

# Review Article

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## AN APPRAISAL OUTLINE ON CORONA VIRUS

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#### ABSTRACT

A respiratory infection owing to a novel corona virus was first identified in Wuhan, China in December 2019. World health organization declared name for this novel corona virus as "COVID-19" is now a worldwide pandemic and has been recognized in more than 200 countries. Corona viruses are virus that is known to cause infection varying from the common cold to more critical diseases like Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). It is known to transmit by respiratory droplets released when corona virus patient coughs, sneezes or talks and if another person inhales the droplets or touches these surfaces and further touches his face, eyes or mouth can get an infection. Currently there are no specific vaccines or medicines for Corona virus disease and treatment given based on symptoms. But many vaccines are under investigation.

Keywords: Corona virus; COVID-19; pandemic; SARS

## INTRODUCTION

Corona virus infection which is popularly known as COVID-19 is caused by the corona virus. In December 2019, a respiratory illness due to a novel corona virus, SARS-CoV-2, was first identified in Wuhan in Hubei Province, China after the malady unfold to additional Provinces in China, and to the remainder of the planet. The respiratory illness due to SARS-CoV-2, termed COVID-19, is now a worldwide pandemic and has been identified in 215 countries and territories around the world and 2 international conveyances and more than 43,770,528 people affected due to corona virus. While death tolls around 1,164,235 (Up to 26 Oct. 2020).<sup>1,2</sup>

The latest grouping of corona viruses acknowledges 39 species in 2. 27 subgenera, 5 genera and 2 subfamilies that associated with the family Coronaviridae, taxonomic category Cornidovirineae, order 3. Nidovirales and realm Riboviria.3,4

Corona viruses are of various types. Most of them cause infection in animals. But corona viruses are known to cause infection in These viruses which cause severe respiratory illness are humans are of 7 types.

Out of 7, four human corona virus infections include mild upper respiratory tract infections which cause signs of the common cold.

While, remaining 3 human corona virus infections perhaps much more dangerous and have newly caused major outbreaks which are as follows:

- 1. SARS-CoV-2 is a latest corona virus that was first recognized in Wuhan (Hubei Province, China) in December 2019 that gives rise to COVID-19 which then spreads in additional Provinces in China, and to the remainder of the planet.
- Middle East respiratory syndrome (MERS) caused by MERS-CoV which was recognized in 2012.
- While, SARS-CoV was caused outbreak of severe acute respiratory syndrome (SARS) in Guangdong province of southern China in 2002.

transmitted to human from animals.5,6

Table 1: Comparison of COVID-19 with SARS and MERS

Characteristics	COVID-19	SARS	MERS
Causative agent	SARS-CoV-2	SARS-CoV	MERS-CoV
Emergence	Wuhan, Hubei province, China	Guangdong province, China	Saudi Arabia
Natural reservoir	Bat	Bat	Bat
Total Cases	43770528	8439	2,519
Total deaths	1164235	812	866
Mortality rate	1.4 to 3.4 %	9.6 %	34.3% %
Incubation period	2-14 days	2-7 days	7-12 days
Major symptoms	Fever, dry cough, shortness of breath	Cough, fever, and diarrhea	Fever, cough, shortness of breath
Vaccine	No	No	No
Treatment	No proper treatment	No proper treatment	No proper treatment <sup>2, 7-10</sup>

In above comparison mortality rate of MERS and SARS have remarkably higher than COVID-19. But COVID-19 is more contagious than MERS and SARS and spreads more easily between people and due to that number of COVID-19 cases are

far more than MERS and SARS. In last ten years there have been no cases of SARS. While MERS is an ongoing public health concern.9,11

Common symptoms of COVID-19 include cough, shortness of breath, and fever, in some cases mild disease to pneumonia, respiratory failure, and death. Recent statistics on worldwide deaths related with COVID-19 demonstrate that the elderly or those with concurrent conditions like hypertension or diabetes are at the highest risk for mortality. Currently the global number of infections continues to rise rapidly. The inability to test widely

and rapidly has hindered the ability to characterize the epidemiology of the disease, prevent further spread, and ensure the optimal use of other limited resources such as personal protective equipment (PPE) and medication therapy. Pharmacists play a crucial role in the healthcare system to improve patient care throughout this COVID-19 pandemic. 12,13

## Structure of Corona virus

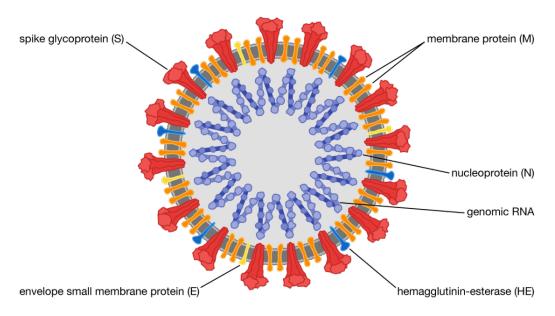


Figure 1: Structure of corona virus<sup>14</sup>

Name corona virus is given since the spikes that protrude from their surfaces, resembling a crown or the sun's corona when observed under the microscope. They are nanoscopic in size and contain a single-stranded RNA. COVID-19 has the identical structure proteins as three earlier known categories of corona viruses: spike glycoprotein (S), envelope protein (E) membrane protein (M), and nucleocapsid protein (N). For RNA synthesis in corona virus N protein is required, and it gives RNA chaperone activity. COVID-19 spike glycoprotein is 1255 amino acids long, with low amino acid which resemble with other corona viruses. Its carboxyl terminus is composed of the transmembrane region and the cytoplasmic tail. The extracellular domain of the SARS-CoV spike glycoprotein contains two heptads repeat regions which are called as heptad repeat region 1 and heptad repeat region 2. S1 and S2 are the two functional domains of SARS-CoV spike glycoprotein. S1 is responsible for the binding with its receptor angiotensin-converting enzyme 2 (ACE2) on host cells and determines the hosts range of the virus. S2 promotes viral and cellular membrane fusion. Membrane fusion takes place when there is a conformational change in the HRs to form a fusion core. Fusogenic state produces the HR domains of the S protein to fold into a hairpin-like formation. 15-17

## Replication

- Corona virus having large RNA virus which is enveloped. It containing complex gene expression.
- Corona virus replication requires ribosome frame shifting mutation in the coarse genome translation.
- The production of genomic and multiple sub genomic RNA species and convection of offspring virions caused by a route, this route is distinctive among enveloped RNA viruses.

- The official series of corona virus for making an RNA copy of a gene sequence or transcription is the formation of diverse sub genomic mRNAs that accommodate sequence corresponding to each end of the genome, so for production of sub genomic mRNAs requires a suspend transcription process.
- In the virus structural proteins encoded by the 30000 nucleotides and non-structural proteins play analytic role in synthesis of RNA. These proteins are not essential for virus replication.
- For viral RNA synthesis required at least 1 Niche-specific protein, non-structural proteins 2 and 1 structural protein and the nucleocapsid protein.
- The translation of the genomic RNA conciliates the expression of the corona virus replicate transcriptase protein gene.
- This transcriptase protein is encoded in open reading frame ORF1a and ORF1b and they are produced primarily as big poly protein, as PP1a and PP1ab respectively in the PP1ab required the ribosomal frame shifting at the time of translation of ORF1a.
- After production this poly protein are break down by using virus encoded in ORF1a and nspl2 to nspl6 this all are encoded in ORF1b.
- Then replicas transcriptase protein in conjugation with other viral protein and other cellular protein get together into membrane bound replication transcription complex.
- After that this formed complex collect at perinuclear region and they are analogous with double membrane vesicles.<sup>18-20</sup>

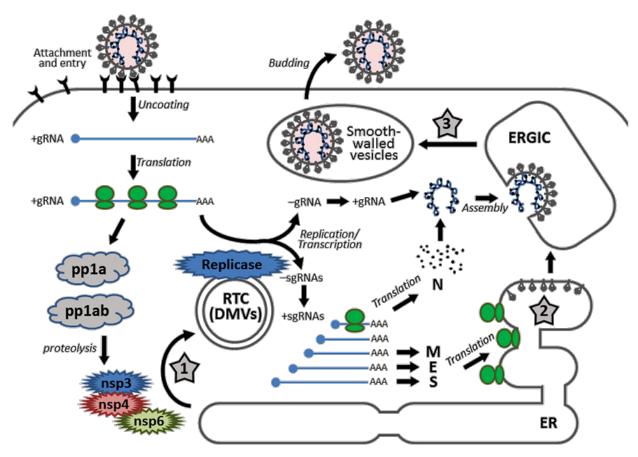


Figure 2: Replication of Corona virus<sup>20</sup>

### Causes

Causes of growing infection with the COVID-19 are as follows:

The virus grows effortlessly among peoples and in less time, it infects the large number of peoples.

This infection spreads too many people in close contact from one person. This virus spreads through the sneezing, coughing, or breathing droplets released when someone with this infection is infected. This droplet containing virus can be goes in the nose or mouth or this droplet inhaled by the normal person who come in contact with diseased one. It can also affect the other one if this person touches an area containing the virus on it and after that he or she touches his or her mouth, eyes or nose, but it isn't contemplated to be infection. This virus also infects those with less immunity. It is also infected by one to another by using infected person's personal stuff.21,22

## Signs and Symptoms

Signs and symptoms of COVID-19 may develop between 2 to 14 days after exposure.

## Common signs and symptoms

- Fever
- Dry cough
- Shortness of breath
- Tiredness

# Less common symptoms can include

- Nasal congestion
- Runny nose
- Pain and Aches
- Chills
- Sore throat
- Loss of smell
- Loss of taste Headache
- Diarrhoea
- Conjunctivitis
- Skin rash
- Severe vomiting

These symptoms are usually mild and appear slowly. Some people get infected but have no any symptoms and don't feel ill. Many patients recover from the infection without requiring special treatment.<sup>23-26</sup>

# **Incubation period**

The time after exposure and before having symptoms is called the incubation period. On an average it takes 5-6 days from when someone is infected with the virus for symptoms to show, however it can take up to 14 days. In few cases symptoms occurs in 2 days following exposure. While symptoms appers after 14 days in 1 out of 100 patients as per recent studies.

Some people may have coronavirus and have no symptoms at all. Others may not know they have it, since they have very mild symptoms. The incubation period will inform many important infectious disease-related public health practices, including active surveillance, monitoring, control and modeling. Successful tracking permits potentially exposed persons to contact local health departments frequently and confirm their health status. <sup>27-</sup>

## Risk

As per recent research high risks for serious infection from corona

Old age persons (above 65 years).

People are with lower immunity.

Heath care workers working in long term supervision provision. Individuals of all ages having underlying medical conditions, including:

- People having lung disease or an asthmatic condition.
- Patient with severe heart problems such as hypertension, hypotension.
- Patients suffering from some specific illnesses such as cancer.
- People having compromised immune system due to HIV, smoking, organs transplanting, long term use of corticosteroids or use of medication that reduces immunity.
- Individual who suffer from high obesity, having BMI average greater than 40 or more.
- Diabetic person.
- Individual having some sort of liver disease or kidney problems.
- Person having close contact with infected patient. 31-34

### Transmission

The virus which causes COVID-19 mainly spreads from person to person. The main route of human corona virus transmission is via the respiratory tract; also, the principal transmission of virus from person to person primarily through direct contact or by droplets spread from infected individuals through coughing and sneezing. COVID-19 appears to be quickly and sustainably spreading in the population means spreading the virus in an area where certain infected individuals are not sure how and where they were infected.

The main source of transmission

- Close contact of infected patient.
- Short range transmission due to droplet spray.
- Long range transmission by the aerosols.
- It also spread by respiratory droplets produced when an infected individual coughs, sneezes and talks.
- Air born transmission in between people due to respiratory droplets and the contact routes.
- The virus also spreads when people touch infected objects and surfaces and touch the mouth, nose and eyes afterwards.<sup>2,35,36</sup>

# Prevention

Prevention of corona virus infection is important since there is no effective treatment for disease. Following majors help in preventing spread of corona virus

- Follows the social distancing and avoid gathering in public places and areas.
- 2. Maintain distance at least 1 meter between each other.
- 3. Keep away from physical contact.
- 4. Cover your mouth with mask in public place.
- 5. Do not touching your mouth, nose and eyes.

- 6. Wash your hands thoroughly for at least 20 seconds with soap, after and before doing any work.
- 7. Use hand sanitizer which contains at least 60% of alcohol.
- Cover your mouth with tissue during sneezing or coughing and throw used tissue in closed dustbin.
- 9. Clean and disinfect areas while touching.
- 10. Strictly follow all instructions which stated by local health authority.
- 11. Stay home if feel unwell
- 12. Immediately hospitalized if any symptoms are seen.

There is no vaccine against corona virus. More than 100 vaccines are under various stages of development across the globe. 37-40

### Diagnosis

Laboratory diagnosis of Corona virus is essential for stop the spread of disease and improving the health.

- 1. Swab test: In this test special swab is helpful for taking a sample from nose or throat of person who shows symptoms.
- Nasal Aspirate: In the nose saline solution is injected and sample is taken with the help of light suction, in this test.
- Tracheal Aspirate: This test is performed with a thin tube having torch also known as bronchoscope which is put in to mouth to reach the lungs in the place where a sample collected.
- 4. Sputum test: Sputum is mucus which is assembled in the lungs. In this test sample is taken from person nose.
- 5. Blood test: In this test blood is taken from vein of arm of symptomatic person.

The virus also confirmed by the polymerase chain reaction (PCR).

CT scan is also advised for diagnosis of COVID-19 to detect where and how virus is spread.

The FDA recently approved the rapid corona virus test.

RT-PCR is also used for the testing corona virus it uses batches for testing the sample away from where it collected.

Serology test is blood-based test where patient is exposed to virus looking for their immune response.

The qualitative PCR is sufficient for the routine diagnosis.

Some experts postulated that lung ultra sound is also helpful. 41-44

### Treatment

Currently, there is no any treatment for novel corona virus. The primary treatment is focused on managing the symptoms if any. The only thing that can help a patient suffering from COVID-19 infection is intensive supportive care.

Encouraging treatment for COVID-19 is as follows:

- To prevent spread of infection (isolation).
- Maintain electrolytic balance.
- Maintain temperature.
- Correct Airways.
- Maintain normal breathing and circulation.

Following classes drugs are used in treatment of symptoms of COVID-19.

- Antiviral drugs like Chloroquine, Arbidol, Remdesivir.
- Bemcentinib is an AXL kinase antagonist, Bevacizumab is VEGF antagonist, hydroxychloroquine and macrolide that are antibacterial and azithromycin used in combination that cured the symptoms within period of 6 days.
- Antiparasitic drugs like Intermective.
- Anti influenza drugs like Baloxavir etc.

Symptoms are cured by these drugs and treatment is preferred depending upon patient clinical condition.<sup>45-48</sup>

## **CONCLUSION**

At present hundreds of corona viruses exists, most of which circulate in animals. Just seven of these viruses infect humans and four of them give rise to common cold symptoms. But in the last 20 years, there were three times, a corona virus has transferred from animals to humans to cause serious illness. Currently most of the vaccines are in the last stage of trials and may get approved around the world in few days.

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