

An Epidemic Transmission of Coronavirus that Ripped Away the World

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ABSTRACT

Several viruses have spread from animals to humans in past couple of decades and caused huge spreads, taking thousands of lives. There are many dangerous viruses out there that are more serious. A virus called the novel coronavirus (COVID-19) currently causing outbreaks across the world having a significant challenge to safety of the public today, as there are no resources available to combat them. Some of the worse killer viruses SARS-CoV-1, MERS-CoV which has already been pandemic to world in the past 20 years can be somehow useful to understand the novel coronavirus anyway. Here in this paper, we are critically highlighting the emergence of COVID-19 along with its symptoms and treatment options. Moreover, the effect of temperature and relative humidity on COVID-19 also being discussed in this paper.

Keyword: - Viruses, COVID-19, WHO Reports, MERS-CoV, SARS-CoV-1 and SARS-CoV-2.

1. INTRODUCTION

Coronavirus disease 2k19 (COVID-19) is a transmissible disease triggered by severe acute respiratory coronavirus syndrome (SARS-CoV-2). The disease was first detected in 2k19 in Wuhan, the capital of the Hubei Province of China and it has subsequently spread worldwide, contributing to a coronavirus pandemic of 2k19-2k20 [1]. Fever, cough, and shortness of breath are typical signs. In addition, signs that can also arise are stomach discomfort, development of sputum, nausea, sore throat, intestinal discomfort, and lack of odor or taste. Although in most cases patients seen to develop pneumonia and multi-organ failure. On March 25th, 2k20, the average mortality risk per reported number of cases were 4.5 percent; varying from 0.2 % to 15 % based on age level and other health problems [2]. The virus is transmitted primarily through direct contact or by respiratory droplets created as individuals cough or sneeze. Respiratory droplets may be created while coughing but the virus is not known to be airborne. Persons may even acquire COVID-19 if some contact has been arising between an infected surface and one's body parts.

The virus will survive on a surface up to 72 hours. The period between infections to initiation of symptoms varies usually between two and fourteen days, with an average of five days. The main diagnosis approach is by reverse transcription polymerase chain reaction (RT-PCR) from a nasopharyngeal swab [4]. Additionally, the virus may be identified by a mixture of signs, risk factors and a chest CT scan revealing pneumonia characteristics. Proposed infection preventive steps involve regular hand washing, social distancing (preserving physical distance from each other, particularly those with symptoms), tissue or inner elbow covering coughs and sneezes, and holding unwashed hands away from the nose [5]. WHO officials encourage the use of masks for everyone who fear that they have the virus but not for the general public, while some if need them may use clear fabric masks. COVID-19 may not have a vaccination or effective antiviral medication. Therefore, in order to eliminate management requires pain diagnosis, compassionate care, separation and novel interventions as early as possible. [6-7].

On 30th January 2020, the World Health Organization (WHO) announced the 2k19–2k20 coronavirus epidemic to be a Public health emergency of international significance (PHEIC) and on 11th March 2k20 as a pandemic. Local transmission of the disease was documented in all six WHO regions in several countries.

2. SIGN AND SYMPTOMS

Many diagnosed with the virus can be asymptomatic or show flu-like symptoms, including fever, cough, weakness and shortness of breath. Emergency signs involve trouble breathing, constant chest discomfort or strain, nausea, trouble awakening, and bluish face or lips; urgent medical treatment is recommended when such symptoms are present. Upper respiratory signs, such as sneezing, runny nose, or sore throat, can be observed less frequently. Symptoms such as fatigue, vomiting, and diarrhea were found in different percentages. Some instances in China originally only displayed tightness and palpitations in the throat. In March 2k20, there were studies suggesting that lack of sense of smell (anosmia) could be a frequent symptom in those with moderate disease, but not as widespread as originally stated.



Fig-1 Effect of Coronavirus on the Lungs

In others, the disease can progress to pneumonia, multi-organ failure and death. In those with serious symptoms, it is usually 8 days from symptom initiation to mechanical ventilation. As is usual with diseases, there is a gap between the moment a person is diagnosed with the virus and the period by which the signs progress. This is called the time of incubation. Usually, the incubation time for COVID-19 is 5 to 6 days, but can stretch from 2 to 14 days. 97.5 % of patients who show signs should do so within 11.5 days after infection [8-12].

3. CAUSES AND PREVENTIONS

The disease is triggered by the extreme acute respiratory syndrome coronavirus (SARS-CoV-2), previously identified as the 2019 novel coronavirus (2019-nCoV). It is mainly transmitted by people via a cough and with sneeze respiratory droplets. A report examining the incidence of virus decay found no viable viruses after four hours on copper, 24 hours on cardboard, 72 hours on stainless steel. Detection values did not exceed 100 percent, however, ranged between surface forms (detection maximum was 3.33 per 100.5 Tissue culture infectious diseases (TCID₅₀) per liter of aerosol air, 100.5 TCID₅₀ per milliliter of rubber, steel, and cardboard material, and 101.5 TCID₅₀ per ml of copper material). Estimating the rate of decay using a Bayesian regression model indicates that viruses will stay viable on copper for up to 18 hours, on cardboard for 55 hours, on stainless steel for 90 hours and on plastic for over 100 hours. Throughout the experiment (three hours), the virus stays active in aerosols. The virus was also detected in faeces, and it is being tested for transmission through faces [13].

The lungs are the organs most affected by COVID-19 because host cells are accessed by the virus via the Angiotensin converting enzyme 2 (ACE2), which is most abundant in lung alveolar cells of type II. The virus uses a specific surface glycoprotein to bind to ACE2 and reach the host cell, called a spike. The amount of ACE2 in each tissue corresponds with the extent of the disease in that tissue and some have proposed that reducing ACE2 production may be protective, but another opinion is that increasing ACE2 utilizing angiotensin blocker drugs may be protective and these observations need to be checked [14].

The virus often impacts gastrointestinal organs as ACE2 is disproportionately distributed in the glandular cells of the gastric, duodenal and rectal epithelium, as well as small intestine endothelial cells and enterocytes. The virus was detected in the faeces of as many as 53 percent of hospitalized individuals and more anal swab positive was identified in the latter stages of the infection than oral swab positive. The virus was detected in faeces from 1 to 12 days, and 17 per cent of patients continued to show the virus in faeces despite no longer presenting it in respiratory samples, suggesting that the viral gastrointestinal infection and possible fecal-oral spread will persist well after the respiratory tract has been virus clear. The virus is believed to be genetic and to have animal roots by spillover contamination. The cause remains unclear but by December 2019 the propagation of contamination was caused nearly exclusively through human-to-human transmission. The earliest reported outbreak occurred in Wuhan, China on November 17, 2019 [15].

4. CORONAVIRUS FROM SARS TO MERS

SARS-CoV-originated from China- was rapidly spread to other parts of the world with hospital-acquired infectious cases, had a mortality rate of 10%, and was transmitted to 8,000 people during an 8-month outbreak in 2002-2003 [16]. In 2012, Middle East respiratory syndrome (MERS-CoV), when it emerged in Arabian Peninsula Middle East respiratory syndrome (MERS-CoV), spread to 27 countries with 35.6% mortality rate having 2220 cases. It is known that both of them are zoonotic viruses showing hospital-acquired and human-to-human transmission [16, 17]. Similar dynamics apply for COVID-19 that was originated from Wuhan and the current the rate of mortality from this infection is about 2%. Comparing non-respiratory complications, MERS-CoV involve the cardiovascular system more frequently than SARS-CoV and frequently require vasopressor treatment [13-15]. Case series have also reported that COVID-19 also affects the cardiovascular system [18]. Acute kidney failure was more commonly seen in SARS-CoV and MERS-CoV epidemics compared to COVID-19. Whereas radiological findings are present in all three pathogens, airspace opacifications are seen in SARS-CoV and ground glass appearance in MERS-CoV and COVID-19 [20]. Hospital-acquired secondary infections have been defined in all three pathogens [18]. There are no studies that report a definitely successful drug for their treatment [19]. In terms of epidemic periods, SARS-CoV ended in less than a year, and the MERS-CoV epidemic lasted for seven years despite its spread to more restricted areas. Now the question arise that interrogates how long the novel COVID-19 outbreak will last that everyone is curious about.

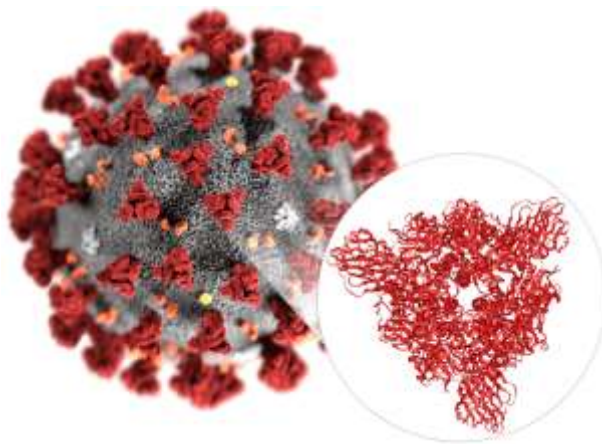


Fig-2 Coronavirus

5. EFFECT OF TEMPERATURE AND RELATIVE HUMIDITY ON COVID-19

High temperature and high relative humidity significantly reduce the transmission of COVID-19. In the early dates of the outbreaks, countries with relatively lower air temperature and lower humidity (e.g. Korea, Japan and Iran) saw severe outbreaks than warmer and more humid countries (e.g. Singapore, Malaysia and Thailand). Considering the

natural log of the average number of cases per day from February 8 to 29 as a rough measure of the severity of the COVID-19 outbreaks, the researchers commended, “The severity is negatively related to temperature and relative humidity” using 14 countries with more than 20 new cases during this period [21-22].

The effective reproductive number R v/s Temperature and Relative Humidity for 100 Chinese cities is depicted below:

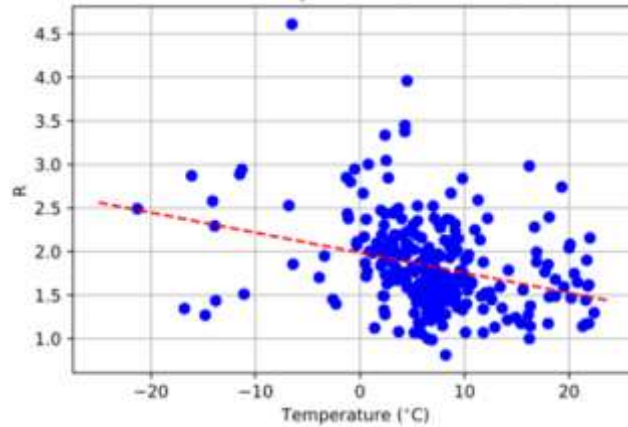


Fig-3(a) R and Temperature (Panel Data)

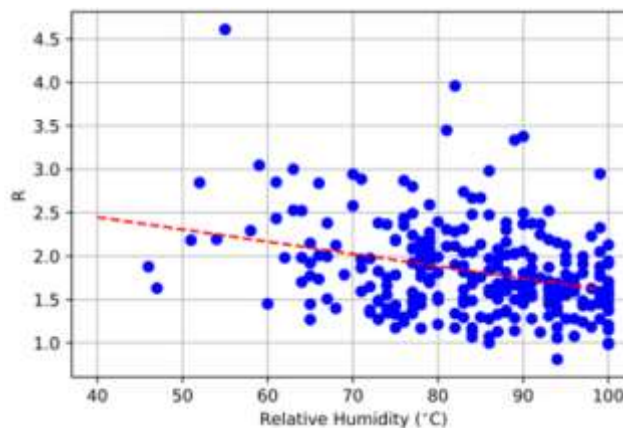


Fig-3(b) R and Humidity (Panel Data)

6. TREATMENT & PROTECTION

Many measures should be taken, such as timely publication of epidemic information for elimination of the source of infection, early diagnosis, reporting, isolation, supportive treatments and for avoiding unnecessary panic. The Centre of Disease Control and Prevention (CDC) reminds basic measures such as hand washing, using disinfectant solutions, avoiding contact with patients in order to prevent the spread of viruses by droplets. Precautionary actions including the provision of medicines supply chains, personal protective equipment and hospital supplies should be organized in a short time for the protection of the Chinese people and global health, especially in the places with close travel ports to major Chinese ports [23]. Based on the 2003 SARS-CoV epidemic experience, the Chinese government takes many effective measures including closing public transport, reducing migration and promoting personal protection with masks in Wuhan and other provinces. Owing to the reported cases of infected hospital personnel, healthcare staff should be informed about taking personal protective measures such as the use of gloves,

eye masks and N95 masks during the examination of patients with a suspected history of COVID-19 contact or travelling history [24, 25].

7. LIST OF ABBREVIATIONS

- a) ACE2: Angiotensin converting enzyme 2.
- b) CDC: The Centre of disease control and prevention.
- c) COVID-19: Coronavirus disease 2k19.
- d) MERS-COV: Middle Easy respiratory syndrome coronavirus
- e) PHEIC: Public health emergency of international significance.
- f) RT-PCR: Reverse transcription polymerase chain reaction.
- g) SARS-COV: Severe acute respiratory syndrome coronavirus.
- h) TCID: Tissue culture infectious disease.
- i) WHO: World health organization.

8. CONCLUSIONS

Not yet effective antiviral therapy is indicated for COVID-19 and there is no vaccination or additional medication required for the infection. So to help ease pain, patients should be provided compassionate treatment. Treatment for serious cases will provide precautions to maintain essential functions of the organ (CDC, 2020j). COVID-19 virus tests arrive in labs in the U.S.A. Additionally, across the globe where experts are researching the virus, discover methods to handle it, constantly trying to create an antidote so as to potentially eliminate the virus. As discussed the high temperature and high relative humidity significantly reduces COVID-19 transmission. Taking into account the natural log of the average number of cases per day as a rough measure of the severity of COVID-19 outbreaks, we demonstrate that the severity is negatively related to temperature and relative humidity. Therefore, it is necessary for everyone to keep their body warm as much as possible and to consume warm water, steam at home in order to suspend the transmission of COVID-19.

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