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**HISTORY OF CORONAVIRUS DISEASE (COVID 19)**

The coronavirus belongs to a family of viruses that may cause various symptoms such as pneumonia, fever, breathing difficulty, and lung infection. These viruses are common in animals worldwide, but very few cases have been known to affect humans. The World Health Organization (WHO) used the term 2019 novel corona-virus to refer to a coronavirus that affected the lower respiratory tract of patients with pneumonia in Wuhan, China on 29 December 2019. The WHO announced that the official name of the 2019 novel corona-virus is coronavirus disease (COVID-19). And the current reference name for the virus is severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It was reported that a cluster of patients with pneumonia of unknown cause was linked to a local Hunan South China Seafood Market in Wuhan, Hubei Province, China in December 2019. In response to the outbreak, the Chinese Center for Disease Control and Prevention (China CDC) dispatched a rapid response team to accompany health authorities of Hubei province and Wuhan city to conduct epidemiological and etiological investigations. The WHO confirmed that the outbreak of the coronavirus epidemic was associated with the Huainan South China Seafood Marketplace, but no specific animal association was identified. Scientists immediately started to research the source of the new coronavirus, and the first genome of COVID-19 was published by the research team led by Prof. Yong-Zhen Zhang, on 10 January 2020. Within 1 month, this virus spread quickly throughout China during the Chinese New Year – a period when there is a high level of human mobility among Chinese people. Al-though it is still too early to predict susceptible populations, early patterns have shown a trend similar to Severe Acute Respiratory Syndrome (SARS) and Middle East respiratory syndrome (MERS) coronaviruses. Susceptibility seems to be associated with age, biological sex, and other health conditions. COVID-19 has now been declared as a Public Health Emergency of Inter-national Concern by the WHO. Given the spread of the new coronavirus and its impacts on human health, the research community has responded rapidly to the new virus and many preliminary research articles have already been published about this epidemic. We conducted a scoping review to summarize and critically analyze all the published scientific articles regarding the new coronavirus in January 2020. This review aims to provide the evidence of early findings on the epidemiology, causes, clinical diagnosis, as well as prevention and control of COVID-19 in relation to time, location, and source of publication. This review can provide meaningful information for future research related to this topic and may support government decision-making on strategies to handle this public health emergency at the community, national, and international levels.

**EPIDEMIOLOGY**

On 29 December 2019, the first four cases of an acute respiratory syndrome of unknown etiology were re-ported in Wuhan City, Hubei Province, China among people linked to a local seafood market (“wet market”). Research is underway to understand more about transmissibility, severity, and other features associated with COVID-19. It appears that most of the early cases had some sort of contact history with the original seafood market. Soon, a secondary source of infection was found to be human-to-human transmission via close contact. There was an increase of infected people with no history of exposure to wildlife or visiting Wuhan, and multiple cases of infection were detected among medical professionals. It became clear that the COVID-19 infection occurs through exposure to the virus, and both the immunosuppressed and nor-mal population appear susceptible. Some studies have reported an age distribution of adult patients between 25 and 89 years old. Most adult patients were between 35 and 55 years old, and there were fewer identified cases among children and infants. A study on early transmission dynamics of the virus reported the median age of patients to be 59 years, ranging from 15 to 89 years, with the majority (59%) being male. It was suggested that the population most at risk may be people with poor immune function such as older people and those with renal and hepatic dysfunction. The COVID-19 has been found to have higher levels of transmissibility and pandemic risk than the SARS-Co, as the effective reproductive number (R) of COVID-19 (2.9) is estimated to be higher than the re-ported effective reproduction number (R) of SARS (1.77) at this early stage. Different studies of COVID-19 have estimated the basic reproduction (R0) range to be from 2.6 to 4.71. The average incubation duration of COVID-19 was estimated to be 4.8 ± 2.6, ranging from 2 to 11 days and 5.2 days (95% confidence interval, 4.1 to 7). The latest guidelines from Chinese health authorities stated an average incubation duration of 7 days, ranging from 2 to 14 days. In China, 11 791 cases were confirmed and 17 988 cases were suspected in 34 provinces as of 24:00, 31 January 2020. Studies indicated that the spread of COVID-19 was relatively quick and reported that it had spread to several other countries after it’s out-breaking in China. On 31 January 2020, there were 213 deaths reported globally. Confirmed cases were re-ported in the following 19 countries outside of China: Australia (9), Canada (3), Cambodia (1), France (6), Finland (1), Germany (5), India (1), Italy (2), Japan (14), Nepal (1), Malaysia (8), the Philippines (1), the Republic of Korea (11), Singapore (13), Sri Lanka (1), Thailand (14), the United States of America (6), United Arab Emirates (4) and Vietnam (5).

**CAUSES**

Virology and pathogenesis Coronaviruses are enveloped single-stranded RNA viruses that are zoonotic in nature and cause symptoms ranging from those similar to the common cold to more severe respiratory, enteric, hepatic, and neurological symptoms. Other than SARS-CoV-2, there are six known coronaviruses in humans: HCoV-229E, HCoV-OC43, SARS-CoV, HCoV-NL63, HCoV-HKU1, and MERS-CoV. Coronavirus has caused two large-scale pandemics in the last two decades: SARS and MERS. To detect the infection source of COVID-19, China CDC researchers collected 585 environmental samples from the Huainan Seafood Market in Wuhan, Hubei Province, China on 1 January and 12 January 2020. They detected 33 samples containing SARS-CoV-2 and indicated that it originated from wild animals sold in the market. Then, researchers used the lung fluid, blood, and throat swab samples of 15 patients to conduct laboratory tests. These laboratory tests found that the virus-specific nucleic acid sequences in the sample are different from those of known human corona-virus species. Laboratory results also indicated that SARS-CoV-2 is similar to some of the beta (β) coronaviruses gen-era identified in bats, which is situated in a group of SARS/SARS-like CoV. To conduct next-generation sequencing from bron-choalveolar lavage fluid and cultured isolates, researchers enrolled nine inpatients in Wuhan with viral pneumonia and negative in common respiratory pathogens. The results of this next-generation sequencing indicated that SARS-CoV-2 was more distant from SARS-CoV (with about 79% sequence identity) and MERS-CoV (with about 50% sequence identity) than from two bat-derived SARS-like coronaviruses – bat-SL-CoVZC45 (with 87.9% sequence identity) and bat-SL-CoVZXC21 (with 87.2% sequence identity). Studies also reported that COVID-19 S-protein supported strong interaction with human ACE2 molecules despite the dissimilarity of its sequence with that of SARS-CoV. Transmission pattern Many domestic and wild animals, including camels, cattle, cats, and bats, may serve as hosts for coronaviruses. It is considered that, generally, animal coronaviruses do not spread among humans. However, there are exceptions, such as SARS and MERS, which are mainly spread though close contact with infected people via respiratory droplets from cough or sneezing. With regard to COVID-19, early patients were reported to have some link to the Huainan Seafood Market in Wuhan, China, suggesting that these early infections were due to animal-to-person transmission. However, later cases were reported among medical staff and others with no history of exposure to that market or visiting Wuhan, which was taken as an indication of human-to-human transmission the latest guidelines from Chinese health authorities, described three main transmission routes for the COVID-19: 1) droplets transmission, 2) con-tact transmission, and 3) aerosol transmission. Droplets transmission was said to occur when respiratory droplets are ingested or inhale by individual nearby in close proximity, contact transmission may occur when subject touches a surface or object contaminated with the virus and subsequently touch their mouth, nose, or eyes; and aerosol transmission may occur when respiratory droplets mix into air, forming aerosols and may cause infections when inhaled high dose of aerosols into the lungs in a relatively closed environment. In addition to these three routes, one study also indicates the digestive system as a potential transmission route for COVID-19 infection. Since patients had abdominal discomfort and Diarrhea with singe-cell transcriptions of digestive system and found that ACE2 was highly expressed in absorptive enterocytes from ileum and colon.

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| **CLINICAL MANIFESTATION AND DIAGONISIS** The complete clinical manifestation is not clear yet, as the reported symptoms range from mild to severe, with some cases even resulting in death. The most commonly reported symptoms are fever, cough, myalgia or fatigue, pneumonia, and complicated dyspnea, whereas less common reported symptoms include headache, diarrhea, hemoptysis, runny nose, and phlegm- producing cough. Patients with mild symptoms were reported to recover after 1 week while severe cases were reported to experience progressive respiratory failure due to alveolar damage from the virus, which may lead to death. Cases resulting in death were primarily middle-aged and elderly patients with pre-existing diseases (tumor surgery, cirrhosis, hypertension, coronary heart disease, diabetes, and Parkinson’s disease). Case definition guidelines mention the following symptoms: fever, decrease in lymphocytes and white blood cells, new pulmonary infiltrates on chest radiography, and no improvement in symptoms after 3 days of antibiotics treatment. For patients with suspected infection, the following procedures have been suggested for diagnosis: performing real-time fluorescence (RT-PCR) to detect the positive nucleic acid of SARS-CoV-2 in sputum, throat swabs, and secretions of the lower respiratory tract samples.**PREVENTION AND CONTROL**Prevention and control strategies and methods are reported at three levels: national level, case-related population level, and general population level. At the national level, the National Health Commission of the People’s Republic of China issued the “No.1 announcement” on 20 January 2020, which officially included the COVID-19 into the management of class B legal infectious diseases, and allowed for class A infectious disease preventive and control measures to be implemented. Under this policy, medical institutes can adopt isolation treatment and observation protocols to prevent and control the spread of the COVID-19. On 22 January 2020, the National Health Commission published national guide-lines for the prevention and control of COVID-19 for medical institutes to prevent nosocomial infection. On 28 January 2020, the National Health Commission issued protocols for rapid prevention and control measures in order to effectively contain the spread of the epidemic through a “big isolation and big disinfection” policy during the Chinese Spring Festival. National-level strategies have also been issued with targeted measures for rural areas (issued on 28 January 2020) and the elderly population (issued on 31 January 2020). Several public health measures that may prevent or slow down the transmission of the COVID-19 were introduced; these include case isolation, identification and follow-up of contacts, environmental disinfection, and use of personal protective equipment. To date, no specific antiviral treatment has been confirmed to be effective against COVID-19. Regarding patients infected with COVID-19, it has been recommended to apply appropriate symptomatic treatment and supportive care. There are six clinical trials registered in both the International Clinical Trials Regis-try platform and the Chinese Clinical Trial Registry to evaluate the efficacy or safety of targeted medicine in the treatment or prognosis of COVID-19. Regarding infected patients with COVID-19, it has been recommended to apply appropriate symptomatic treatment and supportive care. Studies have also explored the prevention of nosocomial infection and psychological health issues associated with COVID-19. A series of measures have been suggested to reduce nosocomial infection, including knowledge training for prevention and control, isolation, disinfection, classified protections at different degrees in infection areas, and protection of confirmed cases. Concerning psychological health, some suggested psychological intervention for confirmed cases, suspected cases, and medical staff. For the general population, at this moment there is no vaccine preventing COVID-19. The best prevention is to avoid being exposed to the virus. Air-borne precautions and other protective measures have been discussed and proposed for prevention. Infection preventive and control (IPC) measures that may re-duce the risk of exposure include the following: use of face masks; covering coughs and sneezes with tis-sues that are then safely disposed of (or, if no tissues are available, use a flexed elbow to cover the cough or sneeze); regular hand washing with soap or disinfection with hand sanitizer containing at least 60% alcohol (if soap and water are not available); avoidance of contact with infected people and maintaining an appropriate distance as much as possible; and refraining from touching eyes, nose, and mouth with un-washed hands. The WHO also issued detailed guidelines on the use of face masks in the community, during care at home, and in the health care settings of COVID-19. In this document, health care workers are recommended to use particulate respirators such as those certified N95 or FFP2 when performing aerosol-generating procedures and to use medical masks while providing any care to suspected or confirmed cases. According to this guide-line, individuals with respiratory symptoms are advised to use medical masks both in health care and home care settings properly following the infection prevention guidelines. According to this guideline, an individual without respiratory symptoms is not required to wear a medical mask when in public. Proper use and disposal of masks is important to avoid any increase in risk of transmission. In addition to articles published in research journals, the China CDC published a guideline to raise awareness of the prevention and control of COVID-19 among the general population. The key messages of the guideline include causes, how to choose and wear face masks, proper hand washing habits, preventive measures at different locations (e.g., at home, on public transportation, and in public space), disinfection methods, and medical observation at home. In addition to scientific know-ledge on ways to handle the COVID-19 outbreak, the guideline also suggests ways to eliminate panic among the general population.**STRENGTHS AND LIMITATIONS OF THE STUDY**The review applied a systematic and rigorous search strategy to retrieve relevant articles according to the re-search objectives. This research summarizes scientific foundations, identifies literature gaps, and suggests some evidence for future research directions on COVID-19 which will provide information for research community, policymakers, and health professionals to adjust and/or come up with new research, policies, and practices. Our study only focuses on the articles published either in English or in Chinese during the early outbreak period. Although, it cannot reflect the entire body of research on COVID-19 worldwide, it will provide some evidences for future study and control.**CONCLUSIONS**This study shows a holistic picture of the current re-search in response to the outbreak of COVID-19. During this early period, many studies have been published exploring the epidemiology, causes, clinical manifestation and diagnosis, and prevention and control of the novel coronavirus. Thus far, most studies have focused on the epidemiology and potential causes. However, studies exploring prevention and control measures have begun to gradually increase. Studies in this domain are urgently needed to minimize the impact of the outbreak. Government agencies have quickly incorporated recent scientific findings into public policies at the community, regional, and national levels to slow down and/or pre-vent the further spread of the COVID-19. We recommend that the scholarly community conduct further research to provide valid and reliable ways to manage this kind of public health emergency in both the short-term and long-term. |