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MINI REVIEW ARTICLE

Human coronaviruses with emphasis on the COVID-19 outbreak

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Abstract Human coronaviruses are known as respiratory pathogens mainly associated with a range of respiratory diseases. In the past 18 years, the beginning of severe acute respiratory syndrome human coronavirus (SARS-HCoV), Middle East respiratory syndrome coronavirus (MERS-CoV) and now the (COVID-19) have driven the HCoV into the platform of the scientific community due to their high pathogenicity in humans. Our study about the HCoV has contributed extensively to the understanding of HCoV pathogenesis its outbreak and precautionary measurements mainly COVID-19. By the 16-February 2020, total existing diagnosis cases of COVID-19, in china now numbered around 57,255, total cumulative diagnosis is about 68,592, total existing suspicion is about 8228, a total severe existing disease 11,272, the total cumulative cure is about 9671 with more than 1666 cumulative deaths have been reported. The purpose of the review is to summarize the present knowledge on the viral diversity, reservoir hosts, and geographical distributions of Human coronavirus (COVID-19) in China.

Keywords Human coronaviruses (HCoV) · COVID-19 · Outbreak · Epidemics · Preventions

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Introduction

Coronaviruses are positive-standard enveloped RNA viruses belonging to the order Nidovirales and family Coronaviridae [5]. The first two human coronaviruses, (HCoV-229E) and (HCoV-OC43) were discovered in the mid-1960s. They are the renowned cause of the common cold [7]. With the advent of the world epidemic, severe acute respiratory syndrome human coronavirus (SARS-HCoV) in 2002–2003 reintroduced the family Coronaviridae [3, 14]. Two of the b-CoVs, the severe acute respiratory syndrome CoV (SARS-CoV) and the Middle East respiratory syndrome CoV (MERS-CoV), have caused serious epidemics [19].

In November 2002, SARS emerged in southern China and the first case was recorded in Foshan city, Guangdong Province and then was spreading across the world in 2003, resulting about 8000 cases with a fatality rate of about 10% [3] (WHO 2004). The SARS-CoV originates from bats/-civet cats [6].

Ten years later, MERS emerged in Saudi Arabia and spread to about 27 different countries resulting in 2249 confirmed cases of infection with a fatality rate of about 35% (up to September 2018) (WHO 2016) [4]. The major reservoir for MERS-CoV is dromedary camels (Reusken et al. 2016). In 2012, Middle East respiratory syndrome coronavirus (MERS-CoV causes mild to severe fever, cough, diarrhea and shortness of breath (De Wit et al., 2013. Both viruses; MERS and MERS-CoV are zoonotic. Nevertheless, both viruses can be transmitted from human to human (de Wit et al., 2016). In contrast, a few other human CoVs of zoonotic origin only cause mild infections of the respiratory tract, such as HCoV-OC43 and HCoV-HKU1 (Gaunt et al. 2010). In 2004–2005, two more human coronaviruses were discovered (HCoV-NL63) causes mild

to moderate upper respiratory tract infections and sever lower tract infection and (HKU1) causes acute respiratory distress and pneumonia [15, 16]. Now in 2019–2020, a novel coronavirus (2019-nCoV) has been discovered which causes respiratory illness and continues to expand [10].

Taxonomy

CoVs are a group of large enveloped RNA viruses of the family Coronaviridea family. Together with Coronaviridae, Roniviridae and Artierivirdae are classified under the Nidovirale order [11, 12]. According to the International Committee for the taxonomy of viruses, CoVs are further divided into four main genera, *Alpha, Beta, Gemma* and *Delta* coronaviruses based on the sequence comparison of the entire viral genome [8, 13]. The number of species will continue to increase as there are still many unclassified CoVs [6, 17]. However, among these, human coronaviruses (HCoVs) are identified to be either in the *Alpha* or *Beta* coronaviruses, HCoV-HKU1, MERS-CoV, SARS-CoV, HCoV-OC43 and 2019-nCoV.

Initially, the Novel Coronavirus has been referred to as 2019-nCoV. But during a news conference on Feb. 8, Chinas National Health Commission give the virus a temporary name, the Novel Coronavirus Pneumonia or NCP. However, the (2019-nCoV) has been recently named COVID-19 by the director-general of the World Health Organization (WHO) Dr. Tedros Adhanom Ghebreyesus.

Origin of the COVID-19

It is speculated that the COVID-19 was first detected near Zhoushan or other places. The COVID-19 was initially isolated from stallholders who worked at the South China seafood market in Wuhan City, Hubei Province, China [9, 10, 20]. This market illegally sells wild animals or mammals, which were likely intermediate hosts of the COVID-19 that were originally from bat hosts. However, the wild mammals may have been sold to the seafood market in Wuhan but infect still the exact host of this COVID-19 is still an enigma. Therefore more studies are required to know about the exact hosts of the COVID-19.

Geographical distribution

The verified COVID-19 occurred at Wuhan City, Hubei Province, China but then the outbreak has rapidly evolved affecting other parts of China. According to the COVID-19 Global Pandemic Real-Time Report (2020), cases have now been detected in different countries and regions of Asia, Australia, Europe, and North America [9].

Zoonotic nature of the COVID-19

COVID-19 is a new strain that has not been previously identified in the human population. Coronaviruses are zoonotic, meaning they are transmitted between animals and people. The virus seems to be transmitted mainly via respiratory droplets that people sneeze, cough or exhale.

An outbreak of the COVID-19

The COVID-19 occurred at Wuhan City, Hubei Province, China. Now the outbreak has rapidly evolved affecting other parts of China (Fig. 1). The COVID-19 also occurred in different parts of the world affecting 29 countries and territories and now 1 international conveyance (The "Diamond Princess" cruise ship currently harbored the Yokohama Japan).

By the 16-February 2020, a total existing diagnosis in china now numbered around 57,255, total cumulative diagnosis is about 68,592, total existing suspicion is about 8228, a total severe existing disease 11,272, the total cumulative cure is about 9671 with more than 1666 cumulative deaths have been reported. In addition to Wuhan, Xiaogan, Huanggang and Jingzhou are the 3 cities with a high cumulative diagnosis rate (Fig. 2). The medical treatment level of these 3 cities is not good as that of Wuhan because at the early stage the outbreak of COVID-19 has not been controlled. Now with the arrival of the medical team and the implementation of precautionary measurement, the newly diagnosed cases in these 3 cities have decreased and the cure rate increased significantly. Moreover, the COVID-19 affecting the 29 countries with a total of 780 confirmed cases [18]. Whereas Japan reporting the highest number of cases. Therefore, keeping in view the rapid outbreak of the virus that dominating most parts of the earth planet and affecting the human lives, the WHO Director-General declared that the outbreak constitutes a Public Health Emergency of International Concern (PHEIC) on 30 January 2020.

Most importantly, Pakistan is still safe from the outbreak of this deadly COVID-19. However, if Pakistan will not take the precautionary measures on an urgent basis, then it will soon bear the huge consequences of COVID-19, which will not only damage their economy but will also affect a precious human life as well.

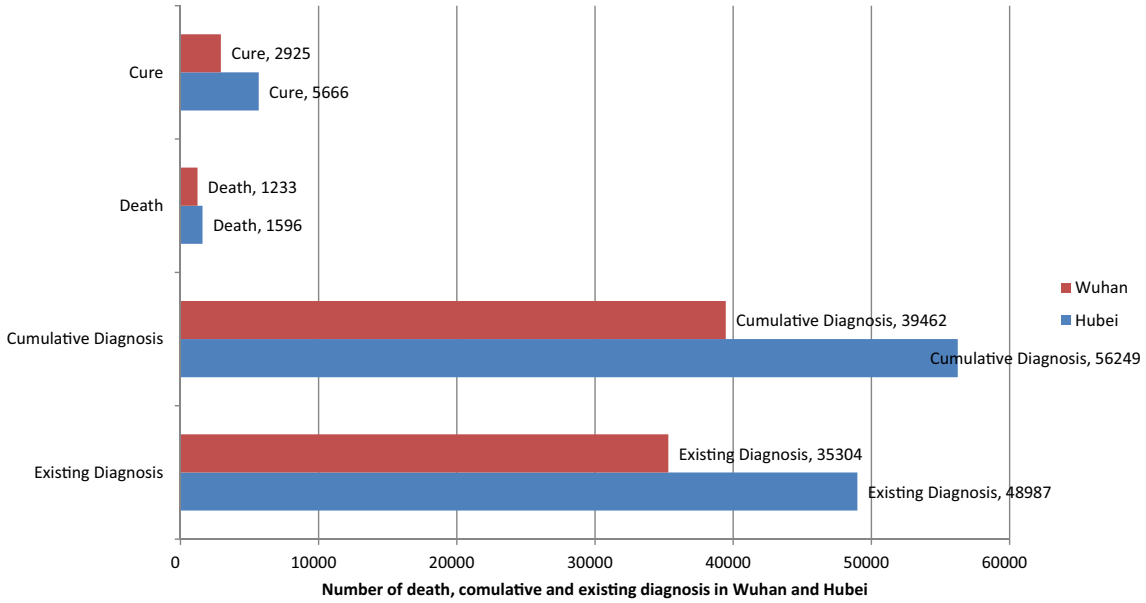

Fig. 1 Showing the number of existing diagnosis cases, cumulative diagnosis, death and cure in Wuhan and overall Hubei Province

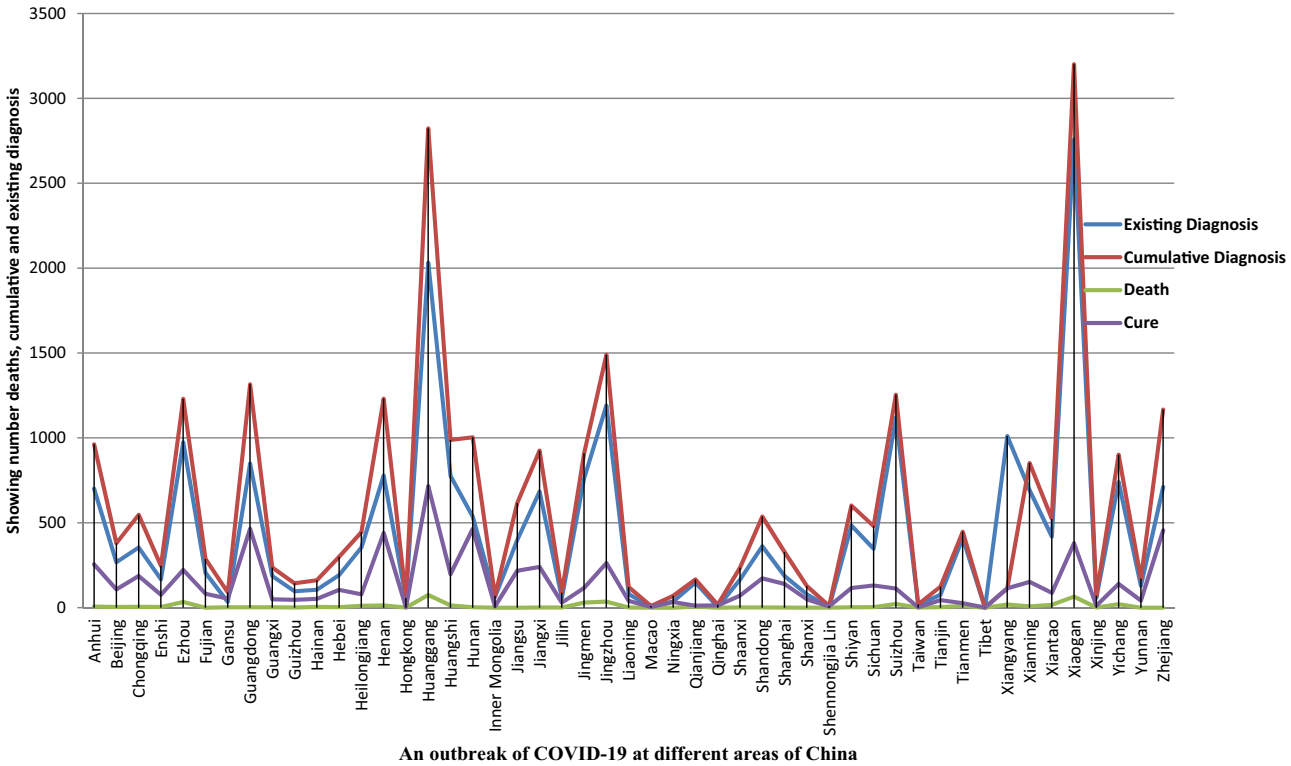

Fig. 2 Showing an outbreak of the COVID-19 in different geographical regions of China

Symptoms of COVID-19

The symptoms of this COVID-19 are somewhat is same is that of MERS-CoV. Symptoms include mild flu, such as fever, cough, difficulty in breathing, pain in the muscles and tiredness. More serious cases develop pneumonia, acute respiratory distress syndrome, sepsis and septic shock that can lead to the death of the patients.

Control measurements of COVID-19

To date, there is no specific treatment for this disease, so the approach used to treat the patients with coronavirus-related infections. However, the epidemic that once seemed hopelessly out of control could be contained now. The precautionary measures taken by the Chines Government have been extraordinary and were seeing the effects. China has completely locked down several cities, threatened quarantined violators with strong punishments for their safety and to overcome the outbreak of COVID-19.

There are some basic protective measures against the COVID-19 need to be followed recommended by WHO 2020.

- Stay aware of the latest information on the COVID-19 outbreak through your local and national health authorities.
- Wash your hands with an alcohol-based rub or wash them with soap and water frequently.
- Maintain at least one-meter distance between yourself and anyone who is coughing or sneezing.
- Avoid touching eyes, nose and mouth.
- Practice respiratory hygiene.
- If you have fever, cough, and difficulty in breathing, seeks medical care at the earliest possible.
- Stay informed and follows the advice given by the healthcare provider.
- Avoid physical contact when greeting.
- Be supportive, careful, alert, kind and ready to fight COVID-19.

Conclusion

Human coronaviruses have been identified as mild respiratory pathogens that affect the human population. However, it was the emergence of COVID-19 that thrust these HCoV into the spotlight of the research field. The outbreak of COVID-19 is considered more severe than the previous SARS-CoV and MERS. Therefore most of the HCoV research today is concerned towards 2019-nCoV which has been recently named COVID-19. More emerging HCoVs might likely surface to threaten global public health. As the high mortality rates of the two past outbreaks i.e. SARS-CoV 10%, and MERS-CoV 35%. Therefore, the study of the pathogenesis of all HCoVs especially COVID-19 would gain more insights for the development of antiviral drugs and vaccines.

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