



## **Differential Mortality and Positive Outcomes of Covid -19 Pandemic in India**

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### **ABSTRACT**

*Corona viruses are packaged RNA viruses having a crown or spike like surface, which has diameter of 60 nm to 140 nm. This virus can be found in animals, especially in birds and humans. It is known that corona viruses have mutation and replication patterns that affect the respiratory system, gastrointestinal tract, liver and nervous system. In early December year 2019, the primary (COVID-19) episode happened in Wuhan, Hubei Territory of China. Numerous patients with pneumonia like side effects in Wuhan were found to be tainted with Hunan seafood. The novel corona virus 2019 (COVID-19), which is caused by SARS-CoV2, is a new concern for global public health. To fight the corona virus, Indian government has forced a complete lockdown on mostly of the 22 states and territories of India that have reported confirmed COVID-19 cases since March 24, 2020, and will continue to do so until May 31, 2020. The Indian government stated that the amount and number of infected patients could have been higher if the nationwide complete lockdown had not been forced. In this review article, we aim to discuss the benefits of national quarantine implemented by India in response to the COVID 19 outbreak and the underlying causes of fewer deaths of Indian people compared to other countries.*

**Keywords:** Covid19, pandemic, SARS-CoV2, Environment, pollution, mortality

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### **INTRODUCTION**

Corona viruses are known as enveloped RNA viruses, which are having 60 nm to 140 nm in diameters, with a crown or spike like appearance and present in mammalian animals especially in birds and humans. Multiple mutation and recombined behavior and design of these viruses can cause respiratory, enteric, hepatic, and neurologic illness. (1-2). In early month of December 2019, the primary COVID-19 episode happened in Wuhan, China's Hubei Territory and many pneumonia patients were found to be associated with the outbreak at the South China fish and Seafood Market in Wuhan. The seafood market is well known in China for selling many wild animals, and various aquatic animals were also sold before the unfortunate event, including birds and rabbits. The WHO (World Health Organization) on January 30<sup>th</sup> 2020, stated that the pandemic was definitely a Public Health Emergency of International Concern (PHEIC) and in next month February 2020, when The WHO (World Health Organization) stated the corona virus-related outbreak as COVID-19, Where CO = Corona, VI = Virus, D = Disease and 19 used for the year 2019 when the virus first time appeared in China. Extreme and acute respiratory syndrome corona virus 2 which is known as (SARS-CoV2) is the cause of COVID-19 pandemic. This SARS-CoV-2 includes an esteem of 79.6 percent of the samples were identical to SARS-CoV and 96 percent to animal born or specifically bat-borne severe acute respiratory syndrome (SARS)-like corona viruses (3, 4). The 2019 corona virus (COVID-19) worldwide pandemic caused by SARS-COV2 was a phenomenal global health calamity (5). The Indian government has forced a complete lockdown in twenty-two states and Indian territories which were declared contaminated with the COVID-19 virus infection since 24 March 2020 in an effort to combat the infection. The lockdown had been expanded until 31<sup>st</sup> May 2020. The Indian government claimed and stated that it was successful in tackling the corona virus, saying the number of patients could have been higher if there was no complete nationwide lockdown. The COVID 19 virus is a very infectious or contagious disease virus which can causes many negative thoughts and emotions in people at high risk. Therefore, the COVID-19 pandemic may produce long-term public mental health problems such as anxiety, depression and panic disorder, in addition to its negative effects on physical health (6, 7). The mean

incubation period for COVID-19 is in the range of zero to twenty-four days, with the possibility of asymptomatic transmission of three days (8). It took around 67 days for COVID-19 to contaminate 100,000 people (approximately March 7), followed by 12 days (approximately March 19) to infect 100,000 more, while the third attack took only 4 days (approximately 3.23), indicating SARS infection. CoV2 is a highly contagious virus. On March 30, 2014, the amount and number of Covid confirmed cases globally increases to 725,000. The 6<sup>th</sup> Public Health Emergency of International Concern followed by Zika virus (2016) and Ebola virus (2019). (9) With this concise and brief review, we are going to discuss the differential mortality rate and positive outcomes of COVID-19 pandemic in India.

### **Rationales for low mortality in India Due to Covid-19**

#### **Age**

The elderly population was assumed to be responsible for the majority of COVID-19 cases of deaths in all different countries (10, 11). Westerner natives are older comparatively than Asians and Africans. India is said to be a young country and according to a statement by the Ministry of statistics and program implementation, youth percentage in India assumed to be 34.33 percent of total population of India by the year 2020 (12).

#### **Genetics**

Various research data have shown greater mortality rates in different western nations are due to their genetic makeup. The entry of corona virus into the cell depends when viral protein (S) spike binds to the receptor present in the cell named as SARS-CoV-2 receptor ACE2 and initiation process happens through the protein (S) spike by the host cell protease which is called serine protease TMPRSS2. The new research studies explain the mechanism of action of SARS-CoV-2, where an enzyme named Angiotensin converting enzyme-2 (ACE2) known to be responsible for splitting of Angiotensin-I and Angiotensin-II when susceptible host cell surface receptor allow the virus to spread or infect the host. SARS-CoV-2 virus caused severe damage of lungs by causing a decrease in ACE2 expression (13). Presence of the D allele of ACE1 gene is very much related with a decrease in the ACE2 gene expression, which down regulates ACE2 receptors, which reduces the risk of infection but increases the severity of lung damage or lung disease. This D/I polymorphism differs in different regions. Asians have a lower prevalence of the D allele compared to Europeans, which may contribute to more severe lung infection and death from COVID-19 (14). The gene variants of HLA are closely associated with a higher incidence of severe acute respiratory syndrome (SARS). The spread or growth of SARS-CoV-2 depends upon the reaction between the virus and the patient's immune system (15). An Indian-American research team found that Indians have more natural killer (NK) cells that are capable of detecting and eliminating infection early if compared to other people in the world (16). Recently, many research scientists have identified several hundred-point mutations in SARS-CoV-2 throughout the genome sequence. They show the connection between the mutation and variation in virulence with an increment in mortality and morbidity rate. They identified around 47 significant point mutations presenting along with the whole genome of virus that would have been affected the severity and response to other anti-viral agents against SARS-CoV-2 (17).

#### **Climate**

There are some evidences which say that changes in humidity and temperature may be the important factors affecting mortality from COVID-19 (18, 19).

Corona virus spreads slowly in high temperature and humid weather and spreads more easily in dry and cold weather (20). In other parts of tropical Asia, the virus is spreading more slowly than in Europe and the United States.

#### **Lockdown effect**

It is also possible that COVID-19 has had a significant impact on deaths, but the overall death toll has not increased because all lockdowns have reduced the number of COVID deaths. The number of infections and deaths increased in India after the lockdown was lifted (21). The BCG vaccine could be a new tool in the fight against COVID-19. The lack of BCG vaccination was reported as the reason for the morbidity/mortality difference between the participating countries. Widespread use of the BCG vaccine to prevent tuberculosis (TB) in India may also be responsible for the low rate of COVID-19.

The BCG vaccine is a FDA-approved vaccine for individuals who are not previously infected with Mycobacterium tuberculosis and now they are at risk of infection. He found that the epidemic appears to be less severe in countries where the BCG vaccine is routinely used, as the vaccine will be a preventive measure. Indian children have been vaccinated with BCG since 1948. Countries without universal BCG vaccination policies (Italy, Netherlands, and USA) are more affected than countries with universal BCG policies worldwide. Older mortality rates are high in countries that generally start BCG policies late (Iran, 1984). Therefore, this entire explanation requires more in-depth study and interpretation (22). The BCG vaccine is currently being tested to reduce the frequency and severity of COVID-19 (23).

### **Inherent immunity**

Many Indians recover from respiratory infections due to their strong immune systems; immunity play important role in removing the virus and killing it (this can also prevent SARS and MERS-CoV). Diet, heavy life, poor personal hygiene, poor social hygiene etc. may also cause respiratory tract diseases (24).

### **Obesity**

Obesity in America and Western countries is higher in comparison to India. The regularity of obesity in the US is approx. 40 percent, compared to 6.2 percent in China, 24 percent in Spain, and 20 percent in Italy (25). Obese patients are very much associated with weakened immunity, dysfunction of endothelial cell, decreased lung residual capacity and hypoxemia, which are closely related to SARCOV2 infection, and ACE2 expression in adipose tissue (26, 27).

### **Use of hydroxyl-chloroquine**

The anti-malarial drug hydroxyl chloroquine has been confirmed to reduce the overall risk of COVID-19 with capability for eyes and heart toxicity, as well as in healthcare workers. These drugs have various effects such as helping to fight infection and prevent death by inhibiting cytokine storm in the host (28). In India, The Indian Medical Research Council (ICMR) has approved and recommended the use of hydroxyl chloroquine for the asymptomatic medical care of people suspected or confirmed to have a case of COVID-19 in their early stages of the disease. Drugs can prevent more deaths in Western countries (29).

### **Positive points of COVID-19 lockdown**

#### **Effect of nationwide lockdown on climate and quality of air**

WHO estimates the death of 7 million people worldwide each year due to outside air, and about 80% of the local population is exposed to poor air quality (30). Nitrogen dioxide (NO<sub>2</sub>) is a pollutant produced from the engines of cars and industries. The World Health Organization said that if the concentration of nitrogen dioxide gas exceeds 200 micrograms per cubic meter, it will cause respiratory problems and cause asthma. As a result of quarantine, shipping restrictions, and factory closures, the concentration of nitrogen dioxide in the air has dropped significantly (from 5.6 µg/m<sup>3</sup> to 0.6 µg/m<sup>3</sup>) (31). Carbon dioxide (CO<sub>2</sub>) emissions cause climate or climate change. Transportation, electricity, and industry contribute significantly to CO<sub>2</sub> emissions. Global CO<sub>2</sub> emissions are reduced due to corona virus lockdowns (32).

#### **COVID-19 lockdown versus ozone**

The lockdown also impacted the production and use of ozone-depleting substances (ODS). There is a closure of industries and reduced economic activities, and the demand for certain ODS- containing products, such as aerosol sprays and air conditioning units was decreased. Consequently, the production of ODS may have been reduced to some extent during the lockdown period. However, it is important to note that the impact of COVID-19 lockdowns on ODS is likely to be minimal compared to the long-term efforts and regulations established by international agreements like the Montreal Protocol, which aim to phase out the production and use of ODS globally.

In 2020, the ongoing worldwide shutdown of COVID-19 showed the relationship between air pollution and sectors such as transport, power generation, and commerce with little impact at the city level. This shows that a system based on clean energy must be accepted at the end of the corona epidemic. Curfews due to COVID-19 have reduced transportation, resulting in reduced electricity consumption and fuel demand. Transportation and fuel demand changes have had a major impact on the environment.

#### **Water quality and aquatic life**

During the lockdowns, many industrial activities, transportation systems, and non-essential businesses were temporarily halted or significantly reduced. This reduction in human activities resulted in decreased pollution inputs, such as industrial discharges, wastewater effluents, and runoff from urban areas. Consequently, some water bodies experienced a temporary improvement in water quality during the lockdown period. Waste produced by homes and factories along the river costs the government. Millions are not successful. Central Pollution Control Board (CPCB) real-time water monitoring report and Dr. Mishra, Professor of IIT, Banaras Hindu University, proved that India's water quality improved by 40-50%(33). As lockdowns were implemented, there were changes in water waste management practices due to reduced industrial and commercial activities. The isolation succeeded in doing what the government had not been able to do for decades. Data from India's Central Pollution Control Board (CPCB) show that the Ganges and Yamuna rivers have dropped their oxygen demand (BOD) to their lowest level (33, 34). Clean water and many bodies of Water is beneficial to aquatic life. Since its closure, many species have returned to their habitats. Transport noise, usually 20-200 Hz, affects water life with 6 dB and noise reduction below 150 Hz (35).

#### **Impact of COVID-19 lockdown on noise pollution**

Noise meets national air quality standards where it is recognized as a major pollutant under the Air (Pollution Prevention and Control) Act of 1981. Noise is an unnecessary sound that can interfere with

communication (36). Noise includes unpleasant, annoying, disturbing sounds that disturb the daily activities as well as the sleep of children as well as old age person. Prolonged exposure to noise can lead to depression, anxiety, stress, anxiety, stress, anxiety, high blood pressure, insomnia, and more. Pollution levels have decreased in many parts of the world, including India.

Noise is estimated to decrease from 35% to 68% (37).

#### **Impact of COVID-19 lockdown on wild-life**

Many animals around the whole world have been observed to be targeted during the global corona virus pandemic. Different kinds of birds, peacocks, monkeys, elephants, dolphins, etc. are prime examples, at the time of worldwide lockdown these animals came out in notice and appeared more and more frequently with the increase in number.

#### **CONCLUSION**

The COVID-19 lockdown was implemented to protect public health and mitigate the spread of the virus. While they had positive impacts in slowing down transmission, there were significant social and economic consequences. It also highlighted the importance of preparedness, robust healthcare systems, and effective communication in managing public health emergencies. The current global pandemic has made us think and imagine a different world. Isolation gives hope that there are opportunities to minimize unnecessary human intervention in the environment.

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