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REVIEW ARTICLE

COVID-19 Outbreak in India: A Review of Preventive Measures and Challenges during the First Wave

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Abstract:

Coronavirus disease 2019 (COVID-19) cases in India, the world's second most populous country, have been increasing rapidly in recent months, challenging India's ability to deal with this viral pandemic. The Government of India (GoI) and the States/UTs have taken a number of "pre-emptive, pro-active and graded" measures to prevent, contain, and manage COVID-19 in the country. These preventive measures and decisions taken by the GoI helped to stem the first wave of COVID-19 in the nation. Such measures and decisions were reviewed and monitored on a regular basis. The GoI followed a graded response approach, and ensured that there is no shortage of supplies of critical items, including medical Personal Protective Equipment (PPE), N95 masks, test kits, medications, and ventilators, across the country. The government ensured the establishment of COVID-19 hospitals at both the Center and the State to take care of the infected patients. Nations like India are at higher risk due to their large population density, inadequate infrastructure, and healthcare systems to satisfy extremely high demands.

Keywords: COVID-19, Preventive measures, Challenges, Infectious disease, Outbreak, Viral pandemic.

1. INTRODUCTION

The name COVID-19 is derived from the words corona, virus, and disease, while the number 19 represents the year that it emerged. Today, people from all over the world are in fear of the spread of COVID-19, which began in Wuhan, China, in December 2019. As of 7th October 2020, there were approximately 36,295,345 confirmed cases of COVID-19, and approximately 1,058,080 deaths reported worldwide [1]. COVID-19 spreads mainly by droplets formed as a result of coughing or sneezing of an infected COVID-19 patient. It could occur in two ways, *i.e. via* direct close contact with COVID-19 patients, particularly if they do not cover their faces while coughing or sneezing. The second way is indirect contact, which involves infected droplets residing on surfaces and fabrics for several days. Thus, touching such contaminated surfaces or fabrics, and then touching one's mouth, nose or eyes, will facilitate in spreading the virus [2].

In India, the first three cases of COVID-19 were identified in Kerala province on January 30th, 2020, and February 02nd-03rd, 2020, and involved patients who returned from Wuhan, China. Afterwards, in February, no new positive cases were identified in the nation. On March 2nd 2020, two other positive cases were identified; one patient had returned from Vienna, Austria's capital, and the other from Dubai. The total number of positive cases was 50 on March 10th, 2020, and the first death due to COVID-19 was reported on March 12th, 2020. Afterwards, COVID-19 spread in the nation at a very rapid rate. Currently, India has the highest number of COVID-19 cases in Asia and the second most confirmed cases in the world after the United States [3]. On August 29th 2020, India recorded the highest one-day increase in COVID-19 cases, with 78,761 cases surpassing the previous record of 77,368 cases recorded in the US on July 17th, 2020 [4]. India currently holds a one-day record for having the highest number of cases, *i.e.* 97,894, as of September 17th, 2020, during the first wave [5]. As of September 30th, 2020, according to the Ministry of Health & Family Welfare (MoHFW), Govt. of India (GoI), a total of 6,225,763 COVID-19 cases were reported in 35 states/union territories. These include 518,7825 people who have been cured/discharged and the 97,497 mortality cases [6]. Hospital/home isolation of reported cases, contact tracing, and home quarantine are still in progress. Each affected country is taking preventive measures to combat the pandemic by avoiding transmission or slowing down the spread depending on the current state in each country [7]. The next section discusses preventive steps and decisions taken by GoI in different sectors.

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2. PREVENTIVE MEASURES AND DECISIONS TAKEN DURING THE FIRST WAVE

The MoHFW, GoI, closely monitored the situation of the COVID-19 outbreak, and its control had become a topmost urgency for the MoHFW GoI in collaboration with the World Health Organization (WHO).

Protective measures were first implemented in January 2020. The GoI has given travel advisory to the citizens, especially those living in Wuhan, where around 500 Indian medical students were residing [8]. It directed seven major international airports to conduct thermal screening of passengers arriving from China [9].

On March 02nd, 2020, due to the surge in positive cases reported from China and other countries, Indian citizens were advised by MoHFW GoI not to travel to the countries affected by COVID-19 (*i.e.*, China, the Republic of Korea, the Islamic Republic of Iran, Italy and Japan), and that people coming from these countries will be quarantined [10].

After that, MoHFW GoI provided some basic protective measures as follows [11]:

- Wash your hands frequently
- Maintain social distancing
- Avoid touching eyes, nose, and mouth
- Practice respiratory hygiene by covering your mouth and nose with the elbow or tissue when you cough or sneeze
- If you have fever, cough and difficulty breathing, seek medical care at the earliest
- Stay informed and follow the advice given by your doctor
- See a doctor if you feel unwell, and while visiting a doctor, wear a mask and cover your mouth and nose
- If you have any symptoms, please call the state helpline number or health ministry 24×7 helpline number +91-1123978046 or email at ncov2019@gmail.com

2.1. Educational Preventive Measures

On March 16th, 2020, GoI declared a countrywide lockdown involving all educational institutions (schools, universities, *etc.*), museums, gyms, swimming pools, cultural and social centers, and theatres; the government also advised people to avoid non-essential travel and private company employees to work from home; however, all essential government services and shops for essential goods (*i.e.*, food, medicines, *etc.*) were to remain open [12]. On March 18th, 2020, revised guidelines for examination centers were released by the Central Board of Secondary Education (CBSE). This includes a distance of at least 1 meter between the students taking the exam and a class of not more than 24 students. If the rooms in the examination centers are small, the students should sit in separate rooms [13]. On March 19th, 2020, the main exams of CBSE and JEE were postponed until March 31st and rescheduled after further assessment [14]. Union Public Service Commission (UPSC) also postponed the interview to be held for the Civil Services Examination 2019 from March 23rd, 2020 [15].

2.2. Social Distancing Measures

On March 17th, 2020, the GoI issued an advisory recommendation that all Indian states should implement social distancing measures as a preventive strategy until March 31st, 2020, which could be revised based on the situation [16].

2.3. Preventive Measures Related to Historic Buildings

On March 17th, 2020, all of the country's historic buildings were ordered to remain close until March 31st, 2020. The Taj Mahal, Qutub Minar, and Red Fort, and all the national monuments and museums under the Archaeological Department of India also remained close until March 31st, 2020, according to Union Tourism Minister [17].

2.4. Preventive Measures in Transportation

On March 19th, 2020, GoI announced that as of March 22nd, no international flights would be permitted to land in India [18]. The union government announced on March 23rd, 2020, that all domestic flights in the nation would be suspended starting on March 25th, 2020 [19].

The union government canceled all rail services in the nation barring goods trains, *i.e.* about 12,500 trains, and all non-essential passenger services, including interstate buses on March 22nd, 2020 [20].

2.5. Preventive Measures in Sports

The 2020 ISSF World Cup, scheduled to begin in New Delhi on March 15th, 2020, was postponed [21]. The Indian Open Badminton Tournament which had to be held in New Delhi from March 24th to 29th, 2020, was suspended until April 12th [22].

India's FIFA World Cup qualification match against Qatar was postponed to March 26th, 2020, in Bhubaneswar [23]. The All India Football Federation suspended all I-League and I-League 2nd Division matches from March 15th [24]. The final of the 2020 Indian Super League was held behind closed doors on March 14th, 2020 [25].

The Board of Control for Cricket in India announced the postponement of the inaugural of the 2020 Indian Premier League on March 13th, 2020, from March 29th to April 15th, 2020 [26]. Later that day, the ODI matches between India and South Africa on March 15th and 18th, 2020, which were to be played without spectators, were canceled [27 - 31].

The prime minister extended the ongoing nationwide lockdown for 19 more days until May 3rd, 2020 [32]. On May 1st, 2020, the GOI extended nationwide lockdown further for two weeks until May 17th. The nation was split into three zones, *i.e.* red zone, orange zone, and green zone, with red being the most affected and with stringent regulations. The GoI identified at least 130 districts in the country as red zones, 284 orange zones, and 319 green zones [33]. Starting on June 1st, 2020, the Government began to unlock the country (barring containment zones) in three unlocking phases [34].

3. CHALLENGES

Despite these decisions and measures, there were many challenges in way for India to confront and defeat the outbreak of COVID-19, including the following:

- The majority of hospitals in India have been overburdened, understaffed, and poorly equipped. In India, there is one government doctor for every 10,189 people (the WHO recommends a ratio of 1:1,000) or a shortfall of 600,000 doctors, and the nurse/patient ratio is 1:483, suggesting a shortage of 2 million nurses according to a 2019 report by the US-based Center for Disease Dynamics, Economics & Policy (CDDEP).

- Our Prime Minister has recently launched "Swachh Bharat Abhiyan" to achieve all-around sanitation and cleanliness in the country. Currently, there is a lot to be done to improve the level of cleanliness at public hospitals. Since cleanliness is the most important prevention of deadly flu, the Union and state health ministries need to ensure that the isolation wards and quarantined facilities uphold hygienic conditions.

- The nation continues to face many of the same challenges as other countries, including restricting unauthorized gatherings, debunking rumours and misinformation, fake health messages that spread on social media.

- On March 19th, 2020, retailers and consumer goods companies observed that their average daily sales were more than doubled as consumers rushed to buy essential goods ahead of PM Modi's national address [35]. In response to this, PM assured the citizens that there were adequate food and ration supplies and counseled them against panic buying [36].

- Almost 90,000 NRI (Non-Resident Indians) returned that month to the state of Punjab. The Health Minister of Punjab wrote to Union Health Minister that "Punjab has maximum numbers of NRI. Many have symptoms of COVID-19 and are further spreading the disease. Therefore, the number of COVID-19 patients could increase alarmingly" [37]. Amongst all of them, many people have been under treatment, but others have also hidden their travel history.

- Many cases have been reported across the nation where people suspected of being infected with the virus have escaped quarantine and hospital treatment [38, 39].

- India's efforts to control the COVID-19 spread have been affected as thousands of migrants returned to their homes and the lockout regulations began to be ignored. However, the Indian government has ordered states to quarantine these migrant workers for two weeks, hoping that this will deter them from spreading COVID-19 from the major cities where they worked before the lockdown [40].

On March 27th, the GoI announced Rs 1.7 lac crore relief package to provide a safety net for those most severely affected by the lockdown, along with insurance coverage for frontline medical personnel. About 800 million people received free grain and cooking gas for three months, in addition to cash, through direct transfers [41].

The Indian Medical Research Council (ICMR) has updated its test strategy for COVID-19 patients. The revised strategy states that asymptomatic direct and high-risk contacts of a confirmed case should be tested between "Day 5 and Day 14" after exposure [42]. Despite this quick increase in numbers, ICMR data suggests that the rate of positive cases is between 4-7% of the samples tested so far. In conjunction with private laboratories, the Government has considerably increased the number of tests a day, as hotspots and high-risk locations have been identified. According to ICMR, a total of 8,22,71,654 samples have been tested as on October 6th, 2020 [43].

The Joint Secretary, MoHFW, informed the results of the statistical analysis carried out by the Health Ministry on April 11th, 2020 [44]:

- A total of 8.2 lac COVID-19 cases would have occurred at a rate of 41% by April 15th, 2020, if no containment or lockdown measures had been taken.

- By this date, there would have been a total of 1.2 lac cases, if only containment measures had been implemented and no lockdown.

- Since the nation implemented containment and lockdown measures, the number of cases as of that date was 7,447.

The Union Minister of Health and Family Welfare stated on May 7th, 2020, that there were 130 hotspot districts, 284 non-hotspot districts, and 319 unaffected districts in the country. He also informed that as of May 7th, 2020, 821 COVID dedicated hospitals with 1,50,059 beds (isolation beds - 1,32,219 and ICU beds - 17,840) and 1,898 COVID dedicated health centres with 1,19,109 beds (isolation beds - 1,09,286 and ICU beds - 9,823) along with 7,569 quarantine centres are available to combat COVID-19 infection in the nation. He also informed that 29.06 lac Personal Protective Equipments (PPEs) and 62.77 lac N-95 masks had been distributed among the States/UTs/Central Institutions [45]. A smartphone application called Aarogya Setu was launched by the Ministry of Electronics and Information Technology to support 'contact surveillance and an attempt to control the spread of the COVID-19 pandemic in the nation' [46]. On May 12th, 2020, the PM announced a huge economic relief package of ₹ 20 lac crore for self-reliant India and extended the lockdown to its fourth phase [47]. From April 1st, 2020, to July 3rd, 2020, the Centre had distributed more than 2.02 crore N95 masks and more than 1.18 crore PPE kits to States/UTs/Central Institutions, free of cost [48]. As of September 23rd, 2020, the health infrastructure related to COVID-19 has been strengthened by the availability of 15,192 facilities with 15,38,541 isolation beds (excluding ICU beds), 66,638 ICU beds and 2,47,972 oxygen supported beds. There are also 33,024 ventilators available for COVID-dedicated beds [49].

4. LESSONS FROM THE FIRST WAVE

Experts have predicted that the second wave will be even more dangerous than the first. Therefore, any lessons learnt

from the first wave of COVID-19 can be helpful to control the spread of the virus, such as:

- An increase in testing.
- Increasing the supply of PPE and other medical supplies.
- An increase in rural workers' capacity to assure that members of the community get rapid referrals and faster testing.
- Following COVID-appropriate precautions such as wearing masks, avoiding gatherings, following hand hygiene and maintaining a distance of at least two yards.
- Considering that India needs to accelerate its vaccination campaign against COVID-19.

CONCLUSION

The GoI along with the states/union territories, has taken many "pre-emptive, pro-active, and graded" steps to prevent, control, and manage COVID-19 in the nation during the first wave of the infection. The GoI has responded to COVID-19 infection with a variety of emergency orders, institutional closures, a ban on mass gatherings, and other restrictions aimed at preventing its spread. These have been regularly checked and tracked. The GoI is constantly striving to ensure that critical products, including PPEs, N95 masks, medicines, test kits, and ventilators, are supplied without shortages to each state across the nation. Nations like India are at higher risk due to their large population density, inadequate infrastructure and healthcare systems to satisfy extremely high demands.

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIALS

The data sets used during the current study can be provided from the corresponding author [R. K], upon reasonable request.

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CONFLICT OF INTEREST

The author declares no conflict of interest, financial or otherwise.

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