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COVID-19: definition, replication, symptoms and Prevention measures.

A Graduation Project Submitted by

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Abstract

Since the outbreak and rapid spread of COVID-19 starting late December 2019, it has been apparent that disease prognosis has largely been influenced by multiorgan involvement.Comorbidities such as cardiovascular diseases have been the most common risk factors for severity and mortality. The hyperinflammatory response of the body, coupled with the plausible direct effects of severe acute respiratory syndrome on body-wide organs via angiotensin-converting enzyme 2, has been associated with complications of the disease. Acute respiratory distress syndrome, heart failure, renal failure, liver damage, shock, and multiorgan failure have precipitated death. Acknowledging the comorbidities and potential organ injuries throughout the course of COVID-19 is therefore crucial in the clinical management of patients. This paper aims to add onto the ever-emerging landscape of medical knowledge on COVID-19, encapsulating its multiorgan impact.

1. Introduction

A novel coronavirus, designated the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), emerged in late December 2019 from a cluster of pneumonia cases epidemiologically linked to a wet market in Wuhan, China. The disease, now known as COVID-19, has since spread rampantly leading to a worldwide pandemic which has precipitated draconian measures to limit its transmission[1].COVID-19 has demonstrated a wide spectrum of clinical manifestations, from asymptomatic or paucisymptomatic forms, to severe viral pneumonia with respiratory failure, multiorgan and systemic dysfunctions in terms of sepsis and septic shock, and death.2,3 This paper aims to encapsulate the multiorgan impact of COVID-19 reported since its outbreak.

Coronaviruses are a widespread family known to cause illnesses ranging from the common cold to more severe illnesses such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS.(

Corona viruses are a group of viruses that cause diseases in mammals and birds. In humans, the virus causes respiratory infections that include the common cold, which are usually mild, and rarely fatal, such as severe acute respiratory syndrome, Middle East respiratory syndrome, and the novel coronavirus that caused the 2019-20 outbreak. It may cause diarrhea in cattle and pigs, and in chickens it may cause diseases of the upper respiratory tract. There are no approved vaccines or antivirals to prevent or treat these viruses[1,2]. Corona viruses belong to the family Orthocoronaviruses (scientific name: Orthocoronavirinae) in the family of coronaviruses in the order Nightviruses. Coronaviruses are enveloped viruses with a positive-sense single-stranded RNA genome, and possess a homologous helical nucleocapsid. The genome of coronaviruses is about 26 to 32 kilobases in size, and is the largest among RNA viruse. The name "coronavirus" (Arabic: corona virus, abbreviated CoV) is derived from (Latin: corona) meaning crown or corona, where the name refers to the distinctive appearance of virus particles (freons) that appears through the electron microscope, as they

have indentations of surface protrusions, which It appears as the king's crown or solar corona[3].

Corona viruses were discovered in the 1960s, and the first viruses discovered were the infectious bronchitis virus in chickens and two viruses from the nasal cavity of human patients with colds named human corona virus 229E and human corona virus OC43. Since then other members of this family have been identified including: 2003 SARS coronavirus, 2004 NL63 human coronavirus, 2005 HKU1 human coronavirus, 2012 MERS coronavirus, and 2019-nCoV novel coronavirus, most of these viruses It has a role in causing serious respiratory infection and may even lead to death[3,4].

Several proteins contribute to the general structure of all coronaviruses: the spike (S), the envelope (E), the membrane (M) and the nucleocapsid (N). In the specific case of SARS-associated coronavirus, a specific receptor-binding domain in S acts as a mediator of attachment of the virus to its cellular receptor, angiotensin-converting enzyme 2 (ACE2). Some coronaviruses (particularly members of the beta coronavirus subgroup A) also have a protein The shortest spike-like is called hem agglutinin esterase (HE). In the Arabic language, the name Corona virus is more common than the rest of the other names, but other nomenclature is more accurate in describing, as it is called: coronavirus, corona virus, corona virus (or corona virus), corona virus, corona virus, corona virus wreathed[5].

2. Literature Review

2-2. Transmission

It is believed that human-to-human transmission of coronaviruses occurs mainly between close people during direct contact through respiratory droplets from sneezing and coughing[3,9].

2-5. Coronavirus Disease 2019 (COVID-19)

In December 2019, a pneumonia outbreak was reported in Wuhan, China. On December 31, 2019, the outbreak was attributed to a new strain of coronavirus, officially named 2019-nCoV by the World Health Organization.

The number of November 23, 2020, more than one million and 400 thousand confirmed deaths. Group 2B beta coronavirus with a genetic similarity of 70% to the SARS virus. eminent eminent with this belief. The virus is 96% similar to bat coronaviruses**[16,17,18]**.

- **In Animals**

Coronaviruses have been recognized as causing disease conditions in veterinary medicine since the early 1970s. With the exception of infectious bronchitis, major illnesses related to these viruses are primarily intestinal diseases.

Coronaviruses primarily infect the upper respiratory and gastrointestinal tracts in birds and mammals. It also causes a range of diseases in livestock and pets, some of which are dangerous and are considered a threat to the agricultural and animal husbandry activities. In chickens, the Infectious Bronchitis Virus (IBV), which is a coronavirus, targets not only the respiratory tract but the genitourinary system as well,). **[16,17,18]**. There are two types of canine coronavirus, one of which causes moderate gastro-intestinal disease and the other of which causes respiratory disease. The murine hepatitis virus is a coronavirus that causes epidemic disease in mice with a high mortality rate, especially among colonies of laboratory mice. Salivary and lacrimal gland inflammation (SDAV) through direct contact or aerosols.

Acute infection with this virus has a high mortality rate and tropism towards the salivary, lacrimal, and hadar glands**[19]**.

A bat coronavirus related to HKU2 called porcine acute diarrheal syndrome coronavirus (SADS-CoV) causes diarrhea in pigs.

Prior to the discovery of the SARS coronavirus, the murine hepatitis virus (MHV) was the best-studied coronavirus, both biologically and in vitro, as well as at the molecular level. Some strains of murine corona cause progressive demyelinating encephalitis in mice that has been used as a mouse model of multiple sclerosis. Significant research efforts have focused on elucidating the viral pathogenesis of these animal coronaviruses, particularly by virologists interested in veterinary and zoonotic diseases**[16,20]**.

2-6. Case Definitions

1. Suspect cases

Considering both the following epidemiological history and clinical manifestations:

- Epidemiological history
- Clustered cases: two or more cases with fever and/or respiratory symptoms in a small area such families, offices, schools, workshops etc within 14 days).

(2) Clinical manifestations

1) Fever and/or respiratory symptoms;

2) The aforementioned imaging characteristics of NCP;

3) Normal or decreased WBC count, normal or decreased lymphocyte count in the early stage of onset.

A suspect case has any of the epidemiological history plus any two clinical manifestations or all three

clinical manifestations if there is no clear epidemiological history. [22,23,24].

2. Confirmed Cases

Suspect cases with one of the following etiological or serological evidences:

(1) Real-time fluorescent RT-PCR indicates positive for new coronavirus nucleic acid;

(2) Viral gene sequence is highly homologous to known new coronaviruses.

(3) NCP virus specific Ig M and IgG are detectable in serum; NCP virus specific IgG is detectable or

reaches a titration of at least 4-fold increase during convalescence compared with the acute phase. [21,19,24].

3. Asymptomatic infected persons

Asymptomatic people with COVID-19 virus detected in respiratory specimens or IgM detected in serum.

They are mainly found through close contact tracing, investigation of clusters and infection source tracing. [22,23,24].

4. Cluster of cases

Clusters of cases refer to 2 or more confirmed cases or asymptomatic infected persons in a small area

before sampling. [22,23,24].

2-7. Symptoms

COVID-19 affects different people in different ways. Most people who develop it have mild to moderate symptoms and recover without hospitalization.

❖ **Long-term side effects[25,26].**

Symptoms of the emerging coronavirus (COVID-19) can sometimes last for months. The virus can damage the lungs, heart, and brain; This increases the risk of long-term health problems.

people may feel unwell for weeks or even months after infection**[23]**.

Signs and symptoms that commonly persist over time include: [22,25,26].

fatigue
Shortness of breath or difficulty breathing
cough
Joint pain
chest pain
Problems with memory, concentration, or sleep
Muscle pain or headache
fast or pounding heartbeats
Loss of sense of smell or taste
depression or anxiety
fever
Dizziness when standing up
Symptoms worsen after physical or mental activities

❖ **Organ damage caused by the novel coronavirus (COVID-19)**

Although the COVID-19 virus is classified as a disease that primarily affects the lungs, it can also damage a number of other body organs, such as the kidneys and brain. Organ damage leads to health complications that may persist even after recovery from COVID-19 In some cases, persistent health effects may include long-term breathing problems, heart complications, chronic kidney failure, stroke as well as Guillain-Barré syndrome — a condition that causes paralysis temporary. Some adults and children develop multisystem inflammatory syndrome after contracting COVID-19. In this disease, some organs and tissues of the body are exposed to acute inflammation**[24,26]**.

2-8. Treatments

Scientists around the world are working to find and develop treatments for the COVID-19 virus. Optimal supportive care includes the supply of oxygen for severely ill patients and those at risk of severe injury, along with more advanced respiratory support such as ventilators for critically ill patients. Dexamethasone is a corticosteroid that can help shorten the length of time a patient stays on a ventilator and save the lives of critically ill patients. The World Health Organization recommends not to self-medicate by taking any medications, including antibiotics, as a prevention or treatment for COVID-19[27,28].

2-9. Prevention and control measures tailored to specific areas and levels.

❖ **Take steps to prevent illness with respiratory pathogens:**

- Avoid direct contact with people who have acute respiratory infections such as fever, cough and difficulty breathing.
- Do frequent hand washing, especially after direct contact with patients or their environments.

1) In low risk areas, the strategy is to "strictly prevent importation". It includes investigations and management of close contacts. The government should urge and provide guidance to the urban and rural communities, government agencies, enterprises and public institutions to strictly implement community prevention and control measures, improve environmental hygiene, and popularize knowledge and skills of disease prevention

to the general public[25,29,30]..

2) In middle risk areas, the strategy is "to prevent importation and stop transmission internally". It includes various measures taken for low-risk areas, and also the preparations for medical treatment, personnel, materials and venues required for disease prevention and control efforts, and isolated medical observation and management of close contacts. prevention and control measures with reference to low-risk areas[25,29,30].

3) In high risk areas, the strategy is "to stop transmission internally, prevent exportation and implement strict prevention and control measure". In addition to measures for the middle risk area, stopping aggregation activities and implement regional traffic control with the approval in accordance with the law and procedures. research and analysis, adjust risk level in a timely manner, reduce

emergency response level or terminate emergency response after the case number keeps declining steadily and the risk of epidemic spread is effectively controlled[25,29,30].

2-10. Protocol for Personal Protection of Specific Groups

This Protocol is used for the prevention and control of the new coronavirus pneumonia among professionals who environmental cleaning and disinfection, specimen collection and laboratory work etc[30,31,32].

I. Personal protection equipment and its usage

All persons who come into contact with, or may come into contact with new coronavirus protective equipment,including: [30,31,32].

1) Gloves

When entering a contaminated area or performing diagnosis and treatment, one should wear disposable rubber or nitrile gloves according to the work content; disinfect, replace gloves and perform hand hygiene in time when contacting different patients or when the gloves are broken.

2) Medical protective masks

When entering a contaminated area or performing diagnosis and treatment, one should wear a medical protective mask or a powered air filter respirator. Before each wear, an air tightness check should be performed. When wearing multiple protective equipment, one should ensure that the medical protective mask is removed as the final step.

3) Protective face shields or goggles

When one is entering a contaminated area or performing diagnosis and treatment, and when one’s eyes, eye conjunctiva, and face are at risk of being contaminated by blood, body fluids, secretions, excreta, and aerosols, one should wear a protective face shield or goggles. After taking off reusable goggles, one should sterilize and dry it in time for the next use.

4) Protective suit

When entering a contaminated area or performing diagnostic and treatment, one should change his or her personal clothing and wear work clothes (surgical scrubs or disposable clothing, etc.), plus protective clothing.

3) Personnel transporting cases and asymptomatic infected persons

It is recommended to wear work clothes, disposable work caps, disposable gloves, protective clothing, medical protective masks or powered air filter respirators, protective face shields or goggles, work shoes or rubber boots, waterproof boot covers, etc.

4) Corpse handling personnel

It is recommended to wear work clothes, disposable work caps, disposable gloves and long-sleeved thick rubber gloves, protective clothing, KN95 / N95 or above particulate protective masks or medical protective masks or powered air filter respirators, Protective face shields, work shoes or rubber boots, waterproof boot covers, waterproof aprons or waterproof isolation gowns, etc. [36,37,38].

5) Cleaning and disinfection personnel

It is recommended to wear work clothes, disposable work caps, disposable gloves and long-sleeved thick rubber gloves, protective clothing, KN95 / N95 or above particulate protective masks or medical protective masks or powered air filter respirators, Protective face shields, work shoes or rubber boots,

waterproof boot covers, waterproof aprons, or waterproof isolation gowns. When using powered airsupply filter respirators, one should select a dust-and toxicant filter box or canister according to the type of disinfectants, and properly protect themselves from disinfectants and other chemicals. [39,40].

6) Specimen collection staff

It is recommended to wear work clothes, disposable work caps, double gloves, protective clothing, KN95/N95 or above particulate protective masks or medical protective masks or powered air filter respirators, protective face shields, work shoes or rubber boots, and waterproof boot covers. If necessary, one should wear a waterproof apron or waterproof isolation gown.

7) Laboratory staff

It is recommended to wear at least work clothes, disposable work caps, double gloves, protective clothing, KN95 / N95 or above particulate protective masks or medical protective masks or powered air filter respirators, protective face shields or goggles, work shoes or rubber boots, waterproof boot covers.

If necessary, one should wear a waterproof apron or waterproof isolation gown. [39,40].

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