REVIEW ARTICLE

Epidemiological and Clinical Aspects of the Coronavirus Disease 2019 (COVID-19) Outbreak Based on Global Data: A Review Article

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Abstract

Background: In December 2019, a series of pneumonia cases of unknown cause appeared in Wuhan, China, which was very similar to viral pneumonia. In late January 2020, the World Health Organization named this disease the sixth public health emergency of international concern due to an increase in the number of COVD-19 cases. This study was designed to determine different epidemiological and clinical aspects of COVID-19 worldwide.

Methods: This is a review study. We searched for articles related to COVID-19 from December 20, 2019 to June 05, 2020. Two researchers performed the search separately, and finally articles containing information on coronavirus, its mortality and epidemiology and clinical characteristics of the patients were selected for review and extraction.

Results: The results of various studies show that the most common symptoms of the disease include fever, cough and fatigue, and the most common respiratory symptom is Rhinorrhoea. Transmission occurs primarily when an infected person sneezes or coughs through respiratory droplets, such as the spread of influenza and other respiratory pathogens. Some studies have reported that the COVID-19 incubation period is an average of 4.6 days, ranging from 1.2 to 11.1 days and can potentially be asymptomatic.

Conclusion: The significant increases in the morbidity and mortality necessitate prevention and control activities by educating people on important health issues such as staying at home, using clean masks and gloves, as well as performing proper and timely medical interventions.

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Introduction

Coronaviruses are RNA viruses from the family Coronaviridae and order Nidovirales that are widely distributed among humans and other mammals.[1] Although most human coronavirus infections are mild, beta-coronavirus epidemics, including acute respiratory coronavirus syndrome (SARS-CoV) and Middle Eastern coronavirus respiratory syndrome (MERS-CoV), have caused approximately 10,000 deaths in the past two decades, with a death rate of 10% for SARS-CoV and 37% for MERS-CoV.[2] 2019-nCoV genome analysis reveals that it is different from SARS-CoV and MERS-CoV.[3] Human coronaviruses have been recognized for the first time since the 1960s, with a high percentage of respiratory infections in children and adults.[4]

In December 2019, a series of pneumonia cases of unknown etiology appeared in Wuhan, China,

which was very similar to viral pneumonia, and these patients were epidemiologically linked to a seafood market.[5] The disease is rapidly spreading in China and other countries worldwide.[6, 7] Although preliminary studies indicated a link between seafood and wildlife markets with coronavirus disease, subsequent studies have increasingly shown that SARS-CoV-2 is contagious through direct contact and droplets from human to human.[8, 9] On 30 January 2020, the World Health Organization named COVID-19 after H1N1 in 2009, polio in 2014, Ebola in West Africa in 2014, Zika in 2016, and Ebola in the Democratic Republic of the Congo in 2019, as the sixth public health emergency and international concern.[10] In-depth analysis of lower respiratory tract specimens revealed that a new coronavirus was named on February 11, 2020 by the World Health Organization, the 2019 novel coronavirus (2019-nCoV).[5, 11] As global outbreaks progress, epidemiological data are needed to guide and develop prevention, control, and intervention strategies. This article is an attempt to provide comprehensive information about the new epidemiologic findings of coronavirus that have been reported worldwide. Therefore, the present study was designed to determine different epidemiological aspects of COVID-19 worldwide.

Methods

The present article is a review study. Articles and information related to coronavirus were searched from December 20, 2019 to June 05, 2020 in the PubMed/Medline, Google Scholar, Scopus, Embase and ISI Web of Science databases. Two researchers performed the search separately, and finally articles containing information on coronavirus, its mortality and epidemiology and clinical characteristics of patients were selected for review and extraction. The search strategy included the keywords such as Coronavirus, COVID-19, epidemiology, clinical characteristics, transmission and mortality. Table was used to show the prevalence (percentage) of patients with coronavirus and its resulting mortality.

Results

Transmission

The COVID-19 epidemic, like the SARS, occurred during the Spring Festival in China, China's most famous traditional festival. During the celebration, many people from all over China attended the celebration, where conditions for the transmission of contagious diseases became very favorable.[12] After the first cases of the disease, secondary cases were reported after approximately 10 days, in addition to the fact that these new patients had no contact with the seafood market, but they had a history of contact with patients.[12] Some sources have suggested that after the SARS epidemic, bats have been considered as a potential reservoir that could contribute to the subsequent human coronavirus epidemic.[13] Often, human-to-human transmission occurs in close contact. Transmission occurs primarily when an infected person sneezes or coughs through respiratory droplets, such as the spread of influenza and other respiratory pathogens. These droplets can be located by inhalation in the mouth or mucosa of the nose and lungs of the person.[12] Although evidence at the outset of the outbreak showed that COVID-19 could not easily spread to humans, it is now well known that the infection is transmitted from person to person.[14] In general, transmission of respiratory viruses occurs through large respiratory droplets, but some respiratory viruses can be transmitted through particle aerosols.[15] Coronaviruses can also infect humans through the gastrointestinal tract, and fecal and oral transmission may also be involved.[14, 16]

Epidemiology

Based on preliminary observations from outbreaks of the disease in China on January 10 to 24, 2020, it was found that the incidence of the disease was largely exponential, with an estimated average reproduction of 2.24 with 95% confidence interval (1.96-2.25) to 3.58 with 95% confidence interval (2.89-4.39) and with a 2 to 8 time increase in the rate of this report.[9, 11] Some studies have reported that the COVID-19 incubation period is an average of 4.6 days, ranging from 1.2 to 11.1 days and can potentially be asymptomatic.[17] In some other sources, the incubation period is estimated to be 5.2 days on average[18] and the onset of symptoms until death is approximately 14 days (ranging from 6 to 41 days). It significantly depends on the age and immune status of the individual.[19] An analysis of 425 confirmed COVID-19 patients whose disease began in the 12 to 22 January 2020 period revealed that about 73% of these patients had contact with seafood markets and others with respiratory symptoms had not reported this type of contact.[18] In another report on January 24, 2020, COVID-19 cumulative cases in China were estimated 5502.[20] By January 30, 2020, there were 7734 cases in China, and 90 cases in other countries such as Taiwan, Thailand, Vietnam, Malaysia, Nepal, Sri Lanka, Cambodia, Japan, Singapore, the Republic of Korea, the United Arab Emirates, the United States, the Philippines, India, Australia, Canada, Finland, France, and Germany with a mortality rate of 2.2.[21] From December 18, 2019 to December 29, 2019, 5 patients with acute respiratory distress syndrome were admitted in the hospital, one of whom died.[22] By January 2, 2020, 41 patients were hospitalized with COVID-19 confirmed by the laboratory.[2] As of January 22, 2020, a total of 571 cases of coronavirus had been reported in 25 provinces in China.[23]

Symptoms

The most common symptoms of COVID-19 are fever, cough and fatigue. Other symptoms of the disease include sputum production, haemoptysis, headache, diarrhea, indigestion, and lymphopenia, with the most common respiratory symptoms being Rhinorrhoea. (Table 1).[5]

Table 1: Systematic and respiratory symptoms associated with COVID-19

Systematic disorders	Respiratory disorders
Fever	Rhinorrhea
Cough	Sneezing
Fatigue	Sore Throat
Sputum production	Pneumonia
Headache	Ground-glass Opacity
Hemoptysis	RNAaemia
Acute Cardiac Injury	Acute Respiratory distress syndrome
Hypoxemia	
Dyspnea	
lymphopenia	
Diarrhea	

Some studies have suggested that the loss of sense of smell and taste is a strong indication of the detection of covid-19.[24]

Case Presentation

A study conducted by Sun et al. between January 13 and January 31, 2020 on 507 patients (364 from China and 143 from outside China) with COVID-19 found that the median age was 46 years. 55 percent of them were male. Less than 3% of patients were younger than 15 years.[25] A study by Huang et al. in January 2020 in Wuhan and 41 hospitalized patients with coronavirus found that the majority of cases were men (about 73%); about 32% with background diseases included diabetes, hypertension and cardiovascular disease. The median age of the patients was 49 years, with 66% being exposed to the seafood market. The most common onset symptoms were fever, cough, myalgia and fatigue. Less common symptoms included sputum production, headache, and diarrhea. In 55% of patients, dyspnea was observed (median time to the onset of dyspnea was 8 days).[2]

A study by Lai et al. in Wuhan, China, on 278 patients with clinical manifestations of SARS-CoV-2 pneumonia found that all patients were over 18 years of age and 61.9% of all patients were men.[9] Chen et al. in a study of 99 patients with coronavirus found that the mean age of the patients was 55.5 years, 67.7% were men, and 40.4% had underlying diseases such as cardiovascular diseases. The most common symptoms were fever, cough and shortness of breath, respectively. The mean white blood cell count was 7,500 per microliter.[26] In another study by Wang et al. on 138 patients at a Wuhan hospital showed that the mean age of the patients was 56 years and 54.3% were men. More than 46% of the patients had underlying diseases such as cardiovascular disease, hypertension, and diabetes. The most common symptoms were fever, cough, myalgia and shortness of breath, respectively. Their mean white blood cell count was 4,500 per microliter.[7] A study in Beijing city showed that 2 out of 13 patients with SARS-CoV-2 pneumonia were children aged 2 to 15 years.[8] A study conducted by Jiehao et al. from January 19, 2020 to February 3, 2020 in China on 10 children with COVID-19 found that 80 of them were in direct contact with adult patients with coronavirus. 80% of these patients had fever, 60% had cough symptoms, and 40% had sore throat. One of the patients with COVID-19 was a 3-month-old infant, to whom the disease was transmitted by her parents due to unprotected parenting care.[27]

In a study by Pavan K. Bhatraju et al. (February 24 to March 9, 2020), a study of 24 patients with COVID-19 with an age range of 23 to 97 found that 63% of patients were male. The duration of diagnosis of symptoms before hospitalization was 3 to 11 days. 54% of patients had been in contact with sick people, but it was not clear how these calls were and whether they were contagious. The most common symptoms included shortness of breath and cough, which were found in 88% of patients. Fifty percent of patients also had a fever when hospitalized. Fifty-eight percent had diabetes, 21 percent had chronic kidney disease, 14 percent had asthma, and 22 percent had a history of smoking. Based on laboratory or radiological findings, lymphocytopenia was found to be a common complication in 75% of patients and 96 percent of patients on chest radiographs showed both the left and right lungs being opaque. All patients were hospitalized due to hypoxemia respiratory failure, and 75% of them required mechanical ventilation. Finally, 12 patients died.[28]

Another study by Rahimzadeh et al. on nine children with COVID-19 who were admitted to Iranian hospitals found that six children had a son, the youngest was a 2-year-old patient and the oldest was 10 years old. All the children had at least one member of the family infected with COVID-19. The most common symptoms of these children included fever, chills, myalgia, cough, and tachypnea. None of the patients had symptoms such as runny nose, diarrhea and vomiting. Three patients also had leukopenia and lymphopenia.[29]

One of the limitations of this study was the lack of review of articles whose full text was not available.

Conclusion

The number of cases of COVID-19 and its associated

mortality is increasing dramatically, so proper interventions, prevention and control of the disease, and timely diagnosis can be effective in reducing those cases. Encouraging people to stay at home and train them in the use of health masks and gloves to cut the chain of transmission can be effective worldwide. Despite various studies around the world, further research is needed to better understand the disease because of the daily variation in the number of patients and the ambiguity of other epidemiological aspects of COVID-19.

Conflict of Interest: None declared.

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