Review Article

COVID-19: Features, Clinical Course and Concerns

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Abstract

The coronavirus disease 2019 (COVID-19) was first detected in December 2019 in Wuhan, China . So far, 136 reports from the WHO were reported. In the latest report, 6416828 patients in almost all countries have been infected with the COVID-19. The present study discusses the different aspects of COVID such as emergence, signs and symptoms, comparisons with SARS and MERS, concerns, governments' actions in controlling the virus and a descriptive analysis of the spread and death. The emergence of the coronavirus family in the last two decades has created a public health issue around the world. It has also caused serious damages to infrastructure, economy, culture and communities of countries. Thus, affected governments have taken steps to reduce these concerns such as quarantine, education, traffic control, closure of recreational centers, reduction of working hours etc. Despite strict measures to contain the COVID-19, this virus is still expanding and the question of "what actions should be taken with what political package?" is being asked. To answer this question, it is important to understand the process of disease occurrence and modeling different interventions on changing the natural course of the disease is very important.

Keywords: COVID-19, Novel coronavirus, SARS-CoV-2, Coronavirus case fatality, MERS, SARS

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Introduction

The coronavirus disease 2019 (COVID-19) was first detected in December 2019 in Wuhan, China (1). The COVID-19 was originally known as the 2019 novel coronavirus (2019-nCoV), but on 11 February 2020, the World Health Organization (WHO) named it COVID-19 (2). So far, 136 reports from the WHO have been reported. In the latest report, 6416828 patients in almost all countries have been infected with the COVID-19 (https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200604-covid-19-sitrep-136.pdf?sfvrsn=fd36550b_2).

The first epidemic of coronaviruses goes back to November 2002 where the virus severe acute respiratory syndrome (3) coronavirus was identified in southern China (Guangdong province) (4). This virus killed 774 patients (out of 8448 cases) in 37 countries (5, 6).

Other types of coronavirus such as the Middle East respiratory syndrome (MERS) was identified in 2012 in Saudi Arabia and South Korea (7). MERS coronavirus was transmitted directly and indirectly through dromedary camels to humans, although the mode of transmission remains unclear. More than 36% of cases of those diagnosed with MERS symptoms died (360 deaths out of 983 cases) (8).

The rise of coronavirus in human: in November 2002 in Guangdong, China SARS coronavirus was transmitted to humans via an animal virus from an uncertain animal whose speculation is more on bats (9).

In recent studies, evidence of an almost identical genetic structure for the cave-dwelling horseshoe bats and SARS coronavirus has been found (10-14). This virus has spread to the palm civets (Asian civet cat) through the cave-dwelling horseshoe bats and then to humans (15). According to the Chinese Ministry of Health, one of the factors contributing to the spread of the SARS virus is due to lack of transparent communication (2).

At the end of the epidemic, 6.8% of patients younger than 60 years were at risk of fatality (16). About 9 years later, a new type of coronavirus known as MERS with symptoms including fever, cough and shortness of breath was observed in a 60-year-old man in Jeddah, Saudi Arabia (17).

Although MERS coronavirus is a beta coronavirus from bats, evidence suggests that MERS is transmitted from dromedary camel to human (18, 19). Interestingly, studies have shown that camels have immunity against MERS coronavirus, therefore, the reason for the camel-to-human transmission remains unclear (8, 19-21).

It was reported that approximately 36% of patients were at risk of fatality from MERS (8). At the end of 2019, the third coronavirus that was very close to SARS was identified (22). COVID-19 is thought to have an animal origin like SARS and MERS (23).

The outbreak of this infectious disease was identified in December 2019 at Huanan Seafood Wholesale Market with several animal-to-human zoonotic events and then in January 2020, early signs of human-to-human transmission were observed (24). As at 18th of March 2020, over 150 countries have been infected with the COVID-19.

Different signs, symptoms and clinical features: the clinical symptoms of SARS and MERS are almost similar, with a slight difference. SARS and MERS has an incubation period of 7 and 5.5 days, respectively, and these diseases develop in 95% of cases after 13 days (25, 26).

In contrast, COVID-19 has an incubation period between 2 to 10 days and median disease develops after 12 days (27, 28). Table 1 summarizes all symptoms observed in SARS, MERS and COVID-19 based on the severity of symptoms (25, 26, 29-32).

Table 1: Classification of symptoms of SARS, MERS and COVID-19

Signs and symptoms	SARS	MERS	COVID-19
Fever	Common symptom	Common symptom	Common symptom
Cough	Common symptom	Common symptom	Common symptom
Shortness of breath	Less common symptom	Less common symptom	Common symptom
Myalgia or fatigue	Common symptom	Common symptom	Common symptom
Abnormal chest X-rays	Common symptom	Common symptom	Common symptom
Upper airway congestion	Rare symptom	Rare symptom	Less common symptom
Muscle pain	–	–	Less common symptom
Headache	Common symptom	Common symptom	Less common symptom
Confusion	Less common symptom	Less common symptom	Less common symptom
Sputum production	–	–	Less common symptom
Sore throat	–	–	Rare symptom
Haemoptysis	Less common symptom	Less common symptom	Rare symptom
Rhinorrhea	–	–	Rare symptom
Chest pain	Rare symptom	Rare symptom	Rare symptom
Diarrhea	Less common symptom	Less common symptom	Rare symptom
Nausea	Less common symptom	Less common symptom	Common symptom during incubation period
Chill	Common symptom	Common symptom	Less common symptom

Survival in the environment: Since the transmission of this type of virus is high (especially for COVID-19), it is imperative to understand the survival of this virus in the environment. An important feature of the coronavirus is its ability to survive in the environment (33).

The simplest mode of transmission is direct contact with an infected person, exposure to infectious droplets and touching surfaces infected with the virus (6, 34).

In classifying the virus' survival in the environment, COVID-19 has a longer half-life than SARS and MERS (35). According to studies, coronavirus has high viability in cold weather, therefore, at high temperatures (30-40°C), it loses its stability (28, 36). Table 2 summarizes the coronavirus survival in different environments (3, 28, 37, 38).

Concerns: Following the outbreak of SARS, MERS and COVID-19 in the last two decades and the lack of a specific treatment, a major public health issue has occurred worldwide (39, 40). SARS and MERS viruses with low transmission rates and high case-fatality (6.8% and 30%, respectively) were not very common in humans.

But COVID-19 with low case-fatality (6.0%: 382867 deaths out of 6416828 patients) and high transmission rates (outbreaks in almost all countries in several months) was rapidly transmitted between Chinese cities and other countries around the world (26, 41). The power of COVID-19 transmission in late 2019 and early 2020 has created palpable fear and stress among people (42).

Table 2: Coronavirus survival in different environments.

Surface	SARS coronavirus	MERS coronavirus	COVID-19 coronavirus
Paper	24 hours	–	–
Disposable gown	2 days at room temperature	–	–
Cotton gown	24 hours	–	–
Respiratory samples	5 days at room temperature	–	–
Stool	Few days at room temperature	–	–
Faecal droplet	4 to 5 days	–	–
Plastic	24 hours at 30 °C	48 hours at 20 °C	9 days at room temperature
Steel	24 hours at 30 °C	48 hours at 20 °C	–
Metal	5 days	–	9 days at room temperature
Glass	4 days	–	9 days at room temperature

Studies have shown that stress has a negative effect on immune function (43-45). Therefore, fear and stress because of this epidemic is the first global concern. Other concerns about coronavirus include shortage of personal protective equipment, panic buying, rising demand and hoarding, which put people's lives at risk (46).

Governments' preventive actions towards virus inhibition: as a result of the widespread outbreak of COVID-19, affected countries have adopted strategies to prevent further spread of the virus. The top six countries with the highest number of infected cases in six WHO regions are USA, Russian, India, Iran, China, and South Africa, respectively. Also the country with high case fatality was the United Kingdom.

In these countries, government strategies aimed at containing the virus include city quarantine, home quarantine, self-care, information sharing, closure of schools and colleges, canceling concerts and sporting events, airport screening and traffic and border controls.

In other countries, actions such as regular hand washing, the use of disposable gloves, hair covering, eye protection and wearing isolation gown and mask are also being pursued (47).

Summaries of the strategies implemented in the above countries with the highest number of cases are presented in Table 3 (48-58).

Reports published by WHO

So far, 136 reports (as at 4th June 2020) have been released by the WHO (59). According to the reports, the initial outbreak of Covid-19 began from China and in a few months, almost all countries around the world

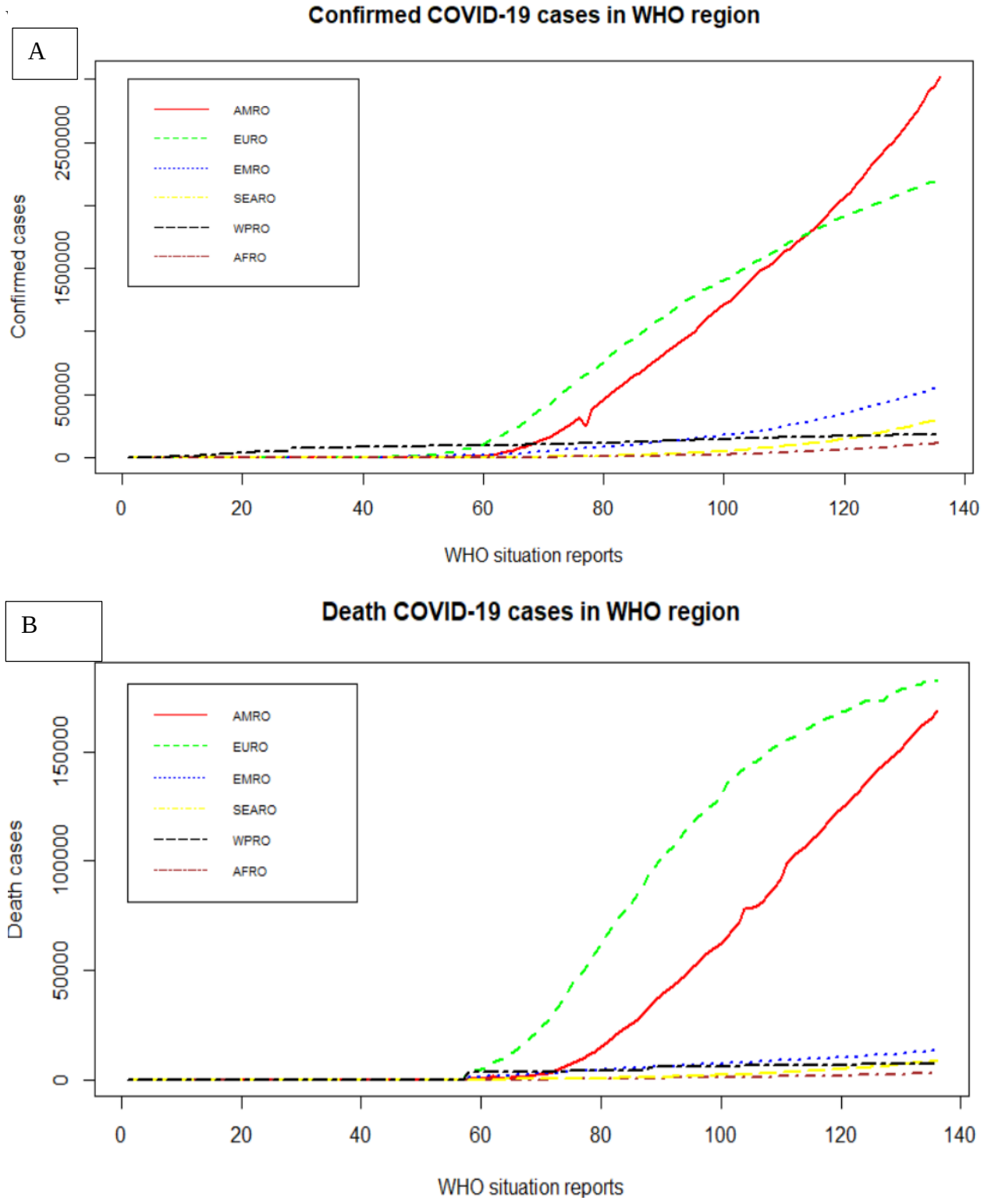

Figure 1. The trend of (A) confirmed COVID-19 cases and (B) deaths in six WHO regions base on WHO situation reports(https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-report).

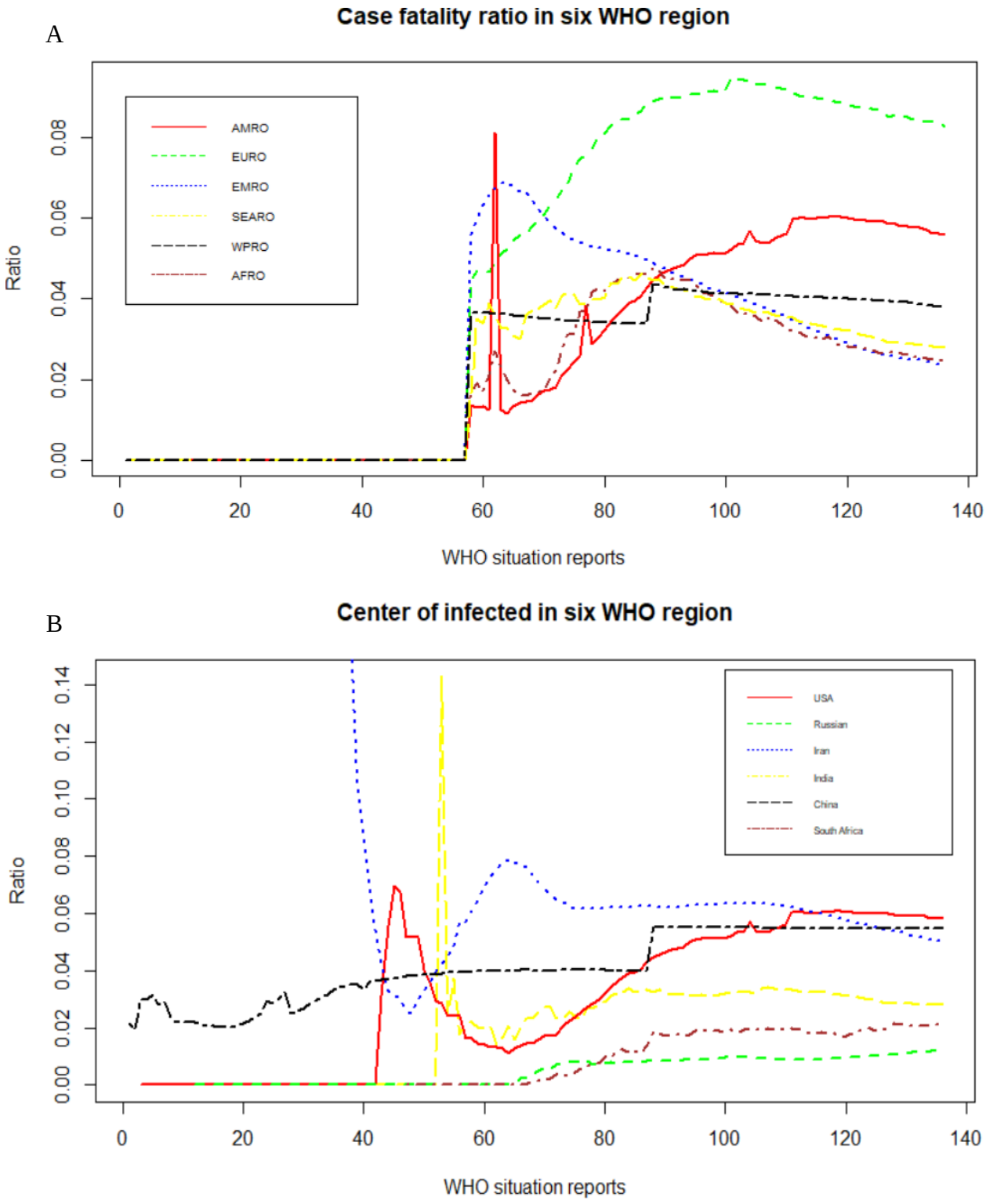

Figure 2. Comparison of the case fatality ratio in six WHO regions (A) and center of infected in six regions (B) (https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports).

Table 3: COVID-19 control strategies implemented in the top countries in six WHO regions with the highest number of infections.

Strategies \ Countries	USA	Rassian	India	Iran	China	South Africa	Germany
City quarantine	✓	✓	✓	✓	✓	×	×
Home quarantine	✓	✓	✓	×	✓	×	×
Self-care training	✓	✓	✓	✓	✓	✓	✓
Reduced working hours	✓	✓	✓	✓	✓	–	–
Teleworking	✓	✓	✓	–	✓	–	–
Prohibition of visiting patients	✓	✓	✓	✓	✓	✓	✓
Preventing the entry of tourists from an infected country	✓	✓	✓	✓	✓	✓	✓
Information sharing	✓	✓	✓	✓	✓	✓	✓
Managing the spread of rumors	✓	✓	✓	✓	✓	✓	✓
Closing recreational centers	✓	✓	✓	✓	✓	✓	×

confirmed infected cases in six WHO regions (European region [EURO], Eastern Mediterranean region [EMRO], Western Pacific region [WPRO], American region [AMRO], South-East Asia region [SEARO] and African region [AFRO]) were 2211148, 570026, 186853, 3022824, 309597, and 115639, while the center of infection in these areas are Russian, Iran, China, USA, India and South Africa, respectively.

We used the WHO reported number of infected people to estimate the trend of COVID-19 in six regions. According to reports in six regions, the trend of infection in two regions namely EURO, AMRO and were faster (Figure 1A). In the EURO, the slope of confirmed cases had risen sharply from 20th March to 4th June. But in the AFRO, from 20th March to 4th June, the trend had slight changes. Also in death trend in the two regions (EURO and AMRO) had a sharp slope rather than the other regions (Figure 1B).

The case fatality of six WHO regions was presented in Figure 2. In this Figure, the case fatality of COVID-19 in EURO are higher than in other regions (Figure 2A). In the other word, in USA, China, and Iran, from 16th April to 4th June, the trend for case fatality had high dramatically. But in other regions, the trend for case fatality increased slowly (Figure 2B).

Since the outbreak of the COVID-19, over a **Publications**: thousand of articles have been published in various journals. Our report here only included the PubMed search engine with (COVID-19[Title/Abstract]) OR (Novel coronavirus [Title /Abstract]) OR (COVID-19 [MeSH Terms]) OR (Novel coronavirus [MeSH Terms]) search strategy until 12 March 2020. Of this search, 38 studies were in Chinese languages and full text not existing. Furthermore, 37 studies with information about COVID-19 were included in this review. From these 37 studies, there were 4277 confirmed cases (55.2% male and 44.8% female). From 1766 infected patients,

44.2%, 48.9% and 1.8% were older, middle aged and young, respectively. Common symptoms in all cases were fever (85.2%) and cough (57.6%). Also in 1836 patients, 763 (41.6%), 503 (27.4%), 461 (25.1%) and 140 (7.6%) had mild (<37.3℃), moderate (37.3-38℃), high (38.1-39℃), and very high (>39℃) temperatures (29, 60-92).

Discusion

In the present study, we provided information on the outbreak, transmission, symptoms, differences and treatments for the three types of coronavirus (SARS, MERS and COVID). Coronavirus belongs to the family coronaviridae, which is common between mammals and birds (93). In 2002, the first type of virus, SARS, was transmitted to humans through palm civets. SARS was dramatically inhibited over one year due to the high fatality rate and low transmission rate. In July 2003, the SARS pandemic was declared to be over (25). However, 9 years after, a new virus (MERS) from same family as SARS appeared. MERS was transmitted from the dromedary camel to humans and led to the death of 36% of infected patients (8).

Transmission of the MERS from human to human has been through close and prolonged contact. Basic programs aimed at combatting the spread of MERS include educational programs. MERS and SARS are almost similar in signs, symptoms and clinical features, however, fatalities and delayed innate antiviral response of these two viruses are very different (7).

In late 2019, the novel coronavirus (COVID-19) emerged from China and spread throughout the world and by March 16, 2020, it had affected more than 150 countries. Although COVID-19 also belongs to the family coronaviridae, it has a much higher transmission and low fatalities (nearly 6.0%) than SARS and MERS. Unlike SARS and MERS, COVID-19 is associated with shortness of breath and rarely has chill symptoms.

The rapid outbreak of COVID-19 has created worldwide concerns that can be categorized into two levels. First, the power of COVID-19 transmission in several months has created fear and stress among people. Therefore, immune system function may be negatively affected in these conditions and in case of infection by the virus, the immune system may not work properly, leading to a possible increase in fatality rate (94).

Second, the shortage of personal protective equipment as a result of panic buying, rising demand and hoarding put people's lives at risk. Therefore, affected governments have taken steps to reduce these concerns such as notification, quarantine, self-care, education, traffic control, closure of some training and recreation centers, reduction of working hours, and so on.

So far, 132 situation reports have been published by the WHO. Daily reports on the total number of confirmed cases and deaths by affected countries, the spread of infection, newly infected countries and the epidemic curve are also provided. As at 18th March 2020, more than a thousand confirmed cases of COVID-19 have been reported in fifteen countries. China, Italy and Iran have a faster rate of infection in the last two weeks.

In China, following a decision to control body temperature at stations and airports, monitoring public places, public health surveillance, quarantine and build specialized hospitals, the number of infections has dropped to less than thirty after about two months (95). But in Italy, despite restrictive measures such as air traffic from China and quarantine (96), the number of people infected with the COVID-19 has increased and in the latest WHO reports, the number of infected cases was 441108.

In Iran, due to US sanctions, the health sector has faced serious problems in providing protective clothing, necessary treatments and COVID-19 detection equipment, which undoubtedly has an effect on the increased number of infections as well as death rate (97).

Conclusion

Currently, the COVID-19 epidemic is considered one of the most important global health challenges and has spread to almost all countries worldwide. This has caused serious negative effects on

infrastructure, economy, culture and communities of countries. Moreover, despite strict measures to contain the COVID-19, this virus is still expanding and the question of "what actions should be taken with what political package?" is being asked. To answer this question, understanding the process of disease occurrence and modeling different interventions on changing the natural course of the disease is very important.

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Conflicts of Interest

The authors declare that there are no conflicts of interest.

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