

A comparative study showing the quick spread of the second wave of COVID-19 outbreaks in Asian countries: A case of China, Pakistan, and India

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Abstract

The COVID-19 pandemic emerged as a severe, ongoing outbreak in December 2019 in Wuhan, China, and several countries, including Pakistan, are currently facing a second wave of the outbreak. This study aims to compare the outbreak in three Asian countries - Pakistan, India, and China - by collecting data on the reported cases during the second wave until June 2021. The study found that India had the highest reported cases, with 29,977,861 cases, followed by Pakistan with 9,49,838 cases, and China with 91,682 cases. The second wave had a deadly impact on India due to a lack of hospital beds, oxygen cylinders, and vaccines. Lockdowns and vaccinations were some factors that helped control the spread of the disease globally. The study suggests that policymakers must plan to better manage COVID-19 reappearance or severity in India and other affected countries.

Keywords: Coronavirus, Second Wave Spike, epidemic, global strategies, India, Pandemic, Pakistan, China, lethal COV-SARS

1 Introduction

Coronavirus (COVID) belongs to the family Coronaviridae (Al Halbusi et al. [2022](#); Jaffar [2020](#); Lebni et al. [2021](#); Soroush et al. [2021](#); Su et al. [2021](#)). These are pleomorphic RNA viruses that typically have crown-shaped peplomers with a size of 80–160 nm and a positive polarity of 27–32 kb, and the virus causes health issues (Jaffar [2020](#); Jaffar et al. [2019](#); Mohammadi et al. [2021](#); Shoib et al. [2022](#); Su et al. [2021](#)). Corona viruses are zoonotic pathogens present in humans and various animals that have a wide range of clinical features ranging from asymptomatic courses to hospitalization in the intensive care unit causing respiratory (Hafeez et al. [2023](#); Iorember et al. [2022](#); Jaffar et al. [2022](#); Micah et al. [2023](#); Peter et al. [2017](#)), including gastrointestinal, liver and nervous system infections.

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They were not considered pathogenic to humans until they were first diagnosed with (SARS), severe acute respiratory syndrome, in 2002 & 2003 in Guangdong, a Chinese state (Local Burden of Disease [2021](#); Moradi et al. [2021](#); Su et al. [2022](#); Su et al. [2021](#); Zafar et al. [2022](#)), Coronavirus as COVID OC43 & COVID 229E which cause slight infections mostly in people whose immune system is compromise (Paris et al., [2003](#)).

In December 2019, the 2019 (nCoV) novel Corona, another public health problem, emerged on the Hwanan Market (Seafood) in Wuhan State, Hubei Province, China, where livestock is also traded, and because of this, it has become the center of global attention, which caused human and economic challenges (Farzadfar et al. [2022](#); Ge et al. [2022](#); Hussain et al. [2017](#); Liu et al. [2021](#); Yu et al. [2022](#); Zhang et al. [2022](#)). Firstly, an unfamiliar pneumonia case was detected on 12 December 2019, and influenza and other coronaviruses were excluded from laboratory testing (Aqeel et al. [2022](#); Azadi et al. [2021](#); NeJhaddadgar et al. [2022](#); Schmidt et al. [2022](#); Shuja et al. [2020](#)). On 7 January 2020, Chinese authorities announced that a new type of coronavirus (nCoV) novel coronavirus had been isolated, which stopped business activities and posed health issues (Aqeel et al. [2021](#); Azhar et al. [2018](#); Geng et al. [2022](#); Li et al. [2022](#); Zeidabadi et al. [2022](#)). On 12 January 2020, the virus was named Coronavirus (COVID-19), and on 11 February 2020, WHO (World Health Organization) named the virus COVID-19; since 12 February 2020, a total of 43,103 confirmed cases and 1,018 deaths have been reported. (<https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases>)

The first case of COVID-19 in Pakistan was confirmed by the Ministry of Health, Government of Pakistan, on February 26, 2020, in Karachi, Sindh Province. On the same day, another case was confirmed by the Federal Ministry of Health in Islamabad. Within 15 days, the total number of confirmed cases (COVID-19 positive) has reached 20 out of 471 suspected cases, with Sindh having the highest number followed by Gilgit-Baltistan, which posed severe health and business activities problems (Aman et al. [2022](#); Aqeel et al. [2021](#); Li et al. [2021](#); Paulson et al. [2021](#); Shah et al. [2023](#)). The latest travel history of all confirmed cases was from Iran, Syria, and London. And currently, these cases have increased a lot, and because of this, the situation has worsened (<https://www.nih.org.pk/novel-coronavirus-2019-ncov/>). Pakistan is a developing country. From October 28, 2020, Code 19 is on its second wave. Although people around the world have not responded effectively to the epidemic, the Pakistani population has mastered the pandemic with a certain mindset, as it was difficult for them to accept the contagious nature, spread, and related restrictions (Fida, S et al., [2021](#)). The virus spread was dangerous, and all industries became paralyzed and minimized economic activities for employees' health safety (Abbas et al. [2021](#); Ali et al. [2015](#); Rahmat et al. [2022](#); Wang et al. [2021](#); Yao et al. [2022](#); Zhou et al. [2021](#)).

India observed the second and largest wave of COVID-19 starting in March 2021. Several factors have contributed to the sudden increase in the number of cases of COVID-19 during the second wave of corona virus in India and posed very serious problems for health and business sectors (Abbas et al. [2021](#); Aman et al. [2021](#); Fattahi et al. [2020](#); Khazaie et al. [2021](#); Mamirkulova et al. [2022](#); Pouresmaeil et al. [2019](#); Yoosefi Lebni et al. [2021](#)). The most suspected cause is the emergence of a different lineage of the new coronavirus B.1.617.2, first recognized in Maharashtra, India, in October 2020.19, the former being a double mutant of the Indian SARS-CoV-2. The Consortium on Genomics (INSACOG), a group of 10 national laboratories under the Indian Ministry of Health, performed genomic sequencing on samples collected from Western Maharashtra. A dual mutation has been observed in the coronavirus protein (spike), which is thought to potentially increase the virus's ability to infect and protect the human immune system.

China appears to have contained a 2nd wave of Coronavirus following an outbreak in Beijing's massive manufacturing market last month, bringing about at least 328 new cases and partial capital shutting. In China, the second wave of COVID-19 was observed on 11 June 2020, Fearing that

the new outbreak is more contagious than the virus that emerged in the central city of Wuhan (China) in December, the new set of laws that a person who has been in acquaintance with an infected person is now 28 days away. (<https://time.com/5862482/china-beijing-coronavirus-second-wave-covid19-xinfadi/>).

2 Methodology

The current work is based on data from the Coronavirus time sequence from the onset of the epidemic to December 2019 to April 2021 which caused problems for health and business industries worldwide (Aman et al. [2019](#); Aman et al. [2019](#); Hussain et al. [2021](#); Lebni et al. [2020](#); Moradi et al. [2020](#); Su et al. [2021](#)). We analyze cases of suspected corona virus in conditions and epidemics that tested positive for COVID-19, as reported in Pakistan, India, and China. The viral disease spread caused a massive challenge for social, economic, environmental, and health industries worldwide (Abbas et al. [2019](#); NeJhaddadgar et al. [2020](#); Shah et al. [2023](#); Yoosefi Lebni et al. [2020](#)).

3 Data collection method

This review is based on published articles from the second outbreak of COVID-19. All information used in this article is contained in the references. The study is a visual test based on the daily increase in COVID-19 cases in three Asian countries, Pakistan, India, and China, and deaths due to the second wave epidemic. On December 30, 2019, the coronavirus spread rapidly from the Chinese city of Wuhan to other countries. In the first epidemic (H. Hasan et al., [2020](#)) pneumonia with unknown symptoms was considered. The 2nd wave of COVID-19 cases has been visualized through daily reports, with three of the 123 countries surveyed by China, India, and Pakistan. Newly confirmed case numbers were examined daily, and a graph was plotted for 123 countries (as updated daily at <https://www.worldometers.info/coronavirus/>) (K.Abid et al. , [2020](#)). Based on the data from our study. Outbreaks of COVID-19 epidemic with all new daily positive cases from December 2020 to April 2021 compared to Pakistan, India, and China. The method of data collection was to monitor daily the number of newly confirmed COVID-19 cases and the total number of confirmed cases to date. (OWID) Our World Data and COVID-19 data retained through india.org have been compiled for countries around the world and the Indian national state (R. Ranjan et al., [2021](#)).

3.1 Use of literature database

We have collected COVID 19 cases from four literature databases (Google Scholar, PubMed, Science Direct, and Web of Science) and from the website (worldometers.info/coronavirus/country/Pakistan) (<http://covid.gov.pk>) and death, March 2020 to April 2021. We reviewed Internet accessible literature and selected more than 38 article surveys for this article. The article has been compiled using various keywords such as COVID-19, epidemic, second wave spike, and coronavirus epidemic. Global Strategy. We analyzed the period from December 2020 to April 2021 and focused on immigrants from the three countries with the highest rates of reported Coronavirus cases.

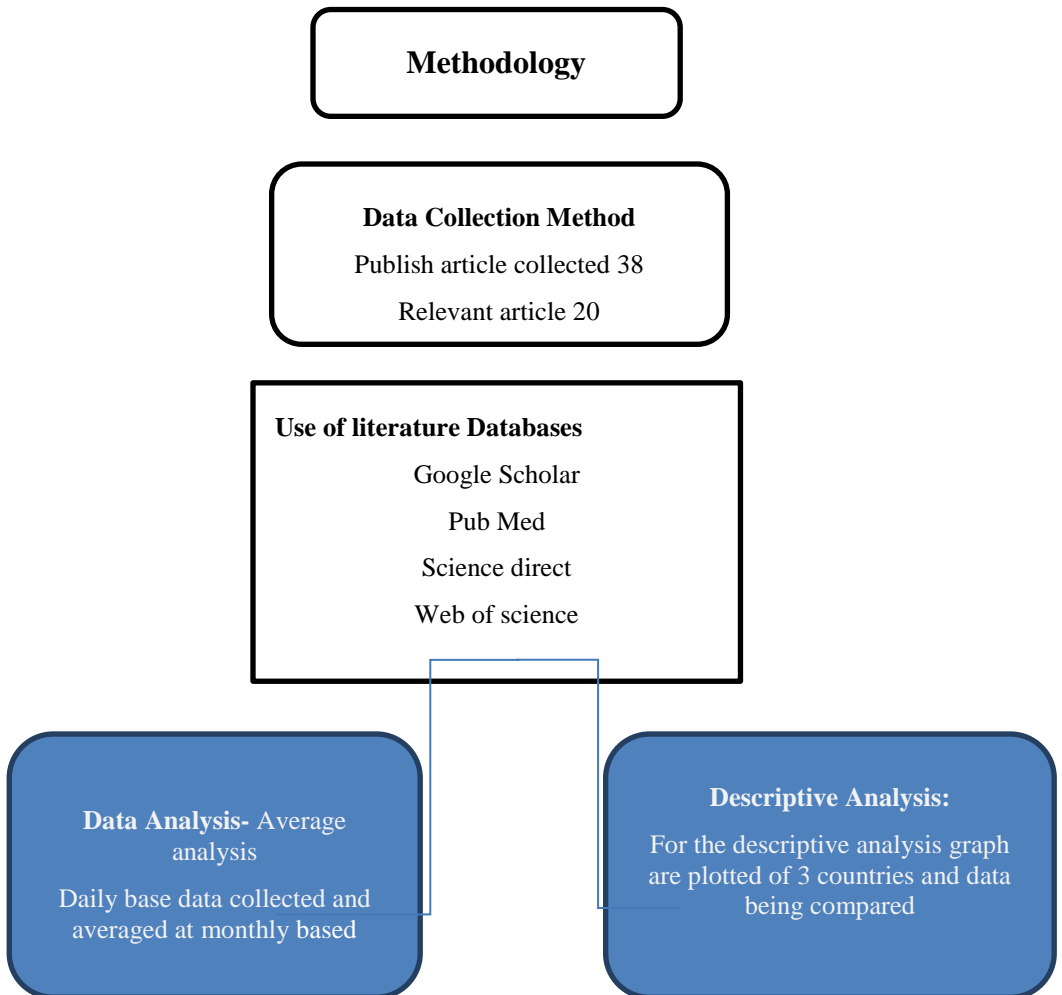
4 Data Analysis

Firstly, we calculated the per day rate of Corona virus cases of each country. Secondly, we have weekly average the cases by using statistic formula. Third, we assessed the cases by using regression analysis. Fourth, we plotted data in form of graph of three countries and compared our result with actual number of diagnose cases.

4.1 Descriptive Analysis

Descriptive analysis was carried out to get insights into the trends of the average new cases of Coronavirus, the total number of cases, and the total number of deaths. A daily number of new

cases, data on means elevation from mean temperature, as well as counts of mutations during the second wave spike, were all monitored (K.Abid et al., 2020). By the 2nd week of March 2021, the daily positive cases of Coronavirus started rising again, indicating the third wave.



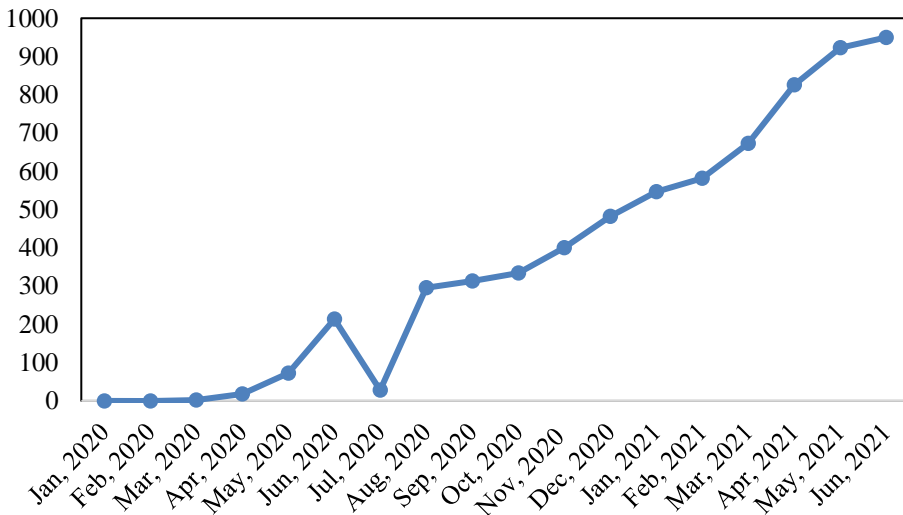
5 Results

Our first analysis was to quantify virus transmissibility data in India, Pakistan as well as China on available time series data. We observed the variation in daily confirmed cases. In a short period of time, millions of people are infected due to Covid-19 second wave. High mortality rate and rapidly increase the number of cases especially in India.

Data highlighted only 4 cases of COVID-19 as reported in Pakistan in February 2020. Day by day, reported cases and the number of deaths increased, and their ratio reached thousands. In February 2021, the total number of reported cases was 5, 81,365, and death cases reached 12,896. During the second wave of COVID-19 in Pakistan last updated data of reported cases reached 9 49,838(Fig 1A), and the total number of deaths reached 22034 in June 2021(Fig 1B). The below data shows that the second wave is worse in Pakistan (Table 1).

Table: 1 Total Reported and Death Cases in Pakistan

Month	Total Reported Cases	Total Reported Death
January 2020	0	0
February 2020	4	0
March 2020	2118	27
April 2020	18114	417
May 2020	72460	1543
June 2020	213470	4395
July 2020	27832	5951
August 2020	295849	6294
September 2020	312806	6484
October 2020	333970	6823
November 2020	400482	8091
December 2020	482178	10176
January 2021	546428	11683
February 2021	581365	12896
March 2021	672931	14530
April 2021	825519	17957
May 2021	922824	20850
June 2021	949838	22034

Total Reported Cases in Pakistan (In Thousands)**Figure 1 (A):** Total reported case in Pakistan

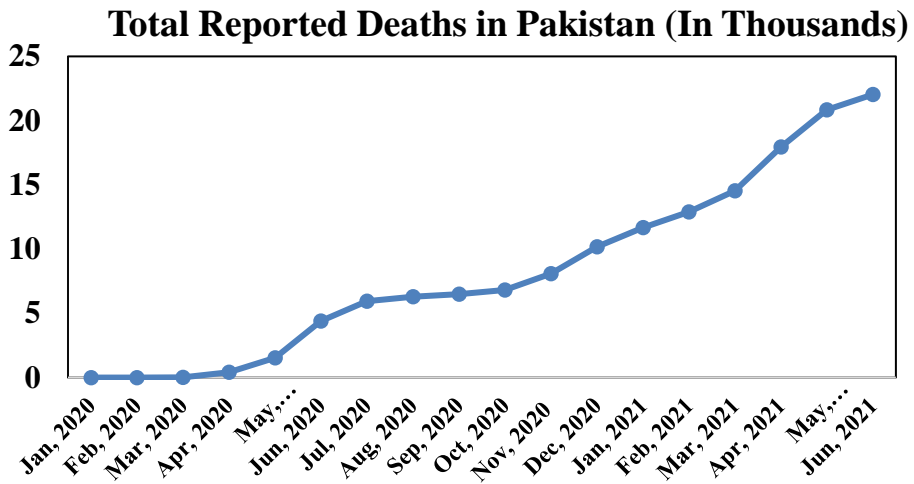


Figure 1 (B): Total reported deaths in Pakistan

Data shows total numbers of reported cases and death cases in China. The total 9,790 cases were reported in January 2020 and 213 total deaths occurred. During second wave spike the reported and death cases increased day by day and in June 2021 total number of confirmed cases was 91,682 reported and death cases reached to 4,636. In China after December 2019, COVID cases spread worldwide across the globe.

Table: 2 Total Reported and death Cases in China

Month	Total Reported Cases	Total Reported Death
January 2020	9790	213
February 2020	79261	2835
March 2020	81365	3305
April 2020	82919	4633
May 2020	83062	4634
June 2020	83580	4634
July 2020	84383	4634
August 2020	85104	4634
September 2020	85458	4634
October 2020	86043	4634
November 2020	85588	4634
December 2020	87117	4634
January 2021	89960	4636
February 2021	89611	4636
March 2021	90265	4636
April 2021	18114	417
May 2021	72460	1543
June 2021	91682	4636

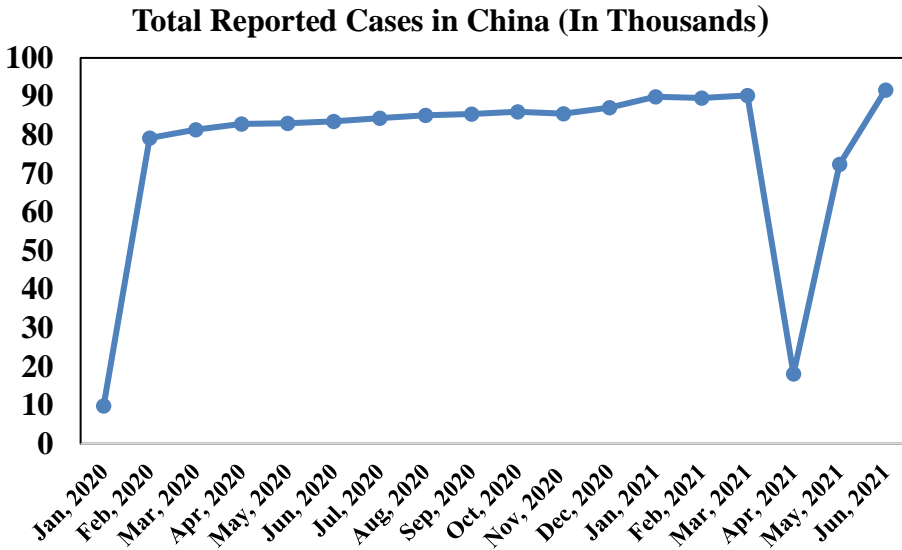


Figure 2 (A): Total reported cases in China (In thousands)

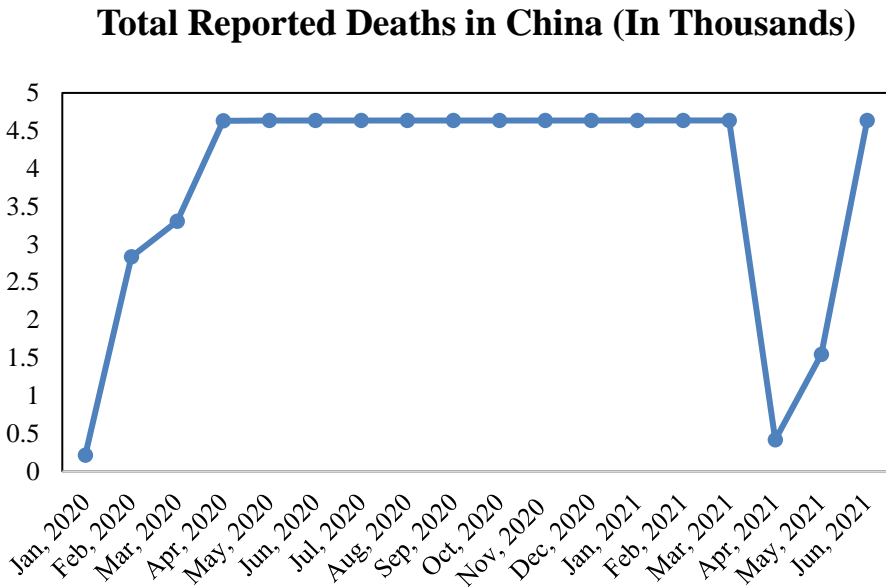


Figure 2(B): Total reported death in China (In thousand)

Data indicated that India is poorly affected by the second wave of COVID. The total number of reported cases in January 2020 was only 1 and no death occurred. But during second Wave of COVID-19 in January 2021 reported cases were 10,757,610 and reported deaths cases reached 1,54,274. As in June 2021 worst period was reported in India as the total number of reported cases recorded were 29,977,861 and total number of deaths reached to 3,89,302.

Table: 3 Total reported and death Cases in India

Month	Total Reported Cases	Total Reported Death
January 2020	1	0
February 2020	3	0
March 2020	1397	35
April 2020	34863	1154
May 2020	190609	5408
June 2020	585481	17400
July 2020	1695988	36511
August 2020	3691166	65288
September 2020	6312583	98678
October 2020	8184082	122111
November 2020	9462809	137621
December 2020	10266674	148738
January 2021	10757610	154274
February 2021	12221665	162927
March 2021	81565	3305
April 2021	19164969	211835
May 2021	2811044	388135
June 2021	29977861	389302

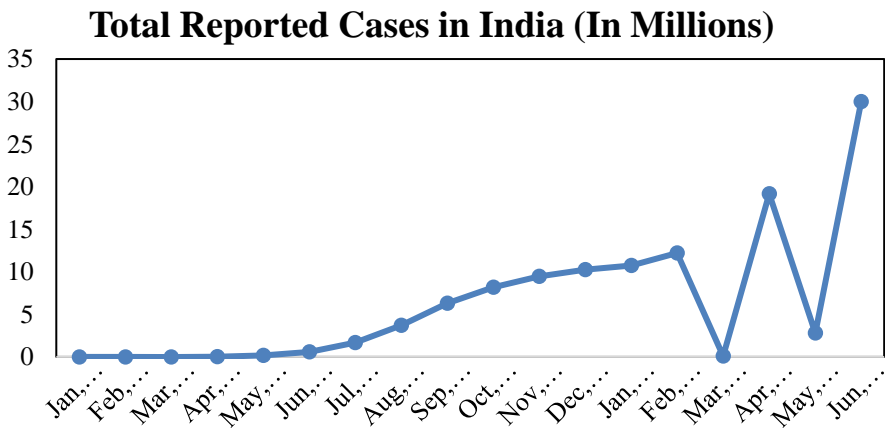


Figure 3 (A): Total reported cases in India (In millions)

Total Reported Deaths in India (In Millions)

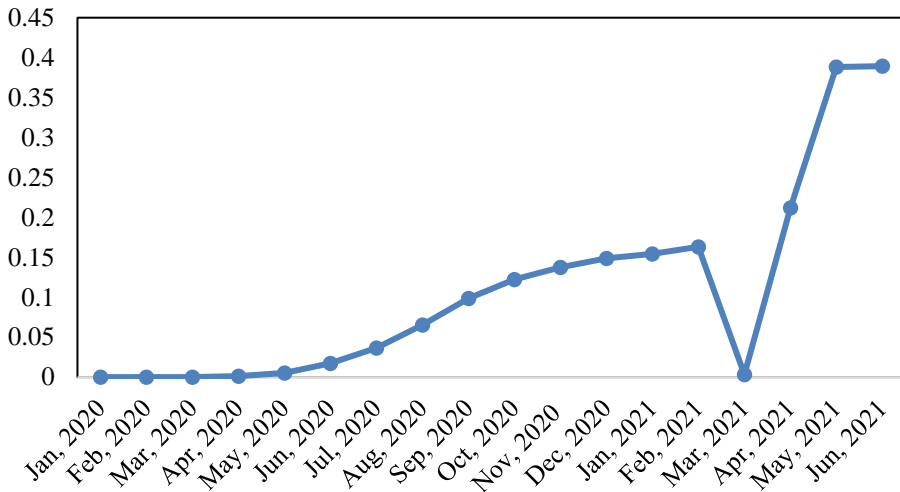


Figure 3 (B): Total reported death in India (In millions).

An analysis based on daily data from January 2020 to June 2020 shows that the first wave of the COVID-19 pandemic has devastated people's health. In the second wave of COVID-19 pandemics, however, the rising incidence of confirmed cases is also linked to different forms of the coronavirus. At the same time, admissions to intensive care units and overall deaths are lower than in the first wave of COVID-19. In India, the second wave of COVID-19 had more drastic effects on health than in China and Pakistan.

As shown in the graph, the effect of the second wave of COVID-19 on India was more severe than that of Pakistan and China. In China, in 23-01-2020, 641 corona cases were reported, and 18 people died; in Pakistan, during the first Wave, 509 cases were reported, and 7 people died in 19-03-2020 whereas on the same date. In India, 1998 cases were reported, and 58 people died due to this pandemic. The comparison showed that the effect of the second wave of COVID-19 was more drastic in India than in Pakistan and China, as shown in the graph. In comparison between China and Pakistan, there were more cases reported, and more people died in Pakistan as compared to China, as represented in the graph. In India, a large number of cases were reported as compared to Pakistan and China, and the death rate was also high.

6 Discussion

The present study was designed to investigate the second wave of COVID-19. In this wave, India was severely affected by COVID-19 on April 19 -2021. The total number of cases in India on 21 June 2021 reported 2, 997, 6871. India was the first country to report 400,000 new cases within 24 hours. Total number of confirmed cases reported in China are 91,682 on 21 June 2021. In a few days, the covid-19 spread worldwide. The viral spread caused very severe challenges for health, social, economic and environmental factors (Abaalzamat et al. [2021](#); Al-Sulaiti [2022](#); Al-Sulaiti et al. [2021](#); Al-Sulaiti and Fontenot [2004](#); Al-Sulaiti and Baker [1998](#); Ismail et al. [2009](#)).

(Zhu, Net.al, [2020](#)) cited that Chinese researchers named the virus 2019-nCoV. The name for COVID-19 was established by China and is now well known in the world. China named it by the year and the virus that caused the disease. All confirmed cases had recent travel histories from Iran, Syria, and London. India's second wave became the worst COVID-19 surge on the planet.

On 30 April 2021, it became the primary country to report over 400,000 new cases during 24 hours. The virus affected the whole world's economy drastically, but India was on top in the second wave of COVID-19.

Xu,S and Li,Y worked in 2020, and the sudden increase in cases after a relatively long 'cooling' period is shocking. However, it is attributed to the highly contagious double mutant variant of SARS-CoV-2 (B.1.617 lineage), population neglect. Behavior and relaxation of interventions, but CFR is lower than the first wave. Ahmed et al. Worked on the vaccine in 2021 and said that spreading this kind of health literacy could improve the population's attitude towards the following COVID-19 vaccines.

Sahin, A. R. cited the daily numbers of new cases data on mean elevation from mean temperature and counts of mutations from during the second wave spike. By the second week of March, the daily positive cases of COVID-19 started rising again, indicating the third wave. With time, this virus has mutated frequently, so the nature of its surface antigens varies. To create immunity against this virus, vaccination was prepared and injected in COVID-19 patients. The death rate begins to decrease after the experience of vaccination and following SOPs in all the countries affected by COVID-19. We observed the variation in daily confirmed cases. In a short period, millions of people have been infected due to COVID-19's second wave. The mortality rate is high, and the number of cases has risen rapidly among Indians.

7 Conclusion

In this review article, we have discussed the second wave of COVID-19 by considering the total reported cases and reported death rate. COVID-19 started in China and mostly affected countries as China, India, Pakistan, and respectively. The symptoms of the COVID-19 virus primarily seen in the patient were pneumonia, fever, cold, respiratory infection, difficulty in breathing, loss of taste, cough, loss of sense of smell, and restlessness. This review article includes the death rate data and total cases in China, India, and Pakistan per year, month, week, and day. From this data, we conclude that the country that was more affected by the economy was India. Analysis based on daily data from January 2021 to June 2021 suggests that the second wave of the COVID-19 pandemic had a high negative impact on people's health. The second wave of the COVID-19 pandemic had a growing incidence of confirmed cases also associated with variants of coronavirus. In contrast, admissions to Intensive Care Units and total deaths had lower levels compared to the first wave of COVID-19. In India, the second wave of COVID-19 had more drastic effects on health as compared to China and Pakistan.

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