



CORONAVIRUS DISEASE 2019 PANDEMIC: EPIDEMIOLOGY, PATHOGENESIS AND CHALLENGES

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Abstract

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by a newly discovered Severe acute respiratory syndrome coronavirus 2. The ongoing pandemic of Coronavirus disease 2019 has rigorous affects worldwide. It is caused by severe acute respiratory syndrome corona virus 2. Till date, more than 190 countries have been affected. Approximately, half million people are suffering from the disease worldwide at the moment. Over 25000 deaths have been reported due to this pandemic. Although the death rate is about 4.5%, yet immunocompromised patients and people incubating other infections are more vulnerable and prone to COVID-19. Treatment and vaccine against this virus are in development phase. Different regimes of treatment have been tried with varying degree of success under different circumstances. Health awareness, hygiene practices, strict precautionary measures and quarantine are needed to hamper the spread of disease.

Keywords: Coronavirus, COVID-19, pandemic, pathogenesis, prevention.

Introduction:

Human respiratory system is the primary target of Coronaviruses. Severe acute respiratory syndrome (SARS)-CoV and the Middle East respiratory syndrome (MERS)-CoV are previously reported outbreaks of Coronaviruses. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the etiological agent of Coronavirus disease 2019 (COVID-19) [1]. Previously, it was known by its provisional name i.e. 2019 novel coronavirus (2019-nCoV) [2]. The first case of COVID-19 was reported in December 2019 [3]. SARS-CoV-2 is a positive-sense single-stranded RNA virus belonging to Coronaviridae. Size of SARS-CoV-2 virion is approximately 50–200 nanometers.

It has four structural proteins, known as the S (spike), E (envelope), M (membrane), and N (nucleocapsid) proteins [4]. COVID-19 is contagious in humans and that's why World Health Organization (WHO) declared it as Public Health Emergency [5]. COVID-19 first originated in the Wuhan, China, therefore, sometimes referred as Wuhan pneumonia or Wuhan flu. Outer surface of the virus resembles a crown, hence giving the virus its characteristic name. It is hypothesized that virus has originated from bats because it has close genetic similarity to bat coronaviruses [6].

COVID-19 pandemic has seriously affected the social as well as economic activities worldwide.

Till date, more than 190 countries have been affected. Approximately, half million people are suffering from the disease worldwide at the moment. Over 25000 deaths have been reported due to this pandemic. Although the outbreak of COVID-19 started in China, currently it has spread to Europe, America and rest of the world. At the moment majority of cases are found in Italy, America, Spain, and Iran (WHO statistics) More than 8000 deaths have been reported in Italy only. Healthcare facilities, age and health problems within the population determine the death rate of COVID-19. Overall, case fatality rate is about 3% in general population. It varies from 0.2% in children to about 15% in people aged 80 years and above [7].

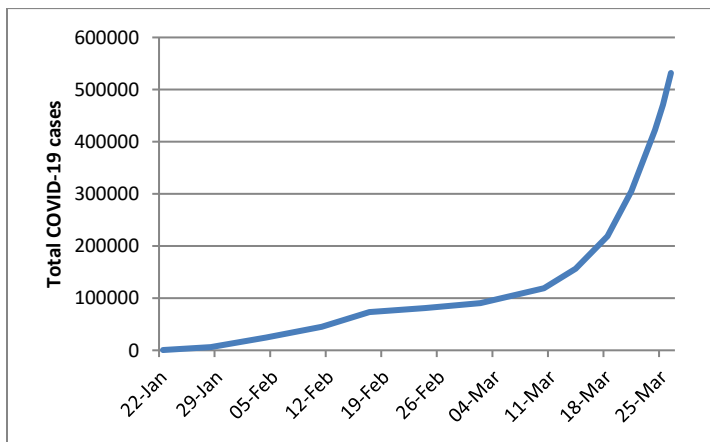


Figure 1: Worldwide periodic increase in cases of COVID-19

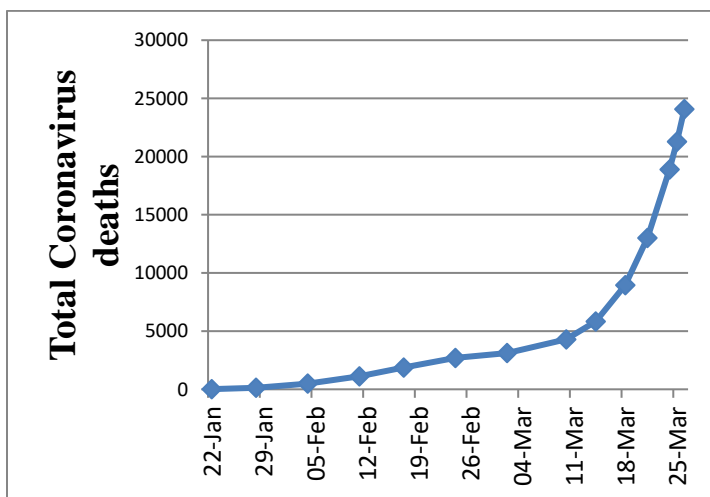


Figure 2: Worldwide periodic increase in deaths due to COVID-19

Pathogenesis:

Respiratory droplets from coughs and sneezes are primary sources of transmission of virus between people. These droplets are too heavy to travel far in the air and can only travel one meter and settle on surfaces. That's why indirect and direct contact through contaminated surfaces leads to spread of virus [8-9]. Virus can survive on plastic and steel for up to three days and three hours in aerosols.

The incubation period of SARS-CoV-2 is usually five to six days but it may range from two to 14 days [10]. Lung epithelial cells are the primary target of the virus. Virus uses a surface glycoprotein to connect to angiotensin-converting enzyme 2 (ACE2) enzyme of host to enter the host cell. Maximum quantity of ACE2 enzyme is found in type II alveolar cells of the lungs. That's why lungs are the most affected organs by the SARS-CoV-2 [11].

Symptoms of COVID-19 are similar to flu including fever, cough, and shortness of breath. Sneezing, runny nose, or sore throats are observed in some cases. Some infected individuals may be asymptomatic. Nausea, vomiting, and diarrhoea are reported in less than 5% patients. Symptoms are mild in children as compared to adults [12]. Patients infected with COVID-19 showed leucopenia with leukocyte counts of 2.91×10^9 cells/L of which 70.0% were neutrophils. Blood C-reactive protein was elevated to 16.16 mg/L (normal <10mg/L) in COVID-19 patients [13].

Blood tests, real-time reverse transcription polymerase chain reaction and chest CT scan are most common diagnostic tests used for COVID-19. Blood tests require two blood samples which are taken two weeks apart. Nasopharyngeal swab and sputum are suitable samples for real-time reverse transcription polymerase chain reaction test. Bilateral and peripheral ground glass opacities are most imminent findings in the chest CT scan [14].

Treatment and Prevention:

Treatment and vaccine against this virus are in development phase. Different regimes of treatment

have been tried with varying degree of success under different circumstances. There are currently no medications or vaccines proven to be effective for the treatment or prevention of the SARS-CoV-2 [15]. The China International Exchange and Promotive Association for Medical and Health Care recommended use of lopinavir in combination with nebulized alfa-interferon [16]. Some reports also suggest use of chloroquine, or hydroxy chloroquine for treatment of SARS-CoV-2 [17]. In the initial phases of disease, symptomatic treatment is recommended. In case of extensive lungs damage, mechanical ventilation is required [15]. Some antiviral medications are under lineal trials. Currently, there is no vaccine for COVID-19. Antisera containing passive antibodies are also being considered as useful option in the treatment of COVID-19 [16]. Health awareness, hygiene practices, strict precautionary measures and quarantine are needed to hamper the spread of disease.

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