A REVIEW ON NOVEL CORONAVIRUS DISEASE 2019

1. INTRODUCTION:

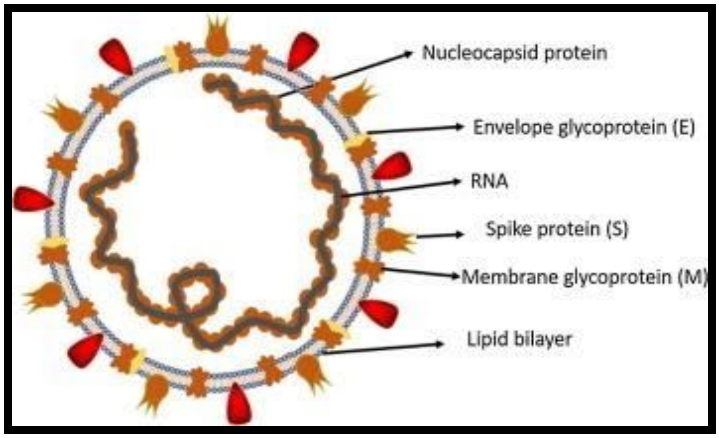

Fig.1. Structure of respiratory syndrome causing human coronavirus. .[3]

The coronavirus disease 2019 (COVID-19) outbreak caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which started in late 2019, has now become a worldwide disaster (Wu and McGoogan, 2020). Since then, the virus has spread to nearly every country, leading the World Health Organization (WHO) to declare a pandemic.

The new coronavirus has been responsible for millions of infections globally, causing hundreds of thousands of deaths.It is an infectious respiratory disease that shares the same routes and means of transmission as influenza. It has become a worldwide health concern. It represents the causative agent of a potentially fatal disease that is of great global public health concern. These viruses can also affect the gut.

Over the past 80 years, scientists have found that these viruses can infect mice, rats, dogs, cats, turkeys, horses, pigs, and cattle. Sometimes, these animals transmit the viruses to humans.

Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.

The best way to prevent and slow down transmission is be well informed about the COVID-19 virus, the disease it causes and how it spreads. Protect yourself and others from infection by washing your hands or using an alcohol based rub frequently and not touching your face.

Scientists and researchers are constantly tracking COVID-19 infections and recoveries. But they don't have information about the outcome of every infection. Early estimates predict that the overall and COVID 19 recovery rate will be between 97% and 99.75%.[1,2,9]

2. EPIDEMIOLOGY AND PATHOGENESIS:

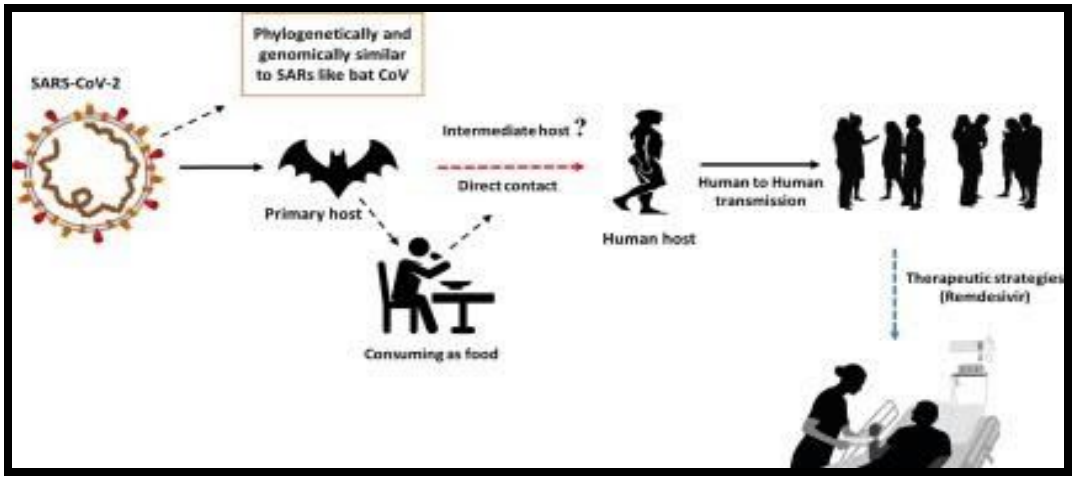

Fig.2. Epidemiology and pathogenesis of covid19.[3]

On Dec 31, 2019, the government of Hubei Province, China, first reported a group of confused patients with pneumonia (The Central Government of the People's Republic of China, 2020). Metagenomics sequencing analysis revealed a novel coronavirus, which was officially named SARS-CoV-2 and is the cause of the disease called COVID-19 (World Health Organization, 2020)

Based on the large number of infected people that were exposed to the wet animal market in Wuhan City, China, it is suggested that this is likely the zoonotic origin of COVID-19.

The present data strongly suggest that game animals or mammals were probably intermediate hosts of SARS-CoV-2 that originated from the Chinese horseshoe bat (Zhou et al., 2020; Lu et

al., 2020). The World Health Organization has declared it a Public Health Emergency of International Concern.

The main pathogenesis of COVID-19 infection as a respiratory system targeting virus was severe pneumonia, RNAaemia, combined with the incidence of ground-glass opacities, and acute cardiac injury. Significantly high blood levels of cytokines and chemokines were noted in patients with COVID-19 infection that included IL1-β, IL1RA, IL7, IL8, IL9, IL10, basic FGF2, GCSF, GMCSF, IFNγ, IP10, MCP1, MIP1α, MIP1β, PDGFB, TNFα, and VEGFA. Some of the severe cases that were admitted to the intensive care unit showed high levels of pro-inflammatory cytokines including IL2, IL7, IL10, GCSF, IP10, MCP1, MIP1α, and TNFα that are reasoned to promote disease severity.[2,3]

3. CORONAVIRUS TRANSMISSION:

SARS-CoV-2, the virus, mainly spreads from person to person.

Person-to-person transmission of COVID-19 infection led to the isolation of patients that were subsequently administered a variety of treatments. Extensive measures to reduce person-to-person transmission of COVID-19 have been implemented to control the current outbreak.

Most of the time, it spreads when a sick person coughs or sneezes. They can spray droplets as far as 6 feet away. If you breathe them in or swallow them, the virus can get into your body. Some people who have the virus don't have symptoms, but they can still spread the virus.

You can also get the virus from touching a surface or object the virus is on, then touching your mouth, nose, or possibly your eyes. Most viruses can live for several hours on a surface that they land on.

A study shows that SARS-CoV-2 can last for several hours on various types of surfaces:

- Copper: 4 hours
- Cardboard: up to 24 hours
- Plastic or stainless steel: 2 to 3 days

COVID-19 has been proven to be transmitted through the respiratory tract, digestive system, and mucosal surfaces (such as the conjunctiva)

Nosocomial infections in healthcare facilities also occur and highlight the significance of effective infection control. The virus has preferential tropism to human airway epithelial cells through the same cellular receptor as that for SARS, angiotensin-converting enzyme 2 (ACE2),

which is a central body receptor for the surface glycoprotein S of the virus (Munster et al., 2020).[3,4]

4. DIAGNOSIS:

The way to ascertain disease depends on positive real-time reverse transcription-polymerase chain reaction (rRT-PCR) results for SARS-CoV-2 nucleic acid. The associated mortality rates are 2- 3% (World Health Organization, 2020b; Chen et al., 2020).[4]

5. MECHANISM OF ACTION OF COVID 19:

All coronaviruses contain specific genes in ORF1 downstream regions that encode proteins for viral replication, nucleocapsid and spikes formation. The glycoprotein spikes on the outer surface of coronaviruses are responsible for the attachment and entry of the virus to host cells (Fig.1.).

The receptor-binding domain (RBD) is loosely attached among virus, therefore, the virus may infect multiple hosts. Other coronaviruses mostly recognize aminopeptidases or carbohydrates as a key receptor for entry to human cells while SARS-CoV and MERS-CoV recognize exopeptidases.

The entry mechanism of a coronavirus depends upon cellular proteases which include, human airway trypsin-like protease (HAT), cathepsins and transmembrane protease serine 2 (TMPRSS2) that split the spike protein and establish further penetration changes.

MERS-coronavirus employs dipeptidyl peptidase 4 (DPP4), while HCoV-NL63 and SARS-coronavirus require angiotensin-converting enzyme 2 (ACE2) as a key receptor.

SARS-CoV-2 possesses the typical coronavirus structure with spike protein and also expressed other polyproteins, nucleoproteins, and membrane proteins, such as RNA polymerase, 3-chymotrypsin-like protease, papain-like protease, helicase, glycoprotein, and accessory proteins. The spike protein of SARS-CoV-2 contains a 3-D structure in the RBD region to maintain the van der Waals forces. The 394 glutamine residue in the RBD region of SARS-CoV-2 is recognized by the critical lysine 31 residue on the human ACE2 receptor. The entire mechanism of pathogenicity of SARS-CoV-2, from attachment to replication is well mentioned in Fig. 3[3].

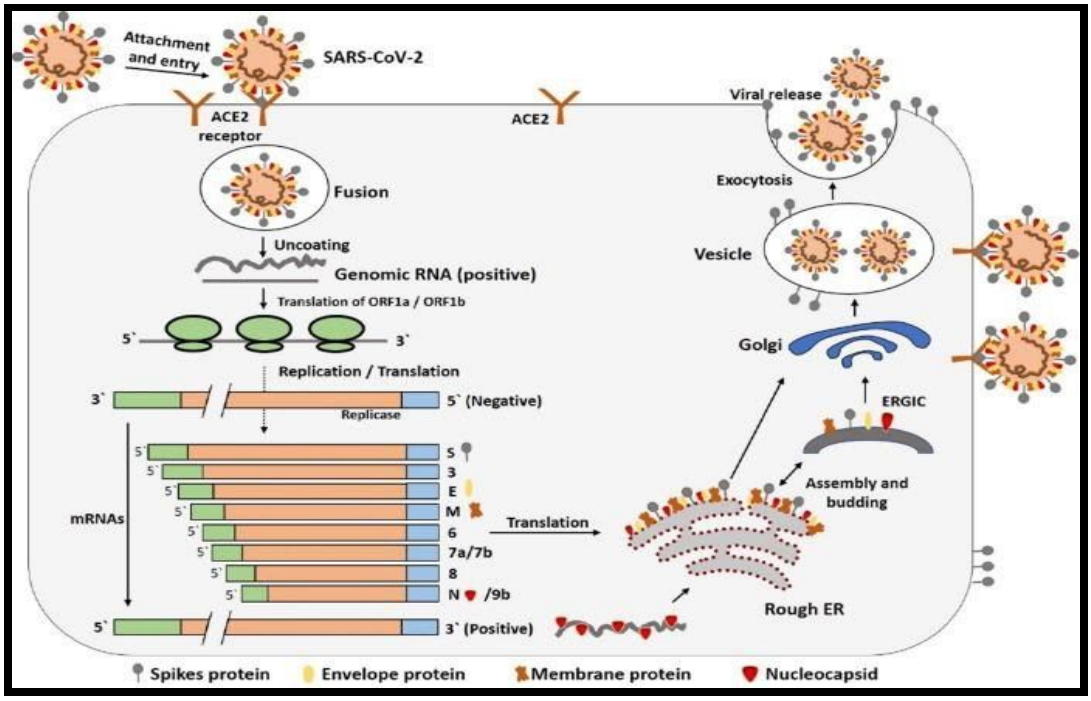

Fig. 3. The life cycle of SARS-CoV-2 in host cells; begins its life cycle when S protein binds to the cellular receptor ACE2. After receptor binding, the conformation change in the S protein facilitates viral envelope fusion with the cell membrane through the endosomal pathway. Then SARS-CoV-2 releases RNA into the host cell. Genome RNA is translated into viral replicase polyproteins pp1a and 1ab, which are then cleaved into small products by viral proteinases. The polymerase produces a series of subgenomic mRNAs by discontinuous transcription and finally translated into relevant viral proteins. Viral proteins and genome RNA are subsequently assembled into virions in the ER and Golgi and then transported via vesicles and released out of the cell.[3]

ACE2, angiotensin-converting enzyme 2; ER, endoplasmic reticulum; ERGIC, ER–Golgi intermediate compartment

6. SYMPTOMS:

Most infected people will develop mild to moderate illness and recover without hospitalization.

Most common symptoms:

- Fever.
- Dry cough.

- Tiredness.

Less common symptoms:

- Aches and pains.
- Sore throat.
- Diarrhea.
- Conjunctivitis.
- Headache.
- Loss of taste or smell.
- A rash on skin, or discoloration of fingers or toes.

Serious symptoms:

- Difficulty breathing or shortness of breath.
- Chest pain or pressure.
- Loss of speech or movement.

On 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 day.[6]

7. Coronavirus Risk Factors:

Anyone can get COVID-19, and most infections are mild. The older you are, the higher your risk of severe illness.

- people aged 65 years or older
- people living in nursing homes or care facilities
- people of any age who have serious underlying medical conditions, including ,severe obesity, a compromised immune system, or diabetes Chronic kidney disease Chronic obstructive pulmonary disease (COPD) Serious heart conditions such as heart failure or coronary artery disease Sickle cell disease

Conditions that could lead to severe COVID-19 illness include:

- Moderate to severe asthma
- Diseases that affect your blood vessels and blood flow to your brain
- Cystic fibrosis
- High blood pressure

- A weakened immune system because of a blood or bone marrow transplant, HIV, or medications like corticosteroids
- Dementia
- Liver disease
- Pregnancy
- Damaged or scarred lung tissue (pulmonary fibrosis)
- Smoking
- Thalassemia
- Type 1 diabetes[4]

8. PREVENTIVE MEASURES:

To prevent infection and to slow transmission of COVID-19, do the following:

- Wash your hands regularly with soap and water, or clean them with alcohol-based hand rub.
- Maintain at least 1 meter distance between you and people coughing or sneezing.
- Avoid touching your face.
- Cover your mouth and nose when coughing or sneezing.
- Stay home if you feel unwell.
- Refrain from smoking and other activities that weaken the lungs.
- Practice physical distancing by avoiding unnecessary travel and staying away from large groups of people. [6]

FOOD SAFETY:

While preparing food for yourself and others, it is important to follow good food hygiene practices to avoid foodborne diseases. The key principles of good food hygiene include:

1. keep your hands, kitchen and utensils clean
2. separate raw and cooked food, especially raw meat and fresh produce
3. cook your food thoroughly
4. keep your food at safe temperatures, either below 5 °C or above 60 °C; and
5. use safe water and raw material.[5]

9. TREATMENT:

DIET FOR PATIENTS SUFFERING FROM COVID19:

People who eat a well-balanced diet tend to be healthier with stronger immune systems and lower risk of chronic illnesses and infectious diseases. So you should eat a variety of fresh and unprocessed foods every day to get the vitamins, minerals, dietary fiber, protein and antioxidants your body needs. Drink enough water. Avoid sugar, fat and salt to significantly lower your risk of overweight, obesity, heart disease, stroke, diabetes and certain types of cancer.[5]

VACCINE FOR COVID 19:

Most importantly, human coronaviruses targeting vaccines and antiviral drugs should be designed that could be used against the current as well as future epidemics. There are many companies working for the development of effective SARS-CoV-2 vaccines, such as Bharat Biotech International limited, Serum Institute of India, Mynvax etc However, there are several ongoing clinical trials of both western and traditional medicines. [3,7]

10. CONCLUSION

COVID-19 is transmitted primarily through respiratory droplets or contact with contaminated surfaces. It is an infectious respiratory disease that shares the same routes and means of transmission as influenza. It has become a worldwide health concern. It represents the causative agent of a potentially fatal disease that is of great global public health concern.

The best way to prevent and slow down transmission is be well informed about the COVID-19 virus, the disease it causes and how it spreads. Protect yourself and others from infection by washing your hands or using an alcohol based rub frequently and not touching your face. However, there are several ongoing clinical trials of both western and traditional medicines. But challenges remain.

11. REFERENCES:

1. **Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease (COVID-19) during the early outbreak period: a scoping review Sasmita Poudel Adhikari, Sha Meng, Yu-Ju Wu, Yu-Ping Mao, Rui-Xue Ye, Qing-Zhi Wang, Chang Sun, Sean Sylvia, Scott Rozelle, Hein Raat & Huan Zhou Published: 17 March 2020 *Infectious Diseases of Poverty*** volume 9**, Article number: 29 (2020)**

2. **The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak** Hussin A.Rothan[a]Siddappa N.Byraredd 2020 May;109:102433.

3. **COVID-19 infection: Origin, transmission, and characteristics of human coronaviruses** MuhammadAdnanShereen[ab1]SulimanKhan[a1]AbeerKazmi[c]NadiaBashir[a]RabeeaSiddique[a]**Journal of Advanced Research** Volume 24, July 2020, Pages 91-98
4. https://www.medicalnewstoday.com/articles/256521#covid-19
5. http://www.emro.who.int/nutrition/
6. https://www.who.int/health-topics/coronavirus
7. https://pubmed.ncbi.nlm.nih.gov/32113704/