

# Current Status of Corona virus: origin, transmission, prevention, Clinical treatments

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**Abstract:** Corona virus which is also known as COVID-19 (Corona Virus Disease 2019), is responsible for current pandemic and affected whole world. It causes diseases which can be grouped under respiratory diseases, which is actually classified as zoonotic disease. Corona viruses was studied long before, and was assumed to be commonly associated with common cold and less fatal complications. However, the current outbreak is associated with a novel strain of virus which is highly infectious as well as fatal. Diseases such as SARS is caused by this novel virus. Various measures to cure this disease has been still under study and in testing phase in different parts of the world

**Keywords:** Origin, transmission, prevention, clinical treatment

**1)INTRODUCTION:** A series of pneumonia cases with an unclear cause appeared in Wuhan at the end of 2019 (Chen et al., 2020). Deep sequencing analysis of lower respiratory tract samples a few weeks later, in January 2020, reported a novel virus, extreme acute respiratory syndrome coronavirus 2 (SARS-CoV-2) as the causative agent for the observed pneumonia cluster (Shi et al., 2020). Dr. Tedros Adhanom Ghebreyesus, Director-General of the World Health Organization (WHO), named the disease caused by the SARS-CoV-2 as “COVID-19” on February 11th, 2020, and by March 11th, 2020, when the number of countries involved was 114, with more than 118,000 cases and over 4000 deaths, the WHO declared the pandemic status. Corona Virus Disease 2019 (COVID-19) is an RNA virus that, due to the presence of glycoprotein spikes on its envelope, has a typical crown-like appearance under an electron microscope (Park et al., 2020). It is not the first time that a coronavirus causing an epidemic has been a significant global health threat: in November 2019, an outbreak of coronaviruses (CoVs) with severe acute respiratory syndrome (SARS)-CoV started in the Chinese province of Guangdong and again, in September 2012 the Middle East respiratory syndrome (MERS)-Co V appeared (Hobbs et al., 2020). There are four genera of CoVs  $\alpha$ -coronavirus (alpha CoV), (beta CoV), (delta CoV), (gamma CoV) (Baruah et al., 2020). The virus is both natural and zoonotic in origin two scenarios that can plausibly explain the origin of SARS-CoV2 are: (i) natural selection in an animal host before zoonotic transfer; and (ii) natural selection in humans following zoonotic transfer Clinical features and risk factors vary greatly, causing clinical severity to range from asymptomatic to fatal (Gennaro et al., 2020). On the 13th of January 2020, the first confirmed case of COVID-19 outside of China was discovered in Bangkok (Okada et al., 2020). On March 2nd, 2020, 67 territories outside of mainland China announced 8565 confirmed cases of COVID-19, with 132 deaths, as

well as major population transmission in several countries around the world, including Iran and Italy, and the WHO declared it a global pandemic on March 11th, 2020 (Wilson et al., 2020). The number of reported cases is steadily rising across the world, and after Asian and European regions, a sharp rise in cases is currently being observed in low-income countries (as of March 31, 2020) (Gennaro et al., 2020). According to WHO records, there are 693,224 confirmed cases and 33,106 deaths worldwide as of March 31, 2020, with the following distribution: 103,775 cases and 3649 deaths in the Western Pacific region, 392,757 cases and 29,962 deaths in the European region, 4084 cases and 158 deaths in Southeast Asia, 46,329 cases and 2813 deaths in the Eastern Mediterranean region, 142,081 cases and 2457 deaths in the Americas region. The purpose of this review is to summarise early findings on the epidemiology, clinical characteristics, diagnosis, management, and prevention of COVID-19 (Prajapat et al., 2020).



**Figure: Spread of Corona virus disease (COVID-19)**

**Table: Transmission of Coronavirus from infected person to Healthy Person**

Infected person	Healthy person	Possibility of transmission
Without mask	Without mask	Very high
With mask	Without mask	Still high
With mask	With mask	less
Without mask but near by	Without mask but near by	Very high
With mask but near by	With mask but nearby	Still high
With mask and quarantined	No physical contact with infected person	Very less

**2) HISTORY OF PANDEMIC:** Pandemics are not new and they have been affecting large populations on all continents for many years, resulting in the deaths of millions of people.

- (1) The Plague has a long history in Europe, with evidence of the disease dating back to the Stone Age (Bramanti et al., 2019). Plague epidemics in Europe during the first (sixth to eighth centuries) and second (fourteenth to nineteenth centuries), including the Black Death (1346–1353), are notorious for their widespread mortality and long-term social and economic impact (Dean et al., 2018). The third plague

pandemic began in the southwest Chinese province of Yunnan, where plague has caused multiple outbreaks since 1772. In the nineteenth century, a third pandemic spread throughout the world, affecting Europe (Evans et al., 1988).

- (2) Throughout the twentieth century, in 1823, the Black Death was named after the black blotches caused by subcutaneous haemorrhages that appeared on the skin of victims (Duncan et al., 2005).
- (3) The Spanish influenza pandemic, also known as the "mother of all pandemics," killed an estimated one-third of the world's population (or 500 million people). During the 1918–1919 influenza pandemic, millions of people became infected (Morens et al., 2018). The disease was extremely severe, with case fatality rates exceeding 2.5 percent, compared to 0.1 percent in previous influenza pandemics. Total deaths were estimated to be 50 million, but could have been as high as 100 million.
- (4) The bacterium *vibrio cholerae* is the causative agent of cholera, a severe and potentially fatal diarrheal disease that is a major public health concern due to its high morbidity and mortality (Mandal et al., 2011). Since 1817, there have been seven cholera pandemics, and all continents except Antarctica have experienced significant or major incursions by one or more of them. In the first half of the nineteenth century, any writer has focused on the shift in the incidence and mortality of smallpox from childhood to adulthood. The last epidemic to occur was in 1837–41 a disproportionate number of deaths among babies and young children. It was generally discovered that the change in age incidence was caused by a Vaccination should be mandated at a younger age. Infant mortality from smallpox was highest in countries where vaccination was not mandatory (Rolleston et al., 1933). During the pandemic, vaccination rates were much higher than in areas where vaccination was more widely or strictly enforced.
- (5) Since the beginning of the epidemic, 75 million people have been infected with the HIV virus, and approximately 32 million have died as a result of the virus (Nash et al 2001). At the end of 2018, 37.9 million (32.7–44.0 million) people worldwide were infected with HIV. Globally, an estimated 0.8 percent (0.6–0.9 percent) of adults aged 15–49 years are infected with HIV, though the burden of the epidemic varies greatly between countries and regions The World Health Organization (WHO) The African region continues to be the most severely affected, with nearly one in every 25 adults (3.9 percent) living with HIV, accounting for more than two-thirds of all HIV patients worldwide (Marsh et al., 2019).
- (6) The Chinese authorities first notified WHO on December 31, 2019, that “a pneumonia of unknown cause” had been detected in Wuhan, the largest city in Hubei province in central China. COVID-19 is the most recent corona virus discovered to have caused respiratory infections such as MERS and SARS (Schwartz et al., 2020).
- (7) Thailand reported the first imported case of lab confirmed novel corona virus (2019-nCoV) from Wuhan, Hubei Province, China on January 13, 2020. The victim was a 61-year-old Chinese woman from Wuhan City, Hubei Province, China. She was reported to have visited a local fresh market in Wuhan on a regular basis prior to the onset of illness and took a direct flight to Thailand from Wuhan city on January 8, 2020, with five family members (Nishiura et al., 2020).
- (8) On the 16th of January 2020, Japan confirmed its first case of infection from the Wuhan pneumonia-like virus, and they isolated two visitors from the Chinese city as a precaution (Seah et al.,

2020). It was discovered that a Chinese national had close contact with a patient while in Wuhan, but none of his family members who live with him in Japan, nor the doctors who treated him, tested positive for the virus. The Wuhan outbreak coincides with Japan's annual flu season, and people were advised to wash their hands, gargle, and wear masks to avoid becoming ill (MCMASTER et al., 2020).

- (9) The first case of 2019-nCoV infection in the United States was reported on January 20, 2020, when a 35-year-old man presented to an urgent care clinic in Snohomish County, Washington, with a 4-day history of cough and subjective fever. He revealed that he returned to Washington State on January 15, 2020, after visiting Wuhan, China. The patient stated that he saw a health alert from the Centres for Disease Control and Prevention (CDC) about a novel corona virus outbreak in China and decided to see a health care provider because of his symptoms and recent travel (Ceukelaire et al., 2020).
- (10) On January 24, 2020, France declared the first confirmed cases of the deadly corona virus, with one case confirmed in Bordeaux and the second near Paris, marking the first confirmed cases of the novel virus in Europe. It was discovered that both of the initial cases had a history of travel to China (Chinazzi et al., 2020).
- (11) The first case of novel corona virus (2019-nCoV) in Australia was confirmed by Victoria Health Authorities on January 25, 2020. The patient was identified as a man from Wuhan who flew to Melbourne from Guandong on January 19, 2020 (Acter et al., 2020).
- (12) On January 27, 2020, the first human-to-human transmission of the Wuhan corona virus was reported in Germany, where a man was infected by a colleague who had been in China, and experts stated that the Chinese woman who had the virus when she transmitted it to her colleague apparently had no symptoms when she transmitted it to him. Within China, there have been warnings that people may be infectious before they become ill. The 33-year-old man who was infected had not visited China, but a Chinese colleague who was visiting Germany gave a training session on January 21, 2020, and the man who attended the session tested positive for virus. She was discovered to have recently visited her parents in Wuhan (Ralph et al., 2020).
- (13) On January 31, 2020, the Italian government announced the suspension of all flights between Italy and China, as well as the declaration of a state of emergency in the country, after doctors confirmed that two Chinese tourists in Rome had tested positive for the coronavirus (Radi et al., 2020).
- (14) On January 31, 2020, a German tourist tested positive for SARS-CoV-2, confirming that the corona virus pandemic had spread to Spain Canary Islands, La Gomera The National Microbiology Centre (CNM) reported a positive test from a Canary Islands resident. The patient was a German national who was being treated at Nuestra Senora de Guadalupe Hospital in San Sebastián, where he was placed in isolation (Fuertes et al., 2020).
- (15) According to WHO, as of March 11, 2020, the number of COVID-19 cases outside of China had increased 13-fold, and the number of affected countries had tripled. In hospitals, thousands more patients are fighting for their lives. The outbreak has been classified as alarming by WHO, and COVID-19 can be classified as a pandemic. By that time, there had been over 1,18,000 cases in 114 countries, with 4,291 people killed (Rawaf et al., 2020).

**3)GLOBAL LOCKDOWN:** The corona virus originated in Wuhan, Hubei China and quickly spread throughout the world. Due to an increase in the number of reported cases and subsequent deaths, all continents of the world were placed on almost complete lockdown, with all social, economic, and other activities suspended except for the vital provision of food and health required for life.



**Figure: Global Lockdown**

**4)CORONAVIRUSES' PRIMARY RESERVOIRS AND HOSTS:** In order to establish preventive measures to control the infection, the source of origin and transmission must be identified. The researchers initially focused on raccoon dogs and palm civets as a key reservoir of infection in the case of SARS-CoV. However, only the samples isolated from the civets at the food market tested positive for viral RNA detection, implying that the civet palm could be a secondary host. In 2001, samples were isolated from healthy Hong Kong residents, and molecular analysis revealed a 2.5 percent frequency rate of antibodies against SARS-coronavirus. Anti-SARS-CoV antibodies were also discovered in Rhinolophus bats, implying that the bats could be a source of the viral infection (Gros et al 2020). The Middle East respiratory syndrome coronavirus first appeared in Saudi Arabia in 2012. MERS-coronavirus is also known as beta-coronavirus, Camel as a primary host or zoonotic source (Ramadin et al., 2019). MERS-coronavirus was also found in Pipistrellus and Peri myotis bats in a recent study, indicating that bats are the primary host and transmission medium for the virus (Sherreen et al., 2020). Researchers proposed snakes as a possible host, but genomic similarities discovered in novel coronaviruses with SARS-like bat viruses supported the statement that bats, not snakes, could be the key reservoirs (Boni et al., 2020). Further homologous recombination analysis revealed that the receptor binding spike glycoprotein of a novel coronavirus is derived from a SARS-CoV (CoVZXC21 or CoVZC45) and an unknown Beta-CoV (Malik et al., 2020).

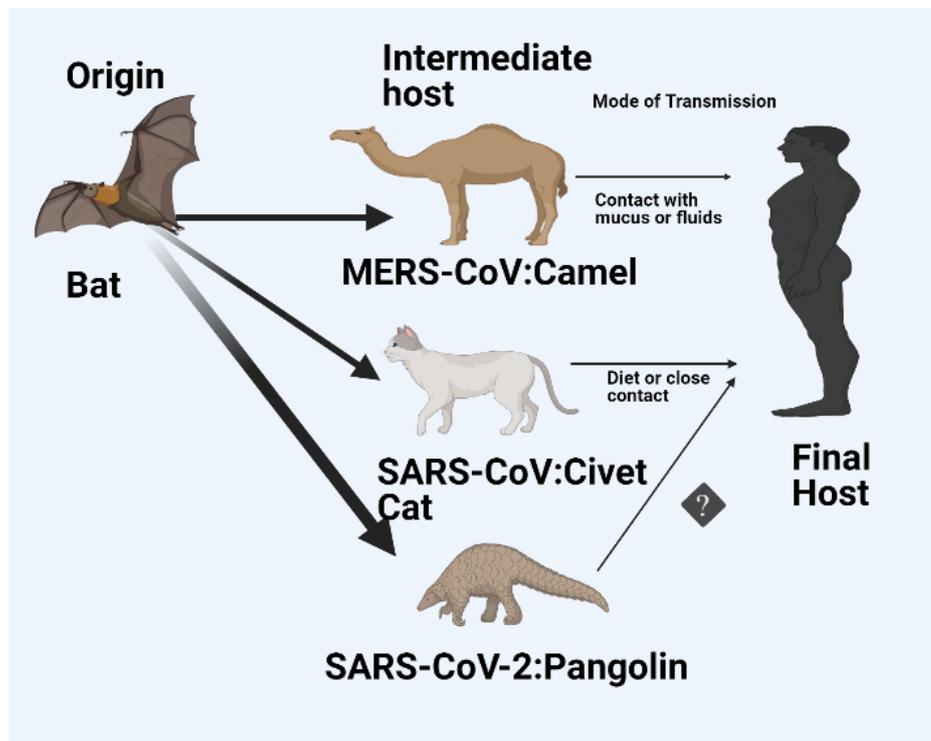


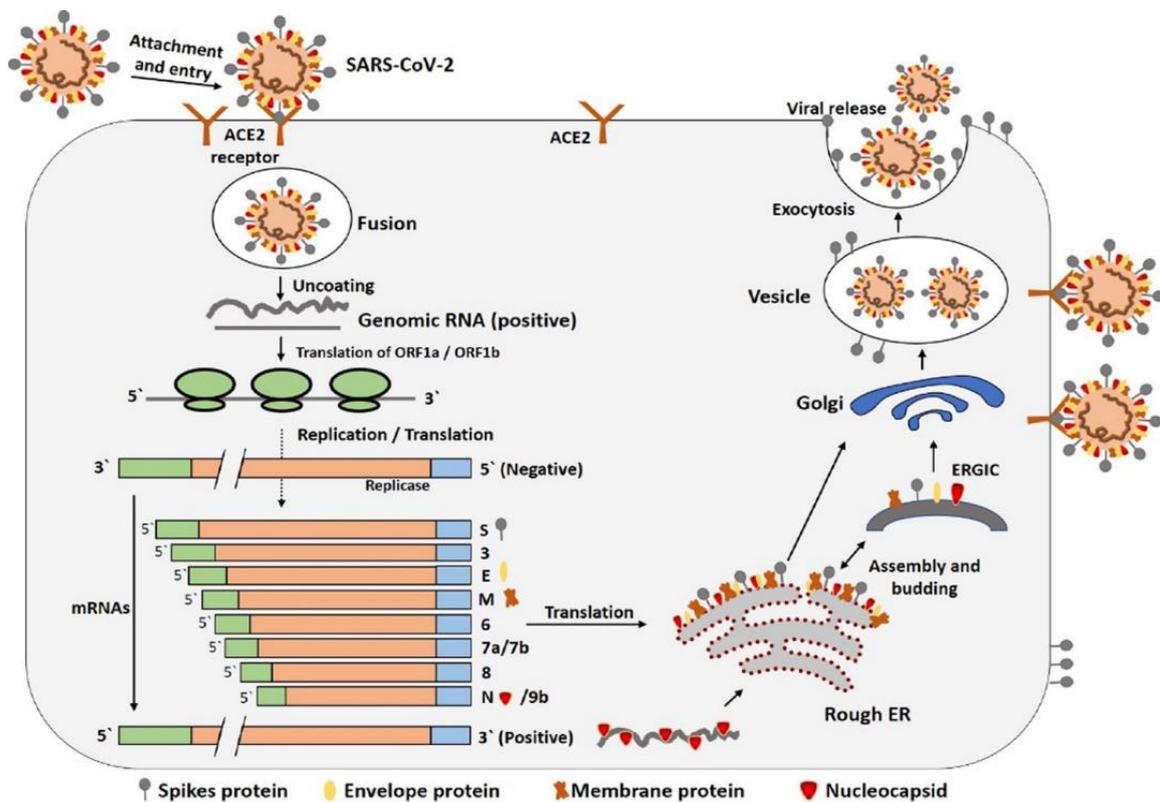
Figure: Transmission of Corona virus from animal to human

## 5) KEY FEATURES AND ENTRY MECHANISM OF HUMAN CORONAVIRUSES:

ORF1 downstream regions contain specific genes that encode proteins for viral replication, nucleocapsid and spike formation in all coronaviruses (Park et al., 2020). The glycoprotein spikes on coronaviruses' outer surface are responsible for virus attachment and entry into host cells. The virus's receptor-binding domain (RBD) is loosely attached, the virus can infect multiple hosts. Other coronaviruses primarily use aminopeptidases or carbohydrates as a key receptor for entry into human cells, whereas SARS-CoV and MERS-CoV use exopeptidases. A coronavirus's entry mechanism is dependent on cellular proteases such as human airway trypsin-like protease (HAT), cathepsins, and transmembrane protease serine 2 (TMPRSS2), which split the spike protein and cause further penetration changes. MERS-coronavirus uses dipeptidyl peptidase 4 (DPP4) as a key receptor, whereas HCoV-NL63 and SARS-coronavirus use angiotensin-converting enzyme 2 (ACE2) as a key receptor (Asrani et al., 2020). SARS-CoV-2 has the typical coronavirus structure with spike protein and also expressed other polyproteins and membrane proteins like RNA polymerase (Acter et al., 2020). 3-chymotrypsin-like protease, papain-like protease, helicase, glycoprotein, and accessory proteins are all examples of enzymes. SARS-CoV-2 spike protein has a 3-D structure in the RBD region to maintain van der Waals forces. The critical lysine 31 residue on the human ACE2 receptor recognises the 394-glutamine residue in the RBD region of SARS-CoV-2 (Zhang et al., 2020).

**6) GENOMIC VARIATIONS IN SARS-COV-2:** The SARS-CoV-2 genome was found to be more than 80% identical to the previous human coronavirus (SARS-like bat CoV). The four structural genes, spike (S), envelope (E), membrane (M), and nucleocapsid (N), encode structural proteins. The

orf1ab gene encodes the pp1ab protein and 15 ns ps in SARS-CoV-2. The orf1a gene codes for the pp1a protein, which contains ten ns ps (Portelli et al., 2020). According to the evolutionary tree, SARS-CoV-2 is related to the SARS-coronavirus group. Recent research has revealed significant differences in SARS-CoV and SARS-CoV-2, such as the absence of 8a protein and fluctuations in the number of amino acids in 8b and 3c protein in SARS-CoV-2 (Cao et al., 2019). Recent research has revealed significant differences in SARS-CoV and SARS-CoV-2, such as the absence of 8a protein and fluctuations in the number of amino acids in 8b and 3c protein in SARS-CoV-2 (Biswas et al., 2020). It is also reported that Spike glycoprotein of the Wuhan coronavirus is modified via homologous recombination. SARS-CoV-2 spike glycoprotein is a hybrid of bat SARS-CoV and an unknown Beta-CoV. A fluorescent study confirmed that the SARS-CoV-2 uses the same ACE2 (angiotensin-converting enzyme 2) cell receptor and mechanism for entry into host cells as the SARS-CoV. The single N501T mutation in the Spike protein of SARS-CoV-2 may have significantly increased its binding affinity for ACE2.



**Figure:** SARS-life CoV-2's cycle in host cells begins when the S protein binds to the cellular receptor ACE2. The conformation change in the S protein after receptor binding facilitates viral envelope fusion with the cell membrane via the endosomal pathway. The SARS-CoV-2 then injects RNA into the host cell. Viral replicase polyproteins pp1a and 1ab are translated into genome RNA, which is then cleaved into small products by viral proteinases. By discontinuous transcription, the polymerase generates a sequence of sub genomic mRNAs, which are then converted into viral proteins. In the ER and Golgi, viral proteins and genome RNA are assembled into virions, which are then transported through vesicles and released from the cell. ACE2 stands for angiotensin-converting enzyme 2; ER stands for endoplasmic reticulum; ERGIC stands for ER–Golgi intermediate complex.

## 7) PREVENTION OF CORONAVIRUS:

- (1) **SOCIAL DISTANCING:** It is recommended that sick people keep a 6foot (approximately two-arm distance) distance between themselves both at home and outside. This much distance may reduce the chances of a person becoming infected by aerosol coming from an infected person or carrier-studies also show that asymptomatic patients can spread virus, so social distancing is essential.
- (2) **WASHING HAND OFTEN:** Washing our hands may reduce the risk of virus transmission from flies. Sanitizer with an alcohol content greater than 60% is also effective, and washing hands with soap and water is most effective when done for at least 20 seconds.
- (3) **AVOID TOUCHING TO MOUTH, EYES AND FACE:** If any particle has remained on your unwashed hands, this will reduce the risk of infection.
- (4) **AVOID GROUPING AND GATHERING:** If even a single person becomes infected, this can exponentially increase the spread of infection among group members.
- (5) **ELDERLY AND VERY YOUNG PEOPLE:** Infection is more likely in people over the age of 60 and children under the age of ten. person's immune system is typically weak at this age and may be incapable of combating the infection. This could have fatal consequences.
- (6) **PROPERLY COVERING OF MOUTH AND NOSE:** even if you are asymptomatic, you may spread the infection to others. Mask made up of cloth will also prevent you from direct infection from someone else. however, a face mask is not a substitute for social distancing in any way.
- (7) **CLEANING AND DISINFECTING:** Cleaning and disinfecting any commercial platform with appropriate chemicals, such as sodium hypochlorite in appropriate concentrations, is required, as the surfaces may contain viruses that can infect others.



**Figure: Prevention of corona virus**

## 8) MEDICAL APPROACHES OF TREATMENT

- (1) **Testing of viral infection:** Viral infection testing may be performed with either a current or a previous infection.
  - (a) **PAST INFECTION:** The agglutination method is used to test antibodies against a specific virus for past infection. If the serum sample agglutinates (forms a cluster), it indicates that the patient has previously

been infected with a virus. However, because antibodies take a few weeks to form, the same method cannot be used to detect current infection.

(b)CURRENT INFECTION: The RT-PCR (reverse transcriptase-polymerase chain reaction) method is used to test this. Reverse transcriptase enzymes are used in this method to create an opposite strand of viral RNA and duplicate it. Using a highly specific probe, this is a highly sensitive and fool proof method for detecting viral infection.

## Curing of coronavirus

**VACCINATION:** Covishield, Covaxin is developed by oxford university in India it is very helpful to boost the efficiency of immune system.

**10)Conclusion:** COVID-19 (Corona virus disease 2019) has affected the whole world's health and economy. The current ongoing pandemic has made us stop continuing our daily activities. So many nations worldwide have to be stopped their trade, manufacturing and commercial activities to deal with this highly infectious and deadly virus. Coronavirus has infected lakhs of people worldwide. The number is still increasing. Due to its infectious nature, people were asked to follow strict protocol during lockdown. These protocols and rules are made considering the measures to reduce or limit the transmission of virus and disease. Apart from this, large amount of money has been invested in finding the cure for the virus and disease. Covishield and Covaxin developed by oxford university helps to increase the efficiency of immune system Various options for curing the diseases are under trial, scientists and doctors are hoping that the cure for this deadly virus will be available soon. However, this process may take few months or few years from now. Till then, maintaining social distancing and sanitation is the best way to keep this virus away, apart from following given by ICMR.

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