



# A COMPERHENSIVE ANALYSIS OF COVID19: An Overview

Sona Scaria\*, Neethu J<sup>1</sup>, Dilip Krishnan KK<sup>2</sup>, Dr. Lal Prasanth M L<sup>2</sup>

\*Bpharm student, Dr. MOOPEN'S College of pharmacy.

1.Associate Professor, department of Pharmacy Practice, Dr. MOOPEN'S College of pharmacy.

2.HOD of department of Pharmacy Practice, Dr. MOOPEN'S College of pharmacy.

## ABSTRACT

With the introduction and spread of 2019 novel coronavirus (2019-nCoV), also known as the severe acute respiratory syndrome coronavirus 2, there is a new public health crisis that threatens the entire world (SARS-CoV-2). In December 2019, the virus spread from bats to humans via unidentified intermediary species in Wuhan, Hubei Province, China. The following. About 96,000 coronavirus disease cases have been reported in 2019 (COVID-2019), and 3300 deaths have been reported as of today (05/03/2020). The disease has an incubation period of 2 to 14 days and is spread through inhalation or contact with infectious droplets. Common symptoms include a fever, cough, sore throat, shortness of breath, exhaustion, and malaise. Most people have a moderate form of the disease; however, some persons (typically the elderly and those with concomitant conditions) may develop.

KEYWORDS: COVID 19, Coronavirus,

## INTRODUCTION

The novel SARS-CoV-2 coronavirus (CoV) is a previously undiscovered coronavirus (CoV). It causes severe acute respiratory syndrome. The coronavirus disease of 2019 is a dangerous, life-threatening illness that is caused by a beta-CoV of group 2B. (COVID-19). Over 96,000 cases of the coronavirus disease 2019 (COVID-19) and 3300 fatalities have been documented as of March 5, 2020. India has thus far documented 29

cases. Luckily, there have been no fatalities and rather infrequent effects on youngsters. But it's unclear how this virus may evolve in the future. An overview of this new virus is provided in this article.<sup>1</sup>

## HISTORY

In two instances over the past 20 years, human infection with animal beta corona viruses has led to serious illness. When a novel coronavirus of the genus and with origins in bats infected humans in 2002–2003, it did so through the intermediary host of Chinese Guangdong province palm civet cats. Before it was contained, the coronavirus, also known as the severe acute respiratory syndrome coronavirus, infected 8422 persons, predominantly in China and Hong Kong, and it resulted in 916 fatalities (mortality rate 11% of cases). In 2012, almost ten years later, the Middle East respiratory syndrome coronavirus (MERS-CoV), which is similarly of bat origin, appeared in Saudi Arabia using dromedary camels as the intermediate host. It infected 2494 individuals and killed 858 (a fatality rate of 34%).<sup>2</sup>

## ORIGIN OF COVID19

Adults in Wuhan, the provincial capital of Hubei and a significant Chinese transportation hub, began presenting to the local hospitals in December 2019 with severe pneumonia of unknown origin. The Huanan wholesale seafood market, which also dealt in live animals, was a source of exposure for many of the earliest cases. In order to conduct etiologic studies, the surveillance system was activated and patient respiratory samples were transmitted to reference labs. On China notified the United States of the epidemic. World Health Organization and the Huanan Province on January 1 the seafood market was shut. There was an exponential rise in the number of cases, some of which did not involve the live animal market, pointing to the possibility of human-to-human transmission. On January 11th, 2020, the first fatal case was reported. On January 20, 2020, the transmission to healthcare professionals providing patient care was described.

By January 23, Wuhan's 11 million residents were under lockdown, and there were limitations on who could enter and leave the area. Cases of COVID-19 outside of China were recorded in individuals who had no prior travel history to China, indicating that local human-to-human transmission was taking place in these nations. It soon became clear that the infection might spread from asymptomatic individuals as well as before the onset of symptoms. Because of this, nations like India, which flew their citizens out of Wuhan on special planes or received visitors from China, isolated everyone exhibiting symptoms for 14 days and tested them for the virus. India, which had only reported 3 cases up until February 3, 2020, has also experienced a significant increase of cases. 29 instances were reported as of 5/3/2020, with the majority occurring in Delhi, Jaipur, and Agra among Italian visitors and their contacts.<sup>3</sup>

## EPIDEMIOLOGY OF COVID 19

All ages are at risk. Large droplets produced by coughing and sneezing by symptomatic patients are used to spread the infection, although this can also happen from non-symptomatic individuals and even before the beginning of symptoms. There is no variation in viral burden between symptomatic and asymptomatic individuals, according to studies, between the nasal cavity and the throat. Individuals may still be contagious even after their symptoms have subsided. These diseased droplets can deposit on surfaces and propagate 1-2 metres. When climatic conditions are favourable, the virus can survive on surfaces for days, but ordinary disinfectants like sodium hypochlorite, hydrogen peroxide, etc. can kill it in under a minute. Infection is contracted either by inhaling these droplets or by touching objects that have been exposed to them before touching the mouth, nose, or eyes. Transplacental transfer from pregnant women to their foetuses has not been documented as of yet. Angiotensin receptor 2 (ACE2) is the receptor that the virus uses to enter the respiratory mucosa, according to studies.<sup>4</sup>

## PATHOGENESIS OF COVID 19

SARS-CoV-2 is composed of four main structural proteins: spike (S), envelope (E) glycoprotein, nucleocapsid (N), and membrane (M), as well as 16 non-structural proteins and 5-8 auxiliary proteins. It is structurally and phylogenetically identical to SARS-CoV and MERS-CoV. The surface spike (S) glycoprotein, which resembles a crown and is found on the exterior of the virion, is cleaved into two subunits: an amino (N)-terminal S1 subunit that aids in the incorporation of the virus into the host cell and a carboxyl (C)-terminal S2 subunit that mediates the fusion of the membranes of the virus and host cells.<sup>8</sup> The N-terminal domain (NTD), which enables viral entrance into the host cell and serves as a possible target for neutralisation in response to antisera or vaccinations, is further split into the S1 subunit. Since it serves as a binding site for the human ACE2 receptors, the RBD is a crucial peptide domain in the pathogenesis of infection. As was previously believed, inhibiting the renin-angiotensin-aldosterone system (RAAS) does not raise the risk of COVID-19 and severe disease-related hospitalisation. The SARS-CoV-2 spike or S protein (S1) binds to the many ACE2 receptors on respiratory epithelium, including type II alveolar epithelial cells, to allow SARS-CoV-2 access into the hosts' cells. The host transmembrane serine protease 2 primes the spike protein S2 subunit after the viral attachment process, which enables cell entrance and subsequent viral replication endocytosis with the formation of virions.<sup>5,6</sup>

## VARIANTS OF COVID19

As was already established, SARS-CoV-2 is prone to genetic evolution, leading to a variety of variations that might differ from its ancestral strains in some ways.

1. Alpha
2. Beta

3. Gamma
4. Delta
5. Omicron

#### 1) Alpha

On the basis of whole-genome sequencing of samples from patients who tested positive for SARS-CoV-2, a new SARS-CoV-2 variant of concern, B.1.1.7 lineage, also known as Alpha variant or GRY was discovered in the UK in late December 2020. This particular issue, which was based on numerous model estimates, was in the public domain in the UK as early as September 2020. It reportedly outperformed earlier SARS-CoV-2 variants in terms of transmissibility, emerging as the predominant SARS-CoV-2 variety in the UK. By the end of December 2020, the B.1.1.7 variant was recorded in the United State(US).

#### 2) Beta

Another SARS-CoV-2 form is B.1.351, often known as the Beta variant or GH501Y. The second wave of COVID-19 infections, caused by V2 with numerous spike mutations, was first discovered in South Africa in October 2020. According to reports, this variation has a lower ability to be neutralised by post-vaccination sera, convalescent sera, and monoclonal antibody treatment. It also has a higher risk of transmission.

#### 3) Gamma

The P.1 version, sometimes referred to as the Gamma variant or GR/501Y.V3, is the third variant of concern. It was discovered in Brazil in December 2020 and was first discovered in the US in January 2021. Importantly, this variation may be less neutralizable by post-vaccination sera, convalescent sera, and monoclonal antibody treatments.

#### 4) Delta

The fourth variety of concern, B.1.617.2, also known as the Delta variant, was discovered for the first time in India in December 2020 and was in charge of the deadly second wave of COVID-19 infections in India in April 2021. This variation was first discovered in the US in March 2021.

#### 5) Omicron

Following a rise in COVID-19 cases, South Africa reported the first case of the fifth variant of concern B.1.1.529, commonly known as the Omicron variant by the WHO, on November 23, 2021. Omicron was rapidly identified as a VOC as a result of more than 30 modifications to the virus' spike protein and the dramatic increase in cases seen in South Africa.<sup>7</sup>

## CLINICAL FEATURES

Asymptomatic state, acute respiratory distress syndrome, and multi-organ failure are only a few of the clinical characteristics of COVID-19. Fever (not always), coughing, sore throats, headaches, lethargy, headaches, myalgia, and shortness of breath are among the usual clinical symptoms. Furthermore,

conjunctivitis has been mentioned. As a result, they are similar to other respiratory illnesses. Acute lung injury, ARDS, shock, and acute renal injury were among the complications that were seen. Recovery began in the second or third week. The average length of stay in the hospital for those who recovered was 10 days. The elderly and those with underlying co-morbidities are more likely to experience negative results and death (50–75% of fatal cases). Adult hospitalised patients' fatality rates ranged from 4 to 11%. According to estimates, the entire case mortality rate lies between 2 and 3%.

It has also been noted that disease in neonates, babies, and children is substantially less severe than it is in adults. There were 14 boys and 20 girls among the 34 kids that were admitted to a hospital in Shenzhen, China, between January 19 and February 7. The illness was linked to a family member in 28 children, and 26 children had a history of visiting or living in the Chinese province of Hubei. The median age was 8 years and 11 months. Fever (50%) and cough (38) were the most prevalent symptoms. With symptomatic treatment, every patient made a full recovery, and nobody passed away. Moreover, one instance of a child with severe pneumonia and multiorgan failure has been documented. Similar to this, the reported neonatal instances have been minor.<sup>8</sup>

## DIAGNOSIS

Anyone with fever, sore throat, and cough who have been to China or other regions with persistent local transmission, or who have had contact with people who have the illness, are considered suspect cases. people with a comparable travel history or those whose COVID-19 is verified infection. Yet, some cases may not even show any symptoms. A confirmed case is one that has a successful molecular test. Specialized molecular tests on respiratory samples (throat swab, nasopharyngeal swab, sputum, endotracheal aspirates, and bronchoalveolar lavage) are used to make a particular diagnosis. Moreover, a virus may be found in the stool and, in serious situations, the blood. Also, there are currently no commercial tests available. The necessary sample must be forwarded to the National Institute of Virology in Pune or to recognised reference labs in India in a suspect case. Commercial testing will become accessible as the disease spreads.

Additional laboratory tests are typically not targeted. Typically, the white cell count is normal or low. Typically, the platelet count is normal or very slightly low. Procalcitonin levels are typically normal despite the fact that the CRP and ESR are typically increased. A co-infection with bacteria may be indicated by a high procalcitonin level. Although early sickness may leave the chest X-ray (CXR) normal, bilateral infiltrates are typically visible on it. The CT is more precise and sensitive. In fact, abnormal CT scans have been utilised to identify COVID-19 in cases when molecular testing was negative but the patient had other symptoms that suggested the disease.<sup>9</sup>

## DIFFERENTIAL DIAGNOSIS

The early stages of the disease have non-specific symptoms. A wide range of infectious and non-infectious (such as vasculitis, dermatomyositis) respiratory illnesses should be considered as part of the differential diagnosis.

- Adenovirus
- Influenza
- Human metapneumovirus (HmPV)
- Parainfluenza
- Respiratory syncytial virus (RSV)
- Rhinovirus (common cold)

Rapid antigen detection should be used in suspected cases, together with additional studies, to check for common respiratory pathogens and non-infectious disorders. Clinically or with standard lab tests, COVID-19 cannot be distinguished from these infections. So, travel history becomes vital. Yet as the disease spreads, your travel past won't matter anymore.<sup>4, 10</sup>

## TREATMENT

Early in the pandemic, there was a lack of knowledge about COVID-19 and its therapeutic care, which made it urgent to use experimental therapeutics and drug repurposing to lessen the severity of this novel viral infection. Since then, tremendous advancements have been made as a consequence of the tireless efforts of clinical researchers around the world. These advancements have improved our understanding of COVID-19 and its management as well as sped up the discovery of novel medicines and vaccines.

To stop the spread of the infection to other contacts, patients, and healthcare professionals, the first step is to provide sufficient isolation (described below). Manage mild illnesses at home with counselling on warning signs. The standard guidelines include keeping hydrated, eating well, and managing fever and cough. It may be necessary to use mechanical breathing or even extra corporeal membrane oxygen support. In some cases, renal replacement treatment may be necessary. Chinese guidelines do advise COVID-19 ARDS patients to receive short-term treatment with low-to-moderate dose corticosteroids. The WHO has released comprehensive critical care management guidelines for COVID-19. As of right now, COVID-19 has no approved treatments.

In the case series of 99 hospitalised COVID19 patients from Wuhan, 76% of the patients received oxygen, 13% received non-invasive ventilation, 4% received mechanical ventilation, 3% received extracorporeal membrane oxygenation (ECMO), 9% received continuous renal replacement therapy (CRRT), 71% received antibiotics, 15% received antifungals, glucocorticoids, and 27% received intravenous immunoglobulin therapy. Before these medications are suggested, further data are required. Arbidol, a Russian antiviral medicine, is one of the additional medications suggested therapy from COVID-19 patients who had

recovered, intravenous immunoglobulin, interferons, chloroquine, and China) Also, the Chinese manual includes suggestions for employing traditional Chinese herbs.<sup>5, 8</sup>

## PREVENTION

Prevention is essential because there are currently no approved therapies for this infection. Many characteristics of this virus make prevention challenging, including, non-specific aspects of the illness, infectivity during the incubation phase even before the onset of symptoms, transmission from asymptomatic individuals, prolonged illness duration, tropism for mucosal surfaces including the conjunctiva, and transmission even after clinical recovery.

It is recommended that confirmed or suspected cases of mild illness be isolated at home. To permit for virus eradication at home, there should be excellent ventilation and sunlight. Patients should be instructed to maintain good cough hygiene and use a basic surgical mask. When in the same room as the patient, carers should be instructed to wear a surgical mask and to wash their hands every 15-20 minutes.<sup>10</sup>

### Vaccination to prevent SARS-CoV-2 infection

The most important step in containing this worldwide pandemic is vaccination to prevent SARS-CoV-2 infection in communities around the world, in addition to the significance of enforcing public health and infection control measures to prevent or decrease the transmission of SARS-CoV-2. Clinical researchers from all around the world made extraordinary efforts during this pandemic, and as a result, innovative vaccines against SARS-CoV-2 have been developed at an unprecedented rate to manage this viral sickness that has destroyed communities all over the world. Immune system activation from vaccination results in the development of SARS-CoV-2 neutralising antibodies. There have already been more than 12 billion doses of vaccine given out, according to the WHO Coronavirus (COVID-19) dashboard.

- Serum institute of India: **COVOVAX**
- Novavax: **NUVAXOVID**
- Moderna: **SPIKEVAX**
- Pfizer: **COMIRANITY**
- CanSino: **CONVIDECIA**
- Johnson and Johnson: **JCOVDEN**
- Oxford/ AstraZeneca: **VAXZEVRIA**
- Serum institute of India: **COVISHEILD**
- Bharat Biotech: **COVAXIN**
- Sinopharm: **COVILO**
- Sinovac: **CORONAVAC**

People should be urged to stay away from busy areas and delay any unnecessary travel to areas where transmission is still occurring at the community level. Asking patients to wear surgical masks is appropriate if they have respiratory problems. WHO does not presently advise healthy individuals to wear masks in public settings because there is no evidence that doing so will protect against respiratory virus infections. Even though, it is against the law for anyone to wear masks in public in China, especially in crowded areas and during large events.<sup>11</sup>

## MYTH AND FACTS OF COVID 19

1. MYTH: As a result of increased testing, we are finding more COVID-19 positive cases.

FACT: Our community has observed an overall rise in the percentage of positive instances, even though more testing may result to more positive cases.

More testing does not fully account for these increases.

2. MYTH: A mask's primary function is to prevent me from spreading COVID-19.

FACT: A mask can protect the wearer by blocking some droplets and viruses. But most importantly, it prevents most droplets and viruses from entering. It is known as "source control" to do this and stop the infection at its origin.

3. MYTH: We do not need to be six feet apart if we are all wearing masks.

FACT: Masks and cloth face coverings are NOT a substitute for social withdrawal. You should always keep a distance of 6 feet between yourself and other people whenever you are outside your home.

4. MYTH: COVID-19 cannot be acquired by kids.

FACT: Children are less likely than adults to exhibit severe symptoms of disease, but anyone can contract an infection at any age, and some kids have had very severe symptoms. We also don't know what the infection's long-term health effects will be.

5. MYTH: I cannot transmit COVID-19 to others if I have the virus but have no symptoms.

FACT: If you have COVID-19 but don't have any symptoms, you can still spread the virus. Because of this, it's crucial that everyone, including those who don't feel sick, take precautions like wearing a mask or cloth face covering and keeping a social distance of six feet from people.<sup>12</sup>

## CONCLUSION

The economic, medical, and public health infrastructure in China as well as, to some extent, in other nations, particularly its neighbours, has been put to the test by this recent virus outbreak. How the virus will affect our life here in India will only become clear with time. Therefore, pandemic virus and disease outbreaks are expected to persist in the future. Consequently, in addition to containing current outbreak, efforts should be taken to develop comprehensive policies to stop outbreaks of pandemic origin in the future.



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