

## Rise and Fall of COVID-19 cases in INDIA: A Review.

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**Abstract:** COVID-19 disease, caused by a novel corona virus known as Severe Acute Respiratory Syndrome Corona virus 2 (SARS-CoV-2), has rapidly expanded throughout world since December 2019, producing a global outbreak and significant public health concern. The coronavirus pandemic has so far been characterized by a series of COVID-19 waves. The new Corona virus has caused a wide range of symptoms in people infected with it, ranging from mild to severe. As the virus alters its kind and new forms emerge, new and unique symptoms are appearing in newly infected patients. The current method for limiting the spread of instances is to take preventive measures. All available measures, such as public engagement and participation in disease control, strict execution of CAB (social distance, wearing of face masks, and hand hygiene), must be adopted and observed by the public. Preventing further spread requires early detection, diagnosis, isolation, and treatment. Preventive strategies focus on patient isolation and infection control, including steps to be taken during diagnosis and clinical care of an infected patient.

**Key Words:** COVID-19, Pandemic, COVID-19 INDIA, Sign and symptoms

### Introduction

COVID-19 disease, caused by a novel corona virus known as Severe Acute Respiratory Syndrome Corona virus 2 (SARS-CoV-2), has rapidly expanded throughout world since December 2019, producing a global outbreak and significant public health concern. On January 30, 2020, the World Health Organization (WHO) declared COVID-19 a global public health emergency<sup>1</sup>.

COVID-19 was first discovered as a respiratory tract infection in Wuhan, China, causing symptoms like fever, chills, dry cough, exhaustion, and shortness of breath<sup>2,3</sup>. This unusual viral pneumonia has rendered the entire world unable to function, resulting in catastrophic health and economic losses. COVID-19 has an incubation period of 1–14 days, with a mean of 6 days, during which asymptomatic virus carriers can spread the disease to healthy persons by droplets or touch, as evidenced by evidence of human-to-human transmission via droplets or contact. According to the World Health Organization's International Health Regulations (2005), COVID-19 was declared a Public Health Emergency of International Concern by the end of January 2020<sup>4, 5</sup>.

The coronavirus pandemic has so far been characterized by a series of COVID-19 waves. The new Corona virus has caused a wide range of symptoms in people infected with it, ranging from mild to severe. As the virus alters its kind and new forms emerge, new and unique symptoms are appearing in newlyinfected patients.

### FIRST WAVE

The first incidence of COVID-19 in India was reported on January 27, 2020, in Kerala. By February 3, 2020, there were three cases. In February 2020, no new cases were recorded. However, by mid-March, the number of infected cases had begun to rise, with numerous cases recorded across India as shown in the Figure 1. SARS- CoV-2 antigen testing by Real-Time Reverse Transcription Polymerase Chain Reaction (RT-qPCR) or Rapid Antigen Test is used to report cases (RAT)<sup>1,6</sup>.

On March 12, 2020, the first COVID-19-related death in India was reported. India has reacted quickly to the new threat. Since March 25, international borders have been closed and a nationwide lockdown has been implemented. According to the Oxford COVID-19 Government Response Tracker, India's response is among the world's most strict, surpassing that of the

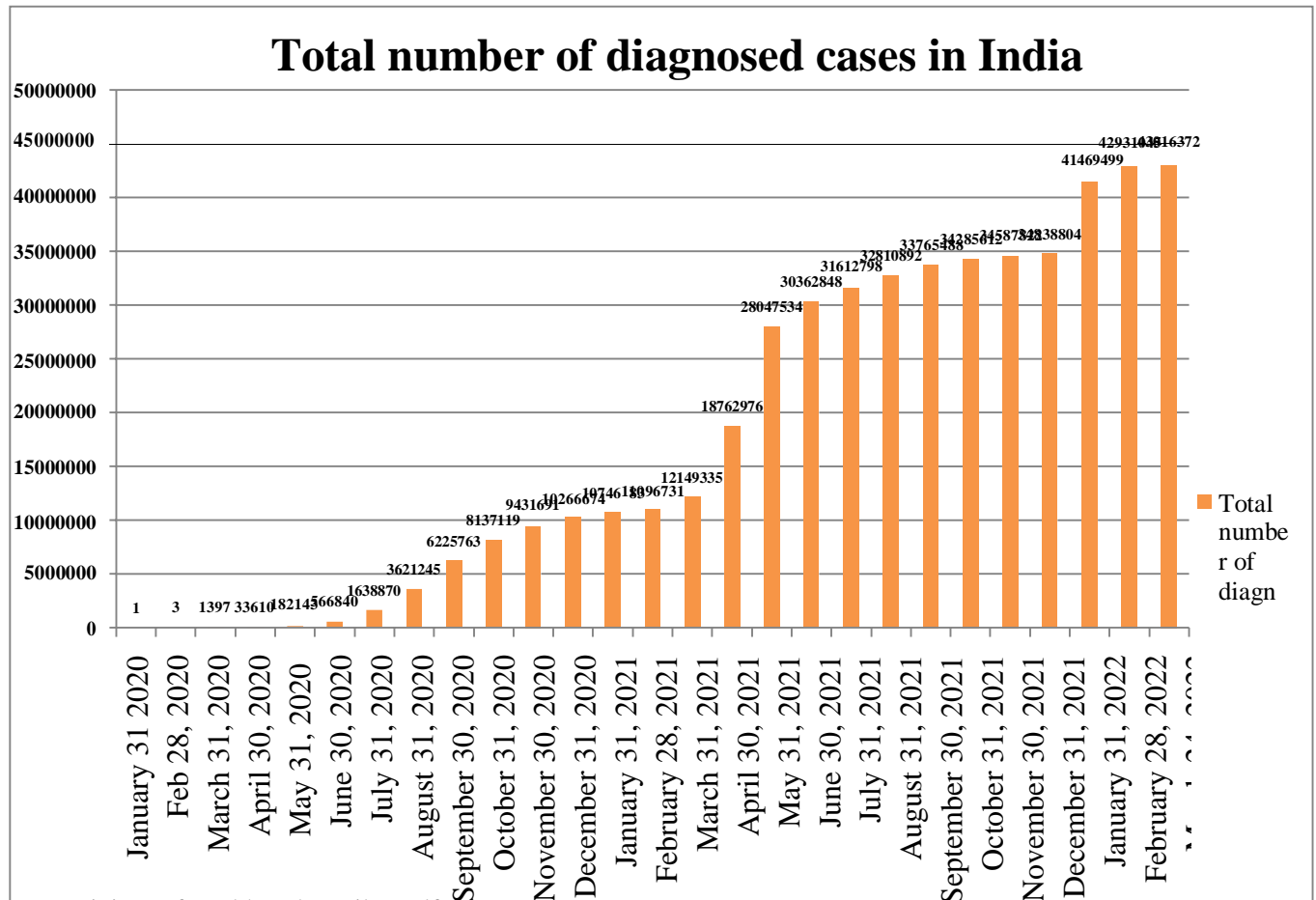
United States, Germany, France, Italy, and the United Kingdom. India would have had 820 000 cases by April 15th if containment and lockdown had not been implemented in a timely manner. On the contrary, as of April 15, there were 11 438 COVID19 cases recorded in India, preventing almost 800 000 infections. The Indian Council of Medical Research (ICMR) had estimated that rigorous social distance would cut total cases by 62 percent and peak cases by 89 percent<sup>7</sup>.

For the first time on June 10<sup>th</sup> 2020, India's recoveries surpassed active cases. In September, infection rates began to decline, as did the number of new and active cases. Daily instances peaked in mid-September at over 90,000 per day, before decreasing to under 15,000 in January 2021<sup>8,9,10</sup>.

In October 2020, a government committee on COVID-19 claimed that the epidemic has peaked in India and that it could be under control by February 2021. This prediction is based on the "Indian Supermodel," a mathematical simulation that assumes India achieves herd immunity. A novel SARS-CoV-2 strain, Lineage B.1.617, was discovered in the country that month<sup>11, 12, 13</sup>.

India's vaccination campaign began on January 16, 2021. Lakshadweep became the final region of India to report its first case on January 19, 2021, over a year after the country's first case was recorded. Daily cases had dropped to 9,000 per day by February 2021<sup>14, 15, 16, 17</sup>.

Figure-1: Monthly report of total number of diagnosed cases in India during first, second and third wave



Source: Ministry of Health and Family Welfare

## SECOND WAVE

Meanwhile, by early April 2021, the country had been hit by a huge second wave of diseases, resulting in shortages of vaccines, hospital beds, oxygen cylinders, and other medical supplies in some areas. India crossed 1 million active instances on April 9th, and by April 12th, India had surpassed Brazil as the country with the second-highest number of COVID-19 cases worldwide<sup>18, 19</sup>. India had crossed 2.5 million active cases by late April, with an average of 300,000 new cases and 2,000 deaths every day. It was the first country to record over 400,000 new cases in a 24-hour period and over 3,500 deaths in a single day on April 30, 2021<sup>20, 21</sup>.

Multiple causes have been suggested as contributing to the abrupt increase in cases, including highly infectious variations of concern like Lineage B.1.617<sup>22, 23</sup>, a lack of preparations, such as temporary hospitals being dismantled after cases began to decline and new facilities not being built,<sup>24, 25</sup> and health and safety precautions being poorly implemented or enforced during weddings, festivals, and the Haridwar Kumbh Mela, which was linked to at least 1,700 positive cases between 10 and 14 April, sporting events, state and local elections in which politicians and activists have held in several states and in public plenaries<sup>24, 25, 26, 27, 28</sup>.

A slowing economy put pressure on the government to ease restrictions, and there was a sense of exceptionalism based on the hope that India's young population and childhood inoculation programme would mitigate the virus's impact. Due to under-reporting of cases in the country, models may have underestimated expected cases and deaths<sup>29</sup>.

The second wave put a burden on the healthcare system, resulting in a scarcity of liquid medical oxygen, logistical challenges, and a lack of cryogenic tankers, all of which were caused by ignored warnings that began in the first wave. A huge number of new oxygen plants have been announced, with the installation burden shared by the center, coordination with other countries for oxygen plants received as help, and the DRDO. Several countries sent emergency relief to India, including oxygen supply, medicines, vaccine raw materials, and ventilators<sup>30, 31, 32</sup>.

By late May, the number of new cases had started to decline steadily; on May 25, the country reported 195,994 new cases, the lowest daily increase since April 13th. The mortality rate, on the other hand, has remained high. COVID-19 was blamed for approximately 300,000 deaths in India by the 24th of May. Over 100,000 people had died in the previous 26 days, and 50,000 in the previous 12 days. The World Health Organization (WHO) announced in May 2021 that two variations first discovered in India will be referred to as 'Delta' and 'Kappa'<sup>33, 34, 35</sup>.

## **NEW SIGNS AND SYMPTOMS OF COVID-19 IN THE SECOND WAVE**

### **Shortness of breath and low oxygen levels**

According to scientific sources, the mutant coronavirus strain has a high risk of lung involvement, with up to 25% of cases involving the lungs, and can cause COVID pneumonia, unhealthy lung progression as early as day 2 or 3 after symptom onset, Acute Respiratory Distress Syndrome (ARDS), and a variety of other pulmonary issues. This is particularly true for the younger generations. This is also one of the main reasons for the rise in hospitalisation and oxygen therapy. The infection causes a decline in oxygen saturation (SpO<sub>2</sub>), which can cause lung damage and, in some cases, multiple organ failure<sup>36, 37</sup>.

### **Infections of the gastrointestinal tract:**

Any issues with your GI system will lower your immunity and have a detrimental impact on your overall health. GI tract infections caused by COVID-19 can induce loss of appetite, vomiting, stomach pain, and loose stools<sup>37</sup>.

### **Hearing Loss**

In the second wave of COVID-19 infection, hearing loss is one of the symptoms. It can be mild, moderate, or severe, with sudden hearing loss, reduced hearing, or ringing in the ears as a result (tinnitus). This starts within the first week of infection and gets worse as time goes on<sup>37</sup>.

### **Extreme weakness and lethargy**

During the second wave, extreme weakness and lethargy were found as one of the initial indications of COVID-19 infection. When your body detects the COVID-19 virus (SARS-CoV-2) as an intruder, it activates an immune response to fight it, leaving the infected person fatigued and feeble<sup>37</sup>.

### **Conjunctivitis,**

It is an inflammation of the eye that causes your eyelid and eyeball's outer transparent membrane (called the conjunctiva) to bulge. Itching, redness, and tears of the eyes are common symptoms, with puffy or watery eyes as a result. In India, new strains of the novel coronavirus have been discovered that infect the conjunctiva. In contrast to typical conjunctivitis, which usually affects both eyes, COVID-19 conjunctivitis affects only one eye. Constant eye inflammation and light sensitivity may accompany it<sup>36, 37</sup>.

### **Dry Mouth**

Dry mouth occurs when the salivary glands do not create enough saliva, which can lead to tooth and gum disease as well as making you more susceptible to infections. COVID-19 produces dry mouth, which is now considered a common and early symptom of the disease. The new corona virus can assault the tissues and mucus lining your oral cavity, resulting in decreased saliva production and consequently dry mouth, because the oral cavity (mouth) is a potential entrance point for it. Dry tongue, changes in the colour and texture of your tongue, ulcers or blisters, and difficulty chewing are all possible oral signs of the corona virus infection<sup>36, 37</sup>.

### **Diarrhoea**

Diarrhoea, or loose watery stools, is one of the most common symptoms seen in COVID-19 patients during the second wave. The majority of persons infected with COVID-19 had chronic diarrhoea for 1 to 14 days, on average<sup>37</sup>.

### **Headache:**

COVID-19 might cause a quick onset of headaches. A regular headache that lasts for a long time and does not go away with medicines was one of the newest symptoms recorded during the second COVID-19 wave<sup>37</sup>.

### **Skin rashes**

Skin rashes have just been recognized as a novel COVID-19 symptom. The virus's immunological reaction may cause these rashes to spread<sup>37</sup>.

### **Unexplained fatigue**

Before acquiring any other symptoms, many patients who tested positive for COVID -19 reported feeling lethargic and fatigued. In fact, in certain circumstances, people only have exhaustion and tiredness as their only symptoms<sup>36</sup>.

## **DIFFERENCES BETWEEN FIRST WAVE AND SECOND WAVE**

During the first and second waves of the corona virus pandemic in India, there was a significant change in how the virus spread. Despite the fact that the disease is still relatively new and that we have vaccines on our side, lakhs of people are still getting infected and suffering from devastating consequences. Whether it's the mutant strains' high infectivity or their lack of COVID -appropriate behavior, the second wave of the Covid-19 pandemic has a number of minor but distinguishing traits in terms of symptoms, age profile, and geographic distribution<sup>38</sup>.

### **New homegrown variants**

Local variations did not play a significant impact in the initial wave of the Covid-19 epidemic in India. However, many specialists believe that indigenous mutant strains of SARS-CoV-2 are driving the increase in Covid-19 infections during the second wave. Over 60% of new cases in Maharashtra were attributable to India-grown mutant corona virus strains, according to genome sequencing<sup>38</sup>.

### **Younger age**

According to some analysts, the second wave of the Covid-19 epidemic is hitting younger individuals more than the first wave, which occurred in 2020. According to government data from December 2020, while under-45 patients accounted for 60% of all Covid-19 cases, the mortality rate among older people was substantially higher – 88 percent.

States like Maharashtra and Karnataka reported near-50 percent infections among those under 45 years old in the second wave of Covid-19. However, there could be a reason for this pattern. As the number of cases increased, older and more vulnerable persons stayed mostly indoors, and they were also among the first to receive the Covid-19 vaccine, which has been shown to lessen the severity of the sickness. Furthermore, because they are more involved in economic activities, the younger generation is more mobile<sup>38</sup>.

### **More children getting infected**

From March 1 to April 4, around 80,000 children in the five worst-affected states — Maharashtra, Chhattisgarh, Uttar Pradesh, Karnataka, and Delhi — tested positive for Covid-19, according to government data.

Health experts, on the other hand, have issued a cautionary note. They claim that because most children in the first wave of the Covid-19 pandemic were asymptomatic and the healthcare system was preparing to deal with severe cases, a huge number of children may have gone untreated even if they contracted the corona virus infection<sup>38</sup>.

### **New symptoms**

Symptoms that were not as common in the first wave of Covid-19 patients in India are now being reported in higher numbers. Pink eyes, loose motions, and hearing loss are among the symptoms, the latter of which was discovered in the second wave of the Covid-19 epidemic.

**COVID-19 Spread, Concentration**

COVID-19's first wave had a broader geographical reach, with hotspots strewn around the country. The second wave is more contagious, although it has been limited to a smaller number of hotspots. In the initial wave, over 40 districts reported 50% of all Covid-19 cases in India; now, only 20 districts are reporting half of the corona virus infections.

The COVID-19 epidemic peaked in August-September 2020, with 60-100 districts reporting 75 percent of the cases in India. Only 20-40 districts are reporting 75 percent of all cases in the second wave, according to the report<sup>38</sup>.

**Differences between first wave and second wave**

	<b>First wave</b>	<b>Second wave</b>
Causative organism	SARS -Cov-2 virus	Several mutations of SARS -Cov-2 virus
New homegrown variants	No significant role	Significant role
Knowledge about the disease	Less	More
Affected children	Asymptomatic	Symptomatic
Age group	Older population	Younger population
Common symptoms	Fever, chills, body ache, loss of smell and taste, and loss of breath or respiratory complications.	Fever, chills, body ache, loss of smell and taste, and loss of breath or respiratory complications.
New symptoms	-	pink eyes, loose motions and hearing impairment,
Spread of COVID-19	widespread in geographical reach with hotspots spread all over the country	more infectious but has been limited to fewer hotspots
Rate of increase in new cases	Less	significantly higher
Hospitalization and mortality rate	High	Low
Case Fatality Ratio	1.3%.	0.87%

**THIRD WAVE**

In the year 2022, the world is grappling with a new corona virus variety that has resulted in an increase in cases all over the planet. More than 2.40 lakh COVID positive cases have been reported in India alone, the majority of which are attributable to the Omicron variation<sup>39</sup>.

According to official estimates, India has the world's second-highest number of confirmed cases of COVID-19 infection (after the United States of America) and the third-highest number of COVID-19 deaths (after the United States and Brazil) with 516,281 deaths as of March 18, 2022<sup>28</sup>

Most persons infected with the corona virus displayed three key symptoms in the first and second waves: a high temperature, a new, persistent cough, and a loss of smell or taste. However, in the year 2022, the development of new mutant varieties caused a significant shift in the situation. Apart from these three common indicators, patients reported a variety of different COVID-19 symptoms, making it difficult to diagnose the infection at an early stage.<sup>39</sup>

Even fully vaccinated people can develop new COVID 3rd wave symptoms, including as headaches, runny nose, loss of smell, sore throat, and sneezing. Fever with or without rigours (shivering), cough, throat discomfort, muscular weakness, and exhaustion are the five most common symptoms of COVID-19 during the third wave, according to the Union health ministry. Because new symptoms of COVID 3rd wave occur 2 to 14 days after infection, staying at home and avoiding contact as much as possible is the best option for preventing the spread of such a severe infection.

Aside from these, there are a few other symptoms that aren't usually related with the respiratory system and can go unrecognized.

**Skin rashes**

Rashes can be caused by a variety of factors, including allergies, exposure to extreme temperatures, and even infection. Rashes on the skin, fingers, toes, lips, and tongue are all possible symptoms of COVID - 19 infection. It is one of the Omicron symptoms that has been observed in multiple patients who have

tested positive for the virus. COVID-19 rashes are usually irritating, and they can get worse at night, making it difficult to sleep. Some persons may develop a sensitivity to ultraviolet (UV) light and develop rashes as a result.

### Delirium

It's a problem with one's mental faculties that might cause confusion in thinking and a loss of awareness of one's surroundings. The condition is likewise associated to COVID-19 and is mainly seen in older people. Delirium symptoms emerge abruptly and within days of being infected with the virus. After being diagnosed with COVID-19, older people become easily confused and begin to act strangely. The symptoms disappear on their own after recovery from the infection.

### Difference between 1<sup>st</sup> and 2<sup>nd</sup> wave with 3<sup>rd</sup> wave

Symptoms	1 <sup>st</sup> and 2 <sup>nd</sup> wave	3 <sup>rd</sup> wave
Smell/taste	Complete loss at onset	Partial loss after 7-8 days
Cough and Cold	Dry cough, no cold	Cough with phlegm
Fever	Medium to high grade	Low grade
Weakness/lethargy	Severe	Mild
Respiratory distress	10-15% patients	Less than 1% patients
Hospitalization	10% patients	Less than 1%

Because there is no immediate end in sight to this disaster, the population must learn to live with it in the most careful and safe manner possible, adhering to the Covid Appropriate Behaviours. It is self-evident that prevention is preferable to cure in this case. The current method for limiting the spread of instances is to take preventive measures. All available measures, such as public engagement and participation in disease control, strict execution of CAB (social distance, wearing of face masks, and hand hygiene), must be adopted and observed by the public.

Preventing further spread requires early detection, diagnosis, isolation, and treatment. Preventive strategies focus on patient isolation and infection control, including steps to be taken during diagnosis and clinical care of an infected patient.

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