

## A REVIEW ON COVID 19: RESPONSIBLE FOR WORLDWIDE PANDEMIC

Deshpande M. M.\*, Khandge N. T. and Chavan M. J.

Department of Pharmaceutical Quality Assurance, Amrutvahini College of Pharmacy, Sangamner, M.S., India.

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\*Corresponding author: Deshpande M. M.

Department of Pharmaceutical Quality Assurance, Amrutvahini College of Pharmacy, Sangamner, M.S., India.

### ABSTRACT

This review aims to introduce the general information about the Coronaviruses and ongoing pandemic of Coronavirus Disease 2019. From the early 1960's the different Coronaviruses species was introduced in the human population that cause mild to moderate respiratory diseases. Coronaviruses are a large family of viruses named for their shape protruding spikes that look like a crown. It belongs to the family Coronaviridae and is enveloped with lipid bilayer. From the multiple copies of nucleocapsid (N) protein nucleocapsid is formed which is present inside the envelope. The first case of Novel Coronavirus was reported in Wuhan, Hubei province, China in December 2019 and it was declared the outbreak a public health emergency of International concern by the World Health Organization on 30 January 2020 and declared as pandemic on 11 March 2020. COVID-19 can cause flu-like symptoms that range from mild to severe including cough, fever, and shortness of breathing.

**KEYWORDS:** Coronaviruses, virus origin, protein structure, replication, pandemic.

### INTRODUCTION

Coronavirus word is derived from the Latin Corona, means "Crown", which determines the characteristics appearance of the virions (virus particles). They are a group of viruses that cause diseases in mammals and birds. In human livestock, birds, bat, mouse, and many other wild animals the coronaviruses can infect respiratory, gastrointestinal, hepatic, and central nervous system.<sup>[1-3]</sup> Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV) are the more severe diseases that are caused by Coronaviruses. A recently identified new strain in humans is named as Novel Coronavirus (nCoV).

### Discovery

Early in 1960s Coronaviruses were discovered.<sup>[4]</sup> The infectious bronchitis virus in chickens and two viruses from the nasal cavities of human patients having symptoms of common cold were the earliest known viruses that were eventually named as Human Coronavirus 229E and Human Coronavirus OC43.<sup>[5]</sup> The different Coronaviruses which have been identified since were SARS-CoV in 2003, HCoV NL63 in 2004, HKU1 in 2005, MERS-CoV in 2012, and SARS-CoV-2 in 2019.

### Coronaviruses diversity

The family of Coronavirus is Coronaviridae and comprises the subfamily Orthocoronavirinae in the order Nidovirales.<sup>[6,7]</sup> This taxon consists of 4 genera-

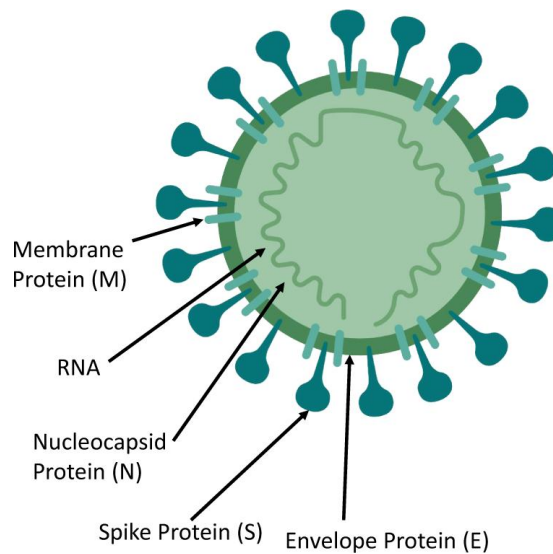
Alphacoronavirus, Betacoronavirus and Deltacoronavirus – on the premise of their process relationships and genomic structures. The Alphacoronaviruses and Betacoronaviruses infect only mammals. The Gammacoronaviruses and deltacoronaviruses infect birds, however a number of them also can infect mammals.<sup>[8]</sup> Alphacoronaviruses and betacoronaviruses usually cause respiratory disorders in humans and inflammatory disease in animals. The two extremely morbidic viruses, SARS-CoV and MERS-CoV, cause severe metabolic process syndrome in humans, and therefore the different four human coronaviruses (HCoV-NL63, HCoV-229E, HCoV-OC43 and HKU1) induce solely delicate higher metabolic process diseases in immunocompetent hosts, through a number of them can cause severe infections in infants, young, youngsters and aged individuals.<sup>[9-11]</sup> Alphacoronaviruses and betacoronaviruses will create a significant unwellness burden on livestock; these viruses embody porcine transmissible gastroenteritis virus, porcine enteric symptom virus (PED) and therefore the recently emerged artiodactyls mammal acute symptom syndrome coronavirus (SADS-CoV). On the basis of current sequence databases, all human Coronaviruses have animal origins: SARS-CoV, MERS-CoV, HCoV-NL63 and HCoV-229E are thought-about to possess originated in bats; HCoV-OC43 and HKU1 probably originated from rodents. Livestock may have important roles as intermediate hosts that change virus transmission

from natural hosts to humans. Additionally, domestic animals themselves will suffer unwellness causes by bat borne or closely connected Coronaviruses: genomic sequences extremely kind of like PEDV were detected in bats and SADS-CoV may be a recent issue from bats to pigs. Currently, seven of eleven ICTV- assigned Alphacoronavirus species and four of nine Betacoronavirus species were known solely in loopy. Thus, loopy are probably the main natural reservoirs of alphacoronaviruses and betacoronaviruses.<sup>[12]</sup>

### Structure

Coronaviruses are enveloped viruses with the positive sense single stranded RNA genome. The size of the

genome is the largest among known RNA viruses ranging from approximately 27 to 34 kilobases.<sup>[13]</sup> The single strand of positive- sense RNA ( $Mr\ 6 \times 10^6$ ) associated with the nucleoprotein are surrounded by the nucleocapsid protein. The major structural proteins which are encoded by coronavirus genome are spike (S) protein, nucleocapsid (N) protein, membrane (M) protein, and the envelope (E) protein which are involved in producing structurally complete viral particle. Each protein individually plays an important role in the structure of the virus particle and other aspects of the replication cycle.<sup>[14-16]</sup> Figure 1 shows the main structure of Coronaviruses.



**Fig. 1: Structure of Coronaviruses.**

### Replication

The virus particles are uncoated and its genome enters the cell cytoplasm after entering into the host cells. The coronavirus RNA genome features a 5' methylated cap and a 3' polyadenylated tail, which allows the RNA to connect to the host cell's ribosome for translation. RNA-dependent RNA polymerase (RdRp) is a protein which is also encoded by the coronavirus genomes. Using the host cell's machinery, the viral genome transcribed into new RNA copies. The first protein to be made is the RdRp. Translation is stopped by a stop codon once the gene encoding the RdRp is translated. This is called as a nested transcript. The term Monocistronic is referring when the mRNA transcript only encodes one gene. Non-structural proteins of coronavirus provide extra belief to replication, because they confer a proofreading function. When all of the proteins are attached, the genome is replicated and a long polyprotein is formed. A protease which is the non-structural protein having the ability to cleave the polyprotein. This process is a form of genetic economy which allows the viruses to encode the greatest number of genes in small number of nucleotides.<sup>[17,18]</sup>

### Why COVID-19 labelled as Pandemic?

On March 11, 2020 World Health Organization has officially declared that COVID-19, the disease caused by the new Corona virus is a pandemic. The Pandemic means when an epidemic goes global it's a whole new disease that we do not really have immunity to its crossing borders and continents. It is spreading quickly from person to person and infecting a large number of people and in many cases, it has a high death toll. The Coronavirus that was recently emerged from Wuhan China is known as 2019-nCoV which stands for 2019 Novel Coronavirus. It is the seventh Corona virus found to cause illness in humans and previous Corona viruses that have caused human epidemics include SARS and MERS viruses. The new Corona virus itself is a novel beta Corona virus and it is in group 2b.<sup>[19]</sup>

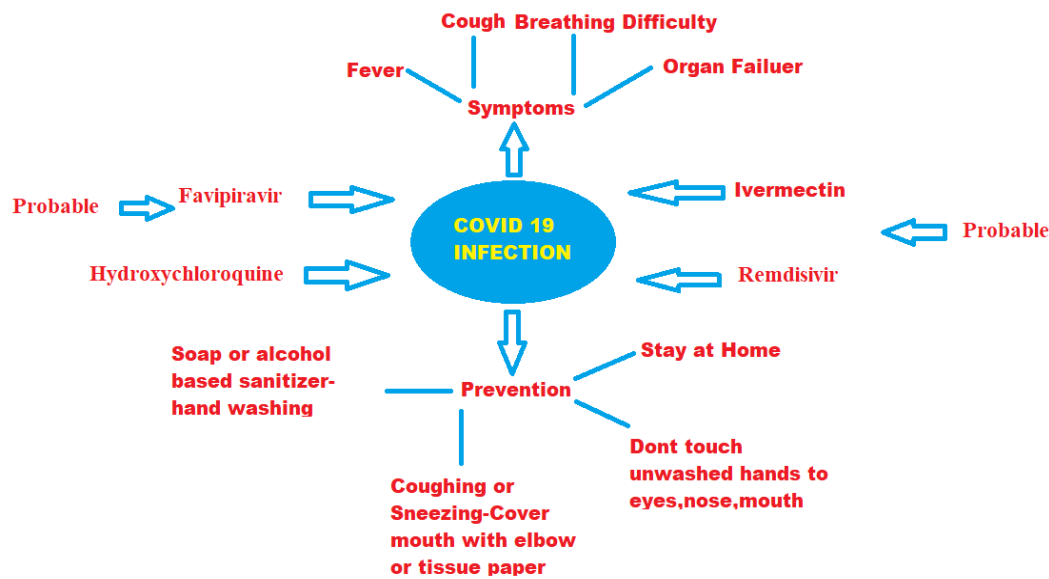


Fig. 2: COVID 19 infection, Symptoms, prevention and probable treatment.

### Origin of COVID-19

The origin of COVID-19 was started in Wuhan, Hubei China and Wuhan is a city of more than 11 million people, it is a relatively large city. It is the seventh largest city in China and the Hubei province is itself home to over 50 million people. In December 2019, they were deemed pneumonia of unknown cause. The first patients with this new coronavirus seem to have been hospitalized on December 16<sup>th</sup> 2019, so that was the first date we know of so far. But it is estimated that the initial infections started to occur even earlier than this probably as early as November 2019 and after multiple sporadic cases began to increase throughout Hubei, China in across China. This virus was reported to the WHO on 31<sup>st</sup> December 2019. It all begins or is thought to have begun in the Huanan seafood market. Huanan seafood market was initially the place where this was thought to have originated through cross species contamination or through transmission from a bat to a human because most of the initial patients with this virus worked or had visited this seafood market, so it's unsure of at this point whether this is the original source of the infection. Over time subsequent cases began to pop up and many of them involved healthcare workers that had been exposed to these patients and family members of patients and this all raised the possibility of human to human transmission.<sup>[20]</sup>

### What are the possible treatments for COVID-19?

The COVID-19 is a newly identified virus which has no specified treatment and there is no vaccine has been developed. Work is underway to develop antiviral medications to combat the illness. The Ivermectin is FDA approved drug for parasitic infection. In vitro study has been conducted and the results are really promising. It was found that single treatment able to affect 5000 folds reduction in virus at 48hrs. in cell culture or

decrease viral load by 99.99%.<sup>[21]</sup> The antiviral EIDD-2801 has shown the promising results in the test-tube experiments with human lung and airways. The EIDD-2801 is an oral drug and more efficient in blocking the COVID-19 than Remdesivir. The Remdesivir being tested against Novel Coronavirus in clinical trials that began in March.<sup>[22]</sup> The Favipiravir is an antiviral drug has been used in Japan to treat influenza. It was approved in March as an experimental treatment for Novel Coronavirus. In Wuhan and Shenzhen, the drug has been tested in 340 individuals.<sup>[23]</sup> The Hydroxychloroquine and Chloroquine are oral prescription drugs that have been used for the treatment of malaria and certain inflammatory conditions. The Chloroquine has been used for malaria treatment at chemo prophylaxis and the Hydroxychloroquine is used for treatment of rheumatoid arthritis, systemic lupus erythematosus and porphyria cutanea tarda. These antimaterial drugs are under investigation for the treatment of COVID-19.<sup>[24]</sup>

### Symptoms and prevention

The symptoms of the infection include fever, cough, and shortness of the breath and breathing difficulties. The organ failure can be occurred in severe cases. The antibiotics cannot be used to cure Coronaviral infection and also the antiviral drugs which are used against flu will not work. The patient recovery depends on its immunity strength. Many of those who have died were already in poor health.<sup>[25]</sup>

Following are the steps to reduce the infection

- Use soap or alcohol-based hand sanitizer for washing hands.
- While coughing or sneezing cover your mouth with your elbow or tissue

- Clean your hands before touching your eyes, nose and mouth.
- Stay at home if you are sick
- If you are sick do not share food, water, bedding and other household items.<sup>[26]</sup>

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