

# Impact of COVID-19, Pre and Post Exposure Prophylaxis of COVID-19

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**Abstract:** COVID-19 is a type of coronavirus disease belonging to the family Coronaviridae. The disease is thought to originate from bats and was spread to people through an unknown medium in Wuhan, China. Ideally the condition is spread by inhalation or close interaction with infected droplets that have an incubation period between two and fourteen days. Today, there are thousands of infections and deaths that have been caused by the disease. Moreover, the symptoms of the disease include fever, cough, sneezing, sore throat, difficulty breathing, and tiredness. Additionally, the diagnosis of the disease starts by gathering samples of the upper and lower respiratory tracts of the infected person. Also, chest X-rays and CT scan are used in the diagnosis stage. Basically, there is no precise treatment for the ailment, and this calls for the need to prevent the disease from spreading. Notable prevention strategies are isolation of the infected persons, proper ventilation, hand hygiene and use of personal protective equipment. Therefore, this paper provides in-depth information on COVID-19 as it discusses the disease epidemiology, transmission, clinical features, diagnosis, treatment and prevention. This makes population continue suffering severe losses in the absence of strict prophylaxis strategy against this pandemic. It is well known that prevention is better than cure, therefore, we plan to display the current strategies that should be implemented prior to exposure to infection and underlines its effectiveness in containing the infection. Pre & Post-Exposure Prophylaxis (PEP & PrEP) is aimed at preventing the development of infection and disease after and before exposure to an infectious agent. PEP is indicated by the WHO, PAHO, the United States HHS and other widely recognized organizations for HIV infection, as well as for other infectious diseases. While several trials are ongoing for treatment of COVID-19 scientific research on chemoprophylaxis is still lacking even though it has potential to flatten the curve allowing us time to complete research on vaccines. Therefore, this paper provides in-depth information on COVID-19 as it discusses the disease epidemiology, transmission, clinical features, diagnosis, treatment and prevention.

**Keywords:** COVID-19, acute respiratory syndrome, multiorgan dysfunction, chest X-rays, CT scan, prophylaxis, post-exposure.

## 1. Introduction

COVID-19 epidemic is the major global health disaster today and the supreme challenge to the universe. Ideally, COVID-19 is an enclosed RNA virus that is distinctly present in people and animals. The virus belongs to the Nidovirales order that consists of families, namely, Roniviridae, Arteriviridae, and Coronaviridae. Coronaviruses can cause a wide range of illnesses, including the common cold and COVID-19. These

typically affect the respiratory system, but they can affect other systems, too.

Prophylaxis is a measure applied or used to prevent an infection or disease from developing (1,2). Prophylaxis is applied to people who do not have the infection but who are at risk of contracting it and take drugs against the infectious agent to prevent infection and disease.

The condition to give Prophylaxis for an infection is that there is exposure to the infectious agent. There are 2 types of Prophylaxis depending on whether the drug is to be taken before or after exposure to the infectious agent, according to this there are:

### A. Type of Prophylaxis

1. Post-Exposure Prophylaxis (PEP).
2. Pre-Exposure Prophylaxis (PrEP).

#### 1) Pre-Exposure Prophylaxis (PrEP)

If COVID-19 is spreading in your community, stay safe by taking some simple precautions, such as physical distancing, wearing a mask, keeping rooms well ventilated, avoiding crowds, cleaning your hands, and coughing into a bent elbow or tissue. Check local advice where you live and work.

#### 2) Post-Exposure Prophylaxis (PEP)

PEP is a secondary prevention measure aimed at avoiding the development of infection and disease after exposure to an infectious agent (1,2). PEP consists of giving the specific drug against the infectious agent as soon as possible after exposure to the infectious agent. PEP has been indicated for several years by the WHO, PAHO, the US Department of Health and Human Services (HHS) and other recognized organizations, for HIV infection (1,2,3), is its most frequently used in medical practice. It is also indicated for other infectious diseases such as Hepatitis B and C (3) and Tuberculosis (4). In the case of diseases transmitted more frequently through the respiratory tract, such as Tuberculosis (4), Prophylaxis is aimed mainly at Contacts of sick people. PRE is also indicated when a person has been exposed to aerosols existing in a certain environment and, when a person has had direct contact or was exposed to body fluids or secretions from a person or people with the infection.

## 2. Epidemiology

Most of the early cases were epidemiologically linked to the Huanan seafood wholesale market where aquatic animals and

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live animals were sold. Using unbiased next-generation sequencing, an unknown betacoronavirus was discovered from lower respiratory tract samples of these patients. Human airway epithelial cells were used to isolate the virus that was named 2019–novel Coronavirus (2019–nCoV). The virus when observed under electron microscope had a diameter of 60 to 140 nm with characteristic spikes of 9 to 12 nm, similar to the Coronaviridae family. Phylogenetically, the novel coronavirus was found to be more similar to two bat derived coronavirus strains (~88% similarity) than coronaviruses which infect humans including SARS (~79% similarity) and MERS (~50% similarity). Based on phylogeny and taxonomy on February 11, 2020, the Coronaviridae study group of the International Committee on Taxonomy of Viruses named the virus as SARS–CoV2. The World Health Organization (WHO) named the resultant disease as Coronavirus disease (COVID-19). All ages are at risk of getting the illness. This is because the ailment is transmitted through large droplets that result from coughing and sneezing by symptomatic individuals. In some instances, the infection can happen from asymptomatic individuals and before the beginning of symptoms. As of March 2020, the WHO announced that there are about 87,317 cases of COVID-19 globally as well as confirmed cases of deaths is 2,977. This implies that the disease symptoms are mild as only 3.42 per cent of patients with it have died because of the virus. At the same time, the high number of incidences and deaths have been identified in China. It is that 92 per cent of the total number of occurrences have been reported in Asia, mainly China [30]. Importantly, the confirmed incidences are clinically identified and laboratory-confirmed. Further, outside Asia, the number of cases and deaths differs due to the ongoing nature of the disease, population density, degree of testing and reporting, and timing of reducing strategies [6]. The features of COVID-19 are categorized into the host of the virus, transmission mode and incubation period [5]. In the first place, the Chinese horseshoe bat is the natural hosts and the terminal hosts are humans [10]. Also, the transmission is from individual to individual through aerosol droplets. Lastly, the incubation period varies from two to fourteen days. Therefore, COVID-19 cumulative incidence differs depending on the country and incidences have been confirmed in almost all continents.

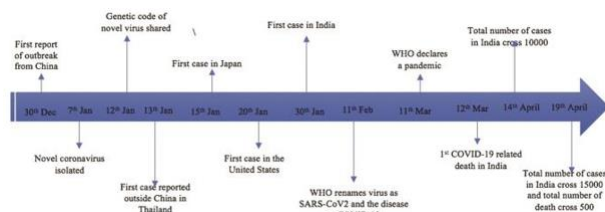


Fig. 1.

### 3. Discussion

Our analysis indicates the positive role of the health system, better economy, urbanization, and good governance. A good investment in the health system has proven the success of case recovery by furnishing easy access to health centers, good quality of care, and handling emergency health conditions by

mobilizing health resources. States like Rajasthan and Chhattisgarh, which have the highest recovery rate in the country, also have a considerably higher proportion of their GSDP spent on health and a higher number of health workers per 10,000 population. Contrarily, states such as Arunachal Pradesh and Nagaland, which have the lowest recovery rates in the country, also have a meager proportion of their GSDP that is spent on health and a smaller number of health workers per 10,000 population.

There are myriad determinants of mortality rate and severity of COVID-19, the most important of them being age and comorbidities among different age groups. This is especially relevant for countries like India which has one of the highest outbreaks. Strategies to tackle the pandemic need to ensure that high-risk groups such as the elderly Early access to medical care when infected is vital for improving chances of survival.

With India recording its highest spike in cases in the past 24 h, it becomes imperative to work toward improving the recovery rate.

The paradox of urbanization is evident from the findings of the current study. Although all major hotspots of the pandemic were recorded in the urban centers, especially low-income areas of cities and informal settlements, being in an urban settlement increases the chances of recovery. This entails that the health facilities available in the urban areas are playing a major role in the abatement of the pandemic. Hence, it is absolutely imperative to focus on the health infrastructure.

The analysis suggests that government spending is an important determinant of improving the recovery rate. There can be several plausible explanations for this. An increase in health spending points toward a more developed economy and it could also be instrumental in providing better testing and screening facilities. Large scale testing could be useful in identifying cases and could, thus, be useful in treatment and recovery. There are studies that have classified districts into categories to assess the pandemic situation in them and suggest optimization of monitoring techniques (screening, closedown, curfews, lockdown, evacuations, legal actions, etc.), which could be immensely helpful not only for the government, the medical fraternity.

It is beyond doubt that COVID-19 continues to be an enigma and there is so much more to learn about the spread and severity of COVID-19 than what is already known. Epidemiological and clinical evidence suggests that there are myriad novel compounds, as well as medicines licensed for other conditions that have proven effective against COVID-19. Therefore, timely access to medical care to infected patients is crucial for improving chances of survival and buttressing the recovery rate in India. Additionally, placing case fatality rate alongside recovery rate after taking a detailed medical history may highlight the highest risk areas and guide the intervention to decrease the spread of the virus. This may enable the development of point-of-care tools to help clinicians in stratifying patients based on possible requirements in the level of care to improve probabilities of survival from COVID-19 disease.

It is also important to understand that though the time taken

for patients to recover is substantial, the recovery rate of confirmed cases in India is also quite high. With a rapid increase in the number of patients, the strain on the medical resource will also increase manifold and, thus, estimation of time taken for recovery is also required for proper arrangement and utilization of available resources and judicious use of resources. The current study is, thus, important as it develops a comprehensive understanding of determinants of recovery rate. In the absence of an exhaustive framework pertaining to the recovery rate and its linkages with other socioeconomic variables, this study is a novel attempt to address the issue and its policy connotations. With a better understanding of the dynamics of recovery rate and related determinants, this study can contribute toward the development of appropriate policy interventions.

#### 4. Conclusion

The result of the present study finds utility in the use of prophylaxis for COVID-19. Given the high morbidity and mortality caused by COVID-19, prophylaxis should be taken into account as a preventive measure to complement those measures already established. We also recommend conducting similar clinical studies on prophylaxis for COVID-19 with a larger number of participants.

COVID-19 outbreak has challenged almost all sectors due to the spread of the disease at an alarming rate across the globe. Notably, COVID-19 is an RNA virus that poses a threat to public health. Currently, the disease has caused thousands of infections and deaths. Ideally, the rapid spread of the ailment calls for strong investigation and isolation protocols to avert additional spread. Fundamentally, no confirmed medicine or vaccine has been created to improve the health of patients with the condition. Therefore, individuals need to take measures such as isolation, proper ventilation, hand hygiene and use of personal protective equipment, mainly surgical masks, eye protection, gloves, and gowns to safeguard themselves from the disease.

The current COVID-19 crisis has a lesser impact on healthy and fit children and adolescents, while claiming its deadly toll among all other segments of the population: the sick, the unfit and the elderly, including patients with cancer. Malignant disease predisposes to severe COVID-19 for multiple reasons, primarily because (i) patients with cancer fall into general at-risk categories because of their average advanced age, predisposing factors such as obesity and smoking, and comorbidities such as T2D and hypertension; (ii) cancer intrinsically has negative effects on patients' general health status; and (iii) antineoplastic therapies such as surgery, chemotherapy and radiotherapy may debilitate the immune system and cause immune senescence and inflammaging. However, whether cancer per se is an independent risk factor for severe COVID-19 remains to be elucidated. It should also be kept in mind that during the COVID-19 outbreak, morbidity and mortality of patients with cancer may have been substantially affected not only by the viral disease itself but also by the extreme pressure exerted by COVID-19 on the healthcare system, which led to the postponement of cancer treatments and the allocation of scarce resources, such as

intensive care beds and ventilators, to patients with better prognoses. During the present COVID-19 pandemic, oncology departments are frequently confronted with the challenge of treating patients with both cancer and COVID-19, raising a strong argument for exploring therapeutic strategies that could simultaneously improve both diseases. Several drugs that have direct inhibitory effects on SARS-CoV-2 replication in vitro (and that still require further characterization in clinical trials; are also known for their potential anticancer effects, supporting the idea that such agents, including imatinib mesylate and inhibitors of cap-dependent translation, might have a dual therapeutic activity against cancer and COVID-19. Given the uncertainties about the benefits of PD-1 and/ or PD-L1 or IL-6R blockade, other possibilities are being investigated, such as passive transfer of neutralizing anti-SARS-CoV-2 antibodies for frail patients at a moderate to severe stage of COVID-19. Finally, active vaccination will be an option for patients at high risk of developing severe COVID-19 but still capable of mounting protective antiviral T cell response.

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