

Review Article

A Review on Covid 19 and its Prevention and Control

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Received: December 11, 2023**Accepted:** January 24, 2024**Published:** January 31, 2024

Introduction

The coronavirus is a member of a group of viruses that can cause a number of symptoms, including pneumonia, fever, difficulty breathing, and lung infection. It is a positive single-strand RNA virus with an envelope. It belongs to the Orthocoronavirinae subfamily, as its name implies, whose members have distinctive spikes that resemble "crowns" on their surfaces [46]. Although these viruses are widespread among animals worldwide, only a small number of human infections have been reported (Li *et al.*, 2020). A small Huanan South China Seafood Market in Wuhan, Hubei Province, China was reportedly connected to a cluster of people with pneumonia of unclear cause in December 2019 (Amite *et al.*, 2020).

The newly discovered virus that started causing pneumonia on February 11th, 2020 was identified by the World Health Organization as Coronavirus Disease 2019 (COVID-19) (WHO). Since the virus's initial appearance in China, in December 2019, its incidence had been rising at an epidemic rate. The virus was

Summary

Severe Acute Respiratory Syndrome Corona Virus- 2 (SARS-CoV-2), which causes COVID-19, can infect people with mild to severe illnesses. The objective of this review is to explain about COVID-19 and its prevention and control. In the months following the pandemic's initial detection in China in December 2019, it has quickly spread over the globe. Massive loss of human life has created public health challenges, overburdened health systems, disrupted supply chains and the economy, while triggering a mental health crisis. Fever, cough, lethargy, mild dyspnea, sore throat, headache, conjunctivitis, and gastrointestinal problems are the predominant signs and symptoms of COVID-19. Public health is facing a global challenge from new and reemerging microorganisms. The extremely contagious disease coronavirus (COVID-19) has created significant risks to the world's health. Transmission happens when a person comes into touch with contaminated fomites and breathes in droplets from an infected individual's coughing and sneezing. Everyone of the country or every citizen of the country must trained on prevention and control methods of COVID-19, like the importance of vaccination, regular adequate hand washing, practice covering mouth and noses anytime or while coughing and sneezing, isolate themselves if they are sick and should adopt them.

Keywords: COVID-19; SARS-CoV-2; Pandemic; Prevention and control

Abbreviations: WMHC: Wuhan Municipal Health Commission; WHO: World Health Organization; RT-PCR: Real Time- Polymerase Chain Reaction; SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus-2; RNA: Ribonucleic Acid; ARDS: Acute Respiratory Distress Syndrome; CT: Computed Tomography; NAAT: Nucleic Acid Amplification Test; CDC: Center for Disease Control and prevention

consistently referred to as the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) by the international virus classification commission [56]. The World Health Organization on March 11, 2020, designated the SARS-CoV-2 to be a worldwide pandemic due to its high contagiousness and rapid global expansion [47].

The emergence of SARS-CoV- 2 in the latter part of 2019 is perhaps the biggest health threat in living memory. This novel coronavirus that causes COVID-19, remains a significant threat to life [11]. Massive loss of human life has created public health challenges, overburdened health systems, disrupted supply chains and the economy, while triggering a mental health crisis [17]. Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) causes morbidity and mortality, especially for those who are not vaccinated against COVID-19, and those with chronic medical conditions, and immune-compromised. A mental health crisis was sparked by the loss of human life, which also

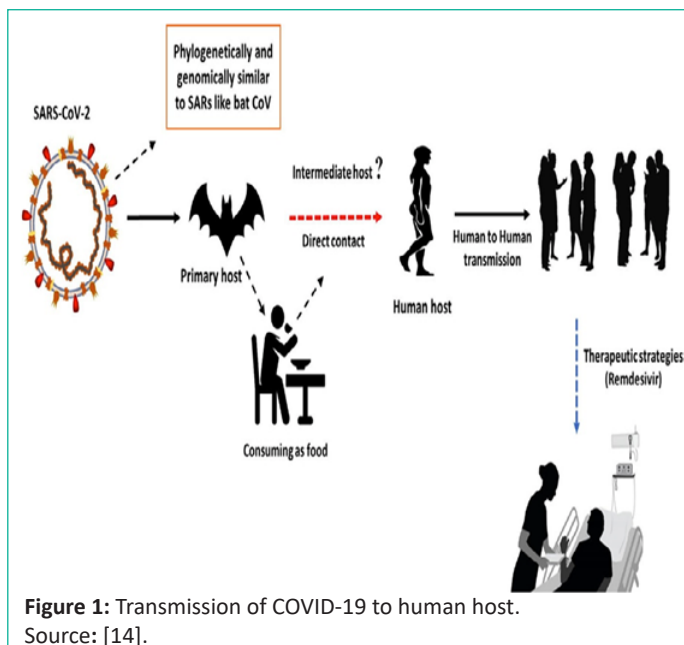


Figure 1: Transmission of COVID-19 to human host.

Source: [14].

overwhelmed health systems, disrupted supply lines, and the economy [6,17].

Economic downturn caused by infection prevention measures including lockdowns, quarantines, and general facemask wear that is either advised or required, and social withdrawal in public places [53]. Currently as of 19 February 2023, over 757 million confirmed cases and over 6.8 million deaths have been reported globally [49]. The public health impact of the SARS-CoV-2 pandemic is beyond everybody's imagination. This pandemic has affected more than 210 countries and a majority of these countries was under some infection control measures, including quarantine, lockdown, and recommended or mandatory general facemask use, and social distancing in public areas. In addition, restriction measures have contributed to a major global economic downturn [30].

The current approach to stopping the spread of instances is prevention. To stop the spread of the disease, early screening, diagnosis, isolation, and treatment are required. Preventive measures emphasize patient isolation and meticulous infection management, including the adoption of appropriate precautions during the diagnosis and delivery of clinical care to an infected patient [48]. Immunization is crucial to lowering illness occurrence and fatality rates. All of the currently available vaccines continue to prevent COVID-19's severe symptoms and mortality quite successfully [3].

According to the WHO's global response strategy to COVID-19, the main goal of all countries is to contain the pandemic by decreasing transmission in order to alleviate the immediate burden on healthcare systems and reduce mortality. Using this approach, everyone has a crucial part to play in preventing COVID-19. People need to adopt habits like consistently thoroughly washing their hands or using alcohol-based hand sanitizers, refraining from touching their faces, covering their mouths and noses when they cough or sneeze, keeping a physical distance, isolating themselves if they are ill, identifying themselves as a contact of confirmed cases when appropriate, and, most importantly, strictly adhering to any rules issued by government or health organization [49]. Even if the disease has the great effects on human health over the world there was the gap of knowledge. Therefore the general objective of this manuscript is to explain COVID-19 disease and its prevention and control.

Literature Review

Etiology

The Nidovirales order contains the Coronaviridae family of enveloped, non-segmented positive-sense RNA viruses, which together make up the large group of viruses known as Corona Virus (CoV). Based on serology, the CoV is classified into four groups: the alpha, beta, gamma, and delta CoVs [12]. The alpha and beta-viruses among them infect mammals, the gamma CoV virus infects birds, and the delta CoV virus can infect both birds and mammals [24].

Although the virus shares 88% sequence similarity with two coronaviruses derived from bats that are comparable to SARS, complete viral genome analysis reveals that the virus is farther away from the severe acute respiratory syndrome coronavirus (SARS-CoV) [9]. A new RNA coronavirus from the same family as SARS-CoV and Middle East Respiratory Syndrome Coronavirus (MERS-CoV). Severe Acute Respiratory Syndrome Corona Virus-2 (SARS-COV-2) is the cause of COVID-19 [10].

Epidemiology

At the whole-genome level, the SARS-CoV-2 virus shares 96% of its genetic makeup with a coronavirus identified from horse-shoe bats (*Rhinolophus affinis*) in Yunnan province, China [36]. It was also discovered that a coronavirus isolated in a Malayan pangolin (*Manis javanica*) has a 91% similar sequence with SARS-CoV-2 at the whole genome level. Genetic characteristics suggest that SARS-CoV-2 either evolved through natural selection in animal species before making the evolutionary leap into humans or that the virus underwent natural selection in the human population following a zoonotic transmission [55].

A different host species contracts the infection during the first stage, but there is no further transmission. For dogs and cats, this scenario is probably accurate, SARS-CoV-2-viremia or even clinical symptoms have sometimes been seen in these animals, who were almost always in close contact with COVID-19-infected people and were the end consequence of human-dog infection or human-cat infection [13].

The possibility that pets may get SARS-CoV-2 originally surfaced during an experimental infection investigation [22]. In particular, SARS-CoV-2 was intranasally administered to 2–6-month-old cats, and 6 days after infection, viral RNA was found in the respiratory system. After three days of interaction between the cats and the uninfected cats, SARS-CoV-2 transmission took place, and antibodies to SARS-CoV-2 were found in the infected and exposed cats. The families Mustelidae, Felinae, and Caninae contain animal species that have contracted the SARS-CoV-2 from COVID-19 infected people [22].

Geographic Distribution

The novel Corona Virus Disease (COVID-19), which originated in China, has spread quickly across borders and infected peoples all over the world. There has been a huge public response to this phenomena [41]. Since the virus's initial appearance in Wuhan, Hubei Province, China, in December 2019, its incidence had been rising at an epidemic rate. The World Health Organization on March 11, 2020, designated the SARS-CoV-2 to be a worldwide pandemic due to its high contagiousness and rapid global expansion [47].

By mid-March, Europe had more cases than anywhere in the world while COVID-19 had spread to more than 160 coun-

tries [20]. As of 18th April 2020, the most-affected countries with more than 30,000 confirmed cases of SARS-CoV-2 were the United States of America, Spain, Italy, Germany, France, the United Kingdom, China, Iran, Turkey, Belgium, the Russian Federation, Canada and Brazil. By the end of August 2020, the United States of America (USA) had the highest number of cases in the world; however, a decline in new cases was seen from previous peaks in July of over 70,000 cases per day to an average of 41,000 new cases per day [47].

A consistent increase in new cases and deaths was seen over the month of September 2020 in the Eastern Mediterranean Region with the highest number of new cases reported by Iraq, Iran and Morocco. The region of Americas continued to be the most affected WHO region with the USA, Brazil, Argentina and Colombia reporting the highest number of new cases in the last week of September. The number of new cases in the USA continued to rise and by the end of October, they started approaching the previous epidemic peak observed in July [47].

The COVID-19 is majorly affecting many countries all over the world, whereas Africa is the last continent to be hit by the pandemic. However, Africa is expected to be the most vulnerable continent where COVID-19 spreading will have a major impact. The continent confirmed its first case of COVID-19 in Egypt on 14th of February, 2020, and from sub-Saharan Africa the first case was reported in Nigeria on 27th of February, in an Italian patient who flew to Nigeria from Italy on 25th of February, 2020 (NCDC, 2020). Ethiopia reported the first case on 13 March 2020. As of 29 September 2020, there had been 73, 944 confirmed cases, 1,177 deaths and 30, 753 recovered cases in Ethiopia [50].

Generally, the current status of COVID-19 as of 19 February 2023, was over 757 million confirmed cases and over 6.8 million deaths have been reported globally and in Ethiopia, there have been 499,329 confirmed cases of COVID-19 with 7,572 deaths reported [49].

Transmission

The Huanan Seafood Wholesale Market in Wuhan was directly associated with the first occurrences of COVID-19 disease, and it was thought that animal-to-human transfer was the primary mode of infection [56]. It appears that COVID-19 may have been first carried by bats and then transferred from person to person after being contracted from pangolin or other wild animals sold at the Huanan seafood market [9].

It has been claimed that close contact with an infected person can cause inter-human transmission. The most common method of transmission is through inhaling droplets from an infected person's coughing and sneezing. Another important path for the spread of this illness is thought to be through fomites. Other coronaviruses can stay live on surfaces for about nine days, but SARS-CoV was found to remain there for about four days [19,21]. The virus survives on aluminum, plastic, and steel for a long time and has the ability to be transmitted through the contacts. There is also a possibility of transmission during recovery and incubation [40].

Asymptomatic people seem to be essential to the transmission process. One of the most effective ways to spread the illness is through social gatherings. Therefore, stadiums are more likely to be relocated in locations like jails, nursing homes for the elderly, gatherings of homeless people, schools, and colleges [42].

Risk factors

People of all ages are susceptible to SARS-CoV-2 infection and serious illness. However, those under 65, those residing in nursing homes or long-term care facilities, those who have not had the COVID-19 vaccine or who have had poor responses to the COVID-19 vaccine, as well as those who have chronic medical issues have a higher risk of developing severe COVID-19. Patients with cardiovascular disease, chronic kidney disease, chronic obstructive pulmonary disease, diabetes with complications, neurocognitive disorders, and obesity are at increased risk of severe COVID-19. Other conditions that may lead to a high risk of severe COVID-19 include cancer, cystic fibrosis, immune-compromising conditions, liver disease (especially in patients with cirrhosis), pregnancy, and sickle cell disease. Transplant recipients and people who are taking immunosuppressive medications may also have a higher risk of severe COVID-19 [26].

Clinical Findings and Symptoms

The clinical features of COVID-19 are diverse and range from asymptomatic to critical illness and death. These symptoms may appear 2-14 days after exposure. The symptoms of COVID-19 vary amongst individuals, ranging from asymptomatic infection to severe respiratory failure [15]. As the upper and lower respiratory tract are mainly infected, influenza-like symptoms tend to be predominant however, sites where the Angiotensin-Converting Enzyme 2 (ACE2) receptor can also be found such as colons, heart and kidneys can be affected as well [16]. The main medical symptoms of Covid-19 are similar to pneumonia [31]. The SARS-CoV-2 infection mainly presents flu-like symptoms common symptoms of the disease are fever, cough, fatigue, slight dyspnea, sore throat, headache and conjunctivitis [8,51].

Fever is the most common symptom, but it is highly variable according to the patient status. On the other hand, critically ill and older patients may not have fever [35]. Although severe lung injury has been described at all ages, in some high-risk individuals, such as the elderly or those affected by multi morbidities, the virus is more likely to cause severe interstitial pneumonia, Acute Respiratory Distress Syndrome (ARDS) and subsequent multi organ failure, which are responsible for severe acute respiratory failure and high death rates. Typically, affected individuals display a variable extent of dyspnea and radiological signs [23,27].

It is therefore difficult to differentiate COVID-19 from other respiratory diseases [38]. It is considered most contagious when people are symptomatic, although transmission may be possible before symptoms show in patients. Time from exposure and symptom onset is generally between two and 14 days, with an average of five days [6].

Diagnosis Methods

The clinical manifestation of novel SARS-CoV-2 (COVID-19) is highly variable from individual to individual, with asymptomatic to acute respiratory distress syndrome and multi organ failure. Hence, the accurate diagnosis of COVID-19 is challenging. The routine clinical diagnosis of COVID-19 is primarily based on epidemiological history, clinical manifestations, and confirmed by a variety of laboratory detection methods, including Computed Tomography (CT) scan, Nucleic Acid Amplification Test (NAAT), and serological techniques [27]. For early screening or diagnosis of SARS-CoV-2 infection, specimens such as nasopharyngeal and/or oropharyngeal swab, bronchoalveolar lavage fluid, spu-

tum, bronchial aspirate, or blood are generally recommended [7,56].

Because of PCR-based techniques are straightforward, extremely sensitive, and extremely specific; they can regularly and consistently identify coronavirus infection in individuals. These assays, which are frequently used to amplify small amounts of Deoxyribonucleic Acid (DNA), begin with the reverse transcription of coronavirus Ribonucleic Acid (RNA) into complementary DNA. It takes up to 4 to 8 hours to process the samples and it can take another 1 to 3 days to provide the findings. It also has a high risk of false-negative results [54].

RT-PCR is a diagnostic test that uses nasal swab, tracheal aspirate or Broncho-Alveolar Lavage (BAL) specimens. The primary, and preferred, method for diagnosis is the collection of upper respiratory samples via nasopharyngeal and oro-pharyngeal swabs. The use of bronchoscopy as a diagnostic method for COVID-19 is not recommended as the aerosol that is generated poses a substantial risk for both patients and healthcare staff. Bronchoscopy can be considered only for intubated patients when upper respiratory samples are negative and other diagnostic tools would significantly change the clinical management. However, bronchoscopy may be indicated when clinical and safety criteria are met and in the case of uncertain diagnosis [42].

Although there are other approaches for diagnosing COVID-19 besides molecular testing like Computed Tomography (CT) scans [32] and serological tests like ELISA (enzyme-linked immune-sorbent assay) are employed [52].

Prevention and Control

There are no approved medications to treat COVID-19 illness at the moment. Supportive therapy, symptom treatment, and attempts to prevent respiratory failure make up the bulk of management. The current approach to stopping the spread of instances is prevention. To stop the spread of the disease, early screening, diagnosis, isolation, and supportive therapy are required. Preventive methods include patient isolation and meticulous infection management, including the adoption of necessary precautions during the diagnosis and delivery of clinical care to an infected patient [33].

Social Distancing

Social distancing is designed to reduce interactions between people in a broader community, in which individuals may be infectious but have not yet been identified hence not yet isolated. As diseases transmitted by respiratory droplets require a certain proximity of people, social distancing of persons will reduce transmission. Social distancing is particularly useful in settings where community transmission is believed to have occurred, but where the linkages between cases is unclear, and where restrictions placed only on persons known to have been exposed is considered insufficient to prevent further transmission. Social distancing includes the closure of schools or office buildings and suspension of public markets, and cancellation of gatherings [45].

Quarantine

One of the oldest and most reliable methods for controlling epidemics of contagious diseases is quarantine. In order to monitor their symptoms and ensure the early diagnosis of cases, the quarantine of people is the limitation of their activities or the separation of people who are healthy but may have

been exposed to an infectious agent or illness. The WHO recommends that contacts of patients with laboratory-confirmed COVID-19 be quarantined for 14 days from the last time they were exposed to the patient [29].

Following the outbreak, the Chinese government supported population prevention and clinical treatment and made incredible strides in responding to disease control, including quarantining over 60,000,000 people, tracing contacts, and taking social removal measures commensurate with risk, while also having unimaginable economic effects. About 43 million people are cut off from 12 other Chinese cities by transportation restrictions established by the Chinese government. The action was done during the Chinese New Year, a time when hundreds of millions of people are uprooted both inside and outside of the nation [5].

Cleaning and Disinfection

High-touch areas such as bedside tables and door handles should be disinfected daily with regular household disinfectant containing a diluted bleach solution (that is, 1-part bleach to 99 parts water). For surfaces that cannot be cleaned with bleach, 70% ethanol can be used. Toilets and bathrooms should be cleaned and disinfected with a diluted bleach solution (one part bleach to 9 parts water to make a 0.5% sodium hypochlorite solution). Disposable gloves should be used when cleaning or handling surfaces, clothes, bed linens, and bath and hand towels should be cleaned using regular laundry soap and water or machine washed at 60–90°C with common laundry detergent [2].

The most important strategy for the population to undertake is to frequently wash their hands and use portable hand sanitizer and avoid contact with their face and mouth after interacting with a possibly contaminated environment. To reduce the risk of transmission in the community, individuals should be advised to wash hands, practice respiratory hygiene (wearing face mask), and avoid crowds and close contact with ill individuals, if possible [48].

Training and Health Education

Staff training, work supervision, and work inspection should be strengthened to improve risk and prevention awareness during the pandemic. Training should be conducted on prevention and control measures of COVID-19. Individuals should be advised to wash hands, practice respiratory hygiene (wearing face mask), and avoid crowds and close contact with ill individuals and vaccination [48].

Vaccination

COVID-19 vaccination does not eliminate the risk of SARS-CoV-2 infection; vaccination does significantly reduce the risk of COVID-19–related morbidity and mortality, particularly in individuals who are at high risk of progressing to severe disease. In individuals who may not be able to mount adequate responses to COVID-19 vaccines due to immune-compromising conditions or the receipt of immunosuppressive medications, the use of the anti-SARS-CoV-2 monoclonal antibodies (mAbs) tixagevimab plus cilgavimab (Evusheld) as Pre-Exposure Prophylaxis (PrEP) can reduce the risk of breakthrough infection and improve clinical outcomes [2,18]. Several vaccines have been developed and they are under trial and some are approved for use while maintaining the appropriate regulations. These vaccines contain mRNA encapsulated in a lipid nanoparticle that is transferred into cells. The host cells produce coronavirus spike

proteins that stimulate the formation of antibodies. This process occurs robustly in regional lymph nodes [34].

The COVID-19 vaccines like Novavax, Johnson, Pfizer and Moderna approved by WHO. These vaccinations may be associated with a fever typically lasting up to 2 days. Pfizer-BioNTech and Moderna vaccines to be effective in preventing infection while being considered safe for pregnancy and the fetus [1]. Generally Coronavirus vaccines are life-saving therapeutics that prevent or minimize covid infections and aid in reducing global transmission [39].

Conclusion and Recommendations

Public health is facing a global challenge from new and re-emerging microorganisms. The extremely contagious disease coronavirus (COVID-19) has created significant risks to the world's health. The SARS-CoV-2 is extremely contagious, quickly spreads throughout the world, and causes death in addition to psychological, mental, and economic effects. Schools, training facilities, and institutions of higher education were closed in the majority of countries as a result of lockdown and social isolation measures brought on by the COVID-19 epidemic. In particular, it causes morbidity and mortality in older individuals and immune-compromised people. Transmission happens when a person comes into touch with contaminated fomites and breathes in droplets from an infected individual's coughing and sneezing. Based on above conclusion the following recommendations are forwarded;

- Everyone should have vaccinated with COVID-19 vaccines.
- Individuals should adopt practices like; regular adequate hand washing, covering mouth and noses anytime or while coughing and sneezing, isolate themselves if they are sick.
- Generally, the government and health minister should continue to aware societies on social Medias to prevent and control of the disease.

Author Statements

Acknowledgments

In particular, I would like to thank my academic adviser, Solomon Shiferaw, for his helpful and insightful advice in helping me to prepare my seminar paper. Additionally, I want to thank seminar coordinator Getachew Mulatu for his unwavering technical guidance.

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