people to people mainly among close contact, usually through small drops produced during coughing, sneezing or chattering of infected person. It can also be infected by touching a contaminated surface and then touching their open organ. Symptoms of COVID-19 can be relatively non-specific and may be asymptomatic. Fever and dry cough two most common symptoms while less common symptoms include fatigue, respiratory sputum production (phlegm), shortness of breath, sore throat, headache, chills, vomiting, hemoptysis, diarrhea. By WHO difficulty in breathing observed in some people. Real-time reverse transcription polymerase chain reaction (rRT-PCR), Chest CT scans, immune response to infection is the production of antibodies mainly IgM and IgG are the diagnostic test use to diagnose COVID19. The infection can be prevented by Handwashing with soap, face masks, respiratory hygiene, social distancing, Self-isolation Containment and mitigation. There is no specific drug available for complete cure for corona disease but Hydroxychloroquine, Remdesivir, Lopinavir/Ritonavir use to treat COVID19.

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by coronavirus 2 having Severe Acute Respiratory Syndrome (SARS-CoV-2) ⁽¹⁾. The first patient of corona identified in December 2019 in Wuhan, the capital of the Chinese province of Hubei, and has since spread globally, resulting in the ongoing coronavirus pandemic 2019-2020. Common symptoms are fever, cough and shortness of breath. Other symptoms may include fatigue, muscle pain, diarrhea, odor loss and abdominal pain. The time between exposure and symptoms begins vary from two to fourteen days. While most cases lead to mild symptoms, some progress to viral pneumonia ⁽²⁾. At April 12, 2020, more than 1.77 million cases of COVID-19 were reported in 210 countries resulting in more than 108,000 deaths. More than 404,000 people have recovered although there may be a possibility of re-infection. The virus spreads mainly among people under close contact, usually through small drops produced during coughing, sneezing. Although these droplets are produced on exhalation, they generally fall to the ground or surfaces, rather than being contagious over long distances ⁽³⁾. People can also be infected by touching a contaminated surface and then touching their face. The virus can survive on surface from 4 to 72 hours. It is most contagious during the first three days after the detection of symptoms. The standard method of diagnosis is by polymerase chain reaction with real-time reverse transcription (rRT-PCR) of a nasopharyngeal swab. Computed tomography may also be useful for diagnosis in individuals, where there is a great suspicion of infection based on symptoms and risk factors, but it is not recommended for routine screening. Recommended measures to prevent infection often include hand washing, maintaining physical distance from other people (especially those with symptoms), covering coughing and sneezing with tissue or internal elbow, and keeping unwashed hands away from the face. Recommendations for the use of masks by the public vary, with some authorities recommending their use, some recommending their use and others requiring use. There is currently no specific vaccine or antiviral therapy for COVID-19. Management involves symptom management, supportive care, isolation and experimental measures. The World Health Organization (WHO) declared the coronavirus outbreak 2019-2020 as a Public Health Crime of International Interest (PHEIC) on January 30, 2020 and a pandemic on March 11, 2020. It is generally known as coronavirus and was previously referred to by the preliminary name of 2019 new coronavirus (2019-nCoV) ⁽¹⁾. SARS-CoV-2 is a positive, single-stranded RNA virus. It is contagious in humans, and the WHO has designated the ongoing COVID-19 pandemic as a public health crime of international

interest. Since the strain was first discovered in Wuhan, China; sometimes it called as "Wuhan virus" or "Wuhan coronavirus" because avoid confusion with SARS. The public often calls SARS-CoV-2 and the disease that causes "coronavirus", but researchers often use a more accurate terminology. Taxonomically, SARS-CoV-2 is a strain of coronavirus related to severe acute respiratory syndrome (SARS-CoV). It is believed to have zoonotic origin and have a similar genetic similarity to bat coronavirus, suggesting that it originated from a virus transmitted by bats. An intermediate container of animals, such as a pangolin, is also believed to be involved in its introduction to humans. The virus is spread mainly among humans through close contact and through respiratory drops produced by coughing or sneezing. It enters human cells mainly by binding to Angiotensin Receptor Converting Enzyme 2 (ACE2) (1, 3, 5).

Epidemiology: (April 16, 11.00 am).

Data provided by the WHO Health Emergency Dashboard (April 16, 11.00 am CET) report 1918138 confirmed cases worldwide since the beginning of the epidemic. 123126 have been fatal in 213 countries (3).

In India, there is 10477 case confirmed, 414 deaths and 1488 cured or discharged (6).

In Italy, there is 105418 cases confirmed, 21645 deaths and 38092 cured or discharged (7).

In USA there is 605,390 case confirmed, 24,582 deaths and data for cured or discharged not available (8).

Cause:

Coronavirus 2 (CoV-2) is the strain of the virus that causes coronavirus disease 2019 (COVID-19), is a SARS. It is generally known as coronavirus disease.

- **Virology:** SARS-CoV-2 virion is a single-stranded RNA virus having 50–200 nanometers in diameter. (Show in Figure I)

It has four structural proteins, known as the 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. The spike protein is the protein responsible for allowing

the virus to attach and fuse with the membrane of a host cell. The spike protein of the virus SARS-CoV-2 has sufficient affinity to the receptor (ACE2) on human cells^(9, 10).

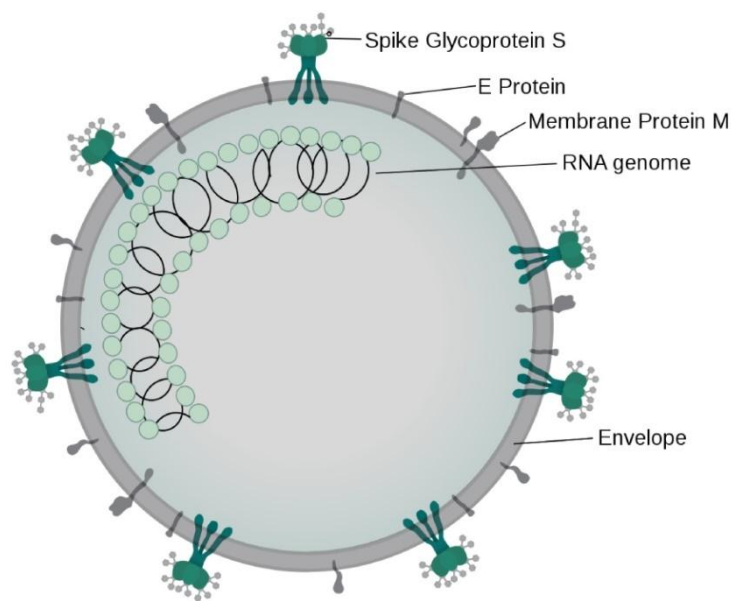


Figure No. I :- Structure of COVID-19.

- **Transmission:** WHO and the US Centers for Disease Control and Prevention (CDC) claim that they mainly spread through close contact and through small droplets produced when people cough, sneeze or talk, breathing drops; with contact close to 1 to 3 m (3 feet 3 inches - 9 feet 10 inches). It is found that an uncovered cough or sneeze can travel up to 8.2 meters (27 feet). In the saliva of patients there is nearly 100 million viral strings per 1 ml⁽¹¹⁾.

Pathophysiology:

COVID-19 are most affect to the lungs and second to GIT because the virus is accessed by host cells through the ACE2, which is more commonly present in alveolar cells of the lungs. The virus uses a special surface glycoprotein called a "pico" (peplomer) to connect to ACE2 and enter the host cell. The ACE2 density in each tissue correlates with the severity of the disease in that tissue and some have suggested that the decreasing activity of ACE2 may be protective, although another view is that increased ACE2 by blocking drugs of angiotensin II receptors can be protective and these hypotheses need to be tested. When alveolar disease develops, respiratory failure can occur and death. The virus also affects the GIT, as ACE2 also expressed in glandular cells in the gastric, duodenal and rectal epithelium, as well as in endothelial cells and enterocytes^(12, 13).

Sign and Symptom:

The sign and symptoms of corona disease initially asymptomatic to symptomatic. Most common are fever and dry cough.

Less commonly include symptoms are fatigue, sputum production (phlegm), shortness of breath, muscle and joint pain, sore throat, headache, chills, vomiting, hemoptysis, diarrhea, or cyanosis. Shortly SARS.

Further progress of the disease can lead to severe pneumonia, acute_respiratory_distress syndrome, sepsis, septic_shock and leads to death ^(2, 14).

Diagnostic Test: There are three main diagnostic test mostly use for diagnosis of COVID-19 as follows:

1. Reverse transcription polymerase chain reaction (RT-PCR):

In these method respiratory samples i.e. nasopharyngeal swab or sputum sample obtained.

Sample subjected to RT-PCR machine that amplifies the viral nuclear material and give result with in few hours to few weeks.

It is a most accurate and significant test method use detection and confirmation of COVID-19 ^(15, 16).

2. Serology tests:

Any infection is part of the immune response. That means production of antibodies specifically IgM and IgG.

According to the FDA, IgM antibodies to SARS-CoV-2 are detectable in blood after initial infection, although levels over the course of infection are not well characterized. SARS-CoV-2 becomes detectable later following infection by appearing of IgG antibodies.

Antibody tests can be used to determine in large population that has contracted the disease and that is therefore immune.

Most serology tests are in stage of development. At 10 April, only a one test kit had been approved for diagnosis in the United States and this is under FDA Emergency Use Authorization (EUA).

This test not completely use to determine and confirmation of COVID-19 (17,18).

3. Medical imaging:

Estimated chest tomography may be useful for diagnosing COVID-19 in individuals with high clinical suspicion of infection based on risk factors and symptoms, but it is not recommended for routine screening. Typical features of CT initially include bilateral opacities in multilobarly ground glass with peripheral, asymmetric, and posterior distribution. Sub pleural dominance, mad coverings and consolidation can develop as the disease progresses (19,20).

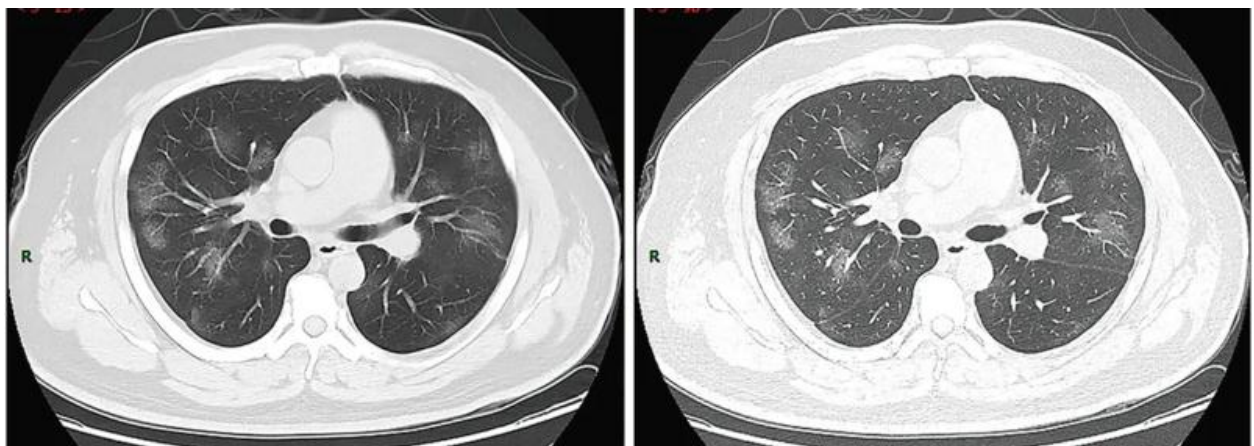


Figure No. II:- Normal CT image of Chest⁽²⁰⁾.

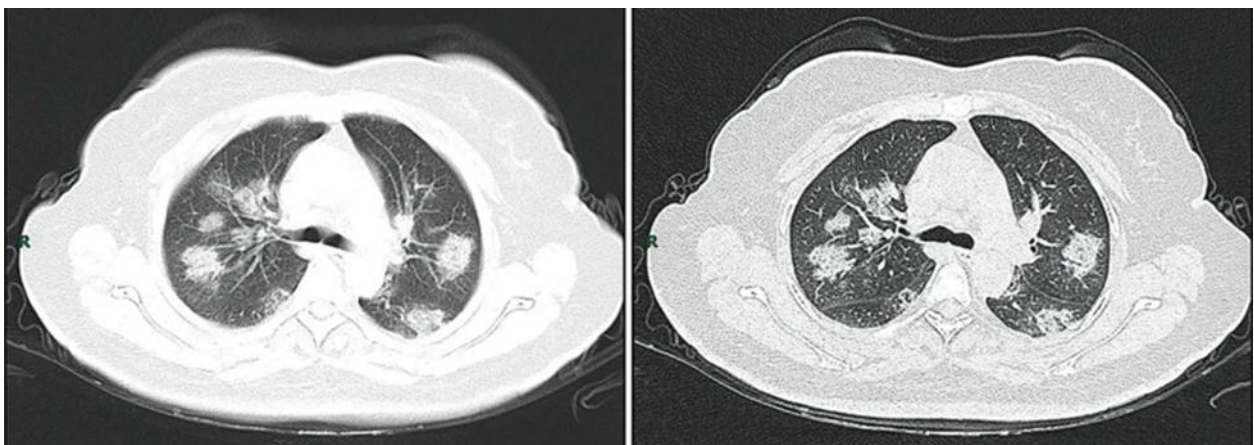


Figure No. III:- Consolidation Developed in Chest with Disease Progression⁽²⁰⁾.

Preventive Measure:

i. Social distancing:

Keep at least 1 meter (3 feet) distance between you and anyone who coughs or sneezes.

If you are too close, you can inhale the drops, including the COVID-19 virus, if the coughing person has the disease.

ii. Washing hand with soap:

An easy and effective way to protect yourself and others from coronavirus is to wash your hands frequently with soap for least 20 sec especially after you have been in a public place, or after blowing your nose, coughing, or sneezing.

Avoid touching your eyes, nose, and mouth with unwashed hands.

iii. Use Face masks and maintain respiratory hygiene:

Health organizations recommend that people cover their mouth and nose with a bent elbow or tissue when coughing or sneezing and throwing tissue immediately.

Surgical masks are recommended for infected person because wearing a mask can limit the volume and distance of scattered expiratory drops when talking, sneezing and coughing. Masks have also been recommended for health care professional such as doctor, nurses, ward boy and pharmacist etc.

iv. Surface cleaning:

Human coronaviruses can remain contagious on inanimate surfaces for up to 9 days. Disinfecting the surface where the chance of virus present wash with 0.1% sodium hypochlorite or 62 to 71% ethanol significantly reduces the infectivity of coronavirus on surfaces within 1 minute of exposure time.

v. Containment and avoid mitigation: Strategies for controlling an outbreak are containment or repression and restriction. Containment is carried out in the early stages of the outbreak and aims to track and isolate the infected, in addition to introducing other infection control in rest of the population.

vi. Self-isolation: Self-insulation at home was recommended for those diagnosed with COVID-19 and for those who suspect they have been infected. Health institutes have issued detailed instructions for proper self-insulation.

vii. To follow Instruction Given by Government Authority:

People must follow the instruction given by the government authority and World Health Organization (WHO) (1, 3, 6, 8, 21.).

Treatment: Till date, there is no specific treatment for COVID-19.

Some Medication and Preventive medical procedure use to treat the corona patient.

Include ⁽²¹⁾:-

1. Drugs Therapy:

a. Hydroxychloroquine (HCQ) and azithromycin combination: The resent study described that chloroquine is known to block infection with the virus, increase the endosomal pH and interfere with the glycosylation of the SARS-CoV cell receptor. So that fusion of the virus with host cell not forms. For azithromycin data are not available relating to use in COVID-19 treatment.

b. Remdesivir:

Remdesivir is an investigational intravenous drug with broad antiviral activity that inhibits viral replication by premature termination of RNA transcription and has in vitro activity against SARS-CoV-2 and in vitro and in vivo activity against related beta-coronaviruses. Pregnant women and children under the age of 18 with confirmed COVID-19 and severe manifestations of the disease can still access the drug through the compassionate icon of the manufacturer's external use program.

Remdesivir is now under the clinical trial.

c. Lopinavir / Ritonavir (Kaletra).

Lopinavir is a human immunodeficiency virus (HIV-1) protease inhibitor given at a fixed dose combination with ritonavir a potent CYP3A4 inhibitor that "increases" the concentration of lopinavir.

It is fixed dose combination sell under name Kaletra. It is also in clinical trial.

d. Nitazoxanide:

Nitazoxanide exhibits a broad spectrum of in vitro antiviral activity against influenza, respiratory virus, influenza, and rotavirus and among others In addition to coronavirus. This antiviral broad spectrum activity is believed to be due to the mechanism of action is based on disturbances in host-regulated pathways involved replication instead of specific virus pathways. It is in clinical trial.

2. Monoclonal antibody:

Tocilizumab:

Tocilizumab is a humanized monoclonal antibody that inhibits both membrane and soluble interleukin-6 (IL-6) receptors. IL-6, which is secreted by monocytes and macrophages, is one of the most important determinants of immune response and symptoms in patients with Cytokine Release Syndrome (CRS). In severe COVID-19 Hyper inflammatory states and cytokine storming, including elevated IL-6, has been reported and were associated with increased mortality.

3. Others:

a. Ribavirin +/- interferon:

Ribavirin, a guanosine analog that terminates RNA synthesis. It has been used clinically for respiratory syncytial virus, viral fever, and in combination with interferon for hepatitis C. Interferons (α , β) may stimulate innate antiviral responses and are expected to have in vitro activity against COVID-19. Based on the poor in vitro activity, an absence of pre-clinical and clinical data supporting to its use, and a significant toxicity profile, WHO recommend avoiding use of ribavirin in patients with COVID-19 at this time.

CONCLUSION

Coronavirus disease 2019 (COVID-19) is a SARS-CoV-2. First case of COVID-19 found in December 2019 in Wuhan, China. It got spread all over world in less time period. WHO declared as coronavirus pandemic 2019-2020. There is 1918138 confirmed cases worldwide since the beginning of the epidemic, 123126 have been fatal in 213 countries according to WHO. It mainly spread through close contact and through small droplets produced when people cough, sneeze or talk, breathing drops. COVID-19 are most affect to the ACE2. For the prevention Social distancing Washing hands with soap, Use Face masks and maintains respiratory hygiene, Surface cleaning Containment and avoid mitigation, Self-isolation and to follow Instruction Given by Government Authority is required. There is no specific treatment for COVID-19 but Hydroxychloroquine (HCQ) and azithromycin, Remdesivir, Lopinavir / Ritonavir (Kaletra). Nitazoxanide, Tocilizumab, Ribavirin +/- interferon use for prophylaxis.

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