

**2020 INDIAN OUTBREAK: THE PANDEMIC CORONA VIRUS
DISEASE (COVID-19) IN INDIA**

**Anil K. Pawar^{*1}, Sneha B. Chaudhari², Vaibhavi K. Salunkhe³, Harshada R.
Khandelwal⁴ and Laxman G. Hatmode⁵**

^{1,2,3,5}Dept. of Quality Assurance, RCPIPER, Shirpur, India, 425405.

⁴Dept. of Pharmaceutics, RCPIPER, Shirpur, India, 425405.

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***Corresponding Author**

Anil K. Pawar

Dept. of Quality Assurance,
RCPIPER, Shirpur, India,
425405.

ABSTRACT

Coronaviruses are a group of related viruses that cause diseases in mammals and birds. In humans, coronaviruses cause respiratory tract infections that can be mild, such as some cases of the common cold among other possible causes, predominantly rhinoviruses), and others that can be lethal, such as SARS, MERS, and COVID-19. **Coronavirus disease 2019 (COVID-19)** is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The disease was first identified in December 2019 in Wuhan, the capital of China's Hubei province, and has since spread globally, resulting in the ongoing 2019–20 coronavirus pandemic. Common

symptoms include fever, cough, and shortness of breath. Other symptoms may include muscle pain, diarrhoea, sore throat, loss of smell, and abdominal pain. While the majority of cases result in mild symptoms, some progress to viral pneumonia and multi-organ failure. As of 5 April 2020, more than 1.2 million cases of have been reported in more than two hundred countries and territories, resulting in over 64,700 deaths. More than 246,000 people have recovered. The first case of the 2019–20 coronavirus pandemic in India was reported on 30 January 2020, originating from China. As of 5 April 2020, the Ministry of Health and Family Welfare have confirmed a total of 3,374 cases, 267 recoveries (including 1 migration) and 77 deaths in the country. Experts suggest the number of infections could be a substantial underestimate, as India's testing rates are among the lowest in the world. The infection rate of COVID-19 in India is reported to be 1.7, significantly lower than in the worst affected countries. On 22 March 2020, India observed a 14-hour voluntary public curfew at the instance of the prime minister Narendra Modi. The government followed it up with

lockdowns in 75 districts where COVID cases had occurred as well as all major cities. Further, on 24 March, the prime minister ordered a nationwide lockdown for 21 days, affecting the entire 1.3 billion population of India.

KEYWORDS: Coronavirus, 2019-nCoV2, 2019–20 coronavirus outbreak, SARS, WHO, 2019–20 coronavirus pandemic in India, lockdown in india, ministry of health and family welfare.

INTRODUCTION

Coronaviruses are a group of related viruses that cause diseases in mammals and birds. In humans, coronaviruses cause respiratory tract infections that can be mild, such as some cases of the common cold (among other possible causes, predominantly rhinoviruses), and others that can be lethal, such as SARS, MERS, and COVID-19. Symptoms in other species vary: in chickens, they cause an upper respiratory tract disease, while in cows and pigs they cause diarrhea. There are yet to be vaccines or antiviral drugs to prevent or treat human coronavirus infections.

Coronaviruses constitute the subfamily *Orthocoronavirinae*, in the family *Coronaviridae*, order *Nidovirales*, and realm *Riboviria*.^{[1][2]} They are enveloped viruses with a positive-sense single-stranded RNA genome and a nucleocapsid of helical symmetry. The genome size of coronaviruses ranges from approximately 27 to 34 kilobases, the largest among known RNA viruses.^[3] The name *coronavirus* is derived from the Latin *corona*, meaning "crown" or "halo", which refers to the characteristic appearance reminiscent of a solar corona around the virions (virus particles) when viewed under two-dimensional transmission electron microscopy, due to the surface being covered in club-shaped protein spikes.

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).^[4] The disease was first identified in December 2019 in Wuhan, the capital of China's Hubei province, and has since spread globally, resulting in the ongoing 2019–20 coronavirus pandemic.^{[5][6]} Common symptoms include fever, cough, and shortness of breath.^[9] Other symptoms may include muscle pain, diarrhea, sore throat, loss of smell, and abdominal pain.^{[7][8][9]} While the majority of cases result in mild symptoms, some progress to viral pneumonia and multi-organ failure^[10] As of 5 April 2020, more than 1.2 million cases of have been reported in more than two hundred

countries and territories, resulting in over 64,700 deaths. More than 246,000 people have recovered.

The virus is mainly spread during close contact, and by small droplets produced when people cough, sneeze, or talk. These small droplets may be produced during breathing but the virus is not generally airborne. People may also catch COVID-19 by touching a contaminated surface and then their face. The virus can survive on surfaces up to 72 hours. It is most contagious during the first three days after symptom onset, although spread may be possible before symptoms appear and in later stages of the disease. Time from exposure to onset of symptoms is generally between two and fourteen days, with an average of five days. The standard method of diagnosis is by reverse transcription polymerase chain reaction (rRT-PCR) from a nasopharyngeal swab.^[13] The infection can also be diagnosed from a combination of symptoms, risk factors and a chest CT scan showing features of pneumonia.^{[14][15]}

Recommended measures to prevent infection include frequent hand washing, social distancing (maintaining physical distance from others, especially from those with symptoms), covering coughs and sneezes with a tissue or inner elbow, and keeping unwashed hands away from the face. The use of masks is recommended for those who suspect they have the virus and their caregivers. Recommendations for mask use by the general public vary, with some authorities recommending against their use, some recommending their use, and others requiring their use. Currently, there is no vaccine or specific antiviral treatment for COVID-19. Management involves treatment of symptoms, supportive care, isolation, and experimental measures.

The first case of the 2019–20 coronavirus pandemic in India was reported on 30 January 2020, originating from China. As of 5 April 2020, the Ministry of Health and Family Welfare have confirmed a total of 3,374 cases, 267 recoveries (including 1 migration) and 77 deaths in the country.^[16] Experts suggest the number of infections could be a substantial underestimate, as India's testing rates are among the lowest in the world. The infection rate of COVID-19 in India is reported to be 1.7, significantly lower than in the worst affected countries.^[18]

On 22 March 2020, India observed a 14-hour voluntary public curfew at the instance of the prime minister Narendra Modi. The government followed it up with lockdowns in 75 districts

where COVID cases had occurred as well as all major cities.^{[19][20]} Further, on 24 March, the prime minister ordered a nationwide lockdown for 21 days, affecting the entire 1.3 billion population of India.^[21]

2020 coronavirus pandemic in India

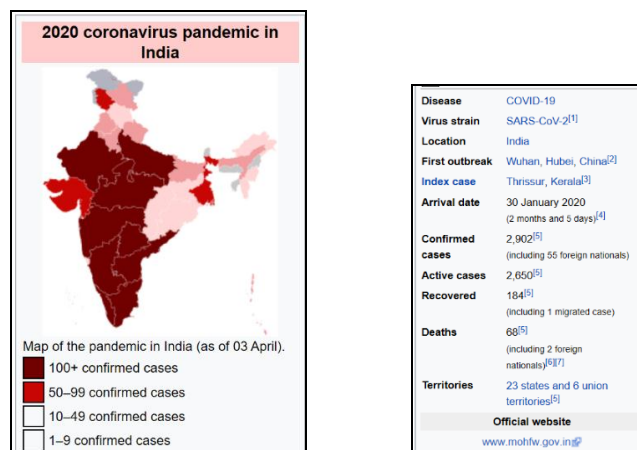


Fig 1: 2020 coronavirus pandemic in india.

Lockdown for 21 days in India

On 24 March Indian government announce 21 days lockdown in whole country for to destruct the replication cycle of corona virus. The first case of the 2019–20 coronavirus pandemic in India was reported on 30 January 2020, originating from China. As of 26 March 2020, the Indian Council of Medical Research and Ministry of Health and Family Welfare have confirmed a total of 2902 cases, 184 recoveries, 1 migration and 68 deaths in the country. The infection rate of COVID-19 in India is reported to be 1.7, significantly lower than in the worst affected countries.^[21] He outbreak has been declared an epidemic in more than a dozen states and union territories, where provisions of the Epidemic Diseases Act, 1897 have been invoked, and educational institutions and many commercial establishments have been shut down. India has suspended all tourist visas, as a majority of the confirmed cases were linked to other countries.^[22]

On 22 March 2020, India observed a 14-hour voluntary public curfew at the instance of the prime minister Narendra Modi. The government followed it up with lockdowns in 75 districts where COVID cases had occurred as well as all major cities.^{[23][24]} Further, on 24 March, the prime minister ordered a nationwide lockdown for 21 days, affecting the entire 1.3 billion population of India.^[25] The World Health Organisation executive director Michael Ryan said

that India had "tremendous capacity" to deal with the coronavirus outbreak and, as the second most populous country, will have enormous impact on the world's ability to deal with it.^[27]

On 22 March, the Government of India decided to completely lockdown 82 districts in 22 states and Union Territories of country where confirmed cases have been reported till 31 March.^[28] At 6 am on 23 March Delhi will be put under lockdown till at least 31 March. Essential services and commodities were to continue.^{[29][30]} 80 cities including major cities such as Bengaluru, Chennai, Mumbai^[31], Chandigarh^[32] and Kolkata were also put under lockdown.^[33] Inter-state movements are allowed during the lockdown period. However some states have closed their borders.^[34] On 23 March, union and state governments announced the lockdown of 75 districts where cases were reported.^[35] On 24 March, PM Narendra Modi announced a complete nationwide lockdown, starting from midnight for 21 days.^[36]

Signs and symptoms

Those infected with the virus may be asymptomatic or develop flu-like symptoms, including fever, cough, fatigue, and shortness of breath.^{[37][38]} Emergency symptoms include difficulty breathing, persistent chest pain or pressure, confusion, difficulty waking, and bluish face or lips; immediate medical attention is advised if these symptoms are present.^[39] Less commonly, upper respiratory symptoms, such as sneezing, runny nose, or sore throat may be seen. Symptoms such as nausea, vomiting, and diarrhea have been observed in varying percentages.^{[40][41]} Some cases in China initially presented only with chest tightness and palpitations.^[42] In March 2020 there were reports indicating that loss of the sense of smell (anosmia) may be a common symptom among those who have mild disease, although not as common as initially reported. In some, the disease may progress to pneumonia, multi-organ failure, and death. In those who develop severe symptoms, time from symptom onset to needing mechanical ventilation is typically eight days.^[43] As is common with infections, there is a delay between the moment when a person is infected with the virus and the time when they develop symptoms. This is called the incubation period. The incubation period for COVID-19 is typically five to six days but may range from two to 14 days.^{[44][45]} 97.5% of people who develop symptoms will do so within 11.5 days of infection.^[46]

Reports indicate that not all who are infected develop symptoms, but their role in transmission is unknown.^[47] Preliminary evidence suggests asymptomatic cases may contribute to the spread of the disease.^{[48][49]} The proportion of infected people who do not display symptoms is currently unknown and being studied, with South Korea's CDC

reporting that 20% of all confirmed cases remained asymptomatic during their hospital stay.^[49]

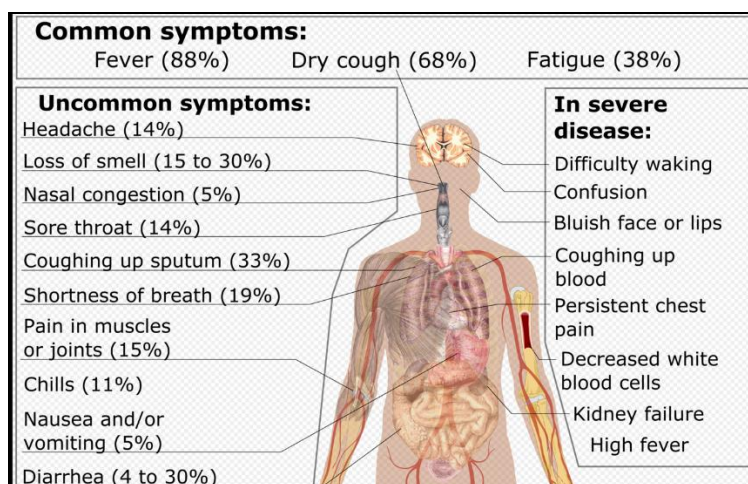


Fig 2: Sign and symptoms of COVID-19.

Transmission

Some details about how the disease is spread are still being determined. The WHO and CDC state that it is primarily spread during close contact and by small droplets produced when people cough, sneeze, or with close contact being within 1–3 m (3 ft 3 in–9 ft 10 in).^[50] A study in Singapore found that an uncovered coughing can lead to droplets travelling up to 4.5 meters (15 feet). Respiratory droplets may also be produced during breathing out, including when talking. Though the virus is not generally airborne,^[50] The National Academy of Science has suggested that bio aerosol transmission may be possible and air collectors positioned in the hallway outside of people's rooms yielded samples positive for viral RNA.^[51] The droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs.^[52] Some medical procedures such as intubation and cardiopulmonary resuscitation (CPR) may cause respiratory secretions to be aerosolised and thus result in airborne spread. It may also spread when one touches a contaminated surface, known as fomite transmission, and then touches their eyes, nose, or mouth.^[50] While there are concerns it may spread by feces, this risk is believed to be low.^[50]

The virus is most contagious when people are symptomatic; while spread may be possible before symptoms appear, this risk is low. The European Centre for Disease Prevention and Control (ECDC) states that while it is not entirely clear how easily the disease spreads, one person generally infects two to three others.

The virus survives for hours to days on surfaces. Specifically, the virus was found to be detectable for one day on cardboard, for up to three days on plastic and stainless steel, and for up to four hours on copper. This, however, varies based on the humidity and temperature. Surfaces may be decontaminated with a number of solutions (within one minute of exposure to the disinfectant for a stainless steel surface), including 62–71% ethanol, 50–100% isopropanol, 0.1% sodium hypochlorite, 0.5% hydrogen peroxide, and 0.2–7.5% povidone-iodine. Other solutions, such as benzalkonium chloride and chlorhexidine gluconate, are less effective.^[53]

Testing in India

The Union Health Ministry's war room and policy making team in New Delhi consists of the ministry's Emergency Medical Response Unit, the Central Surveillance Unit (IDSP), the National Centre for Disease Control (NCDC) and experts from three government hospitals.^[17] They are part of policy decisions to decide how coronavirus should be tackled in the country.^[18] A cluster-containment strategy is mainly being adopted, similar to how India contained previous epidemics, as well as "breaking the chain of transmission". 15 labs across India led by the National Institute of Virology (NIV), Pune, are testing for the virus, with more labs being trained. On 14 March 65 labs were named capable for testing for the virus (though as of 17 March not all are fully functional).

On 14 March, scientists at the National Institute of Virology isolated a strain of the novel coronavirus. By doing so, India became the fifth country to successfully obtain a pure sample of the virus after China, Japan, Thailand and the US.^[19] The Indian Council of Medical Research (ICMR) said that isolation of the virus will help towards expediting the development of drugs, vaccines and rapid diagnostic kits in the country. NIV has shared two SARS-CoV-2 genome sequences with GISAID.^[20] On 17 March, The Union Ministry of Health has decided to allow private pathology labs to test for COVID-19. The ministry official said that only the government lab is allowed to test the coronavirus. By allowing private labs, the work of testing can be doubled. The ministry said that about 60 private labs may soon be allowed for this. Once set up, a person can get COVID-19 test done at a private lab after a qualified physician in a government facility recommends it. The ICMR has appealed to the private labs to offer the tests for free as the government labs do.

On 18 March, A top health ministry official said that a Swiss private company named Roche Diagnostics has been given the Food and Drug Administration (FDA) emergency approval to

conduct tests for coronavirus. The Indian regulator has given them a licence to conduct diagnostic tests of the virus on 17 March. The Drug Controller General of India (DCGI) was assessing giving another firm license while two Indian diagnostic companies have also sought approval for the coronavirus testing kits developed by them. The government has also issued guidelines to cap the cost of sample testing by private labs at ₹ 4,500.

On 19 March, Ramanan Laxminarayan, director of the Center for Disease Dynamics, Economics & Policy stated that India could be facing a "tsunami of cases within a few weeks" as testing increases and the reason for the low number of confirmed cases currently is due to under-testing. He also said that according to mathematical models applied in the US or UK at least 20%-60% of the population will be affected. Applying the same models in India means that at the lower end of the estimate there could be 300 million cases of which 4-8 million could be severe.^[11] 111 additional labs for testing became functional on 21 March. On 24 March, Pune-based molecular diagnostic company Mylab Discovery Solutions became the first Indian company to have received validation for its RT-PCR tests from National Institute of Virology and the Indian Council of Medical Research (ICMR). The test takes 2.5 hours and the company is looking to price it at around ₹ 1,200 (US\$17), or Rs 80,000 for a 100 test kit.

According to ICMR, 47,951 samples have been tested as of 1 April and on 2 April, 7,900 samples were tested, taking total to 55,851 out of which 2,056 individuals have been confirmed positive.

Treatment

In Rajasthan, a combination of anti-malaria, anti-Swine flu and anti-HIV drugs resulted into recovery of three patients in March.^[54] In same month, Indian Institute of Chemical Technology, Council of Scientific and Industrial Research and Cipla corporation, launched a joint venture to develop anti-COVID-19 drugs.^[55] Pune-based Serum Institute of India is expected to apply for clinical trials of certain strains from Drug Controller General of India. As per company president Adar Poonawalla, a vaccine for COVID-19 will be delivered within an year, however, it may not be effective on 20 to 30% people.^[56]

On 23 March, the National Task Force for COVID19 constituted by Indian Council of Medical Research recommended the use of hydroxychloroquine for treatment of COVID19 for high-risk cases.^[57]

Preventive measures

Protective measures were first applied in January. The Government of India issued a travel advisory to its citizens, particularly for Wuhan, where about 500 Indian medical students study. It directed seven major international airports to perform thermal screening of passengers arriving from China.

By early to mid-March the government had drawn up plans to deal with a worsening of the pandemic in the country which includes seven ministries working together to set up additional quarantine and treatment facilities across the country. States and twenty ministries including home, defence, railways, labour, minority affairs, aviation and tourism have been informed of the containment plan. Plans to avoid a panic like situation have also been made. The Ministry of Textiles has been assigned the task of making sure the availability of protective and medical materials. The Department of Pharmaceuticals is tasked with making sure of the availability of essential medicines. Ministry of Consumer Affairs, Food and Public Distribution has been asked to ensure availability of essentials.

The Indian Space Research Organisation (ISRO) has adopted precautions against the pandemic in its three facilities in Thiruvananthapuram, Kerala. The facilities have suspended bio-metric fingerprint scanning, disabled entrance turnstiles and limited internal meetings and travel to a minimum while stepping up medical surveillance. However, mission schedules were not affected.

On 17 March, The Government of India issued an advisory urging to all Indian states to take social distancing measures as a preventive strategy for implementation till 31 March. A government directive was issued asking all Central Armed Police Forces to get into battle mode; all non-essential leave has been cancelled. A COVID-19 Economic Response Task Force has also been formed.

On 27 March, The Tamil Nadu government has issued appointment orders to 1508 lab technicians, 500 doctors and 1000 nurses with immediate effect in view of the current status of corona virus. With this, orders have also been given to increase 200 new ambulances in the state. The government of Assam started making isolation facilities in Sarusajai stadium and Nehru Stadium in Guwahati.

Closedown and curfews

- **On 5 March**, amidst a surge in fresh cases being confirmed in Delhi NCR, the Government of Delhi announced that all primary schools across Delhi would be shut until 31 March as a precaution.^[58]
- **On 7 March**, primary schools in Jammu district and Samba district were closed down until 31 March after two suspected cases with "high viral load" were reported in Jammu.^[59]
- **On 9 March**, collector and district magistrate of Pathanamthitta district of Kerala declared three days long holidays for all educational institutions in the district. Karnataka declared indefinite holiday for all kindergarten and pre-primary schools in Bangalore. The holiday was extended to all primary schools up to fifth grade after a confirmed case was reported in the city.^[60]
- **On 10 March**, Kerala announced closure of all schools and colleges across the state until 31 March, with effect from 11 March.^[61]
- **On 12 March**, the Chief Minister of Delhi Arvind Kejriwal announced that all schools, colleges and cinema halls in New Delhi would be closed till the end of March and all public places disinfected as a precautionary measure.^[62]
- **On 12 March**, the Chief Minister of Karnataka B. S. Yediyurappa announced that all educational institutions, malls, cinema halls and pubs would be shut for a week across the state. He also issued prohibitory orders on public events such as parties and weddings. The Government of Odisha, declaring the outbreak a "disaster", announced the closure of educational institutions and cinema halls until the end of the month, as well as prohibition on non-essential official gatherings. The Government of Maharashtra declared the outbreak to be an epidemic in the cities of Mumbai, Navi Mumbai, Nagpur, Pune and Pimpri Chinchwad. It announced that all malls, cinema halls, swimming pools and gyms in these cities will be closed until 31 March.^[63]
- **On 13 March**, the Punjab and Chhattisgarh governments declared holidays in all schools and colleges till 31 March. Manipur government announced that all schools in the state, where examination are not being held would remain closed till 31 March.^[64]
- **On 14 March**, the Himachal Pradesh chief minister Jai Ram Thakur declared that all educational institutions and theatres would remain closed until 31 March as a precautionary measure in view of the threat of the coronavirus. Also, in the West Bengal government announced that all educational institutions will be closed till 31 March, however the board examinations will be conducted. Maharashtra government closed

shopping malls, swimming pools, movie theatres, gyms and asked all schools and colleges in the state's urban areas to remain close till 31 March 2020. Government of Rajasthan announced to close all educational institutions, gyms, and cinema halls till 30 March, however ongoing school and college exams will continue.^[65]

- **On 15 March**, IIT, Bombay suspended all academic activities till 29 March. In Goa chief minister Pramod Sawant declared that all educational institutions would remain closed until 31 March. While the examinations of the 10th and 12th Goa Board of Secondary and Higher Secondary Education will be held as per schedule. Brihanmumbai Municipal Corporation shut down Jijamata Udyaan till further orders. The Gujarat government announced that all schools, colleges, cinema halls will be closed till 31 March, however the board examinations will be conducted. Bihar Public Service Commission (BPSC) has postponed all the recruitment exams till 31 March. Vaishno Devi Shrine Board issued an advisory asking non-resident Indians and foreigners not to visit the temple for 28 days after landing in India. The Tamil Nadu and Telangana governments declared closure of schools, malls and theatres till 31 March. Ministry of Culture shut down all monuments and museums under Archaeological Survey of India till 31 March.^[66]
- **On 17 March**, schools, colleges and multiplexes in Uttar Pradesh were shut down till 2 April and on-going examinations were postponed.^[101] BMC ordered private firms in Mumbai to function "only at 50% of their staff capacity or face action under section 188 of the IPC".^[102] Rajasthan government banned the gathering of more than 50 people in public places till 31 March.^[103] Important tourist destinations in Tamil Nadu were locked down. Authorities in Nilgiris district ordered the closure of tourist sites including Ooty and the tourists staying in hotels and resorts were given 24 hours to leave the city.^[104] In Maharashtra, government offices were closed down for seven days.^[105] Chandigarh administration ordered the closure of shopping malls, cinema halls, gyms, nightclubs, swimming pools, coaching centres, spas, creches and video game parlours till 31 March. It also banned gatherings of more than a 100 people and census work was postponed.^[106] At the same time, Dera chiefs were asked to postpone all religious events till 31 March.^[107] The GoM has also directed that no more than 50 people are allowed to gather at any place other than weddings.^[108] Pondicherry shut down schools, colleges, cinemas and gyms till 31 March.^[109] Mumbai Police ordered the closure of pubs, bars and discotheques till 31 March.^[67]
- **On 18 March**, district magistrate and deputy commissioner of Srinagar district in Jammu and Kashmir said that the entry of all foreign tourists has been banned in the entire union

territory.^[111] On the other hand, the Directorate of Floriculture, Parks and Horticulture of the state has also extended the Bagh-e-Bahu Garden to the general public from 18 to 31 March to keep the situation under control in the Union Territory.^{[112][113]} Government of Andhra Pradesh announced closure of all educational institutions till 31 March.^[114]

- **On 23 March** Chief Minister of Maharashtra announced that borders of all the districts will be closed, and a strict curfew will be implemented statewide.^[68]


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