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Review

# Novel Coronavirus Disease ( COVID-19) Pandemic in India: A Review

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## Abstract

The first incidence of coronavirus disease-2019 (COVID-19) in India was disclosed on 30 January 2020. This viral pandemic disease caused by SARS-CoV-2 is a global challenge. It belong to Coronaviridiae family. The sources and mode of transmission is similar to the previous outbreaks of coronaviruses such as MERS-CoV and SARS where the disease infection occurred due to transmission from human-to-human. The symptoms are most likely to be similar to regular cold, flu or seasonal allergies like fever, fatigue, sore throat and running nose, tiredness, and dry cough. As of 6 April, 2020 The Ministry of Health and Family Welfare has confirmed 3851 active cases of COVID-19 infection, 318 recovered and 111 deaths in India. In India, the rate of infection from COVID-19 is reported 1.7 which remarkably low as compared to other affected countries of the world. Initial studies suggest that COVID-19 virus may survive on the surfaces from few hours up to several days. The treatments of patients with COVID-19 infection are basically symptomatic. Research is underway for the vaccine development. However, the ways to prevent virus spread by following hygiene practices such as hand washing, using masks and gloves, social distancing, etc. This article is an overview of the COVID-19 infection in India.

**Keywords:** Coronavirus, COVID-19, India, pandemic, SARS-CoV-2

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Coronavirus is an RNA virus consisting of positive-sense single-stranded RNA of approximately 27–32 kb. Coronavirus belong to the family Coronaviridae, which comprises of alpha, beta, delta, and gamma coronaviruses.[1,2] As the name indicates, the spherical external spike protein displays a characteristic crown shape when observed under an electron microscope.[3,4] The virus is known to infect a wide range of hosts including humans, other mammals, and birds. Infected hosts exhibit different clinical courses, ranging from asymptomatic to severe symptoms in their respiratory, digestive, and genital organs.[1,2] There are six known coronaviruses that typically cause infection in humans. Among these, coronavirus 229E, OC43, NL63, and HKU1 generally cause mild cold-like symptoms, whereas severe acute respiratory syndrome-coronavirus (SARS-CoV) in 2003, and Middle East respiratory syndrome-coronavirus (MERS-CoV) in 2012, caused severe respiratory diseases such as pneumonia and death.[5,6]

In Wuhan city of China a case of unidentified pneumonia was reported during last week of December, 2019.[7] The symptoms were similar to those of normal viral pneumonia. After conducting research on the samples received from pneumonia patient, PRC Centers for Disease Control (CDC) specialist announced that the pneumonia was caused by novel corona virus.[8] Later on WHO officially called the disease as COVID-19. The International Com-

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mittee on Taxonomy of Viruses (ICTV) gave the name of virus as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Among the large class of viruses prevailing in nature this virus belongs to β-coronavirus. Similar to other viruses, SARS-CoV-2 has numeruos natural hosts, intermediate hosts as well as final hosts. This produce a vast challenge towards prevention and treatment of corona virus. As compared to SARS and MERS, corona virus has higher ability to transmit and infect, despite of its low mortality rate.[9] Complete genome sequence recognition rates of SARS-CoV and bat SARS coronavirus (SARSr-CoV-RaTG13) were recorded 79.5% and 96% respectively after Genome analysis of the coronavirus sequences.[10] It indicated that the corona virus might have originated from bat.[11] It created a threat to whole humanity. This review article imphasizes on the infection source, transmission route, pathogenesis, clinical characteristics, and treatment and prevention on this new infectious disease.

COVID-19 is an infectious disease caused by recently discovered SARS-CoV-2. This virus as well as disease was unknown to the world before its outbreak in Wuhan city of China, in December 2019. The Ministry of Health and Family Welfare (MoHFW) has confirmed 3066 cases of COVID-19 infection, 167 recoveries and 87 deaths in India.[12] India, reported its first coronavirus case on 30 January, 2020 in a student who arrived in Kerala state from Wuhan city, China. India reports its first corona virus Covid-19 death on 12 March, 2020 in Karnataka.[13] The probability of infection in air travellers who came back India was 0.209 % with maximum relative import risk in Delhi (0.064%) followed by Mumbai, Kolkata, Bengaluru, Chennai, Hyderabad and Kochi.[14]

## COVID-19 Symptoms

The symptoms of SARS-CoV-2 infected people may appear between 2 to 14 days. According to WHO the most common symptoms of COVID-19 are fever, cough, shortness of breath and difficulties in breathing. However, the infected people have been recovered from COVID-19. SARS-CoV-2 is one of the cause of gigantic pandemic disease (WHO). In India, Ministry of Health and Family Welfare on 4 April, 2020 reported that out of the total infected cases, the percent distribution is 42% infected people (between 20 to 40 years), 9% (between 0-20 years), 33% (between 40 to 60 years) and 17% patients were more than 70 years old. Youngsters between age group 20 to 40 years are more affected in contrast to other countries where maximum infected people were from old age.

## Epidemiology

The first case of COVID-19 in India was disclosed on 30 January 2020. As of 3 April, 2020 The Ministry of Health and Family Welfare has confirmed 3066 cases of COVID-19 infection, 167 recoveries and 87 deaths in India.[12] The experts advocate that the number of infections may be considerably underestimate, because in India the testing rates are lowest as compared to the rest of the world.[15] In India, the rate of infection from COVID-19 is reported 1.7 which remarkably low as compared to other affected countries of the world.[16] The Indian Council of Medical Research (ICMR) claimed that isolation of the COVID-19 virus will assist towards accelerate the making of drugs, vaccines as well as diagnostic kits in India.[17] NIV has shared two genome sequences of Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) with Global Initiative on Sharing All Influenza Data (GISAID) India.[17] The Indian scientists from National Institute of Virology were able to isolate a strain of the novel corona virus on 14 March, 2020. After China, Japan, Thailand and the United States our country became the fifth victorious country to procure a pure sample of corona virus India.[17]

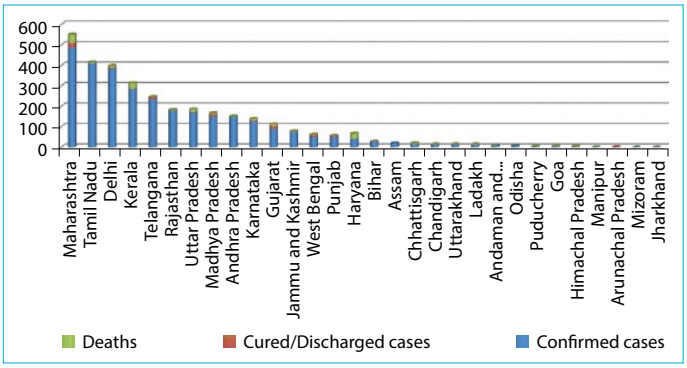


**Figure 1.** State-wise total number of confirmed cases, cured/discharged and deaths on 3, April, 2020.[18]

As per reports in India, almost all the states are at the risk of COVID-19 infection. The most number of COVID-19 effected cases are recorded in Maharashtra followed by Tamil Nadu, Delhi, Kerela and Telangana. On the other hand, the maximum number of deaths recorded were from Maharashtra followed by Kerela, Haryana and Uttar Pradesh. It is also evident from the Figure 1 that there are various cases of cured patients based on symptmological grounds.

## Pathogenesis

The pathogenesis of SARS-CoV-2 infection in human is poorly understood. However, the similar mechanisms of SARS-CoV and MERS can give information that might be helpful in understanding te pathogenesis of SARS-CoV-2. Initial studies suggest that COVID-19 virus may survive on the surfaces from few hours up to several days. This may depend upon different environmental conditions (e.g., temperature, humidity and type of surface).[19]

## Transmission

People can get infected with COVID-19 from person who is already infected with the virus. Sources and mode of transmission is similar to the previous outbreaks of corona viruses such as MERS and SARS where the disease infection occurred due to transmission from human-to-human most commonly through nasal discharge droplets, personal contact as well as contaminated surface/objects. [20] Human-to-human transmission of the COVID-19 virus occurs mainly within families.[21] Epidemiological evidence reveals that this disease is contagious, i.e. it spread from one person to another through nasal discharge or cough from mouth. When the nasal discharge droplets land on the surfaces of various objects and the other person comes in contact with such objects then gets infection from COVID-19 when they touches their eyes, nose or mouth. Studies till date, suggests that this disease is mainly transmitted through contact with an infected patient either in a household, workplace, or health care centre rather than through air. In few case reports, the live virus has been reported in patient's feces.[22]

## Diagnosis

The symptoms shown by majority of COVID-19 patients are mild. Some even shows no or few symptoms. If they do have symptoms they are likely to get effected within 14 days after exposure.[23] The symptoms are most likely to be similar to regular cold, flue or seasonal allergies like fever, fatigue, sore throat and running nose, tiredness, and dry cough. Coughing and shortness of breathe are also common at later stage of infestation. The older you are the more likely you are risk to these symptoms. The people with underlying health conditions like heart diseases or diabetes can develop symptoms of pneumonia, frequent high fever, persistent cough and signs of respiratory distress like shortness of breathe and chest pain. A small percentage of cases develop the acute respiratory distress. People showing symptoms of high fever, cough and difficulty in breathing should seek medical treatment.[24]

In India tests for community transmission began on 15 March, 2020. Sixty five laboratories of the Department of Health Research and ICMR have started testing the random samples of people who exhibit flu-like symptoms and samples from patients who had no travel history nor had any contact with infected people.[25]

The Union Ministry of Health on 17 March, 2020 took a decision to permit private pathology laboratories for testing COVID-19. The ministry official said that only the government lab is allowed to test the corona virus. Giving permission to the private laboratories, aimed at increasing testing of COVID-19. The ICMR also appealed the private laboratories to provide the tests free of cost[26] and one hundred eleven additional labs for testing on 21 March, 2020 became functional.[27] According to ICMR, 89,534 samples have been tested as of 5 April and 3,554 individuals have been confirmed positive.[29] Government of India has also imposed lock down from 23, March to 14 April, 2020 with the aimto avoid spread of coronavirus.

## Treatment and Prevention

Till date, there is no such vaccine and drug available to prevent or treat COVID-2019. The treatments of patients with COVID-19 infection are basically symptomatic treatments. In India during March following a case of COVID-19 in Rajasthan state, the doctors tried successfully the combination of medicines used as anti-malarial, anti-Swine flu and as anti-HIV.[29] The three patients recovered due the use of combined drug used. Meanwhile, in the same month, Indian Institute of Chemical Technology (IICT), Council of Scientific and Industrial Research (CSIR) and Cipla Corporation, started a joint venture to develop anti-corona virus (anti-COVID-19) drug.[30] Serum Institute of India from Pune, Maharashtra is awaited to apply for conducting clinical trials of various strains to be received from Drug Controller General of India and announces vaccine against COVID-19 within a year. However, it might not be successful on 20-30 per cent of people.[31] Indian Council of Medical Research (ICMR) on 23 March recommended the use of hydroxychloroquine for treatment of COVID-19 in high-risk cases (Bureau, ABP News (22 March 2020).[32] WHO has confirmed that the two candidate vaccines for COVID-19 have entered the first phase of human clinical trials and beside this 60 more candisate vaccines are in preclinical trials. Two coronavirus vaccine candidates are being jointly developed by CanSino Biological Inc and Beijing Institute of Biotechnology (WHO).

COVID-19 advance through nasal discharge droplets or through physical contact. Hence, it becomes cruicial to excercise precautionary measures to restrain the transmission. The standard precautionary measures involves maintaining hand hygiene and maintain a distance of more than one meter from the person showing symptoms corona virus. For maintaining hand hygiene one should use alcohol based hand rubs having 60-80 per cent ethanol or hand sanitizers. Also one should wash hands with soap several times a day. After washing hands one should preferably use tissue papers rather than using cloth towels. The personal having any symtopms of cough and cold should use PPE medical masks to cover their face, wear gloves and goggles.[33,34] It should be mandatory for persons showing symptomas of infection from COVID-19

to wear medical masks and maintain hand hygiene and should follow correct disposal of masks, gloves and tissue paper used.[33]

Particulate respirators (NIOSH-certified N95, EU standard FFP2 or equivalent) should be used by HCWs involved in aerosol-generating procedures (AGPs). Face shields/goggles are to be used by all HCWs while performing AGPs. Long-sleeved, sterile, waterproof gowns, made of non-absorbable materials are to be worn. When gowns are not available, waterproof aprons should be used.[35]

For medical doctor and other staff handling COVID-19 infected patients it is mandatory to use powder-free latex gloves. Covers on shoes should be used to avoid any kind of cloth contamination. While sneezing and coughing, one should use tissue paper and if nothing else is available they should use the flexed elbow, following appropriate hand hygiene. The person showing symptoms should not be allowed to participate in public areas. They should be kept in isolation only.[36] Advisory regarding safety of guidelines should made in public interest through various information means. For isolation in home, the symptomatic patients should be kept in a well ventilated and hygienic room.

## Quarantine

The main aim of quarantine is to prevent the community from acute public health risks because this virus has the potential to spread the disease in an uncontrolled way. The Ministry of Health and Family Welfare, Government of India, has issued travel advisories from time to time, considering the surge in cases of COVID-19 in China in accordance with the principles outlined by IHR.[36] The Union Health Ministry on 2 March, 2020 reported two cases: a 45-year-old man in Delhi who had travelled back from Italy and a 24-year-old engineer in Hyderabad who had a travel history with the United Arab Emirates.[37,38] Eighty eight people who were in contact with the Hyderabad individual, including fellow bus passengers from Bangalore, were tracked down by the government and placed under watch.[39] The government advised the Indians to refrain from travelling to China. The visas issued will be no longer valid for any foreign travel to China. Since in certain cases the persons having travel history from corona infected countries were found positive after check up. Hence the people having travel history to China or other corona affected nation are quarantined.

## Future Directions to Control the Spread of the Disease

Extensive measures should be taken to prevent spread of COVID-19 from one person to another so as to control the current outbreak. Special care and efforts to control the transmission of COVID-19 should be employed in infected populations specially children and elderly people. The cases of death caused by COVID-19 outbreak was primarily detected in aged people, probably due to weaker immune system which allows rapid advancement of viral infection.[40] Medical staff should avoid physical contact with wet and contaminated objects while handling with theis virus, especially the agents like samples of faecal and urine which can potentially serve as alternate route of transmission.[41,42] Few countries like China USA, India etc. have implemented control measures like travel screenings to prevent further spread of COVID-19.[43] The epidemiological changes in COVID-19 infection should be supervised for adaptation, evolution, possible intermediate animals, potential routes of transmission as well as subclinical infections. There should be proper transfer of advisory and guidelines among the citizens from the goverment to prevent the spread of COVID-19. This gigantic disease need special attention and preventive measures to restrict its spread from human to human. There is an urgent need for the development of effective treatment methods for complete eradication of this virus.

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