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CORONA VIRUS DISEASE-2019 (COVID-19) AND ITS PREVENTION: A REVIEW

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ABSTRACT

A Corona virus is a common large family of virus that causes an infection in human respiratory tract such as nose, sinuses upper throat and lungs. It causes the infection ranging from common cold to severe illness (MERS and SARS). COVID- 19 (Corona Virus Disease-2019) is an acute infectious respiratory disease caused by a newly discovered corona virus (SARS-COV-2) is a highly spreadable disease. The World Health Organization (WHO) has stated the current epidemic to be a global public health emergency. Presently, the research on SARS-CoV-2 is in its initial phases. Based on recent available evidence, this review of COVID-19 analytically summarizes the pathogenesis, clinical features, diagnosis, transmission and prevention of COVID-19. We hope that this review will give the guidance to the public and health care peoples to identify and deal with SARS-CoV-2 disease and also it might be provide a reference for carry out the future studies and research on COVID-19.

KEYWORDS

COVID-19, Pathogenesis, Corona, Transmission, Sinuses and Respiratory.

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INTRODUCTON

Coronaviruses are a group of RNA viruses that cause diseases in humans, animals and birds. In humans, these viruses affect the respiratory tract and cause infections that can range from mild to serious breathing problems and also it may leads to fatal¹. Mild infections include common cold (it is also caused by other viruses, mainly rhinoviruses), but further lethal differences can caused by SARS, MERS and COVID-19 infections. Coronaviruses are found in the subfamily Orthocoronavirinae, in the family Coronaviridae, order Nidovirales and realm Ribavirin. They are enclosed viruses with a positive-sense single-stranded RNA genome and a nucleocapsid of helical symmetry².

The novel coronavirus Disease-2019 (COVID-19) or the severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) as it is now a day's named, is quickly spreading disease from person to person and it was originated in Wuhan City of Hubei Province of China to the rest of the world including India³. Till 04/06/2020 around 62 lakhs cases of coronavirus disease 2019 (COVID-19) and nearly 3 lakhs deaths have been reported across the world⁴. India has reported around 2 lakhs cases till date. Auspiciously so far, children have been infrequently affected with no deaths and mostly affected by travelers and preexisting health problem and old peoples. However the future progression of this corona virus is unidentified. This review article gives eye opening information about this new corona virus based on the information gathered from the various sources. Subsequently data about this virus is quickly changing; readers are advised to update themselves regularly on day to day. (<https://www.worldometers.info/coronavirus>).

STRUCTURE OF CORONA VIRUS

Figure No.1: Source of this picture from (Wikipedia, the free encyclopedia), Illustrated of the morphology of coronaviruses; the club-shaped viral spike peplomers (red color) generate the look of a corona surrounding the vision when seen with an electron microscope.

Coronaviruses are large, roughly spherical in shape and the particles with bulbous surface of the projections. The average diameter of the coronavirus particles is around 125nm in size. The diameter of the envelope is 85nm and the spikes are 20nm lengthly. On average a coronavirus particle has 74 surface spikes in that structure⁵.

TAXONOMY OF CORONA VIRUS

The name of the "coronavirus" is resulting from Latin corona, meaning "crown" or "wreath", itself a copying from Greek κορώνηkorōnē, "garland and wreath". The name was developed by June Almeida and David Tyrrell who first detected and studied human coronaviruses (Wikipedia, the free encyclopedia).

The word of corona was first used in print in 1968 by an informal group of virologists in the journal Nature to label the new family of viruses. The

characteristic appearance of virions (the infective form of the corona virus) are detected by electron microscopy⁶, which have a fringe of large, bulbous surface projections making an appearance is significant of the solar type of corona virus⁷. The morphology of the corona virus is shaped by the viral spike peplomers, which are proteins on the surface of the coronavirus⁸.

PATHOGENESIS

The leading pathogenesis of COVID-19 infection affect a respiratory system cause mild common cold to severe illness such as pneumonia, RNAemia, joint with the incidence of ground-glass opacities and acute cardiac problem⁹. Inflammatory mediators of Cytokines and chemokines were increase significantly in blood levels in patient with corona (COVID-19) contamination that included IL1-β, IL1RA, IL7, IL8, IL9, IL10, basic FGF2, GCSF, GMCSF, IFNγ, IP10, MCP1, MIP1α, MIP1β, PDGFB, TNFα and VEGFA. Approximately of the severe cases blood showed a high level of pro-inflammatory cytokines including IL2, IL7, IL10, GCSF, IP10, MCP1, MIP1α and TNFα that are evident to stimulate the disease as severity condition and care the patients in ICU⁹.

Patients those who infected with COVID-19 the blood level show a higher leukocyte numbers (WBC), abnormal respiratory findings such as difficult to breath and increased levels of plasma pro-inflammatory cytokines with a cough, coarse breathing sounds of both lungs and a body temperature rise up to 39.0°C. The patient's sputum showed positive real-time polymerase chain reaction results that confirmed COVID-19 infection¹⁰.

MODE OF TRANSMISSION

The mode of transmission of coronaviruses (assumed reservoirs of SARS-CoV-2 are red surrounded); only a and b coronaviruses have the capability to infect humans, the eating of infected animal as a source of food is the main cause of animal to human transmission of the COVID 19 virus and also a close contact with an infected person, exposure with droplets from the infected person the virus is further transmitted to healthy persons. In the above picture dotted black arrow

shows the opportunity of viral transfer from bat whereas the dense black arrow represents the definite transfer of virus to human¹¹.

Founded on the huge number of infected peoples were exposed to the wet animal market in Wuhan City where live animals are regularly sold, it is proposed that this is the likely zoonotic cause of the COVID-19. Person-to-person transmission occurs mainly via direct contact or through droplets spread by coughing or sneezing from an infected individual and close contact with someone sick like hugging or shaking hands. But it can also be left on the objects and surfaces such as doorknob, laptop and mouse, lift buttons, TV remote, pen and other digital devices. So if you touch something contaminated and then touch your face or another's face, might be transmit to all. Significantly, the arrangement of the receptor-binding domain of COVID-19 spikes is similar to that of SARS-CoV-2. This information strongly suggested that the corona virus entry into the host cells is most likely via the ACE2 receptor¹².

SIGN AND SYMPTOMS

The most common symptoms at onset of COVID-19 illness are fever, cough and fatigue, difficult to breathing, sore throat, sputum production, headache, hemoptysis, diarrhoea, dyspnoea and lymphopenia¹³.

DIAGNOSIS

(<https://www.goodrx.com/blog/coronavirus-covid-19-testing-updates-methods-cost-availability>)

Currently there are two main types of tests available for coronavirus (COVID-19).

Molecular testing method.

Serological testing method (antibody).

The FDA has officially authorized over 30 manufacturers to make molecular tests and over 10 manufacturers have been authorized to distribute serological tests.

What's the science behind it?

In a patient with a COVID-19 infection, genetic material from SARS-CoV-2, the virus that causes COVID-19, is generally detectable in upper and lower respiratory specimens. In acute respiratory infections, molecular tests are routinely used to detect the presence of viral genetic material in a sample. The specific technique that's used is called

reverse transcription polymerase chain reaction, or RT-PCR, where genetic material from a sample is copied and then compared to the genetic sequence of the virus you're trying to detect.

SWAB TESTS FOR CORONAVIRUS

Molecular level test

This test can be done by implanting a 6-inch lengthy swab into the back of the nasal way through single nostril and spinning the swab for 10-15 seconds and this procedure is continual through the other side nostril. After that swab is introduced into a container and allow it lab for testing.

Nasal aspirates test

Materials Needed

1. N95 respirators for the healthcare worker and assistant(s)
2. Disposable gloves is used
3. Goggles, if available
4. Nasopharyngeal tube (connects to the sputum trap)
5. Suction machine is needed.
6. Sputum traps (mucous extractor) labeled with the patient information
7. Pulse oximetry machine, if available
8. Sterile sputum collection container is used
9. Completed laboratory request forms with patient information.

Preparations

1. Set up in advance of time to reduce the anxiety to child and caregiver.
2. Fill out laboratory request form(s).
3. Child coughs up sputum samples are collect in to the sputum bottle during the procedure.
4. Keep a suction catheter (e.g., Yank Auer) nearby in case of vomiting.
5. Follow the position of the child in upright or semi-upright position and hold infants supine or feeding position.
6. Keep the stand position or sitting position the child when you perform the equipment used for the test.

After the nasopharyngeal aspirate procedure

Monitor the child for several minutes after the procedure. If pulse oximetry is below base line or there are signs of respiratory distress, give oxygen and suction excess sputum from the airway. Educate caregiver that coughing may be more

frequent within 24 hours after the procedure. Ensure all samples are correctly labeled and the lab forms are fully completed. Transferring of specimens from the sputum trap to separate containers should only be done by lab personnel under a biosafety cabinet. Keep samples out of direct sunlight.

(https://childhoodtb.theunion.org/system/resources/attachments/000/000/031/original/SW7_FINAL_NP_A_Job_Aid.pdf?1493736400).

Other diagnosis Tests

- Depending on the results, doctor might ask to take other tests.
- X-ray or CT scan is advisable for examine signs and symptom lung condition.
- Pulmonary function test is advisable to examine the working condition of lungs.

Prevention and control

At present no vaccines or antiviral drugs are available to inhibit or eradication of human coronavirus (COVID-19) cause infections.

But the following the (WHO guidelines and ICMR Guidelines) ways we can reduce the risk of COVID 19 infection.

- ❖ Clean your hands frequently through soap or hand wash.
- ❖ Cough or sneeze in your determined elbow but not your hands.
- ❖ Do not touching your nose, eyes and mouth frequently.
- ❖ Reduce your social get-togethers and time spent in crowd places.
- ❖ Avoid adjacent contact with sick peoples.
- ❖ Maintain self-hygienic and sanitize frequently touched things and surfaces.
- ❖ Wear the face mask while going out.
- ❖ Do not deals with any kindmess.
- ❖ Choose vegetarian food.
- ❖ Do not take needless travel trips.
- ❖ Avoid need less gatherings all the time keep in mind maintain social distancing.
- ❖ Clean your hands and legs when you come home outside.
- ❖ Don't bring the shoes into your house, leave them outside.
- ❖ Stay away from a person who has cough.

- ❖ When you have feel you have come nearer to a suspected patient take a thorough bath.
- ❖ Lockdown or no lockdown next 6 months to 12 months follow these precautions.
- ❖ Stay Home Stay Safe.

Recent Corona Disease Treatment

(<https://emedicine.medscape.com/article/2500116-overview>)

1. Hydroxyl chlorine and chloroquine (not clearly known) inhibits infection of cells by SARS-CoV-2 *in vitro*, which is approved for malaria prophylaxis.
2. Remdesivir is an antiviral drug and are effective against SARS and MERS.
3. Ribavirin and Interferon antiviral drugs, effective against MERS.
4. Camostat Mesilate effective against SARS-CoV-2 *in vitro* in lung cells.
5. Lopinavir and ritonavir antiviral drugs, effective against SARS-CoV-1 *in vitro* and *in vivo* studies.
6. Tocilizumab reduced fever and oxygen requirement in COVID-19, which is approved for rheumatoid arthritis. (<https://theconversation.com/coronavirus-treatments-what-drugs-might-work-against-covid-19-135352>).

Table No.1: Represented the types (taxonomy) of Corona virus

S.No	Virus classification	
1	Realm	Riboviria
2	Kingdom	Orthornavirae
3	Phylum	Pisuviricota
4	Class	Pisoniviricetes
5	Order	Nidovirales
6	Family	Coronaviridae
7	Subfamily	Orthocoronavirinae

Table No.2: Represented the sign symptoms of systemic disorder and respiratory disorder through coronavirus

S.No	Systemic Disorders	Respiratory Disorders
1	Fever, Cough	Rhinorrhea, Sneezing
2	Haemoptysis	Pneumonia
3	Acute Cardiac Injury	Ground-glass opacities
4	Dyspnoea	RNAemia
5	Lymphopenia	Acute Respiratory Distress
6	Diarrhoea	Sore Throat

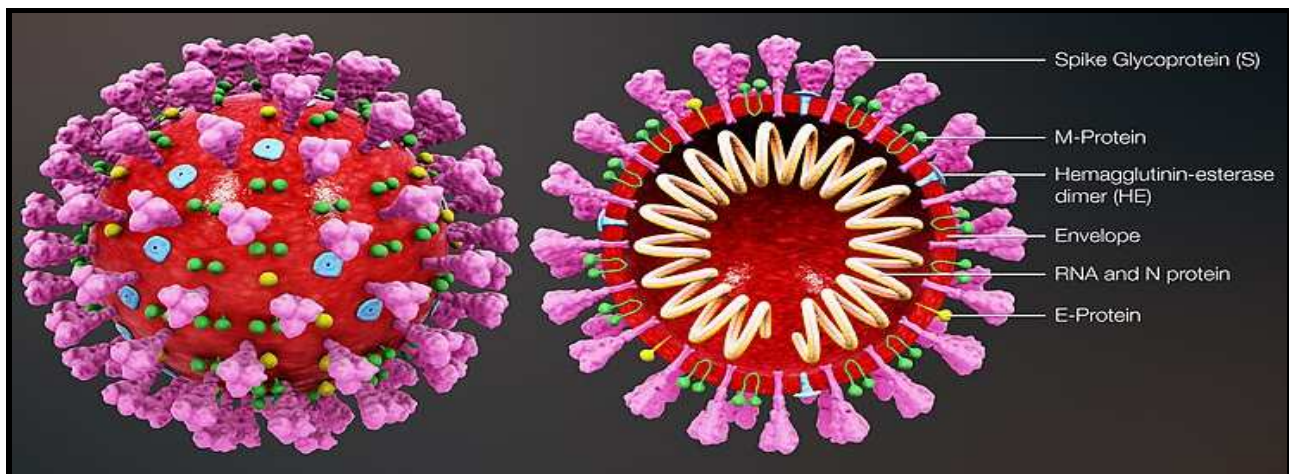


Figure No.1: Represented a schematic diagram of structure of corona virus and it illustrated parts of the SARS-coV-2 virus Nucleocapsid (N) protein, Spike is a another glycoprotein (S), (M) is the transmembrane protein, (E) is a membrane-spanning protein and hemagglutinin-esterase (HE).

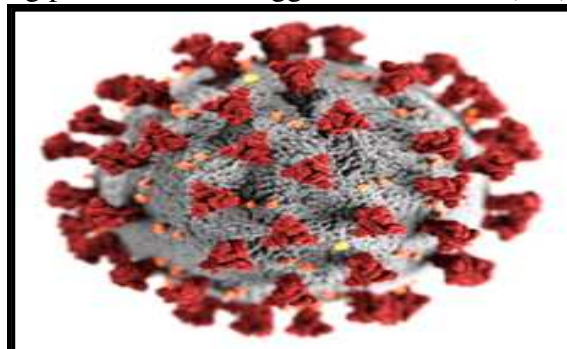


Figure No.2: Source of this picture from (Wikipedia the free encyclopedia) represented a structure of corona virus

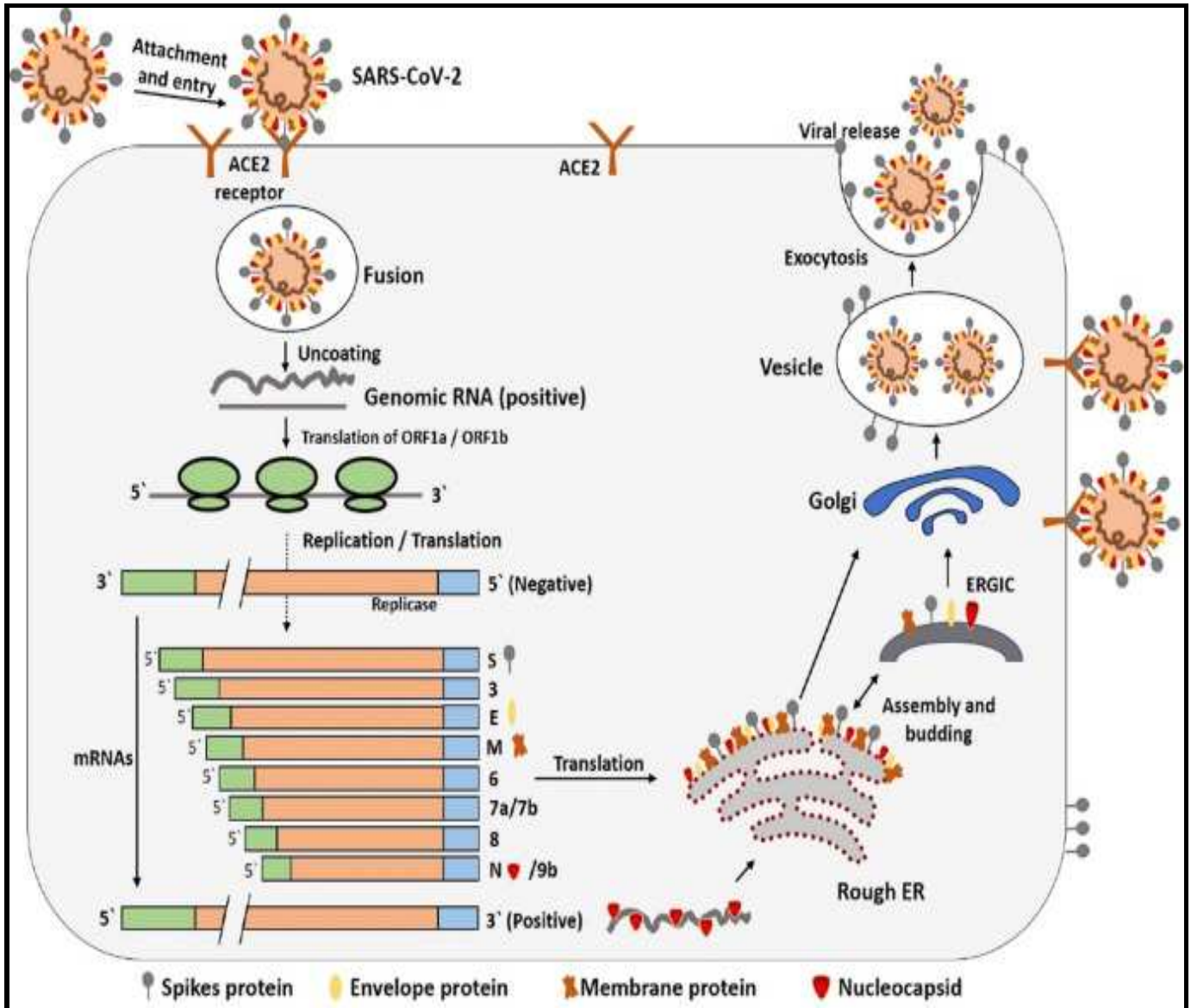


Figure No.3: Represented a schematic diagram of pathogenesis of corona virus. Viral elements surround an internal helical RNA-protein nucleocapsid enclosed by an wrapper covering viral glycoproteins. SARS-CoV-2 attached with ACE2 receptor which is located in the lungs and it get fused and leads to replication/translation process and exocytosis. Nucleocapsid (N) protein is a phosphoprotein which is combined with genome RNA to form the nucleocapsid. Spike is another glycoprotein (S) forms the large glycosylated peplomers that are a special type of coronaviruses. (M) is the transmembrane protein that is highly hydrophobic and extends the membrane by three times. (E) is a membrane-spanning protein(envelope protein) that is a minor constituent of the membrane. express, hemagglutinin-esterase (HE) is another glycoprotein expressed by some group II viruses which forms a minor spikes on virions.

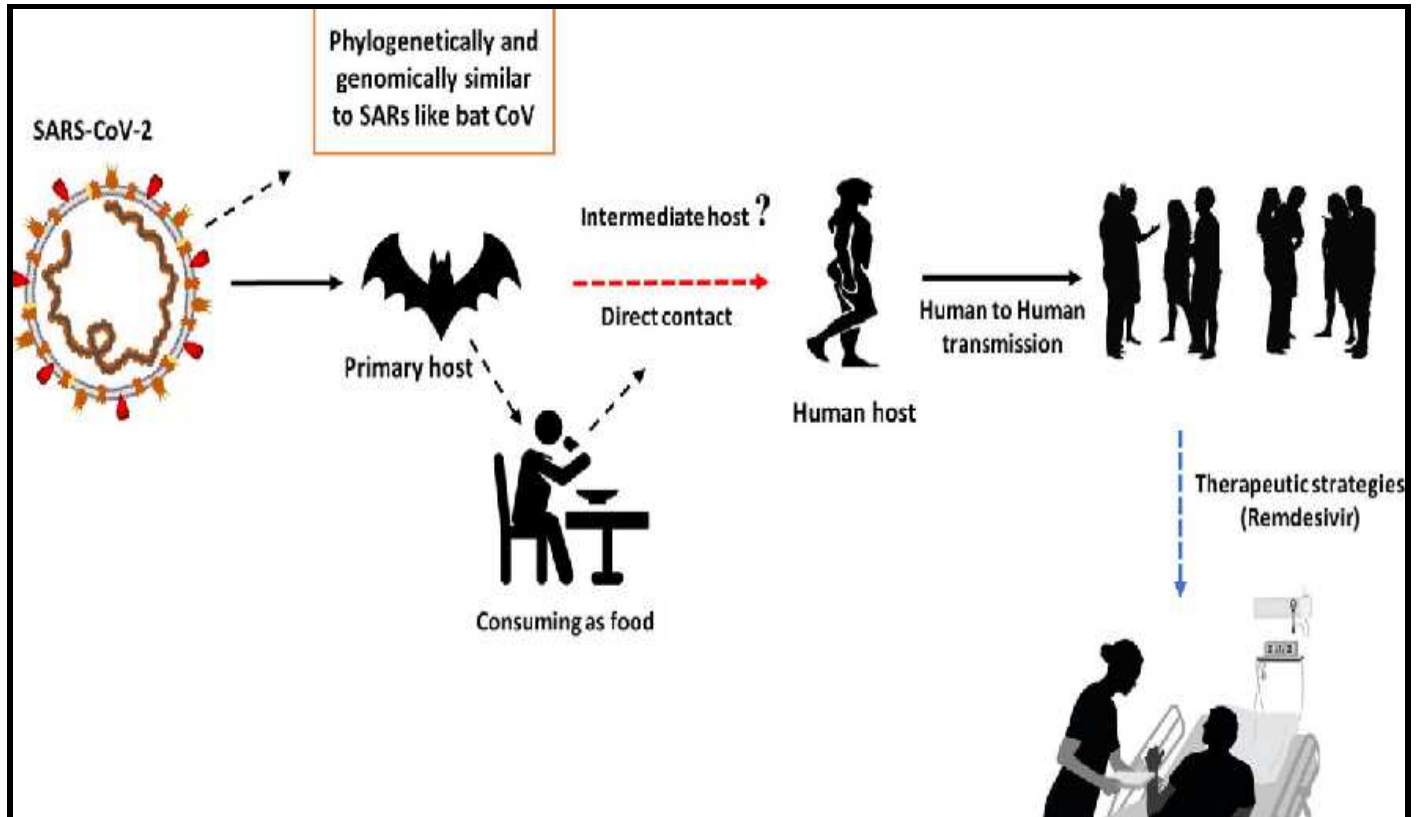


Figure No.4: Represented a schematic diagram of mode of transmission of corona virus and it illustrated the spreadable SARS-coV-2 virus transmission from the bat (primary host) and contamination disease with consuming as food. Route photograph of how virus infects people through different ways, areas, and places. SARS-coV-2 virus also spread through droplets and contact with infected peoples.

CONCLUSION

This new virus COVID-19 epidemic has challenged the economic, medical and public health arrangement of India and other countries like Italy, France and USA etc., Time only will express how the coronavirus will impact our lives at this time in India and world. Consequently, apart from reduction this epidemic, efforts should be made to develop a wide-ranging measure to prevent the forthcoming epidemics of zoonotic source.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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