

A Review on COVID19: Evolution, Structure of Corona Virus and Comparison of COVID19 with Common FLU

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Abstract

Covid-19 is a pandemic disease that threatened the World both socially and economically. The virus originated from Wuhan – China in December 2019. Globally 18,354,342 cases were reported and total mortality cases are 6,96,147 till Aug 5 2020. The spreading of Novel Covid19 is faster than MARS and SARS Virus. The symptoms are very similar to the common cold or flu such as running nose sneezing, sore throat are the common symptoms and difficulty in breathing, severe muscle ache, dry cough GIT irregularity were the serious symptoms. The infection may leads to pneumonia, Acute Respiratory disorder (ARD) Syndrome. The incubation period varies from 7- 14 days. The transmission occurs through physical contact with infected person, infected droplets and contaminated objects. Laboratory test includes CT scan, Nasal Oral pharyngeal swab tests, RT PCR were employed for diagnosis. The disease at the end of August showed increasing mortality rate. Maintaining Physical distance is the only measure to overcome the infection.

Keywords: Corona Virus, Glycoprotein, Dyspnea, Myalgia, Hydrtoxchloroquine

Introduction

The Entire World is suffering from pandemic disease Covid19. Covid19 is caused by a group of viruses called Corona. The corona virus belongs to a large family of Coronaviridae and order 'Nido' virus. The name 'Corona' derived from Latin word 'Coronum' which means crown-like appearance on its external surface called spikes. The human corona virus was first seen in the year 1965 which was known to cause the common cold in humans. After several years the similar human and animal viruses were identified and named as corona virus for its crown-like appearance.

Evolution of Corona virus:- In 2002 Severe Acute Respiratory Syndrome (SARS) emerged in Southern China and escalated for 28 counties. ICTV (International Committee on Taxonomy of Viruses)

named the corona virus as SARS-CoV-2 the name was given because the virus is genetically related to the corona virus responsible for the SARS outbreak of 2003. The human infecting corona virus is SARS CoV-2 beta Corona Virus. The virus has capacity to adapt for new environment through mutation and recombination. Order Nidovirales consists of 4 genera namely Alpha Corona virus, Beta Corona virus, Gamma Corona virus and Delta corona virus. The Alpha and Beta Corona virus infects Mammals, Gamma infects Aves and Delta infects both Mammals and Aves. The infection of Corona virus is termed as Covid19 (earlier named as 2019 Novel Corona virus) by WHO on 11 February 2020. On early March 11 2020 WHO declared Covid-19 as a pandemic.

Structure of Coronavirus: A study from Spaan W, Cavanagh D, Horzinek MC revealed that Corona virus - virions are spherical to pleomorphic enveloped particles and measures about 125 nm. They have positive stranded RNA virus with 27-32 Kb. The envelope is studded with projecting glycoproteins, and surrounds a core consisting of matrix protein enclosed within which is a single strand of positive-sense RNA ($M_r 6 \times 10^6$) associated with nucleoprotein. The Glycoproteins are named as Envelope protein, Membrane protein and Spike protein. The surface glycoproteins aids the virus for attachment to the host cell and also carry the main antigenic epitopes, particularly the epitopes recognized by neutralizing antibodies. OC43 also possesses a haemagglutinin.(10). The Membrane protein and Envelope proteins are involved in assembly of virus while spike protein mediates the entry of virus into host body.(4)

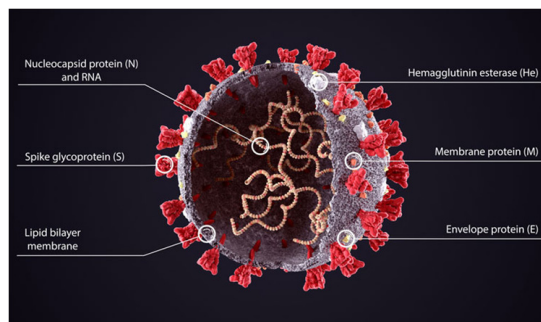


Figure 1: Structure of Corona Virus

Source: <https://www.theweek.in/news/health/2020/06/30/xrays-size-up-coronavirus-structure-at-room-temperature.html>

Transmission: The first Covid case was identified in Hunan seafood market of Wuhan China. It was pre assumed that the infection was from bat to humans but the study revealed that there was no transmission of virus from bat to human.

Spreading mechanism: Primarily the transmission of virus occurs through Respiratory droplets of infected persons from coughing or sneezing. It can also be transmitted through direct or close contact with infected person secretions like saliva, nasal droplets and respiratory droplets. Transmission may also occur through fomites in the immediate environment around the infected person. Airborne transmission can also occur in health workers during medical procedures that generate (1).

Receptor recognition: The entry of Corona viruses into the host cell is mediated by Spike proteins. The Corona spike consists of 3 segments namely ectodomain, transmembrane anchor and intracellular tail. The ectodomain has receptor binding S1 subunit and membrane fusion S1 contains C Terminal Domain(S1-CTD), N terminal Domain(S1-NTD) The Spike C Terminal Domain(CTD`s) recognises the ACE2 (Angiotensin Converting Enzyme) of the host epithelial cells. The S1 CTD`s, S NTD`s are grouped into RBD (Receptor binding Domain). (5).

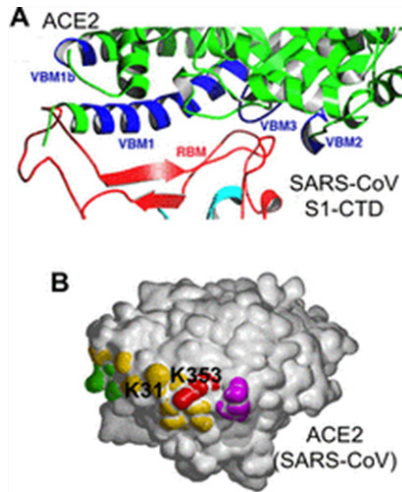


Figure 2: Spike Domains of Corona Virus

Image Source: <https://pubmed.ncbi.nlm.nih.gov/25428871/#&gid=article-figures&pid=fig-3-uid-2>

Replication of viral particles: According to Anthony R. Fehr and Stanley Perlman, the Viral RNA synthesis follows the translation and assembly of the viral replicase complexes. Viral RNA synthesises and produces both genomic and sub-genomic RNAs. Sub-genomic RNAs serve as mRNAs for the structural and accessory genes which reside downstream of the replicase polyproteins. All positive-sense sub-genomic RNAs are 3' co-terminal with the full-length viral genome and thus form a set of nested RNAs, a distinctive property of the order Nidovirales. Both genomic and sub-genomic RNAs are produced through negative-strand intermediates.(6)

After replication the Spike, Envelope and Membrane translated and continues to assembling. After assembling the viral particles - virions get transported to cell surface by exocytosis.

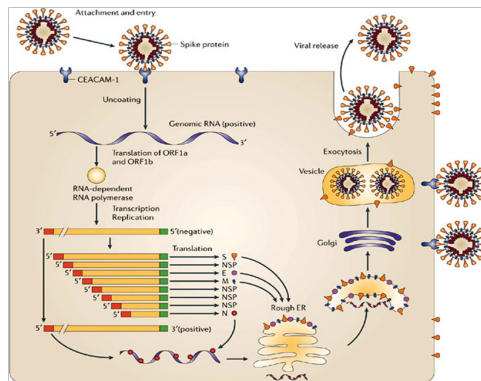


Figure 3: Replication of Viral Particle in Host Body

Source: <https://www.sinobiological.com/research/virus/coronavirus-replication>

Symptoms of Covid19: The infection of covid-19 shows primary or common symptoms like fever, Sore throat, runny nose, dry cough, headache, dizziness, nausea, GIT problems, The secondary symptoms are similar to SARS-CoV2, like Shortness of breath /dyspnea (3), Muscular pain (myalgia), Chest pain and fatigue. Approximately 75% of patient develops bilateral pneumonia. (7).

The Covid-19 and Influenza exhibits similar symptoms both causes respiratory illness. But the Covid 19 shows mild from asymptomatic and leads to serious illness and can be fatal. The difference between these infections is how they spread.

Table 1 Comparison of Covid19 Symptoms with Common flu

Symptoms	Corona	Common cold/ flu
Fever	Yes	Yes
Cough	Yes	Yes
Sore throat	Yes	Yes
Respiratory disorder	Yes	Yes (Caused due to Influenza Virus)
Fever	Yes	Yes
Fatigue/ Tiredness	Yes	Yes
Runny Nose	Yes	Yes
Muscle ache/ body Ache	Yes	Yes
According to Centre for Disease Control and Prevention (CDC) Flu virus causes mild illness But Corona causes mild illness which leads to severe illness and results in loss of Smell and Taste.		

Diagnosis: The Swab test, naso-oropharyngeal samples, Serological test are preliminary tests. The etiological diagnosis of Covid19 is RT-PCR (Reverse Transcriptase Polymerase Chain Reaction) Assay and also an Antigen-Antibody based test also conducted. (11)

Incubation Period: The medical incubation period for Covid19 is about 5 to 11 days similar to SARS. (7)

Treatment: Till now there are no vaccines and antiviral drugs available for treating covid19. The treatment is symptomatic and oxygen treatment against respiratory impairment, Non Invasive (NIV) and invasive Mechanical Ventilation (MIV) for Oxygen therapy (2). Antiviral drugs like Lopinavir/Ritonavir, anti-flu drugs such as Oseltamivir, Favipiravir, Immuno-modulatory drugs like Chloroquine, Hydroxychloroquine, Serotherapy (Obtained antibodies from healed individual), Anticoagulant (to prevent venous thromboembolism), corticosteroids [treat pneumonia and Acute Respiratory Distress Syndrome(ARDS)].(8)

Table 2 Several Drugs Administered to Common Cold and Flu Shows the Similar Symptoms of Covid19

Sl. No	Generic name of the drug	Side effects Which is Similar to Covid 19
1	Amantadine hydrochloride (Antiflu medicine)	Nausea, dizziness (light headedness), and insomnia
2	Azithromycin	Nausea, Diarrhoea, Headache, Tiredness, Decreased Smell and Taste
3	Diphenhydramine (As discongestants)	Drowsiness, fatigue, tiredness, headache, dry mouth/nose/throat, dizziness
4	Fluticasone propionate (For runny Nose)	Sore throat, cough, sinus pain, dry mouth/nose/throat

5	Dextromethorphan Hydrobromide (To reduce cough)	Drowsiness, dizziness, nausea, vomiting, dry mouth, confusion
6	Doxycycline moxinohydrate (To treat Bacterial Infections)	Chest pain, irregular heart rhythm, feeling short of breath
Data obtained from https://tinyurl.com/y5rvrjgj and https://www.rxlist.com/drugs/alpha_a.htm		

Hence administering the antibiotics for common cold and flu mimics the symptoms of Covid19. The stress/ anxiety causes the Chest pain which results in rapid heartbeat may induce the Shortness of breath which is a most serious symptom of Covid19.(1)

Psychological support increases the immunity. According to Jennifer N. Morey et al.,(9) the individuals exposed to chronic can exhibit immune dysregulation.

Prevention

General awareness is the main factor to overcome the infection. Using masks and sanitizers, maintaining the social distance, avoiding the risky behaviour like visiting to covid hotspots or containment zones that increase the risk of infections. Most of the infection is reporting in Health care workers, to overcome these personal protective equipments like N95 masks, goggles and protective units should be provided. Care should be taken while drawing the swab sample for testing. Patients should be isolated for at least a week or till the appearance of negative results. At community level people should avoid crowds, gathering should be prohibited. Maintenance of hygiene, travelling should be avoided. Psychological and moral support with the patients affects the immune system.

Conclusion

Covid19 is a pandemic disease declared by WHO. It is a deadly respiratory illness that emerged from SARS CoV2. The infection is more common with the persons who were immunologically weak. The majority of cases were between the ages of 25- 64 years. The mortality rates are increasing day by day. The virus outbreak challenges the World Economy. The Environmental pollution has been decreased due to Lockdown instance. Increasing the mental health of the patients decreases immunity dysregulation. It is better to maintain physical distance than the social distance.

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