

Exploring COVID-19 case fatality rate trends in the Union Territory of Jammu & Kashmir, India: A comprehensive study

Abstract

Background: In 2021, India witnessed a resurgence in Coronavirus cases, marking the onset of the second wave of the pandemic, six months after the first wave peaked in September 2020. This study aims to investigate trends and disparities in COVID-19 case-fatality rates across various districts within the Union territory of Kashmir Division during the period of escalating cases after the decline of the initial wave.

Methods: A cross-sectional study was conducted in a region of the Union territory of Jammu & Kashmir, India. After obtaining necessary permissions, data collection took spanned from November 1, 2020, to May 8, 2021. Aggregated weekly data from various zones in India was collected during the study period and exploratory analysis was conducted.

Results: The data analysis reveals that, from November 2020 to May 2021, COVID-19 cases in the Union Territory of Jammu & Kashmir demonstrated fluctuating tendencies. Notably, there was a substantial surge in March 2020, especially in Srinagar, which suggests the possibility of localised breakouts or dynamics of transmission. Even though Rapid Antigen Test (RAT) positivity rates were originally low in all districts, by the end of the study period, they had significantly increased, particularly in Srinagar and Shopian. This suggests that the dynamics of virus transmission may have changed, either as a result of new variations or behavioural changes.

Conclusion: Our findings highlight those disparities in case-fatality rates between districts, whether low or high, are significantly influenced by the number of confirmed cases. Case-fatality rates were highly impacted by variations in the testing accessibility, containment strategies, and healthcare infrastructure. The results highlight how crucial it is to allocate resources fairly and implement focused interventions in order to lessen the pandemic's effects and safeguard the region's public health.

Keywords: COVID-19, case fatality rate, mortality rate, pandemics

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Introduction

COVID-19 emerged in India on 31 January 2020 when the first case got diagnosed in Kerala and within 3 months, the virus had spread to all 36 states and union territories, including the Union Territory of Jammu & Kashmir (UT J&K), where the first confirmed positive case was reported on March 9, 2020.^{1,2} The subsequent months witnessed a steady rise in cases, reaching around 73,014 cases by September 2020, which marked the peak of the initial wave, according to expert reports.³ In 2021, India faced a resurgence of COVID-19 cases in the first week of March, indicating the beginning of second wave, which was roughly six months after the peak formed of COVID-19 first wave, while no nation was prepared to take up outbreak of such a magnitude, under optimal Indian healthcare structure were one of the worst hits.⁴ Since then, the country has experienced a surge in daily cases, with over 3 lakh fresh positive cases reported daily.

Amidst the second wave, the J&K government implemented various measures, including night curfews, limited functioning of shops, reduced occupancy in public transport, and the designation of micro containment zones to curb the spread.⁵ Kashmir witnessed its peak on May 7, 2021, with 5,443 positive cases.^{2,3} In response, the J&K Government imposed curfews across all 20 districts, allowing only essential services to operate, and limiting gatherings at marriages to 25 persons.⁶ To manage the surge, 23 hospitals were designated as dedicated COVID-19 facilities, increasing the total COVID-19

beds to 1194 in Kashmir and 511 in Jammu divisions.⁷ Additionally, financial incentives were offered to healthcare resources, including final year medical students and nurses.⁸ A comprehensive door-to-door awareness campaign was initiated in Jammu to educate the public about COVID-19 prevention, patient identification, appropriate behavior, helpline access, and hospital information.⁹ Simultaneously, the Indian army conducted campaigns in remote regions, emphasizing social distancing and Standard Operating Procedures (SOPs) to control infections.¹⁰

Though vaccinations for COVID-19 were timely introduced in the country, there were some challenges that government and health partners struggled to resolve and increase the acceptance in the communities.¹¹ As of May 26, 2021, the union territory achieved complete vaccination of over two-thirds (67%) of its population aged 45 and above, surpassing the national average of 44.1%.¹²

Amid these challenging times, one crucial but often misunderstood indicator was the Case Fatality Rate (CFR), which represents the proportion of diseased cases among the diagnosed ones within a specified time.^{13,14} J&K reported a significant reduction in CFR compared to the national average. However, this study delves into the ground reality of the 10 districts in UT of J&K, focusing on the cases and their trends during the surge, spanning from the decline of the first wave to what is commonly referred to as the peak of COVID-19 second wave in India.

Objective

The objective of this research is to monitor trends and variations in COVID-19 case-fatality rates in different districts of the Union Territory of Kashmir Division when the number of cases increased following the decline of initial wave.

Methodology

A cross-sectional analysis was conducted in one of the regions of the UT J&K, India. The UT of J&K comprises two divisions: Jammu and Kashmir, each with ten districts. The Kashmir division, covering approximately 42,241 km², has a population of 1.23 crores as per the 2011 census. In response to the pandemic, both divisions established COVID-19 control war rooms to manage the emergency situation effectively. These control rooms served as central hubs for data collection and provided essential information to the public regarding COVID-19 related queries, ensuring systematic resolution of such issues.

All surveillance data from the ten districts in the Kashmir division was gathered at the COVID-19 control room of the Kashmir division. With the necessary permissions obtained from the competent authority, data collection for our study took place from November 1, 2020, to May 8, 2021.

Analysis plan: We conducted an exploratory trend analysis on the outcomes of interest, utilizing percentages and means. To investigate the divisional and sub-divisional trends from November 2020 to May 2021, Excel 2019 version was utilized for the analysis.

Ethical issues: The study had no ethical issues pertaining to animal or human experimentation. The permission to use the data was taken from the competent authority.

Results

The data utilized for this study were aggregated weekly across various zones in India from November 2020 to May 2021. We computed trends analysing the COVID-19 reports by region and presented an average. This approach enabled us to conduct an exploratory analysis over this time period to understand the distribution of COVID-19 cases in UT J&K. While few variables from the same study were published elsewhere,¹⁵ this paper presents a comprehensive reporting of the analysis.

District wise distribution of COVID-19 cases from Kashmir division, UT J&K

Figure 1 illustrates the number of active cases in each district under consideration. Initially, active cases were relatively small, with the highest reported in Srinagar, around 1400 cases at the beginning of the study period. These numbers gradually decreased throughout the rest of 2020 and the early parts of 2021. However, a significant spike in active cases occurred in March 2020 particularly in Srinagar, witnessing a significant increase in the number of cases once again during this period.

Distribution of symptomatic patients tested

Similarly to the active cases depicted in Figure 1, the number of symptomatic patients tested during the period under review remained relatively constant between November and January. A decline in the number of symptomatic patients tested was noted in Figure 2 before seeing an overall increase in tests between March and May. Notably, Srinagar experienced a significantly higher increase in testing during this period. This possibly reflecting the effectiveness of targeted

efforts implemented by health authorities to identify the positive cases and isolate them.

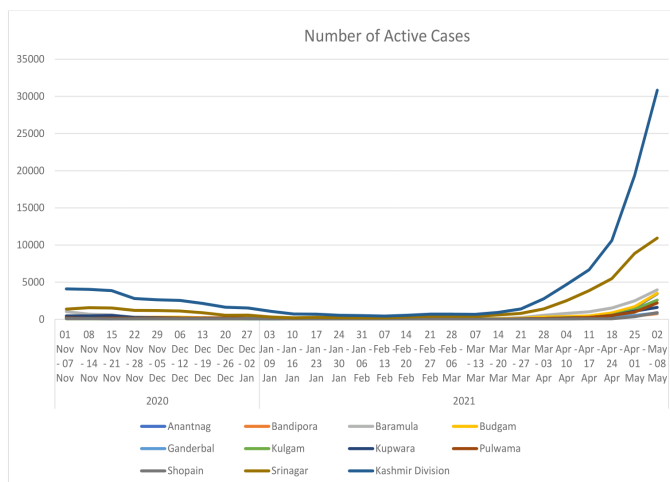


Figure 1 Number of COVID-19 active cases by districts in Kashmir division between 1 November and 8 May 2021.

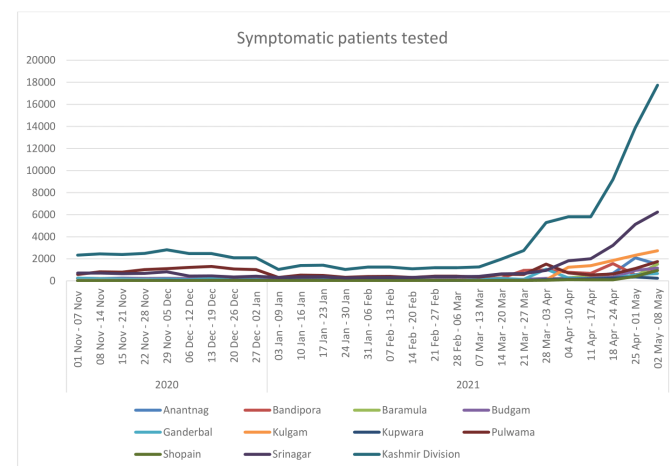


Figure 2 Distribution of the number of symptomatic cases tested by districts in Kashmir division between 1 November and 8 May 2021.

Distribution of RAT positivity rates by districts in Kashmir division

The Rapid Antigen Test (RAT) positivity rate, as shown in Figure 3, was generally low across the districts, with the highest rates observed in Srinagar (6.7%) and Shopian (0.18%). However, due to the reduction in the number of tests, as depicted in Figure 2, the RAT positivity rate decreased initially and then escalated, reaching about 19% in Srinagar by the end of the study period. This spike was observed in all districts, which may indicate a shift in the transmission of virus, possibly due to the spread of new variants of COVID-19 virus or changes in the behaviours of people.

Distribution of RAT positivity rates by districts in Kashmir division

Numerous COVID-19 tests were conducted in the Kashmir Division during the period under review, peaking in May with over 125,000 tests administered in the district, as indicated in Figure 4. In contrast, each of the districts reported fewer than 25,000 weekly tests during this period. This increase in testing may be a proactive approach to better identify and isolate infections, or it may be a reaction to the reported increase in cases. (Figure 5)

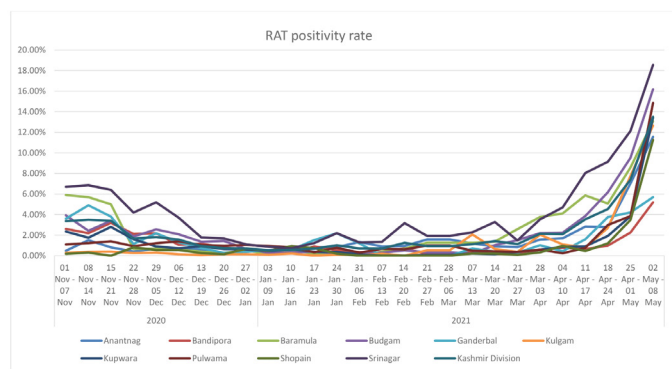


Figure 3 RAT positivity rate by districts in Kashmir division between 1 November and 8 May 2021.

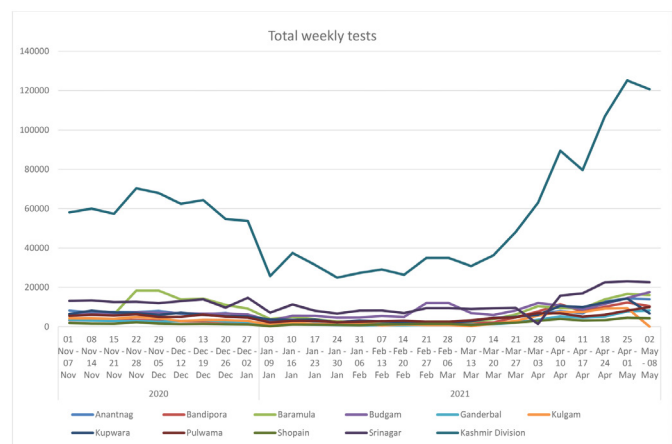


Figure 4 Total weekly tests by districts in Kashmir division between 1 November and 8 May 2021.

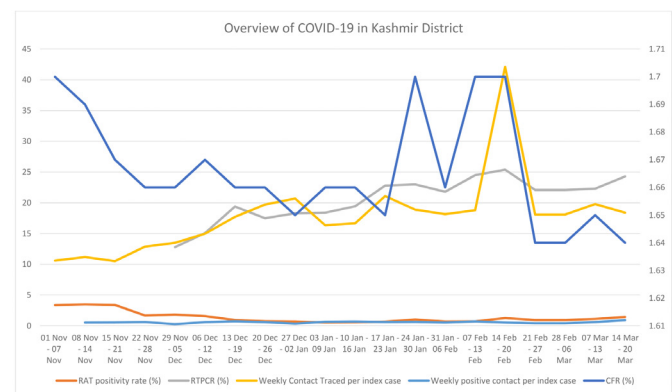


Figure 5 Overall weekly RAT positivity rates, RTP CR, Weekly contact traced per index case, weekly positive contact per index case and CFR in Kashmir division between 1 November and 8 May 2021.

Discussion

The present study analyzed the patterns and indices related to COVID-19 in the Kashmir division from November 2020, focusing on the second wave that hit India during January to March 2021. While the country was undergoing the biggest vaccination drive ever, extensive measures were also required to control the transmission, a significant public health challenge emerged amidst SARS-CoV-2 virus mutations, making it highly infectious. In India, the first wave peaked around September 2020.¹ The saturation of the first COVID-19

wave was believed to have resulted due to a combination of factors, including robust government interventions, increased community awareness and response to adhering to the precautionary measures.

The Rt level began rising nearing February end, and cases started increasingly sharply by mid of March 2021, suggesting that the second wave of COVID-19 has begun in India.² Sudden surge in cases, after a decently long ‘cooling’ period, was believed to be due to a highly infectious double mutant variant of SARS-CoV-2 (B.1.617 lineage), negligent population behavior, and relaxation of interventions like lockdowns, among other factors. Furthermore, the second wave stretched faster than expected and the first wave, making India one of the worst-hit region globally. In 2021, India led the world in the highest number of cases (daily) while ranked third in death counts (daily) attributed to COVID-19. Comparatively, the cases (daily) in April increased multifold and nearly tripled as compared to the United States of America.³ However, the CFR in India was relatively low compared to countries like Brazil, where the CFR was very high.⁵ The surge in cases strained healthcare systems, pushing them to the brink of collapse.

In Jammu & Kashmir, the UT administration made extraordinary efforts in March 2021 to promote tourism and cultural events, encouraging tourists to visit the valley. The government hosted a tulip festival from April 4th to 12th, 2021, where thousands of people disregarded COVID-19 appropriate behavior and social distancing. Cases in Kashmir started rising from March, with a sharp increase in April, reaching nearly 20 thousand cases daily, peaking in the first half of May 2021. Srinagar reported the highest number of cases, possibly due to the presence of multiple tertiary care hospitals in the district, attracting people from other districts and far-flung areas.

In India, the cumulative average CFR curve peaked at 3.5% in mid-April 2020 and goes upto 1.2% during mid-April 2021, wherein the overall average CFR was around 1.2%.⁷ During the second wave, in April and May 2021, Kashmir’s case fatality rate was observed to be 1% daily, with daily deaths surpassing the peak values from the first wave. Kashmir reported fewer case fatalities than Jammu division, possibly due to its robust healthcare infrastructure, including 232 Primary Health Centers (PHCs), 50 Community Health Centers (CHCs), and 9 district hospitals, with a doctor-patient ratio exceeding the national average.⁹ Remote areas in Kashmir are well-connected with healthcare institutions in Srinagar. Additionally, Kashmir valley has a network of charity groups and non-governmental organizations, aiding patients with oxygen supply, concentrators, transportation, medicines, and burials.⁹ Due to Jammu’s proximity to Punjab and Haryana, the UK variant of the virus was likely introduced earlier in Jammu compared to the Kashmir division.¹² The lineage B.1.1.7, discovered in the United Kingdom, is believed to be 40-80% increased risk of transmissible than the SARS-CoV-2.^{13,14}

The Jammu and Kashmir government adopted a five-pronged strategy during the second wave, focusing on testing, isolation, treatment, vaccination, and containment.¹⁶ Active COVID-19 testing of travellers entering the region was conducted at road, rail, and air entry points. Testing centers were set up at Shaitani Nallah and Banihal railway station, and testing was made mandatory for travelers at Srinagar airport. The World Health Organization (WHO) recommends a Test Positivity Rate (TPR) of less than 5% for at least two weeks to bring COVID-19 transmission under control. In March, Kashmir tested around 5 to 6 thousand cases, increasing to almost 18 thousand by the end of the study period, with a TPR of 6%-10%. Srinagar conducted the highest number of tests, ranging from 2 thousand to 5 thousand, possibly due to the availability of numerous

testing facilities. In May 2021, the ICMR issued a fresh COVID-19 testing advisory, recommending increased usage of rapid antigen tests (RAT) due to the exponential surge in cases, causing backlogs in the gold standard RT-PCR test.¹⁷ The Kashmir division exhibited a RAT positivity rate of around 2.1%, which subsequently rose sharply to around 13.5% by the end of the study period. The RT-PCR positivity rate peaked at around 34% at the end of March, gradually falling and remaining constant in May at 28% daily.

The UT improved healthcare facilities at various levels by dedicating COVID-19 care centres into categories, Category II and Category III. Dedicated COVID-19 Health Centres provided care for moderate cases, COVID-19 Care Centres treated mild, very mild, or suspected cases, and Dedicated COVID-19 Hospitals offered comprehensive care to severe cases.¹⁸ The administration also established a 24X7 COVID-19 control war room in Jammu for medical oxygen distribution and implemented active containment measures. The healthcare system faced challenges during the second wave, leading to active testing of face mask violators, district classification into red and orange zones,¹⁹ and the establishment of 5-bed healthcare facilities in each panchayat, among other measures.²⁰ The Indian Army also set up dedicated hospitals in border villages and isolated areas of north Kashmir.²¹ Healthcare workers in Kashmir conducted a successful COVID-19 vaccination drive, reaching remote areas and ensuring vaccinations for individuals aged 45 and above. The vaccination drive needs to be expedited and expanded for including all eligible individuals.^{22–24}

Contact tracing, an essential component of combating the epidemic, was actively pursued in Kashmir. States were recommended to trace at least 20–25 contacts, including family members, social contacts, workplace contacts, and casual contacts, per index case.²⁵ Despite challenges faced by other states, Kashmir continued its contact tracing efforts.^{26,27} Coordination between various sectors is crucial, as demonstrated by Kashmir's early lesson during the first wave. Internet restrictions in centrally administered Jammu and Kashmir hindered people from accessing COVID-19 related information, awareness, preventive measures, and appropriate behaviors, making it challenging to assess the actual impact.²⁸

Prevention remains crucial in these unprecedented times. Public engagement, strict adherence to COVID-19 appropriate behaviors (such as social distancing, mask usage, hygiene maintenance), partial lockdowns, restricted socialization, containment zones, and other measures must be properly implemented by the government improving public adherence and enforced by the administration. Social and Behavioral Communication Change (SBCC) campaigns, exemplified by Herpora village in Shopian district, played a vital role in controlling the virus. The village effectively followed SOPs and government guidelines. Strengthening social capital, demonstrated by public trust in the government, as seen in Kerala during the first wave, is essential for effective pandemic containment.^{29–31} Continued safety measures and precautions like social distancing, masks, complete/partial time and locality bound lockdowns are crucial during the vaccination drive to halt the virus's spread.

Conclusion

Through the investigation of variations in case-fatality rates, testing rates, and transmission dynamics, there is a greater understanding of the variables affecting the impact of the pandemic in the area. The lower case-fatality rates in districts with better healthcare systems and proactive containment strategies highlighted the need for focused actions to reduce mortality. Furthermore, the disparities in

positivity and testing rates among districts highlight the significance of equitable access to testing resources and early case detection. Although the number of confirmed cases is a major predictor of case fatality rates, other variables that are important in determining differences in mortality rates between districts include healthcare capacity, timely delivery of care, population characteristics, public health interventions, and environmental and socioeconomic factors. Comprehending and tackling these complex factors is vital in reducing the influence of COVID-19 and enhancing general health results throughout different regions.

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Conflicts of interest

There is no conflict of interest in this research work.

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