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# Covid-19 from Wuhan Outbreak to Now

**LAKSHMI . P***
*LAKSHMI. P, Asst professor, Department of pharmacology. Faculty of Pharmaceutical sciences, PES university, Bangalore, Karnataka, India*
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**ABSTRACT:** COVID-19 (coronavirus disease 2019) was declared by WHO as public health emergency of international concern. The coronavirus outbreak came to light on December 31, 2019 when China informed the World Health Organisation of large number of cases of pneumonia of an unknown cause in Wuhan City in Hubei Province. Subsequently the disease spread from China to the rest of the world. The WHO has now declared it a pandemic. The virus has been named SARS-CoV-2 and the disease is now called COVID-19. As of now no specified treatment or medications is available for COVID-19. In this article I have discussed some keypoints regarding the outbreak of disease and impact from Wuhan to other parts of the world, pathogenesis, transmission, diagnostic procedures, prevention and management of COVID-19.
**KEYWORDS:** COVID-19, SARS-CoV-2, pandemic, transmission, prevention and management

## I. INTRODUCTION

The first reports of unknown virus behind pneumonia cases in Wuhan, a city in Eastern China were brought to the notice of WHO office in china on december 31, 2019. It started as an epidemic in china but now become a truly ongoing global pandemic[1][2]. As of now, more than 5,118,416 people have been infected with the novel virus, resulting in more than 338,000 deaths. More than 2.05 million people have recovered.[3] . The disease has been detected in more than 200 countries with the US, Russia and the UK experiencing the most widespread outbreaks, followed by Brazil, Spain, Italy. On 30 January 2020 WHO declared the outbreak a public health emergency of international concern[4][5][6] (PHEIC). On February 11, the WHO announced the official name of the disease: Covid-19.

ORIGIN OF THE DISEASE:

As wild animals like bats and snakes, are traded illegally, primarily the stall holders of Wuhan sea market who were in contact with these animals where infected with the disease. Some cases were reported before the Wuhan outbreak, so the initial route of human infection may pre-date the market cases. The actual source of Covid-19 is still unknown. Covid-19 is caused by Severe acute respiratory syndrome coronavirus 2, or SARS-CoV-2[7].

VIROLOGY: INFECTION AND TRANSMISSION

Corona virus disease -2019 is a infectious disease. The routes of SARS-CoV-2 transmission include direct contact — that is, contact with the respiratory droplets and aerosols from an affected person within a range of about 1.8 metres (6 ft)[8] — and indirect contact, such as contact with contaminated surfaces or supplies[9]. Sputum and saliva carry large amounts of virus.[10][11][12][13] When the contaminated droplets fall to floors or surfaces they can remain infectious if people touch contaminated surfaces and then their eyes, nose or mouth with unwashed hands.[10] The virus is inactivated by soap, which destabilises its lipid bilayer.[14]It is also found in stool samples and semen from infected individuals.[15]The degree to which the virus is infectious during the incubation period is uncertain, but reaches peak viral load approximately four days after infection[16] or the first week of symptoms, and declines after.

VIROLOGY:

COVID-19 is a spherical or pleomorphic enveloped particles containing single-stranded (positive-sense) RNA associated with a nucleoprotein within a capsid comprised of matrix protein. The envelope bears club-shaped glycoprotein projections.The hem agglutinin-esterase protein (HE) is seen on the virus surface.The spike protein (S) is the major inducer of neutralizing antibody which constitutes the peplomers. SARS-CoV-2 (COVID-19) binds to ACE2 (the angiotensin-converting enzyme 2) by its Spike and allows COVID-19 to enter and infect cells.

In order for the virus to complete entry into the cell following this initial process, the spike protein has to be primed by an enzyme called a protease. In order to attach virus receptor (spike protein) to its cellular

ligand (ACE2), activation by TMPRSS2[17] as a protease is needed after the virus enters the host cell and uncoats, the genome is transcribed and then translated. Coronavirus genome replication and transcription takes place at cytoplasmic membranes. The proteins are assembled at the cell membrane and genomic RNA is incorporated as the mature particle forms by budding from the internal cell membranes.[18].

PATHOGENESIS:

Members of this large family of viruses can cause respiratory, enteric, hepatic, and neurological diseases. The lungs are the target organs of COVID 19 because ACE2 receptors are utilized by the virus to enter the host cells. This angiotensin-converting enzyme 2 (ACE2) which is most abundant in type II alveolar cells of the lungs.[19] By increasing ACE2 using angiotensin II receptor blocker medications could be protective.[20] As the alveolar disease progresses, respiratory failure might develop and death may follow.[21]

SARS-CoV-2 might infect the respiratory center of brain, which could be accountable for the respiratory breakdown of COVID-19 patients. Two sets of neuronal networks pre-Bötzinger complex (PBC) andretrotrapezoid nucleus/parafacial respiratory group (RTN/pFRG) present within the brainstem are crucial for generation of respiratory rhythm. SARS-CoV-2 may shut down the PBC and in turn breathing by infecting and destroying the PBC in the brainstem. Respiratory failure related death is seen in covid-19 patients. By affecting the brainstem respiratory failure related death is seen in covid-19 patients. The glandular cells of gastric, duodenal and rectal epithelium[22] as well as endothelial cells and enterocytes of the small intestine.[23] are affected by SARS-CoV-2 as ACE2 is abundantly seen here. Acute myocardial injuries may also be related to ACE2 receptors in the heart.[24]

Excessive inflammation, hypoxia, immobilization, and diffuse intravascular coagulation (DIC) leads to thrombosis and venous thromboembolism in ICU patients with COVID 19 infections . An elevated D-dimer level is usually found in significant formation and breakdown of blood clot with COVID-19 patients. It might play a significant role in mortality as it is closely related to organ dysfunction. The vasoconstrictive responses like constriction of blood vessels within the pulmonary circulation were reported with COVID-19 patients in which oxygenation decreases alongside the presentation of viral pneumonia[25]. Another cause of death is related to the kidneys[25] complications. Diffuse alveolar damage (DAD), and lymphocyte-containing inflammatory infiltrates within the lung[26] were found in autopsies of COVID-19 cases.

SIGNS AND SYMPTOMS:

It takes 2-14 days for the symptoms to appear after exposure to the virus. Incubation period is the time after exposure and before having symptoms. Fever, Cough, Tiredness are the Common signs and symptoms. Other symptoms includes shortness of breath or difficulty breathing, Muscle aches, Chills, Sore throat, Loss of taste or smell, Headache, Chest pain. Children also show similar symptoms to adults.

The severity ranges from very mild to severe. Some may be symptomatic, and some asymptomatic, According to the WHO, symptoms tend to appear between five and six days after infection.

DIAGNOSIS:

CDC DIAGNOSTIC TEST FOR COVID-19

A new laboratory test kit was developed for testing patient specimens for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which causes COVID-19. The test kit is called Real-Time Reverse Transcriptase (RT)-PCR Diagnostic Panel. It is used with the Applied Biosystems 7500 Fast DX Real-Time PCR Instrument with SDS 1.4 software for testing upper and lower respiratory specimens. CDC's is a qualified test kit intended for use by laboratories. In the United States, it is certified under the Clinical Laboratory Improvement Amendments (CLIA) to perform high complexity tests.

**NASOPHARYNGEAL SWAB SPECIMEN**

Collection of specimens from the surface of the respiratory mucosa with nasopharyngeal swabs is a procedure used for the diagnosis of Covid-19 in adults and children.[27-30] The procedure is also commonly used to evaluate patients with suspected respiratory infection caused by other viruses and some bacteria. Nasopharyngeal swabs are designed specifically to have long, flexible shafts made of plastic or metal and tips made of polyester, rayon, or flocked nylon. Personal protective equipment (PPE) includes a gown, nonsterile gloves, a protective mask, and a face shield are needed as specified by the Centers for Disease Control and Prevention (CDC)

SEROLOGY-BASED TESTS FOR COVID-19

Accurate diagnosis of COVID-19 is essential to better quantify the number of cases of COVID-19, including those that may be asymptomatic or have recovered. Serology based tests are widely recommended for SARS-CoV-2 .The CDC uses and currently recommends a PCR method to diagnose infection. It can only indicate the

presence of viral material during infection and will not indicate if a person was infected and subsequently recovered.

**Rapid diagnostic test (RDT):** Rapid diagnostic test (RDT) is a qualitative lateral flow assay. blood samples from a finger prick, saliva samples, or nasal swab fluids are used for tests. RDTs shows the user colored lines to indicate positive or negative results. Antibodies (IgG and IgM), or viral antigen are tested for covid-19 suspected patients. It is also used to measure IgG and IgM titers before infection.

**Enzyme-linked immunosorbent assay (ELISA):** This test can be qualitative or quantitative and usually use whole blood, plasma, or serum samples from patients. The realibilty of the test depands on a plate coated with a viral protein of interest, such as Spike protein. Patient samples are then incubated, if the patient has antibodies to the viral protein they bind together. The bound antibody-protein complex produce a color or fluorescent-based readout with another wash of antibodies.

**Neutralization assay:** Neutralization assays tell researchers if a patient has antibodies that are active and effective against the virus. whole blood, serum, or plasma samples are required from the patient. Neutralization assays depend on cell culture. In Neutralization assay virus and cells are grown with decreasing concentrations of patient antibodies, researchers can visualize and quantify antibodies in the patient serum which are able to block virus replication.

**Chemiluminescent immunoassay:**

Chemiluminescent immunoassay test uses whole blood, plasma, or serum samples from patients. This test uses magnetic, protein-coated microparticles, known as a chemiluminescent microparticle immunoassay. In this test patient samples are mixed with a known viral protein, buffer reagents, and specific enzyme-labeled antibodies that produces a light-based, luminescent as inference. The amount of light (radiance) emitted from each sample is used to calculate the number of antibodies present in a patient sample. This test detects antibodies like IgG, IgM, and IgA.

PREVENTION:WHO recommends strict personal hygiene, washing hands with soap and sanitizer, avoiding touching the eyes, nose, or mouth with unwashed hands, and coughing or sneezing into a tissue prevents the transmission of the disease. Those who may already have the infection have been advised to wear a surgical mask in public.[31][32] Physical distancing measures are also recommended to prevent transmission.[33][34] Health care providers taking care of someone who may be infected are recommended to use standard precautions, contact precautions, and eye protection.[35]

**HAND HYGIENE**:

Hand Hygiene play a critical part in fighting COVID-19. Hands have a crucial role in the transmission of COVID-19. COVID-19 virus spreads mainly through droplet and contact transmission of the infected people and/or contaminated objects or surfaces. virus can spread to other surfaces by hands. Hand Hygiene is one of the most effective way to reduce the spread of pathogens and prevent infections. The WHO global hand hygiene campaign SAVE LIVES: CLEAN YOUR HANDS increase adherence to hand hygiene in health care facilities, thus protecting health care workers and patient from COVID-19 and other pathogens. Washing hands with soap for 20 seconds ensures complete protection. Then dry. Sanitiser containing at least 60% alcohol should be rubbed in hands for at least 20 seconds.

**SURFACE CLEANING**

Decontamination of the surfaces with solutions including 62–71 percent ethanol, 50–100 percent isopropanol, 0.1 percent sodium hypochlorite, 0.5 percent hydrogen peroxide, and 0.2–7.5 percent povidone-iodine ensures cleaning and disinfection. If any COVID-19 case is suspected or confirmed at a facility such as an office or day care, all areas such as offices, bathrooms, common areas, shared electronic equipment like tablets, touch screens, keyboards, remote controls, and ATM machines used by the ill persons, should be disinfected[36] as recommended by CDC.

**FACE MASKS AND RESPIRATORY HYGIENE**

The WHO has recommended healthy people wear masks only if they are at high risk, such as those who are caring for a person with COVID-19[37] China and the United States have encouraged the use of face masks or cloth face coverings more generally by members of the public to limit the spread of the virus by asymptomatic individuals as a precautionary principle[38][39] Several national and local governments have made wearing masks mandatory[40]

**SOCIAL DISTANCING AND SELF-ISOLATION**

Social distancing is a process through which the chain of transmission of the coronavirus can be broken. Many governments are now mandating or recommending social distancing in regions affected by the outbreak.[41][42] It has been recommended for those diagnosed with COVID-19 and those who suspect they have been infected. Health agencies have issued detailed instructions for proper self-isolation.[43][44] Many governments have mandated or recommended self-quarantine for entire populations living in affected areas[45][46]

**MANAGEMENT AND TREATMENT OF COVID-19**

People are managed with supportive care, which may include fluid therapy, oxygen support, and supporting other affected vital organs[47][48][49] The CDC recommends those who suspect they carry the virus wear a simple face mask. Personal hygiene and a healthy lifestyle and diet have been recommended to improve immunity[50] Supportive treatments may be useful in those with mild symptoms at the early stage of infection[51]. There is no specific treatment for COVID 19[52]. Researchers have developed many vaccines which is in testing phases. Paracetamol (acetaminophen) over ibuprofen for first-line use[53] ACE inhibitors and angiotensin receptor blockers, Medications to prevent blood clotting have been suggested for treatment,[54] and low molecular weight heparin may be the better choice of anticoagulant therapy in severe COVID-19 cases. The FDA says currently there is no evidence that NSAIDs worsen COVID-19 symptoms.[55]

## II. CONCLUSION:

COVID-19 outbreak is a major destabilising threat to the global economy. It has adverse effects on financial status of the individuals. Hundreds of millions could have lost their jobs. It had religious, psychological, educational impact. Personal gatherings has been avoided as medical experts have advised, and local authorities often mandated stay-at-home in order to prevents gatherings. Many countries have reported an increase in domestic violence and intimate partner violence attributed to lockdowns amid the COVID-19 pandemic.

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