

Mini Review

Epidemiology of COVID-19 in the Most Pandemic Countries

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Abstract

The novel Coronavirus SARS-CoV-2 or COVID-19 was first discovered in Wuhan, China in late December 2019 and soon became a global pandemic. The virus causes flu-like symptoms and rapidly spread leaving the world in total paralysis and has devastating effects on the health, economic, and social levels of most countries.

The World Health Organization (WHO) announced the epidemic disease caused by SARS-CoV-2 as COVID-19. Currently, COVID-19 has spread widely around the world, affecting more than seventy countries. In this review, we summarized the epidemiological characteristics, clinical features and transmission routes of COVID-19. A comprehensive understanding will help to control the disease.

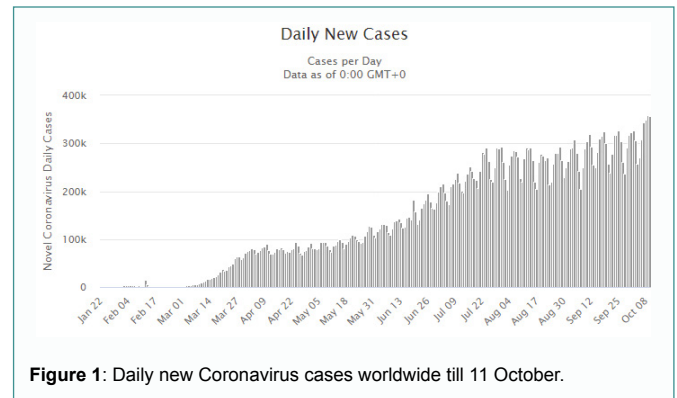
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Introduction

Since emerging in Wuhan, China, in December 2019, the Coronavirus disease 2019 (COVID-19) epidemic caused by severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2) has progressed rapidly into a pandemic [1].

COVID-19 is characterized by fever, cough, fatigue, shortness of breath, pneumonia, and other respiratory tract symptoms [2-4], and in many cases progresses to death. As of October 11th, 2020, there have been 37,501,260 confirmed Coronavirus Cases, divided into: Deaths: 1,077,951, Recovered: 28,145,941 [5].

Most cases were initially confined to Hubei province in China, but there has since been substantial spread not only elsewhere in China but worldwide. A rapid and robust response by the global scientific community has described many important aspects of SARS-CoV-2 transmission and natural history [6-8], but key questions remain (Figure 1).



Prevalence in China

Local hospitals in Wuhan, China reported on 31st December 2019 that a group of cases were infected by corona virus [1]. On 9th January 2020 WHO identified the causative agent of these infections as "2019-nCoV" [2]. At the same date, Huanan seafood market was identified as the site of elementarily exposure event, then on 1st January 2020. This market was closed and several studies proposed that bats may be the potential reservoir of SARS-CoV-2, knowing that recently these bats considered a natural reservoir of MERS-COV and SARS-COV viruses [3].

On 2nd January 2020, 41 patients were admitted to the hospitals as having laboratory-confirmed COVID-19 infection, less than half of these patients had hypertension, diabetes and cardiovascular disease [4]. On 14th February 2020, Guan et al. [5]; reported the most

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commonly method for transmission of COVID-19 in China and it was divided into: 31.3% of patients travelled to Wuhan recently, 72.3% of patients contacted with people non-residents of Wuhan, and 3.8% of the patients infected with corona virus were healthcare workers. All available evidence indicates that corona-virus is transmitted by cough and vomit droplets of patients and reach to nose, eyes or mouth of healthy people. However, when heavy droplets had landed on surfaces, other people may be in close contact with these contaminated surfaces and touched their mucous membranes [6].

On 26th March 2020, WHO reported that total confirmed cases in China reached 81961 and total deaths were 3293 and the transmission classification of COVID-19 between patients was local transmission [7]. On 11th October 2020, there were just 218 infected patients and their health condition ranged from mild to moderate, and no critical case was recorded.

Prevalence in Iran

The first two reported cases in Iran were on 19 Feb 2020 as two patients in Qom city were infected [8], these two cases were registered in the report-31 of WHO COVID-19 states reports [9]. The legislative elections in Iran were announced on 21st February 2020 which contributed with the rapid prevalence of the COVID-19 epidemic, due to the congestion without any protection equipment, and the high travel rate in the time of Persia New Year [8].

After the first week, the number of deaths was 10 times more than the first case confirmed according to the 38 reports of WHO in 27th February 2020 [10]. During the next weeks the confirmed cases increased more rapidly and the number of total cases and deaths were consequently 496,253 and 28,293 according to the (COVID-19) weekly epidemiological update and weekly operational update of WHO issued on 11th October 2020 [11].

Prevalence in Italy

The epidemic of COVID-19, which Italy had suffered, emerged in the Lombardy region on the 20th February, 2020. A case of unidentified not-responding-to-treatment pneumonia was reported, without any connection, the number of proved cases increased to 36 in the second next day [12]. The main cause of transmission during the early stages of the epidemic in Italy was Traveling. That's what made Lombardia and Veneto regions in Northern Italy the most contagious in the country [13].

On March 26th, 2020, total confirmed cases were 74386, correspondingly new cases are still reported, a total of 7505 deaths occurred among confirmed cases [14]. The median age of death is 81 years with more than two-thirds of these patients having chronic underlying diseases (diabetes, hypertension, heart disease, etc.) the percentage of female patients was 20%.

From August 25th, Italy has returned to record a new increase in infections which is feared to be as a new wave of spread, where WHO recorded 74,829 active cases, including 390 cases (1%) classified as critical condition on October 11th, 2020. Last but not least, Italian society is hugely affected by psychological, social and economic levels with predictions to plunge into a recession [13,14].

Prevalence in France

On January 2020, strengthened surveillance of COVID-19 cases was implemented to identify imported cases early and to prevent secondary transmission in the community or among healthcare workers. On 24th January 2020, the first three imported cases of

COVID-19 identified in France referred to persons with a recent stay in Wuhan. Two cases were detected in Paris and one in Bordeaux [15]. The first cases on the European continent were diagnosed in France on 24th January 2020, while, the first case outside of China was confirmed in Thailand [16].

As of March 5, 2020, the European Centre for Disease Prevention and Control (ECDC) reported 91315 COVID-19 confirmed cases in 81 countries and 3282 deaths (3.4%). In Europe, France was ranked the second country after Italy with 423 confirmed cases and 5 deaths (1.2%) [17,18].

On 7th March 2020, Santé Publique France [19] reported 949 confirmed cases leading to 11 deaths (1.2%). Between 8th-11th March, the number of cases increased from 1126 to 2269, and from 2,269 to 4469 cases between 11-14th March [19]. On 11th October 2020, there were a total of 718,873 coronavirus cases registered in all of France with 32,637 deaths [20].

After modeled the propagation of COVID-19 from March 10th to April 14th, across all French regions the total number of infected cases were expected to range from 22872 to 161832 and the total number of deaths were expected to vary from 1021 to 11032 but the worst did not happen due to the strict measures and the imposition of lockdown and restrictions [21].

Prevalence in United States

In United States, the first confirmed case of infection reported on 20 January 2020. The patient returned from a visit to Wuhan, China but he reported that he had not spent any time at the Huanan seafood market and no known contact with ill person during his visit [22].

On 31st January 2020, the United States declared public health emergency to respond to the new epidemic. After that, on 4th February 2020, 11 cases of COVID-19 had been reported [23]. On 14th March 2020, the number of total confirmed cases was 1678 and 41 deaths in total [24]. These numbers still stable until 17 March when there were 1825 new cases and more than 15 new deaths [25]. According to WHO reports, the incidence and mortality rate severely increased exceeding numbers in China where the total case reached to 7,945,945 on 11th Oct 2020, with 219,291 death cases.

At least 13 states have reported more than 100,000 Coronavirus infections. California, with more than 516,000 positive cases, has reported the most infections in the nation. The statistics from 20th January to 4th August 2020 show a total of 4,629,459 confirmed cases of COVID-19 with 154,226 deaths [26].

Transmission Routes

Previous studies showed that corona virus can survived only 2 days in hospital wastewater and in dechlorinated tap water at 20°C [27]. WHO reported that COVID-19 has not been discovered in drinking-water fittings, and the risk to water supplies is low [28]. Laboratory studies demonstrated that the water contaminated with feces of infected patients could promote the survival of the virus for days to weeks [29]. Besides transmitting by droplet, the oral-fecal route is considered as a crucial route to spread the virus. SARA-CoV and MERS-CoV are proved to transmit by stools. Thus, it is possible to transmit SARS-CoV-2 *via* the fecal-oral route. Therefore, it is crucial to get rid of patients' fecal in a hygienic way [30]. Luo et al. [31] reported that there is no relationship between absolute humidity and transmission of COVID-19.

One study showed that SARS-COV2 still in the aerosol for 3h,

72h on plastic, and for 48h on stainless steel, no viable SARS-COV2 was measured on copper and cardboard after 4h, 24h respectively. In addition, the novel Coronavirus stayed for up to seven days on the outer layer of a surgical mask and for two days on a cloth, but the virus was killed in three hours on printing paper like newspapers. As for SARS-COV1 it had a half-life approximately 1.1 to 1.2 in aerosols, and no viable SARS-COV1 was measured after 8h on copper and cardboard, therefore it was stayed up to 72 h on plastic, and for 48h on stainless steel. Similar to SARS-COV2 in these surfaces [32].

It still may be contagious for 2h to 9 days. However, this can be related to the temperature of the environment for instance 30°C to 40°C can decrease the period of presence. On the contrary, 4°C would raise the period of persistence to over than 28 days (Table 1) [33].

Table 1: Persistence of some strain of SARS-COV on some surfaces.

Specie of surface	Virus	Strain	Persistence
Metal	SARS-COV	Strain P9	5 d
Wood	SARS-COV	Strain P9	4 d
Paper	SARS-COV	Strain P9	Dependent on Inoculum
		Strain GVU 6109	
Glass	SARS-COV	Strain P9	4 d
Plastic	SARS-COV	Strain P9	4 d
		Strain FFM1	6-9 d
Disposable gown	SARS-COV	Strain GVU6109	Dependent on Inoculum From 1-2 d

Conclusion

Although COVID-19 cases declined, World Health Organization (WHO) still recommend washing hands frequently, clean and decontaminate surfaces, also keeping social distancing, and be aware of contact with people which they have fever or respiratory symptoms, that could limit viral transmission. It is also recommended to use medical masks for those who deal with COVID-19 patients such as FFP2 or FFP3, N95 masks.

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