

Could Lockdown Really Lockdown Covid-19 Spread: A Data-based Analysis in India

Sanjo Saijan*, Aby Paul, Joel Joby, Jeeva Joseph, Stelvin Sebastian, Jobin Kunjumon Vilapurathu

Department of Pharmacy Practice, Nirmala College of Pharmacy, Kizhakkemkara, Kerala, INDIA.

Received: 04 May 2020;

Accepted: 19 June 2020

*Correspondence to:

Mr. Sanjo Saijan,

Pharm.D Intern, Department of Pharmacy Practice, Nirmala College of Pharmacy, Kizhakkemkara-686661, Kerala, INDIA.

Phone no: +91 9745862341

Email: sanjosaijan25@gmail.com

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Abstract

Objective: To compare the impact of lockdown in Maharashtra, Kerala and United States. **Methodology:** We conducted a prospective observational study in order to assess and compare the impact of lockdown between Kerala, Maharashtra and United States (US). The study involved the collection of data from two phases. The first phase is the time from the index case reported in each country till the 14th day after the declaration of lockdown in that country. The second phase involved the data collected from the 15th day to the 28th day of lockdown. Data storage and analysis were performed using Microsoft excel and SPSS version 24. **Result:** As per 21st April, 426 cases were reported in Kerala among which 307 (70.07%) recovered, active cases were 117 and 2 deaths (0.4694%). Whereas in Maharashtra 7628 cases were reported and among which 1076 had recovered and there was 323 deaths. The total number of cases reported before lockdown in Maharashtra was 97 and in Kerala was 95. After the 29 days of lockdown the increase in the number of cases in Maharashtra was significantly higher when compared with Kerala. Also, the recovery rate before and after lockdown in Kerala was 4.10% and 72.53% respectively. In Maharashtra recovery rate before and after was 70.93% and 14.00% respectively. **Conclusion:** The implementation of lockdown had a great impact on reducing the transmission of infection across the country. The number of cases also reduced due to this lockdown, but its effectiveness varied from place to place.

Key words: COVID-19 in India, Corona virus, Impact of lockdown, Viral infection, Pandemic, SARS- CoV-2.

INTRODUCTION

The coronavirus belongs to a family of virus that may cause various symptoms such as pneumonia, fever, breathing difficulty and lung infection. These viruses are commonly seen in animals worldwide, but only few cases have been known to affect humans.^[1] Novel coronavirus (2019-nCoV), officially known as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS CoV-2), the causative agent of the (coronavirus disease 2019) COVID-19, emerged in Wuhan, Hubei province, China.^[2] COVID-19 is now a pandemic as declared by the World Health Organization (WHO) on March 11, 2020.^[3] As of April 15, 2020, there have been 1914916 confirmed cases and 123010 deaths reported worldwide. Most of the cases were initially confined to Hubei province in China, but there has since been substantial spread not only in china but worldwide, over 192 countries are affected with this coronavirus.^[4]

Many domestic and wild animals, including camels, cats, cattle and bats may serve as a host for coronavirus. Generally animal coronavirus do not spread among humans. However, there are exceptions in the cases of Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS), which are mainly spread through close contact with infected people via respiratory droplets from cough and sneezing. With regard to COVID-19, initially patients were reported to have some link to the human seafood market in Wuhan, China, suggesting that the infection due to animal to human transmission. However later cases were reported among medical staff and others with no history of such exposure, which indicates human to human transmission.

The measures to prevent the spread of COVID-19 such as social-distancing,

hand hygiene, surveillance and isolation of person suspected or confirmed to have infection is considered to be largely effective. Isolation is the separation of infected person with non-infected person, and usually occurs in hospital setting. Quarantine is one of the oldest and most effective measure for controlling communicable disease outbreak. It involves the movement restriction of person who are presumed to have been exposed to a contagious disease but are not ill, either because they did not become infected or they still in the incubation period. Social distancing is used to reduce the interaction between people in a broader community and it helps to reducing the spread of disease transmitted by respiratory droplets.^[5] In the setting of fast spreading infection across the world, lockdown is now increasingly being implemented in many countries to prevent the worst effect of virus. Lockdown was implemented as the first line of defense in most of the countries all around the world. But no studies are done in India that assess the impact of lock down in controlling the spread of COVID-19 in India.

METHODS

We conducted a prospective observational study in order to assess and compare the impact of lockdown between Kerala, Maharashtra and United States (US). The study involved the collection of data from two phases. The first phase is the time from the index case reported in each country till the 14th day after the declaration of lockdown in that country. The second phase involved the data collected from the 15th day to the 28th day of lockdown. This division was based on the assumption that the cases reported till the first 14 days of lockdown may be acquired prior to the beginning of lock down as the incubation period of the virus can be up to 14 days.^[6]

Data source: Various data relevant to the study like the total cases reported till the 28th day of lockdown, new case reported on each day, number of samples tested, number of the recovered patients and the mortality rate were obtained before and after the lockdown from the various official websites.

Impact of lockdown: The effect of lockdown was evaluated by comparing the doubling rate. Doubling rate from the index case till the 14th day of lockdown and 28th day of the lockdown were analyzed. Higher the doubling rate implies that the rate of spread is less and more efficient the lockdown. Moreover, the rise in doubling rate of each place considered in the study were analyzed. In addition, the effectiveness of lockdown was analyzed by determining the percentage reduction in the cases reported from the predicted cases without lockdown.

In India the nationwide lockdown was implemented on 25th March 2020 and hence for the comparison of the impact of lockdown in Kerala and Maharashtra the data till 21st April 2020 was collected (28 days).

Data storage and analysis were performed using Microsoft excel and SPSS version 24. The study approved by the research and ethics committee, Nirmala College of Pharmacy.^[7-9]

RESULT

As per 21st April, 426 cases were reported in Kerala among which 307 (70.07%) recovered, active cases were 117 and 2 deaths (0.4694%). Where as in Maharashtra 7628 cases were reported and among which 1076 were recovered and there was 323 deaths. The first case in Kerala was reported on 30th January 2020 while in Maharashtra the first case was reported on 9th

March 2020 and the whole country went to lockdown by 25th March 2020. However, in America the first case was reported on 13th January 2020. America didn't go for a nationwide lockdown in the country, they focused more on the implementing social distancing and localized lockdowns in mostly affected places.

Impact of lockdown: comparison between states and country

The impact of lockdown in Kerala, Maharashtra and United States were analyzed and compared by determining the doubling rate. The increase in doubling rate implies less spreading of the infection and effectiveness of the lockdown.

The rate of spread of infection in Kerala before and after the implementation of lockdown are illustrated in Figure 1 and 2 respectively. The doubling rate of the first phase was that is before lockdown was found to be 7.4356 days (R sq= 0.854). The overall doubling rate after the implementation of lockdown was found to be 8.6625 days (R sq= 0.8712).

In the state Maharashtra, the index case was reported much later than when compared to the other Indian states. The doubling rate before the lockdown phase was found to be 3.43 days (R sq=0.958). There was an increase in the doubling rate after the initiation of lockdown and it was found to be 4.022 days (R sq=0.963). But which was lower than Kerala. The rate of spread of infection in Maharashtra before and after lockdown are depicted in Figure 3 and 4 respectively.

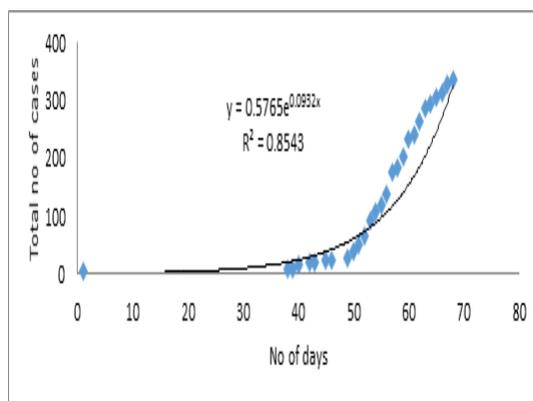


Figure 1: Rate of spread in Kerala before lockdown.

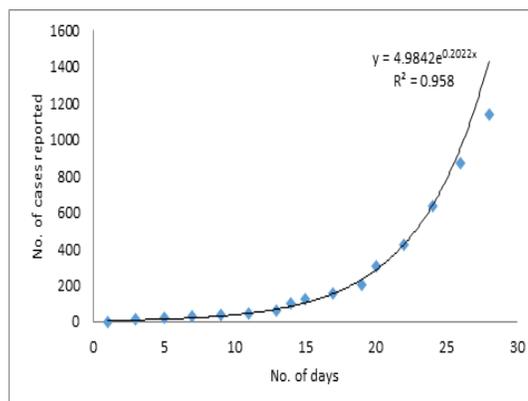


Figure 3: Rate of spread in Maharashtra before lockdown.

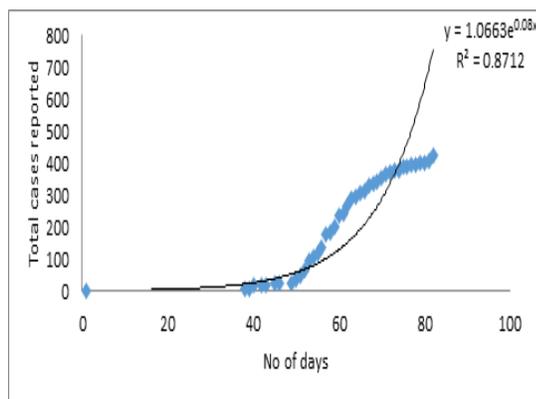


Figure 2: Rate of spread in Kerala after lockdown.

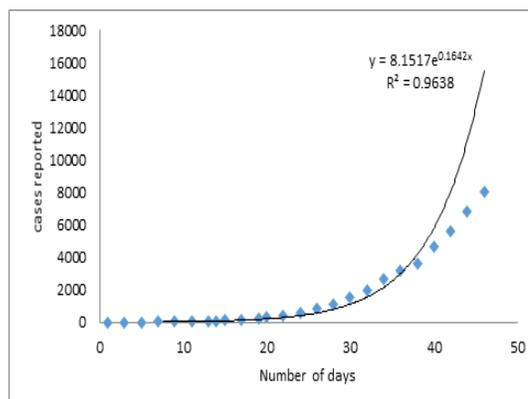


Figure 4: Rate of spread in Maharashtra after lockdown.

In America the index case was reported on 21st January 2020 and the first known deaths happened in February. By the end of March cases were spread to all 50 US States. As mid of May 2020, US has the most confirmed active cases and deaths in the world. The doubling rate of cases reported in US was found to be 3.50 days (R sq= 0.934). The doubling rate of death reported was found to be 3.9 days (R sq= 0.951) and the doubling rate of recovered cases are found to be 3.65 (R sq=0.951). The comparison of number of new cases reported, new deaths reported and recovered cases were depicted in Figure 5. And their cumulative data were depicted in Figure 6.

Impact of lockdown: Comparison between states

Maharashtra is a state in the western region of the India and the second most populous state in the country. Kerala is a state in the southern part of the

India and comparatively small population than Maharashtra. In this study the two states were compared for their methods and strategies in dealing with the covid-19 pandemic. The number of samples tested before lockdown in Maharashtra and Kerala were 2144 and 4516 respectively. But after the 31 days of lockdown there was a tremendous increase in the number of samples tested in Maharashtra (96369) when compared with Kerala (21941). The pattern of sample testing in Maharashtra and Kerala after the lockdown till the 31st day is illustrated in Figure 7 (Table 1).

The total number of cases reported before lockdown in Maharashtra was 97 and in Kerala was 95. After the 29 days of lockdown the increase in the number of cases in Maharashtra was significantly higher when compared with Kerala. Also, as showed in Table 2, the recovery rate before and after lockdown in Kerala was 4.10% and 72.53% respectively. In Maharashtra

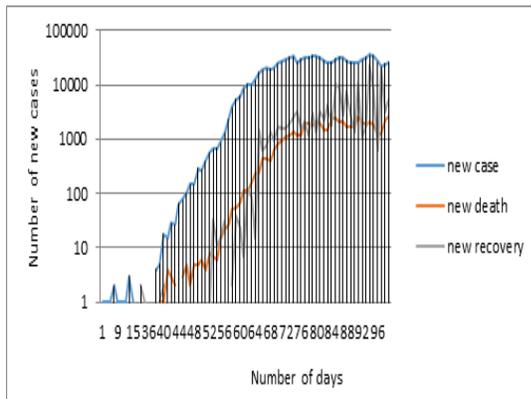


Figure 5: The number of newly reported cases, deaths and recoveries.

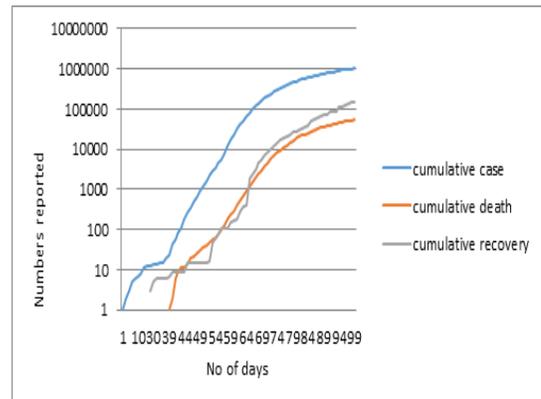


Figure 6: Cumulative data of cases reported, death and recoveries.

State	Total population	Total test / population before lockdown	Total test / population after 29 th day of lockdown	Tests required to identify a case in suspected population before lockdown	Tests required to identify a case in suspected population after 29 day of lockdown
Kerala	35461849	7852.490	1751.02	47.53684	47.645
Maharashtra	123522214	57612	1281	17.51	15.97

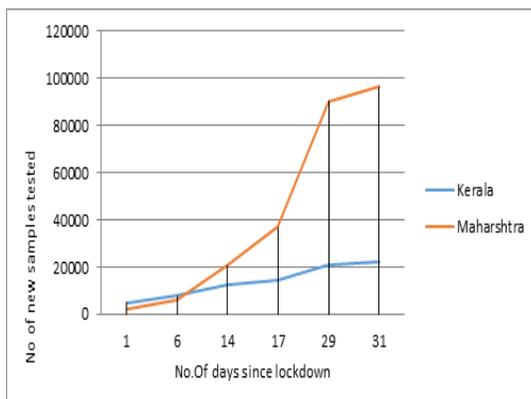


Figure 7: Testing pattern in Maharashtra and Kerala.

Parameters	Kerala	Maharashtra
Cases reported before lockdown	95	97
Cases reported 29 days of lockdown	437	5649
Recovery rate before lockdown	4.10%	3.27%
Recovery rate 29 days after lockdown	70.93%	14.00%
Death rate before lockdown	1.04%	2.45%
Death rate 31 day after lockdown	0.68%	4.76%

recovery rate before and after was 70.93% and 14.00% respectively. The death rate was also much lower in Kerala than Maharashtra.

DISCUSSION

From the above data, we can observe that the implementation of lockdown helped in reducing spreading rate of infection in Kerala, Maharashtra and United States. It is evident from the above tables that there is much variation in the doubling rates of these places, it may be due to the differences in extend of lockdown. The highest doubling rate was in Kerala.

While comparing Kerala and Maharashtra, there was a reduction in numbers of deaths and reporting of new cases in Kerala while the rate of sample testing was done more in Maharashtra. Due to the advanced medical system and proper education among common people, it was much easier to implement lockdown in Kerala. Nipah, a prior outbreak occurred in Kerala last year also helped the healthcare members and government in taking the accurate measures.

From the above data, we can observe some variation in the effect of lockdown, this may be because of the different strategies opted by different places. In Kerala the first case was reported on 30th January 2020. This alarmed the medical workers and government. The hotels and other places turned into isolation wards, social distancing became a major trend. The route maps of the infected people were generated and circulated all over the state which reduced the chances of infection. New campaign 'Break the chain' has been adopted by all Keralite to fight against COVID-19.

Where as in Maharashtra the first case was reported on 9th March 2020. Maharashtra including Mumbai have witnessed community spread of the disease within few weeks. Even though the lockdown was implemented, Failure in identifying the origin of infection and maintenance of social distancing increased the rate of transmission. The doubling rate have been decreased with increase in sample testing. The government allowed to open shops and non –essential commodities even after identifying some districts as red zone. Some reports state that Maharashtra is the worst affected state in the country with COVID-19.^[10]

In United States the first case was reported on 13th January 2020. Rates of testing positivity have become the main trend of U.S now.^[11] Due to the improper management in disease control the rate of deaths are increasing here. Lockdown was not strictly implemented here, this made United States the current hub of viral load.

In China, implementation of lockdown and social distancing gave a great impact in the decreased spread of the disease. Not only implementing lockdown, strict obeying of the rules should be practiced, the failure of these lead to the wide spread of the disease globally. Even though the effect of ongoing lock down has caused minor ailments like mental illness, weight gain in some of the individuals, the reduction in viral transmission has found a major benefit over it.^[12,13] As our main aim is to eradicate these SARS CoV 2 virus lockdowns should be continued.

CONCLUSION

The implementation of lockdown had a great impact on reducing the transmission of infection across the country. The number of cases also reduced due to this lockdown, but its effectiveness varied from place to place. So that appropriate containment and preventive strategies have to be adopted by each place based on their pandemic severity.

ACKNOWLEDGEMENT

None.

CONFLICT OF INTEREST

None.

ABBREVIATIONS

None.

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Cite this article as: Saijan S, Paul A, Joby J, Joseph J, Sebastian S, Vilapurathu JK. Could Lockdown Really Lockdown Covid-19 Spread: A Data-based Analysis in India. *J Pharm Pract Community Med.* 2020;6(2):25-8.