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COVID 19: Unresolved Dichotomy



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ABSTRACT

In late December 2019, Chinese health authorities reported a plague of pneumonia of unknown origin in Wuhan. Coronaviruses are enveloped non-segmented positive-sense RNA viruses belonging to the family Coronaviridae. The human coronavirus infections are mild, the epidemics of the 2 β -coronaviruses, severe acute respiratory syndrome coronavirus (SARS-CoV), and Middle East respiratory syndrome coronavirus (MERS-CoV) have caused quite ten thousand cumulative cases in the past two decades. The COVID-19 epidemic has spread very quickly. It only took 30 days to expand from Wuhan to the rest of the country and then worldwide.



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1. INTRODUCTION:

The World Health Organization (WHO) has declared the coronavirus disease 2019 (COVID-19) a pandemic (1). A pandemic is defined as “occurring over a wide geographic area and affecting an exceptionally high proportion of the population.”(2) The last pandemic reported in the world was the H1N1 flu pandemic in 2009.

Coronaviruses are a huge family of viruses that moderate to severe from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). A COVID-19 was found in 2019 in Wuhan, China. A new virus that has not been previously identified in humans.

The COVID-19 outbreak has now spread to more than 192 countries and administrative regions infecting nearly 141M individuals of all ages [3]. Globally, at least 3.01M deaths have been directly attributed to COVID-19 [3], and this number is expected to rise with the ongoing epidemic.

1.1 Symptoms

Fever,

Upper Respiratory Tract,

Shortness Of Breath,

Diarrhea,

Pneumonia,

Multiple Organ Failure,

Death [4 & 6].



1.2 High-Risk Populations

The virus that causes COVID-19 infects people of all ages. However, evidence to date suggests that two groups of people are at a higher risk of getting severe COVID-19 disease (10):

Older people (people over 70 years of age)

People with serious chronic illnesses such as:

Diabetes

Cardiovascular disease

Chronic respiratory disease

Cancer

Hypertension

Chronic liver disease

WHO advice for high-risk populations (17):

- When having visitors at your home, extend “1-meter greetings”, like a wave, nod, or bow.
- Request that visitors and those who live with you wash their hands.
- Clean and disinfect surfaces in your home (especially those that people touch a lot) regularly.
- Limit shared spaces if someone you live with is not feeling well (especially with possible COVID-19 symptoms).
- If you show signs and symptoms of COVID-19 illness, contact your healthcare provider by telephone, before visiting your healthcare facility.
- Have an action plan in preparation for an outbreak of COVID-19 in your community.
- When you are in public, practice the same preventative guidelines as you would at home.
- Keep updated on COVID-19 by obtaining information from reliable sources.

1.3 Microbiology

Coronavirus is a single-stranded, organic phenomenon, enclosed polymer, and lined with club formed conjugated protein. Coronaviruses are four subtypes such as alpha, beta, gamma, and delta coronavirus. Some types of them have affected humans and other affected animals such as birds, cats, mice, and dogs. [7, 8 & 9]

1.4 Structure

Coronavirus virions are spherical to pleomorphic enveloped particles. 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 envelope glycoproteins are responsible 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.

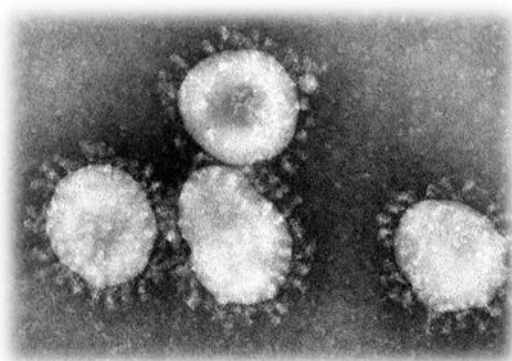


Figure No. 1: Microscopic structure of CORONA virus

1.5 Transmission of COVID-19

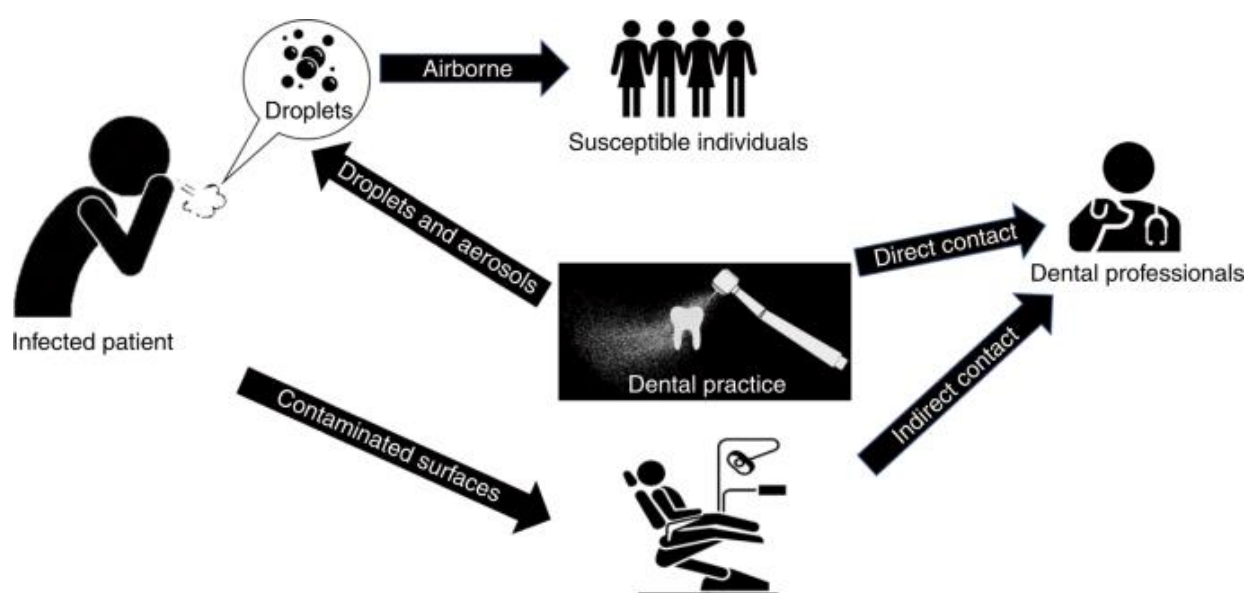


Figure No. 2: Transmission of COVID-19

The routes of transmission of COVID-19 remains unclear at the moment, however proof from different coronaviruses and metastasis wellness indicates that the disease could unfold through massive metastasis droplets and direct or indirect contact with infected secretions (11). The air-born transmission will occur in thronged places and indoor rooms with poor aerated, particularly infected persons disbursement a protracted time with others, a shopping center, restaurant, etc. And also air-borne transmission happens in medical aid settings whereas conducting medical aid procedures (aerosol-generating procedures). (12)

Transmission can occur more easily in the “Three C’s” (the risk of COVID-19 spreading is higher in places where these “3Cs” overlap):

1. Crowded places with many people nearby;
2. Close-contact settings, especially where people have conversations very near each other;
3. Confined and enclosed spaces with poor ventilation (14).

The incubation period of COVID-19 is currently understood to be between 2 to 14 days (13). This means that if a person remains well after 14 days after being in contact with a person with confirmed COVID-19, they are not infected.

1.6 Replication:-

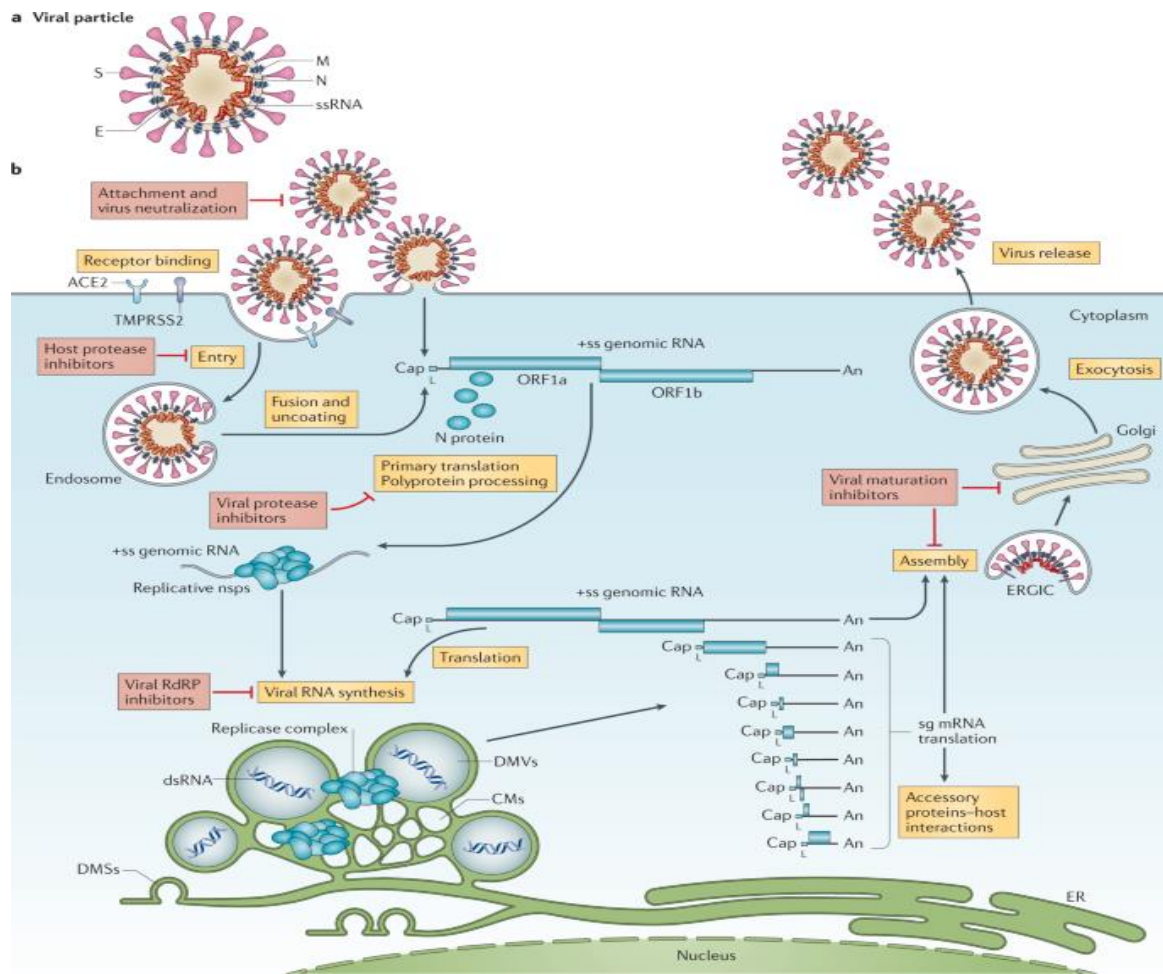


Figure No. 3: Replication of CORONA virus

Coronavirus infection involves the specific binding of the coronavirus spike (S) protein to the cellular entry receptors, which have been identified for several coronaviruses and include human aminopeptidase N (APN; HCoV-229E), angiotensin-converting enzyme 2 (ACE2; HCoV-NL63, SARS-CoV and SARS-CoV-2) and dipeptidyl peptidase 4 (DPP4; MERS-CoV). The expression and tissue distribution of entry receptors consequently influence viral tropism and pathogenicity. During the intracellular life cycle, coronaviruses express and replicate their genomic RNA to produce full-length copies that are incorporated into newly produced viral particles.

Day 1: On the starting day of the symptom, the patient suffers from fever along with fatigue, muscle pain, and a dry cough. Few of them may experience nausea and diarrhea a few days before the arousal of symptoms.

Day 5: Patients may suffer from breathing problems especially if they are elderly or have some pre-existing health condition.

Day 7: According to the Wuhan University study, these are the symptoms of the patient that lead the patient to be admitted to the hospital.

Day 8: On the 8th day, patients (15%, according to the Chinese CDC) develop acute respiratory distress syndrome (ARDS), a condition where the fluid fills up in the lungs and this is mostly fatal. This usually happens in severe cases.

Day 10: The progression of the disease leads to worsening of the symptom and at this point the patient is shifted to ICU. Patients with milder symptoms probably have more abdominal pain and loss of appetite. Only a small fraction dies. The current mortality rate is around 2%.

Day 17: On average, after two-and-a-half weeks patients who recover are discharged from the hospital. However, it's difficult to find out the symptoms in the earlier days of the infection. This is usually seen after 5-6 days. [15] Reported symptoms have ranged from mild to severe illness and death for confirmed coronavirus disease 2019 cases.

1.7 Diagnosis of COVID-19

There is no reliable clinical method to distinguish coronavirus colds from colds caused by rhinoviruses or less common agents. For research purposes, the virus can be cultured from nasal swabs or washings by inoculating organ cultures of human fetal or nasal tracheal epithelium. The virus in these cultures is detected by electron microscopy or other methods. The most useful method for laboratory diagnosis is to collect paired sera (from the acute and convalescent phases of the disease) and to test by ELISA for a rise in antibodies against OC43 and 229E. Complement fixation tests are insensitive; other tests are inconvenient and can be used only for one serotype. Direct hybridization and polymerase chain reaction tests for viral nucleic acid have been developed and, particularly with the latter, are the most sensitive assays currently available for detecting viruses. (16)

The gold standard for testing for COVID-19 is Reverse Transcription Polymerase Chain Reaction (RT-PCR). However, current data suggest that RT-PCR is only 30-70% effective for acute infection, this may be due to incorrect use of lab kits or not enough virus in the blood at the early stages of testing. (17)

1.8 Treatment Strategy of COVID 19

1.8.1 General Treatment

Complete bed rest

Adequate calorie and water intake to reduce the risk of dehydration.

Keeping respiratory tract unobstructed and inhaling oxygen in more severe cases.

Measuring blood count, Creative protein, urine test, and other blood biochemical indexes including liver and kidney function, myocardial enzyme spectrum, and coagulation function according to patient's conditions.

1.8.2 Symptomatic Treatment

Antipyretic drug- ibuprofen orally, 5–10 mg/kg every time; acetaminophen orally, 10– 15 mg/kg every time. (in case of higher fever)

1.8.3 Oxygen Therapy

In case of hypoxia

In emergency conditions, Non-invasive or invasive mechanical ventilation should be provided to the patient. (18)

1.8.4 Antiviral Drugs

Group of antiviral drugs including interferon α (IFN- α), remdesivir, lopinavir/ritonavir, chloroquine phosphate, ribavirin, and arbidol are therapeutically useful for the Prevention, Diagnosis, and Treatment of Novel Corona virus-induced Pneumonia.

Remdesivir, an antiviral agent, is currently the only drug that is approved by the FDA for the treatment of COVID-19. It is recommended for use in hospitalized patients who require supplemental oxygen. However, it is not routinely recommended for patients who require mechanical ventilation due to the lack of data showing benefit at this advanced stage of the disease. (19)

1.8.5 Immune System

Prevention and real defense against disease is a strong immune system.

1.9 Management of COVID-19

DISEASE SEVERITY	PANEL'S RECOMMENDATIONS
<p>Not Hospitalized, Mild to Moderate COVID-19</p>	<p>There are insufficient data to recommend either for or against any specific antiviral or antibody therapy. SARS-CoV-2 neutralizing antibodies (bamlanivimab or casirivimab plus imdevimab) are available through EUAs for outpatients who are at high risk of disease progression.^a</p> <p>The Panel recommends against the use of dexamethasone or other corticosteroids (AIII).^b</p>
<p>Hospitalized but Does Not Require Supplemental Oxygen</p>	<p>The Panel recommends against the use of dexamethasone (AIIa) or other corticosteroids (AIII).^b</p> <p>There are insufficient data to recommend either for or against the routine use of remdesivir. For patients at high risk of disease progression, the use of remdesivir may be appropriate.</p>
<p>Hospitalized and Requires Supplemental Oxygen (But Does Not Require Oxygen Delivery Through a High-Flow Device, Noninvasive Ventilation, Invasive Mechanical Ventilation, or ECMO)</p>	<p>Use one of the following options:</p> <ul style="list-style-type: none"> • Remdesivir^{c,d} (e.g., for patients who require minimal supplemental oxygen) (BIIa) • Dexamethasone^e plus remdesivir^{c,d} (e.g., for patients who require increasing amounts of supplemental oxygen) (BIII)^{f,g} • Dexamethasone^e (e.g., when combination therapy with remdesivir cannot be used or is not available) (BI)
<p>Hospitalized and Requires Oxygen Delivery Through a High-Flow Device or Noninvasive Ventilation</p>	<p>Use one of the following options:</p> <ul style="list-style-type: none"> • Dexamethasone^{e,g} (AI) • Dexamethasone^e plus remdesivir^{c,d} (BIII)^{f,g}
<p>Hospitalized and Requires Invasive Mechanical Ventilation or ECMO</p>	<p>Dexamethasone^e (AI)^h</p>

Figure No. 4: Management of COVID-19

CONCLUSION:

Through this review, we conclude that the disease profile of COVID-19 is dynamic and continues to rapidly evolve. Coronavirus was spreading from human to human to transmission by close contact via airborne droplets generating by coughing, sneezing, kissing, and smooching. So avoid these activities with infected partners and family members. And also avoid Crowded, Close-contact settings that can prevent the spreading of the coronavirus.

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