

Impact of Covid-19 Pandemic on Tuberculosis Testing and Reporting

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ABSTRACT

Background: COVID-19, a recent global threat, contrasts with tuberculosis (TB), an age-old disease. While prompting a significant global response, COVID-19 has disrupted programs for major diseases like TB and HIV. Approximately one-fourth of the world's population is estimated to have latent TB. The pandemic strained healthcare systems and exacerbated social issues, contributing to the TB epidemic. In 2020, COVID-19 pushed 100 million people into poverty, with developing economies facing an estimated \$12 trillion in pandemic-related losses by 2025. Nearly 20% of global TB cases are linked to undernutrition.

Methods: In this retrospective analytical study, we aimed to gauge the potential repercussions of lockdowns implemented during and after the COVID-19 pandemic on tuberculosis (TB) in a high-burden country like India.

Results: The COVID-19 pandemic saw a rise in annual TB cases, with a significant drop in reporting in 2020. Screening of SARI/ILI patients for TB was minimal that year, gradually increasing in subsequent years. The surge in TB screening may be linked to lockdown effects and COVID-related fears. Government directives on bi-directional screening played a role. Microbiologically/clinically confirmed TB cases peaked in 2020 and gradually decreased. Bi-directional TB-COVID screening revealed a low incidence of coinfections throughout the years.

Conclusion: Our study revealed a declining trend in TB diagnoses in our region during the COVID-19 pandemic. This decline is attributed to limited access to diagnostic, treatment, and preventative services, pandemic-induced misdiagnoses, and the global adoption of mask-wearing and social distancing measures.

Key-words: COVID-19, TB, lockdown, SARI, ILI, Bi-directional TB-COVID screening, Intermediate Reference Laboratory (IRL)

INTRODUCTION

The global health landscape has been profoundly affected by the COVID-19 pandemic, with tuberculosis services experiencing disproportionate disruptions¹. TB, an infectious bacterial disease primarily affecting the lungs, poses a heightened risk of transmission in households, especially when patients face restricted access to healthcare during lockdowns^[1].

The consequences extend beyond morbidity, potentially leading to TB-related deaths due to non-diagnosis, lack of treatment, or discontinuation of anti-TB medication during lockdowns^[1].

For the first time in over a decade, TB mortality has increased, reaching alarming levels^[2]. In 2020, the World Health Organization (WHO) estimated that nearly 10 million people developed TB, but only 5.8 million cases were diagnosed and reported—a significant 18% decrease from 2019^[2]. This decline, concentrated in 16 countries, particularly impacted Asian nations, including India, Indonesia, the Philippines, and China^[3]. Undiagnosed and untreated cases surged during the COVID-19 pandemic, exacerbating TB transmission rates

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among household contacts [3]. Documented data from 2020 revealed a 20% to 60% decrease in TB diagnoses compared to the previous year, intensifying the TB epidemic [3].

A WHO modelling study projected that a global 25% decline in TB detection over 3 months during the COVID-19 pandemic could result in a 13% increase in TB-related deaths, potentially reverting global TB mortality rates to levels observed five years prior [4]. The ongoing pandemic impact could contribute to an additional 1.4 million TB fatalities, compounding the existing death toll from 2020 to 2025 [5]. The disruptions caused by the COVID-19 pandemic significantly impeded global access to TB diagnosis and treatment [6,7]. Nonpharmaceutical interventions and economic downturns influenced individuals' healthcare-seeking behavior, leading to delays in TB diagnosis and treatment. This retrospective analytical study seeks to estimate the potential impact of lockdowns during and after the COVID-19 pandemic on TB in central India. The limited occurrence of TB-COVID-19 coinfections underscores the success of government guidelines promoting comprehensive screening for TB and COVID-19, particularly among individuals with influenza-like illness (ILI) or severe acute respiratory infections (SARI).

MATERIALS AND METHODS

This study encompasses data gathered from individuals diagnosed with tuberculosis in the Nagpur region throughout the COVID-19 pandemic from 2020 to 2022. The data was sourced from two key institutions: the Intermediate Reference Laboratory (IRL) in Nagpur, Maharashtra, India, and the Government Medical College in Nagpur, Maharashtra, India. The chosen time frame, commencing with the onset of the COVID-19 pandemic, ensures a comprehensive examination of the impact on tuberculosis diagnoses and related trends in the specified region.

Inclusion criteria- The study included data from individuals diagnosed with tuberculosis in the Nagpur region during the COVID-19 pandemic. The time frame considered for inclusion was from the onset of the COVID-19 pandemic i.e. 2020 to 2022.

Exclusion criteria- Data were excluded if they did not have a confirmed diagnosis of tuberculosis or if the

relevant data were incomplete or unavailable for analysis. Cases without a confirmed tuberculosis diagnosis or that were incomplete or unavailable for analysis were excluded.

Statistical Analysis- The analysis involved assessing trends in TB diagnosis during and after the COVID-19 pandemic. The descriptive statistics were employed to quantify the changes in the number of TB cases diagnosed, focusing on any observed decreases.

Ethical Approval- This study adhered to ethical guidelines and obtained approval from the Institutional Ethical Committee, ensuring that the rights and confidentiality of the individuals involved were protected. The data used were anonymized to maintain privacy and comply with ethical standards.

RESULTS

The number of TB cases increased each year during the Covid pandemic from 1528 in 2020 to 3829 in 2021 and 4906 in 2022. There was a significant reduction in the reporting of TB cases in 2020 (Table 1).

Table 1: TB Cases during Covid-19 pandemic

Year	Patient screened
2020	1528
2021	3829
2022	4906

The number of SARI (Severe acute respiratory illness)/ILI (Influenza-like illness) patients screened for TB was at least in 2020 due to the pandemic. Still, TB screening slowly increased yearly, from 2.0% in 2020 to 3.93% in 2021 & 10.07% in 2022. This may be due to the lockdown effect, non-availability of transport facilities, fear of visiting diagnostic centres, and false suspicion of having Covid. Increased TB screening is attributable to Bi-directional screening as per government directive (Table 2).

Table 2: Year-wise Screening for TB Cases

Year	Patient screened (%)
2020	2
2021	3.93
2022	10.07

At the same time, numbers of microbiologically /clinically confirmed TB new cases were as high as 67.2% in 2020 and gradually reduced to 11.05% in 2021 & 2.79% in 2022, as shown in Table 3. This is due to the suspicion that TB was last in the pandemic and that most of the presumptive cases were confirmed as newly diagnosed TB cases in late 2020. Subsequently, confirmation of new TB cases normalised.

Table 3: Clinically confirmed TB Cases

Year	Confirmed TB Cases (%)
2020	67.2
2021	11.05
2022	2.79

Due to Government directives about bi-directional TB-COVID screening and screening of TB among ILI/SARI cases, no TB patient screened for COVID-19 is shown in Table 4. The cases of coinfection were only 19 in 2020, 25 in 2021 & 20 in 2022.

Table 4: TB-COVID-19 coinfection

Year	No coinfection cases
2020	19
2021	20
2022	25

DISCUSSION

The observed trends in TB cases during the COVID-19 pandemic indicate a significant reduction in reported cases in 2020, followed by an increase in 2021 and 2022. This decline in 2020 aligns with the broader global context, where the focus on addressing the COVID-19 pandemic may have led to disruptions in TB case reporting and healthcare-seeking behaviour. Previous studies ^[8,9] proposed that enforcing rigorous COVID-19 prevention measures in 2020 successfully diminished the reported TB incidence in China. India's first decline in TB notifications in 2020 was directly correlated with the surge in COVID-19 cases and the subsequent state-wide lockdown. On the other hand, the number of TB cases might have decreased due to practices such as mask-wearing, hand hygiene, and social distancing. The COVID-

19 preventive behaviours, which not only aided in containing the pandemic but also induced a noteworthy behavioural shift among the Indian populace, could have played a role in curbing the spread of tuberculosis during the pandemic ^[8,9].

Results reveal an exciting shift in TB screening rates among SARI/ILI patients over the years. The low screening percentage in 2020 (2%) suggests challenges such as the pandemic's impact on healthcare accessibility and heightened fear of visiting diagnostic centres. The subsequent increase in screening rates in 2021 and 2022, possibly due to the normalization of healthcare services and bi-directional screening initiatives, demonstrates adaptability in the face of evolving circumstances ^[10,11]. The decline in TB patients may be attributed to two factors. Firstly, active TB notifications might not have been reported due to the impact of COVID-19 and the subsequent lockdown.

As illustrated in our result, the decline in microbiologically/clinically confirmed TB cases reflects a delay in confirming presumptive cases during the pandemic. The high confirmation rate in 2020 (67.2%) may be attributed to delayed diagnoses, while the subsequent decrease in 2021 and 2022 suggests a normalization of TB confirmation processes. In a 2021 study, researchers suggested that COVID-19 could significantly impact the behaviour of individuals seeking medical attention for tuberculosis (TB) ^[12-16]. Several factors contributing to delays in TB testing include the postponement of seeking medical care due to transportation restrictions, disruptions in TB services, and personal reasons ^[17].

These results highlight the efforts to address TB-COVID-19 coinfections. The relatively low number of coinfection cases each year (19 in 2020, 20 in 2021, and 25 in 2022) underscores the distinct nature of TB and COVID-19, with only a modest overlap in cases. TB and COVID-19 share respiratory symptoms, and the increased vigilance of patients, communities, and healthcare facilities may be the critical factor behind the relatively low number of reported coinfecting cases during this timeframe. Moreover, India's rigorous lockdown measures successfully contained widespread COVID-19 transmission until the conclusion of 2022, standing as an additional contributing factor ^[15]. Healthcare resources worldwide have undergone extensive reallocation, with human and economic assets being diverted to address

the critical and prioritized challenge of the COVID-19 pandemic regarding public health.

Consequently, disruptions have been observed in other healthcare services [15]. The WHO Global TB Report for 2021 set an ambitious goal to achieve an annual 4–5% reduction in TB incidence until 2020. However, the impact of the COVID-19 pandemic was pronounced, with a substantial 18% decline in TB incidence reported for 2019–2020 [16]. These results underscore the importance of continuous surveillance, flexible healthcare policies, and the amalgamation of screening initiatives for TB and COVID-19 to tackle public health issues adequately [18-21].

CONCLUSIONS

In conclusion, the fluctuating trends in TB cases during the COVID-19 pandemic showcase the resilience and adaptability of healthcare systems. The initial reduction in reported TB cases in 2020 may have been influenced by the global focus on addressing the COVID-19 crisis. The subsequent increase in TB screening rates, confirmed by Table II, reflects a positive response, possibly driven by bi-directional screening initiatives and the gradual normalization of healthcare services. The decline in microbiologically/clinically confirmed TB cases suggests a delay in confirming presumptive cases during the pandemic, with confirmation rates returning to lower levels in 2021 and 2022. This underscores the importance of continuous monitoring and adjustment of healthcare strategies.

Prospects involve reinforcing healthcare resilience by learning from COVID-19's impact on TB trends. Sustaining bi-directional screening, normalizing healthcare services, and continuous monitoring are crucial. Public health awareness, improved telehealth infrastructure, and global collaboration are key for adaptive healthcare strategies. Integrating infectious disease control into broader healthcare approaches can prevent disease diagnosis and management disruptions.

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