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Epidemic Trend and Effect of COVID-19 Transmission in India during Lockdown Phase

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Authors' contributions

This work was carried out in collaboration between both authors. Author RPS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors PKS and RPS managed the analyses of the study. Author PKS managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

To evaluate the present situation concerning the epidemic trend associated with the COVID-19 in Indian demography, the dynamics of the case rise has been analyzed from the perspective of the different index. The index for the analysis has been chosen in terms of the Case Recovery Rate (CRR), CASE Fatality Rate (CFR), as well as Mortality rate (MR). The study includes the rise of the case related to the pandemic in the different demographic regions of India as well as deep analysis and calculation of the indexes considered for the study. The analysis of the rising cases has also been investigated to relax the imposed rule so that economy of the country will not get affected adversely. Several preventive and control initiative has been taken by the central and state government in collaboration. The result of this paper can be taken as an input to decide further policy in the fight against the COVID- 19.

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1. INTRODUCTION

COVID-19 had started from the Chinese terrain. The first case had been reported in the city of Wuhan of China. Prima facie of the incident, some 40 cases found in Hubei town of the Wuhan city. All of the patients have been suffering from pneumonia and occupation of some patient is vendors, as well as some, are being engaged in the seafood market in Wuhan city. The authorities of china along with the World Health Organization (WHO) come into action and extensive trials to know the cause of the disease started. The etiological lab testing has reached its outcome soon and made a declaration of the new virus named as Novel corona virus [1].

Fig.1 shows the spread of the disease in Indian states and union territories. During this fatality, death has been recorded in China due to COVID-19. The Chinese authorities made a formal announcement that a man in his early sixties has been died because of COVID -19 and the occupational work of that man was related to the seafood market. After that, throughout a short time, this disease spread across the globe at a rapid pace. Looking at the increasing number of the countries with COVID -19, WHO announced COVID -19 a communal health crisis on 30 January 2020 as outrage due to COVID-19 has been increasing continuously. The first mortality other than China was (of a Chinese male in Wuhan) recorded in the Philippines on 2 February amid the growing deaths in China. WHO coined a name for the new corona virus disease on 11th February: COVID-19. On March 11, the WHO announced COVID-19-a endemic that had infected about 114 countries by then [2].

The researchers found the corona virus as the class of pathogens, which has a great tendency to attack the respiratory cycle of humans. Earlier cases of the corona virus have occurred in the structure of Extreme Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). Now it appears as a COVID-19 in the current context, which is triggered by the SARS2 Corona virus and presents a major hazard to individuals. A percentage of patients suffering from pneumonia syndrome were registered in Wuhan and Hubei Province of China in December 2019 and were later described as symptoms caused by corona virus multiply. As per the lab test of the disease, firstly these patients were supposed to be infected with a pathogen related to an animal as well as the market of the seafood at Wuhan. However, finally, the City of Wuhan in China was identified as the epicenter of the disease called COVID-19 and also fatality have been increased as the spreading this deadly disease all over the world. Fig. 2 describes the timeline of the increase of the COVID from China to the rest of the World [4].

Till 2 January 2020, a total of 42 labs in china confirmed the presence of the corona virus and these labs also identified the patient with such symptoms. The symptoms due to COVID have been seen as chest pain, indigestion, coughing, breathing problems, sneezing, and respiratory sickness. It has been also found that many of these people are suffering from different conditions such as hypertension and cardiovascular diseases. As per China's National Health records, 18 deaths from COVID were registered in China until 22 January 2020 and then in four days, the demise rate increased to triple with 5502 confirmed incidents. By the end of January 2020, there were 7734 cases in China and 90 in other countries like Thailand, Malaysia, Japan, India, Italy. Iran, USA, Taiwan, Vietnam, Canada, Nepal, France, Cambodia, Nepal, Germany, Korea, Singapore, Sri Lanka, the United Arab Emirates, the Philippines, Australia, Finland. Besides, WHO announced an international public health disaster due to the seriousness of the disease [5].

The classification of the virus has been decided by the international committee on taxonomy. They named the virus the Severe Acute Respiratory Syndrome coronavirus-2(i.e. SARS Cov-2) and the disease is designated as the corona virus Disease -19 as COVID- 19 by the WHO. The COVID-19 spread with 118,326 active cases and 4,292 casualties in more than 114 countries on 11 March 2020 and announced a pandemic by WHO. Less than a week after its declaration as to the pandemic, the situation is getting worse and Italy becomes the second most affected country after China. Currently, about 204 economies across the globe are affected by COVID-19 and have disrupted both advanced and underdeveloped countries in terms of economic growth. The WHO published the report of COVID cases on 14 April 2020, which claimed 5, 53,823 cases in the USA, 1,

59.526 cases in Italy, 1, 59, 495 cases in Spain,97,049 cases in France,1,25097 cases in Germany. These data have given a clear indication that the numbers of cases in these countries are much higher than that of China (83,697) which is the first epicenter of this disease. The chronology of incidents that have occurred during a COVID-19 outbreak across the globe is shown in Fig. 1. Any susceptible groups such as the old, children under 5, or citizens with manifold chronic illnesses are at superior risk of COVID. China succeeded in stabilizing the situation, other than in the present situation it is most horrible in America, Europe, in addition to Asian countries [6].

According to who guidelines, Elderly people above age 60 years, and children below5 years are highly vulnerable to this disease. Pregnant women have also come into the population which can easily get affected by this disease. China was quick to get action against this disease and stabilize the situation but as the situation gets stabilize in china the disease spreads rapidly in the rest of the world. The worst affected parts of the world are America, Europe as well as south Asian countries. Among the South Asian countries, India has been affecting most due to COVID-19. This might be the reason that India is the most populous country in the world after China and population density is also too high in Indian demography. Although the rate of spread of COVID-19 in India was not too high in starting, the number of cases was being confirmed by the Lab testing is low. But as time passes the rate of the spread of this disease has grown. In comparison to the rest of the world, the pace of the spread of disease is too slow in India [7].

Fig. 3 explains the effect of the disease on social and economic measures. In March, the pace of the disease was very slow in India but unfortunately, the transmission rate of the disease went up side by each passing day. The most satisfying fact is that rate of COVID has the worst effect by the measure of the Indian government as the Country was gone in complete lockdown. The main point of the focus of this paper is to analyze the situation of the political, economic, and social changes and defensive measures taking by the administration to keep the people safe. This study analyses India's fatality rate and contrasts its international scenario utilizing a discourse on various factors that account for the dissemination, prevention, and treatment steps in use to manage COVID19 broaden [8].

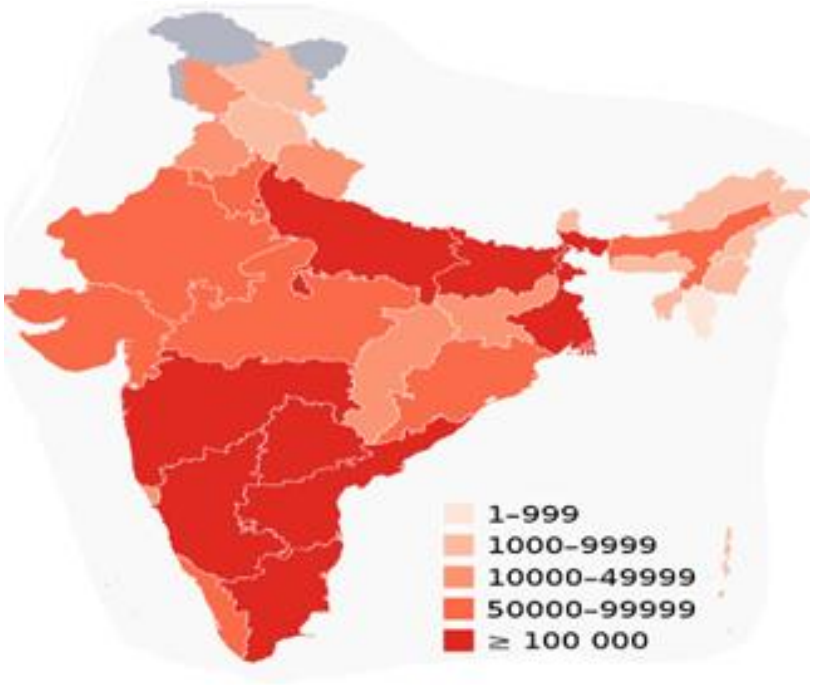

Fig. 1. Number of COVID-19 confirmed cases in India as on 30 August 2020, showing the density of spread of the disease in indian states and union territories [3]

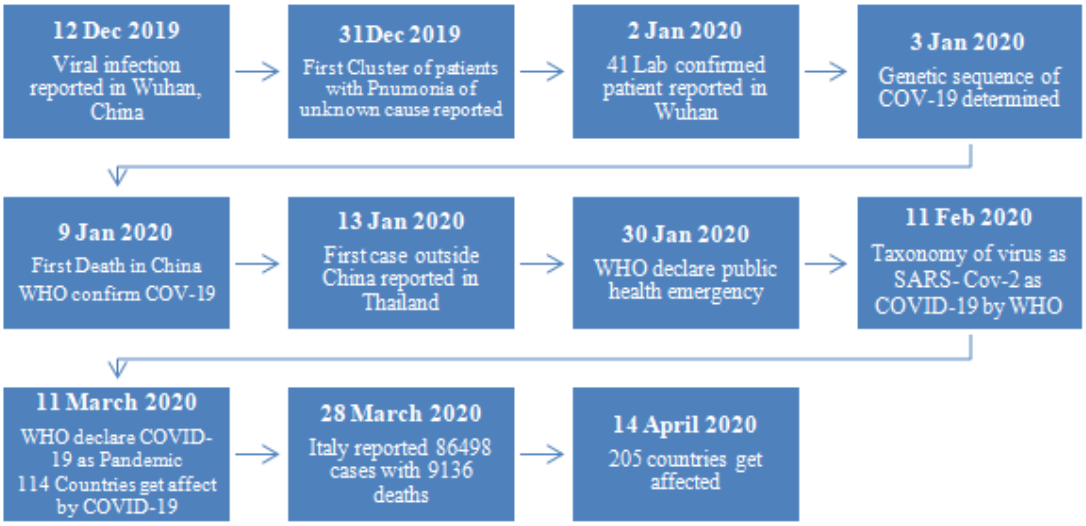

Fig. 2. Timeline of the COVID-19, From the first case until it was declared as a pandemic

Fig. 3. The effect of the pandemic on social and economic condition of the people

2. METHODOLOGY

2.1 Design

The paper aims to research the outcomes of the COVID-19 spread as the number of cases reported, changes adopted by the people for their living and daily activity, and defensive measures in use by the people and administration. The various Ministries in India are carefully watching the COVID-19 outbreak. MoHFW released the Integrated Disease Surveillance Programmer (IDSP), the National Center for Disease Control, for in-country and out-of-travelers earlier than the outbreak of the disease on January 25, 2020. Each COVID-19 case has been modified and notified via the hospital, laboratory, and field observation teams

to the government surveillance control room. Of confirmed incident has been given a unique status patient number and therefore no risk of overlap in the data and verification of all COVID cases. The data were modified directly to MoHFW in each state surveillance control room. Thus, the data for COVID-19 case analysis was retrieved nationally from MoHFW's official website. Global COVID-19 data was derived from accounts of the circumstance at the WHO. The demographic data was derived from a Population Survey of the United States.

2.2 Sample

For the collection of the sample, 5000 people have been considered belonging to different cities of the Indian states and union territories. Besides this, the government authorized data was also being considered from different sources. The government Aarogya Setu app has also been used for the validation of the data as the number of a confirmed case, the number of an active case, and the number of confirmed death reported.

2.3 Instrument

A simple cumulative analysis has been used to study the data. For the cross-linking of the data, various sources have been taken into consideration. The district administration data have been cross-checked with the central government data to prove the validation of the data taken into account for the study. The outcome of the data has been crossed checked with the help of various government and non-government organizations for cumulative study [9].

2.4 Analysis

The region-wise data of the COVID-19 and related characteristics of the disease have been compiled and analyzed with descriptive statics. The examination consists of the age distribution and male-female relation graphs, Fatality rate calculation (CFR), the Mortality rate (MR), and Case recovered rate (CRR) for a reported case of the COVID so far in India. CFR/CRR per total cases have been calculated by the following equation:

$$CFRpertotal\ (\%) = \frac{\text{Number of Death}}{\text{Number of Confirmed cases}} \times 100$$

$$CFRpertotal\ (\%) = \frac{\text{Number of Identified cases}}{\text{Number of Confirmed cases}} \times 100$$

3. RESULTS AND DISCUSSION

According to the Health Ministry, a total of 3853406 cases had been identified in all state as well as union territories till 3 September 2020, out of this 815538 are active cases and 2970492 cases had been recovered. And the total number of 67376 people had decreased. The first report demonstrated for COVID in India is in Kerala on 30 January and tends to increase to 3 by 3 February 2020 within three days. These identified cases were related to students who had come back from Wuhan, China. No incident was filed after that in February. Throughout March the COVID-19 transmission reports were reported from different Indian states. Covid-19's first death in the region was reported on March 12 from a 76-year-old male in Karnataka who returned from Arabian countries. Fig. 4 illustrates the number of the confirmed case in Indian states and union territories as of 21 August 2020.

But in March up to 15, the tallies of a confirmed case of the COVID-19 had been increased and counting reached 100. But the number of cases had been increasing continuously and at the end of March 1400 cases were reported by the authorities. After that, within one week, cases increases to 5000. The total number of cases doubled and reached 10,000 till April 14. The numbers of the case till August have been shown in Fig. 4, showing the exponential growth of the number of cases of COVID-19 in India.

3.1 Demographic Studies

The demographic counting of the people, who were infected with the COVID-19, was different in comparison to other countries. A detailed analysis has been shown in Fig. 5 according to data gathered from the 5000 people of different age groups. The fig. illustrates that 59 % of people infected belong to the age group of 20-49 years, followed by 25% of people in the age group of 50 -69 years old. This data revealed that most people belong to the working class who had a greater tendency to come out from their house for work and had a lot of interaction with other peoples. The data of India are slightly different from countries like China and Italy, where older persons are more prone to COVID-19. But in India, only 5% of people in the older age group had been infected by this deadly disease. In the range of below 20 years, only 11% of people were infected with the disease. But in the older age group, people were badly affected by the disease and frequently counted in reported death [10].

The average age of the people infected in India calculated as 39 which were quite below that of other countries like China and Italy, where the age of the people average found to be 49.5 and 64 respectively. This data clearly shows the difference between the infected age group in India and Other countries as well. The experts revealed that this difference in an infected age group is due to the differences in the median age of India and the other countries. The median age in India was 28.4 years while in other countries this age is found to be greater than that of India. The median age of china is 38.4 years while the median age of Italy is 41.9 respectively as per the census report of 2020 (Population report of the United Nation). This is a well-known fact that currently, India is the youngest country among another country according to the data available of median age [11].

According to gender differences, the male population was more prone to be infected than the female population. As per data available, 76% of the male population and 24 % of the female population had been infected so far. This data had shown a diversion than that data of the other countries. In the early stage of the outburst of the COVID-19, the ratio of the infected male and female was almost equal in China. But in the case of South Korea, 60 % of females were found to be infected by this disease. In India, the huge gap between the patient's gender of COVID-19 is the reason for the social bias of the community towards women. The mindset of the masses creates ample discrepancy towards their counterpart. But it might be possible that this difference will tend to reduce as the number of the test to be conducted increases. The other reason for this might be that the women in India undergo less internationally traveling than the male [11].

3.2 Geo-Temporal Studies

The government of India issued a guideline to impose a complete lockdown in the country. The lockdown had extended one by one in four-phase and after that, the unlock of the country had started in phase manner. The government issued a complete guideline for the people to follow during the lockdown phases. The social distancing comes out as the main weapon against the fight of COVID-19. The holistic approach of following social distancing during the lockdown phases is the only way to win the battle of COVID in India with a huge population and population density. In India, Some states had done praiseworthy work to fight against the disease but still number of cases is tremendously increasing in some of the states. Maharashtra, a southwestern state was worst affected state followed by Andhra Pradesh, Tamil Nadu, Karnataka, and the national capital territory of Delhi. Maharashtra ranked number one in the total number of cases and also ranked one in the total number of deaths [12].

3.3 Preventive with Control Measures

The WHO released Guidelines on COVID 19 of suspected patients for infection prevention and control (IPC). Health care amenities should have given clinical triage according to the IPC recommendations to ensure and separate the suspicious patients. To start triage position to train physical condition staff, also to screen questionnaires. It ought to include hand sanitation as well as respiratory hygiene, decontamination of enduring care facilities, use of safety apparatus, environmental sanitation, and safe disposal of medical waste to ensure the implementation of the preventive measures on all persons. Family members including visitors must strictly observe before meeting the suspected patient at COVID 19. The patient ought to be held in a single, enclosed 60 L / s room ideally. In the absence of sufficient single space, the suspicious patient can be put in a separate bed together. Fig.7 showing the unlock phase in India to boost the social and economic measure [13].

When treating the patients, health care staff should obey clear norms. One should wear a mask and other safety equipment properly. Used devices should fully be decontaminated with ethyl alcohol. the use of portable testing kits for patient review should be made. Limiting and documenting the transmission of COVID, close relatives, visitors shall be restricted. Since COVID 19 is an extremely contagious disease compared to previous cases, all airborne safeguards for alkaline-generating procedures must have properly adhered to when taking evidence, handling, and transferring them to clinical laboratories. Table 1 shows the guideline of the central government to avoid the spread of the COVID-19 [14].

The Government's swift measures to revoke visas and quarantine all transportation from countries affected maintained the rapidly spreading virus. Approximately one million travelers from other countries have properly checked at the international airports to know their

status for the disease, all negative respondent of the test denied to roam in-country and asked to spend 15 days in quarantine facilities. The asymptomatic contagious persons could miss the screening but could cause an infection. Indian government's tough national lockdown decision encourages successful social distancing, detection, and tracing of infected individuals [15].

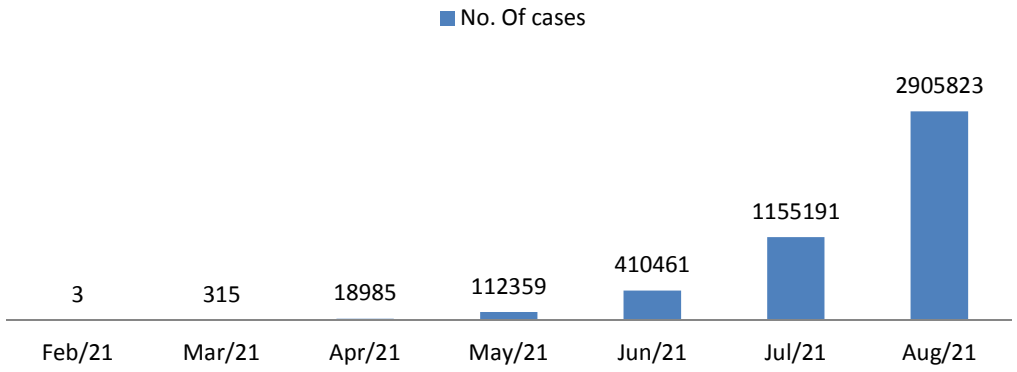

Fig. 4. Number of the case in India on 21 August 2020

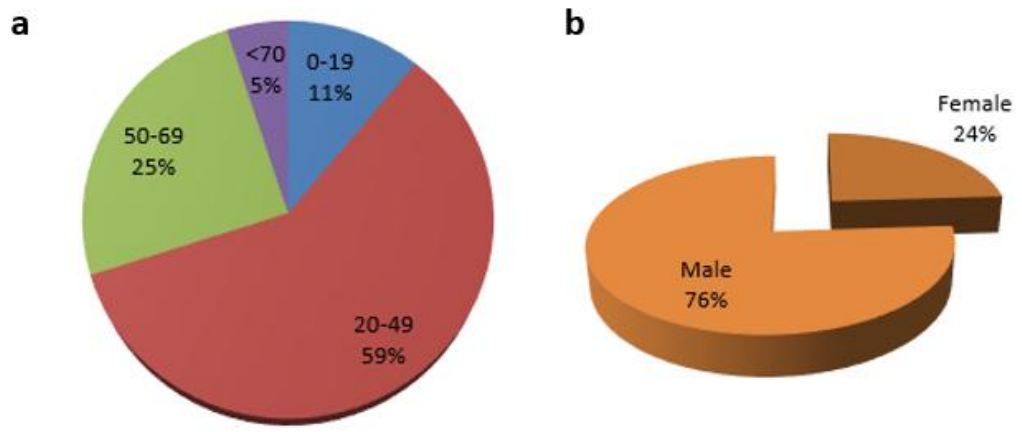

Fig. 5. (a) Demographic spread of COVID-19 between different Age group; (b) The disease spread according to the gender of the patients in India

Fig. 6. Lock down TimeLine in India to protect the people from the COVID-19

Fig. 7. Unlock TimeLine in India to start the economy along with protect of the people

Table 1. Guideline of the central government during lockdown phases to protect the people and avoid the spread of the disease

1	Ban on people from stepping out from their homes.
2	All service and shop closed except essential one.
3	Closure of commercial and private establishment (Only work from Home allowed).
4	Suspension of all educational institutions.
5	Closure of all place of worship.
6	Suspension of all transport mechanism.
7	Prohibition of all social, political, sports, entertainment, academic, cultural, religious, activities.

4. CONCLUSION

The current study summarizes the latest COVID-19-transmission review in India. At the second phase of the outbreak, the disease is always expected to spread, and not at the community level. But, due to low testing rates in India, data on the virus' transmissibility is still not recorded fully. It was shown that as the number of tests during the lockdown time rises, and the more companies came into the light and regular infection reporting emerge. The disease is starting to increase across dense populations within the Mumbai (India's financial capital) Dharavi area. However, the Indian administration's tremendous and effective measures have reduced the rate of COVID outbreak in India, other than the endemic is still not to appear in its maturity stage, and Indian may face several difficulties ahead.

The latest COVID epidemic has to turn out to be a global clinical danger and a community health emergency for the world's working population and health workers. Active treatment, cure, and vaccination are under review. Virus transmission is increasingly growing, and the number of uninsured patients and death rates continue to rise every day. Only protective actions can be adopted to stop the spread of the COVID through the human transmission. From the analysis, it is clear that quarantine alone is not sufficient to regulate the transmission of the COVID-19 virus.

Extensive study is needed to determine the exact exchange rate of this virus, and to invest heavily in the production of specific therapy or vaccine. Also, the COVID-19 pandemic virus needs ongoing surveillance, identification of hospitalized individuals, and theoretically forecast their future adaptation, mode of transmission, and pathogenic organisms. Surely such factors will influence mortality rates. However, along with MoHFW, the Indian Government has taken successful containment steps such as Janta Curfew, time-to-time travel advisory for foreign and domestic travelers, country lockdowns, and helpful preventive guidance. A healthy and optimistic mental wellbeing, together with all these steps, will play an important role in reducing this threat worldwide. Each individual has to be attentive to the identified symptoms of the disease of the outbreak and to get care in good time for the reported incidents.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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