

A Review on COVID-19 Outbreak: An Unprecedented Threat to the Globe

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ABSTRACT

The coronavirus outbreak in December 2019 has added renewed interest in bygone micro enemy and upraise questions about the ability of current protective measures in our healthcare system to handle this threat. It is a known fact that coronaviruses to cause respiratory infections in humans for over six decades, but their pandemic potentiality has been addressing for the last few years. Coronavirus disease-19 (COVID-19) has caused so much concern around the world that the World Health Organization (WHO) on January 30, 2020, proclaimed it as a world health emergency, and on March 11, 2020, the WHO declared COVID-19 a global-wide pandemic. The ease at which this virus spread caused people to use some precautionary measures such as masks and gloves, resulting in the generation of a large amount of medical waste in the environment. To reduce the spread of the virus, human beings were put on restricted at homes in the name of lockdown. This pandemic has also altered people's lifestyles. This analysis reflects the current state of public health impact; we deal with current information on coronaviruses, including epidemiology, signs and symptoms, disease manifestation, and treatment and prevention strategies.

Keywords: Coronavirus, Epidemic, Global health emergency, Pandemic.

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INTRODUCTION

Coronavirus disease-19 (COVID-19) pandemic constitutes an unexpected warning to the entire globe which is encountering extensive transmission of the virus for several weeks. In addition, with high associated mortality many countries implementing "stay-at-home" policies, physical distancing measures.¹ Now the entire world is facing the challenge of this new outbreak from an old enemy. This has been considered as the "third major coronavirus outbreak over the past 2 decades" and causing a dramatic collision on human life and as well as world's economy. In the 21st century, this outbreak is the first incident to affect all continents except Antarctica.² In a city named Wuhan of China atypical pneumonia was reported in late December 2019 which has been linked to an animal market in the same locality.³ On January 26, the causative microorganism of this unusual pneumonia was named COVID-19.⁴ This outbreak is referred to as "severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) or coronavirus disease-19 (COVID-19)".⁵ Because of its very rapid spreading COVID-19 caused varying degrees of health issues in entire China. On January 30, 2020, based on its incidence and prevalence rate, the World Health Organization (WHO) announced a global health emergency.^{4,6} On March 11, 2020, the WHO proclaimed COVID-19 as a worldwide pandemic, as >118,000 cases were identified globally.⁷ Coronavirus disease-19 endangering the health and well-being of the vulnerable population and become a global threat.^{8,9}

We have tried to encapsulate the epitome of COVID-19, transmission and evaluation, etc. The goal is to amalgamate the knowledge about corona to address the current health emergency. We try to give our best in regard to management, evaluate predict complications and prognosis, and provide opportunities for research in this review.

AN OVERVIEW OF CORONAVIRUS

Severe acute respiratory syndrome coronavirus-2 related to the family Coronaviridae, order Nidovirales. It is classified into four sub-variants:

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human-infecting, animal infecting, gamma, and delta variants. All four variants are single-stranded RNA viruses that infect humans as well as animals.¹⁰ These viruses contain ranges genomic range from 26 and 32 kb. Nucleocapsid protein, the spike protein, a small membrane protein, and the membrane glycoprotein are the four structural proteins. Severe acute respiratory syndrome coronavirus-2 genome and genome of bat coronavirus are identical.¹¹ An average incubation period of coronavirus is 0–24 days. It causes a various range of symptoms that affect the various systems such as the respiratory and gastrointestinal systems.^{12,13} At first in 1966, Tyrell and Bynoe cultured these viruses from common cold patients. Severe acute respiratory syndrome coronavirus-2 was first isolated in Wuhan city from COVID-19 infected patients and was recognized as a novel coronavirus.¹⁴ Severe acute respiratory syndrome coronavirus-2 is a zoonotic virus that can spread among humans via aerosols. The main carrier for humans is the bat. Four different subfamilies were reported to infect humans including alpha, beta, gamma, and delta.¹⁵ Original

SARS-CoV originated in another province called Guangdong of China, infected thousands of individuals in 29 countries, and 774 deaths.¹⁶ In 2012, a novel β -coronavirus caused Middle Eastern Respiratory Syndrome (MERS-CoV), because of this >2,494 individuals infected, and 858 deaths reported across 27 countries in November 2019.¹⁷ At the time of authoring globally, as of 8:25 am CEST, May 21, 2020, almost 4,864,881 cases of and 321,818 deaths related to COVID-19, reported to WHO.¹⁸

EPIDEMIOLOGY OF CORONAVIRUS INFECTIONS

Because of the emergence of dangerous strains of coronavirus in recent years, it has triggered more studies on coronavirus mutation and transmission between animals to humans and vice versa. It has got variations in gender, age. Elderly males are more affected by SARS-CoV-2, females, and children aged between 5 years and 14 years are affected by other non-disruptive coronaviruses.¹⁹ In contrast, SARS-CoV-1 infects more females, and young people, and the death rate at 12% in old patients.^{20,21} But the MERS coronavirus affects commonly males and middle-aged persons.²² Existing data from Wuhan of China showing 68% of cases are middle-aged males, in those more than half had chronic diseases.²³ All three viruses such as SARS-CoV-2, COVID-19, and MERS-CoV are most likely to have originated in bats.^{24,25} A pandemic can be defined as “the worldwide spread of a new disease.” Lack of preexisting immunity is the main reason for this rapid spreading of the coronavirus.⁵ In the year 2009, H1N1 pandemic infected about 140 crore people and caused more than half a million deaths.²⁶ The outbreak started as patients presenting with atypical pneumonia in Wuhan City, in late December 2019.²⁷ Later within 3 days of duration, the WHO got noted 44 new cases from the same city. Japan and South Korea were the first countries to report cases other than the China.^{28,29} Within 5 days of WHO declaration of this situation as a pandemic, the virus spread to >140 countries with 6,606 deaths.³⁰ Chinese viral laboratories isolated a strange variant of coronavirus, on January 7, 2020.³¹ By the end of January 2020, United States, Japan, Thailand, and South Korea reported their first positive cases of COVID-19.^{27,32} The WHO declared a Public Health Emergency of International Concern (PHEIC) on January 30, 2020.³³ Public Health Emergency of International Concern can be defined as “an extraordinary event which is determined to constitute a public health risk to other States through the international spread of disease and to potentially require a coordinated international response.” Also, as per the WHO.³⁴ February 10, 2020, almost 910 COVID deaths have been reported from many countries and a major portion from China.³⁵ On February 11, 2020, it has been discovered as COVID-19 by WHO.³⁶ By March 10, 2020, the case rate was escalated >110,000 cases in 110 countries. On March 11, 2020, the WHO Director-General announced COVID-19 as a pandemic based on statistics of cases and deaths in 114 countries.^{37,38}

TRANSMISSION

Transmission of this virus is through respiratory droplets in-between persons when SARS-CoV-2 infected patient coughs, spits, or sneezes. Transmission is minimal when people maintain at least 2 m distance. Transmission can be through aerosols while singing or intubation or the use of nebulizers and the virus can be active in aerosols for >3 hours.^{39,40} Even though no confirmation of feco-oral transmission its RNA has detected in serum and stool. Severe acute respiratory syndrome coronavirus-2 may be active for

days on persist on plastic, wood, and stainless steel. Transmission through contaminated inanimate have been documented.^{40–42} Pre-symptomatic and asymptomatic people also can spread the SARS-CoV-2.⁴³ Mean basic reproductive number for COVID-19 is defined as “average number of secondary infections produced by a case of an infection in a fully susceptible population—at 3.28, with a median of 2.79”. Transmission potential at a given region is called as basic reproduction number (R_0) and transmission potential at a given time is called as effective reproductive number (R_e). After implementation of physical distance measures, it is noted that R_e is reduced in all regions of Italy.⁴⁴ More viral load is seen in nasopharyngeal specimens for about a week in mild cases.^{45,46} In severe cases, it reaches peaks in 7–14 days after infection.⁴⁷ The high viral load close to symptom onset suggests that SARS-CoV-2 can be easily transmissible at an early stage of infection and viral RNA has been isolated in other body fluids such as saliva and urine.^{48,49} Severe acute respiratory syndrome coronavirus-2 virus RNA was detected up to day 21 in ocular fluid. A recent study reported that asymptomatic individuals are dangerous carriers for COVID-19 pandemic spread.^{50,51} Existing studies showed risk of SARS-CoV-2 transmission through blood components is very negligible.⁵²

SIGNS AND SYMPTOMS

As per case-based data to European Surveillance System (TESSy) from countries such as Germany, Portugal, the most commonly reported clinical symptom was fever, cough, throat pain, general weakness, generalized body pains, watery nose, and gastroenteritis in the respective order. But symptoms vary between countries. According to the data collected from the USA, the most common reported symptoms were dry or productive cough with fever or chills and generalized body pains.⁵³ Reports from US CDC listed the symptoms such as chills, shaking, headache, and a disturbance in taste or smell.⁵⁴ In a few cases, conjunctivitis is also reported as a symptom.⁵⁰ Few studies reported severe cases presented with thrombosis and purpuric lesions and shortness of breath.^{55–58}

EVALUATION

Severe acute respiratory syndrome coronavirus-2 can be diagnosed by polymerase chain reaction (PCR) assay.⁵⁹ Initial symptomatic period, the sensitivity of PCR testing swabs from nose and pharynx is high, but with less specificity in terms of false-negative. Test to be repeated in case of false negative is suspected if that person belongs to active community transmission area.⁶⁰ The type of sample mostly used PCR assays across the world is testing nasopharyngeal swabs. Sputum and lower respiratory tract secretions also can be tested. Sputum samples will be easier and sensitive.⁶¹ It is contraindicated because of the possibility of aerosol infection, in one study, test sensitivity of oropharyngeal swabs was low especially in the late disease course.⁶² If a nasopharyngeal swab could not be taken from a patient alternative sample can be collected from the oropharynx.⁶³ The Food and Drug Administration (FDA) recently recognized on-site self-collection of nasopharynx secretion from anterior nares as an acceptable method of collection.⁶⁴ Patients with mild manifestations are not mandatory to be investigated but there may be a danger of clinical deterioration.^{65,66} Conditions such as respiratory rate ≥ 30 breaths per minute, $SpO_2 \leq 93\%$, etc., are considered as severe illness.⁶⁷ Few other tests include complete blood investigations, chest computed tomographic (CT) scan coagulation studies estimation of D-dimer, CR protein, and

procalcitonin levels. The prognostic value and clinical utility of the results of these and other tests remain uncertain. Mass screening procedures have shown that the spectrum of manifestations with this virus appears to be wide, with a range of asymptomatic infection to death.^{6,68} Radiographic findings revealed that patients had abnormalities on a chest CT scan.

TREATMENT OF CORONAVIRUS-ASSOCIATED DISEASES

Supportive measures and isolation are enough in mild cases. Moderate and severe cases are used to monitor the hospital. As of now, there are no approved treatments for COVID-19. Hydroxychloroquine, chloroquine, and azithromycin have appeared *in vitro* activity probably could be due to antagonizing endosomal transport.^{69,70} There are many studies on if and but in using hydroxychloroquine combined with azithromycin, lopinavir-ritonavir, or any other HIV-1 protease inhibitor. Remdesivir shown its activity in several animal trials.⁷¹⁻⁷⁴ Several immunomodulating therapies are under investigation, non-steroidal anti-inflammatory drugs. Convalescent plasma therapy also got less clinical data.

Social factors which drive the catching of virus are densely packed people in urban areas especially in slums, big household, dissimilar levels of social distancing, communal gatherings, mass prayers, gatherings in marriages, and other family functions. Medical and health factors such as diabetes, carcinomas, cardiorespiratory diseases, vascular diseases, and immune-compromised conditions, and both extremities of age are more prone to get an infection.⁷⁵⁻⁷⁷ World Health Organization has alerted people to the dangers of smoking on the lungs and the risk of COVID-19.

Prevention Strategies

Healthcare workers who are more prone to get infection must be protected. By reducing the number of healthcare workers and allotment of duties on a rotation basis can minimize the possibility of continuous exposure of health staff to infected persons and maintaining hygiene in the surroundings are critical by using personal protective equipment (PPE) such as goggles/a face shield, mouth mask, an isolation gown and gloves for the routine care of patients with COVID-19 is mandatory as per the WHO guidelines.⁷⁸⁻⁸¹ Instead of a face mask, the CDC prefers the use of an "N95 filtering facepiece respirator, a powered air-purifying respirator [PAPR] unit, or a contained air-purifying respirator [CAPR]" as an acceptable alternative due to the shortage of supply.⁸² By supporting universal droplet-contact precautions, we can reduce the transmission from asymptomatic positive patients.^{39,83-86} Strategies for prevention and control to be needed for people living in congregate settings, dormitories, jails, prisons, etc.

Rights and Legal Obligations of Physician's during Pandemics

Medical practitioners should not deny attending the duty for fear of getting infected themselves during an outbreak and should notify communicable disease to the constituted health authorities. Doctors should enlighten the public regarding measures for the prevention and control of communicable diseases and quarantine regulations during an outbreak. Though practitioner has the right to choose patients, no physician shall arbitrarily refuse to treat the patient. Physicians have a legal obligation to treat emergencies as per their capacity even if it is not within the range of experience.⁸⁷ If the doctor has any high-risk factors or inaccessibility of PPE, should

make alternative arrangements for his/her personal and as well as patient care or has to inform the government authority and take permission for not to attend the duty temporarily.

CONCLUSION

The novel coronavirus originated from the animal market at Wuhan city in China and rapidly spread across the world. Even though of SARS-CoV-2 source from animal origin is not confirmed, existing studies suggested that bats are the key reservoir. There are many variants of coronaviruses. Only seven variants of those infect human beings and four of them cause signs of the not unusual cold. SARS, a beta coronavirus appeared in 2002 and turned into managed especially by way of aggressive public health measures. MERS come out in 2012, nonetheless exists in camels, and might infect human beings who have got exposed to them. The new coronavirus at first detected in Wuhan city of China in December 2019, but now it has got hooked up itself across the world and turned out pandemic. On March 11, 2020, because it unfolded the disorder out of doors of China, the WHO declared the corona epidemic as a global pandemic. The manifestations of SARS-CoV-2 precipitated corona are a bit much like influenza and other seasonal allergies and increased body temperature which can be detected via thermal screening; hence, the individual turns into suspected. Therefore, an accurate and speedy diagnostic procedure to be needed as PCR is a costly and time taking process. Health officials are working to contain the unfold of the virus through public fitness measures together with social distancing, contact tracing, trying out, quarantines, and journey restrictions. Until now, no promising medical remedies or prevention techniques have been advanced in opposition to human coronaviruses. Various broad-spectrum antivirals previously used toward influenza, SARS, and MERS coronaviruses were evaluated both alone or in mixtures to deal with COVID-19 sufferers, mice models, and scientific isolates. Scientists are trying to find cures for the disease and create a vaccine. There needs to be strict law enforcement on utilizing wild animals and birds as a source of food. The only way that we can get prevented from this rampage is effective vaccination.

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