Original article

Effect of COVID-19 lockdown on the pathway of care and treatment outcome among patients with tuberculosis in a rural part of northern India: a community-based study

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Abstract

Objectives: The coronavirus disease 2019 (COVID-19) pandemic affected routine healthcare services across all spectra, and tuberculosis (TB) care under the National Tuberculosis Elimination Program have been affected the most. However, evidence available at the community level is minimal. The clinical features, care cascade pathway, and treatment outcomes of TB patients pre- and during/post-COVID-19 pandemic lockdown in a rural community health block in northern India were assessed and compared.

Materials and Methods: This was a retrospective cohort study that included all patients diagnosed with TB and initiated treatment under programmatic settings between January 1 and June 30, 2020, in a rural TB unit in northern India. The periods from January 1 to March 23 and March 24 to June 30 were marked as pre-lockdown and during/post-lockdown, respectively.

Results: A total of 103 patients were diagnosed and treated for TB during the study period. A significantly higher proportion of pulmonary TB cases were reported during/post-lockdown (43, 82.7%) compared to that pre-lockdown (32, 62.7%), and a higher diagnostic delay was noted during/post-lockdown (35, 81.4%). Through adjusted analysis, patients diagnosed during/post-lockdown period (adjusted risk ratio [aRR], 0.85; 95% confidence interval [CI], 0.73–0.98) and previously treated (aRR, 0.77; 95% CI, 0.60–0.995) had significantly lower favorable treatment outcomes.

Conclusions: The symptom and disease (pulmonary/extrapulmonary) pattern have changed during/post-lockdown. The care cascade delays are still high among TB patients, irrespective of the lockdown status. Lockdown had a significant adverse impact on the outcomes of TB treatment.

Key words: tuberculosis, COVID-19, India, time-to-treatment, treatment outcome, pathway of care

Introduction

Owing to the coronavirus disease 2019 (COVID-19) pandemic, routine healthcare services have taken a hit to various extents, with a greater intensity among the low- and middle-income countries1–2. The National Tuberculo-
patients’ health-seeking behavior managed by the national disease control programs can shed light on those who are not appropriately detected by the programs and provide detailed information on other healthcare providers’ practices and their contribution to increasing the duration of infectivity in the community10. Studies have found that even with free provision of TB care, 21% of households face economic hardship over TB management11.

India imposed a nationwide lockdown from March 24, 2020, to contain the COVID-19 pandemic. The adverse impact of the lockdown on the economic livelihood and the movement restrictions may have precipitated delays in the care cascade of TB patients. Their health-seeking behavior and out-of-pocket expenditure (OOPE) incurred may have also changed during the lockdown period. However, no studies could be found in the Indian program settings regarding the impact of the lockdown on the abovementioned domains of TB care. It is important to determine the effect of the COVID-19 pandemic on TB service delivery and the outcomes to identify the gaps, if any, to be worked upon to improve the services and reignite the elimination mission. With this background, the clinical features, care cascade delays, and treatment outcomes of TB patients before and during the COVID-19 pandemic lockdown in a rural block in northern India were assessed and compared.

### Materials and Methods

#### Study design

A retrospective cohort study was conducted through record review and patient interviews.

#### Study setting

The study was conducted in one rural TB unit covering a total population of 200,000, that is, the coverage area of a community health center in northern India. TB diagnostic and treatment services are provided under the NTEP of India in designated microscopy centers and directly observed treatment short-course (DOTS), centers, respectively. NTEP is a federally sponsored scheme implemented with resource sharing between state governments and the Government of India12. TB diagnostic and treatment services are predominantly provided by the public health system (for free), and private providers are also involved to a certain extent. Of the 2,576 patients notified from the district (for the year 2019) where the study site is situated, 390 (15.1%) were notified by the study site.

#### Operational definitions

**History of unintended weight loss:** >10% weight loss in 6 months or >5% loss in 1 month indicates severe weight loss13.

**Diagnostic delay:** Diagnostic delay was assessed in patients with pulmonary tuberculosis (PTB), based on the date of symptom onset, date of eligibility for sputum examination (which is 14 days from the date of symptom onset in case of cough and fever and the same day in case of hemoptyisis), and the actual date of diagnosis14–16. PTB patients were categorized as those with delayed diagnosis if the difference between the date of diagnosis and the date of eligibility was >1 day.

**Treatment delay:** Treatment delay was defined as the duration between the date of diagnosis and treatment initiation of the COVID-19 pandemic was initiated on March 24, 2020, and extended until the first week of June 2020. Some minor relaxations were given in the latter part of the lockdown. During the lockdown, except for essential health services such as antenatal, immunization, and emergency services, all routine healthcare services were stopped in public health facilities. However, TB diagnostic and treatment services were provided in a restricted manner due to the deployment of human resources and laboratories for COVID-19 response. Similarly, most private health facilities were providing limited services during the lockdown period.

#### Study population and period

All patients diagnosed with TB and registered for treatment with the public health system under NTEP from January 1 to June 30, 2020, in the selected TB unit were included. The study period was divided into “pre-lockdown” (January 1 to March 23, 2020) and “during/post-lockdown” (March 24 to June 30, 2020).

#### Study procedure

A list of patients diagnosed with TB and registered for treatment under NTEP was obtained from the study TB unit. A pretested, interviewer-administered, semi-structured questionnaire was used to assess the (a) sociodemographic and economic characteristics; (b) nutritional status (c) clinical and treatment-seeking characteristics such as symptom profile with the date of onset of each symptom, contact history, type of healthcare provider first contacted, site of TB, and drug resistance status; and (d) receipt of public health action measures such as enrolment with NPY and OOPE from onset of symptoms to the initiation of treatment among the study population. The resident doctors conducted the interviews who were involved neither in the diagnosis nor in the initiation of the treatment. All interviews were conducted at home or at the patient’s place of convenience.

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among patients with PTB and extrapulmonary TB (EPTB). Patients with TB were categorized as those with delayed treatment if the difference between the date of treatment initiation and the date of diagnosis was >1 day.

Treatment outcome: Favorable treatment outcomes were marked in patients who were declared cured or completed the prescribed course of treatment under the NTEP. Unfavorable treatment outcomes were marked in patients with relapse, loss to follow-up, developed resistance, death, and continuing treatment due to persistent symptoms.

**Ethics**

Ethical clearance to conduct the study was obtained from the Institute Ethics Committee, Postgraduate Institute of Medical Education and Research, Chandigarh, India. Written informed consent was obtained from all patients.

**Statistical analysis**

Data were documented using Epicollect5®. The analysis was performed using SPSS (version 26.0, IBM Corp, Armonk, NY, USA). Quantitative data were tested for normality using the Shapiro–Wilk test. Median and interquartile range (IQR) were calculated, and the Mann–Whitney U test was applied to test the significant difference of the continuous variables pre- and during/post-lockdown. The difference in frequency (proportion) of diagnosis and treatment delay and type and pattern of TB was compared using the chi-square test. Factors with \( P \leq 0.2 \) in the univariate analysis associated with favorable TB treatment outcomes were included in the adjusted analysis using a generalized linear model, and adjusted risk ratio (aRR) along with 95% confidence interval (CI) was calculated. \( P \)-values <0.05 were considered statistically significant.

**Results**

A total of 103 patients with TB were registered under the NTEP during the study period. Of them, 51 were diagnosed pre-lockdown, and 52 were diagnosed during/post-lockdown. The overall, pre-, and during/post-lockdown period median (IQR) ages of the patients were 38.0 (27.0, 56.0), 36.0 (24.0, 50.0), and 43.5 (30.5, 61.5) years, respectively. Similarly, 68 (66.0%), 30 (58.8%), and 38 (73.1%) were men during the overall, pre-, and during/post-lockdown periods, respectively. A statistically significant difference was not observed between various sociodemographic, economic, and nutritional characteristics across the lockdown period (\( P=0.05 \)) (Table 1).

Fever was the most common symptom in both the pre-lockdown (32, 62.7%) and during/post-lockdown period groups (39, 75.0%) (Table 2). Weight loss was reported twice (\( P=0.02 \)) during/post-lockdown (26, 50.0%) compared to that pre-lockdown (14, 27.5%). No significant change was observed in the number of healthcare visits before diagnosis. Although no difference was found in the proportion of new or previously treated patients across the lockdown period, a significantly (\( P=0.03 \)) high proportion of pulmonary TB cases were reported during/post-lockdown (43, 82.7%) compared to that pre-lockdown (32, 62.7%). Similarly, NPY registration and the payment of dues on time significantly decreased during/post-lockdown (\( P<0.05 \)) (Table 2).

Of the patients with pulmonary TB, a high proportion of patients had diagnostic delay during/post-lockdown (35, 81.4%) with a median (IQR) delay of 33.0 (15.8, 81.3) days compared to that pre-lockdown (Table 3). Non-suspicion by healthcare providers (19, 54.3%) and nonavailability of transport (12, 34.3%) were cited as the predominant reasons for the diagnostic delay during/post-lockdown.

A total of 21 (20.4%) patients had a pretreatment delay with a median (IQR) delay of 6 (2.5, 10.5) days, and no significant change was observed across the lockdown period (Table 4). The favorable treatment outcome was lower during/post-lockdown period (42, 80.8%) compared to that in the pre-lockdown period (47, 92.2%). However, it was not statistically different (\( P=0.15 \)). Three patients with EPTB continued treatment for >6 months due to the persistence of clinical symptoms. After adjustment of various sociodemographic and clinical characteristics, patients diagnosed during or after the lockdown period (aRR, 0.85; 95% CI, 0.73–0.98) and previously treated (aRR, 0.77; 95% CI, 0.60–0.995) had significantly lower favorable treatment outcomes compared to that of their respective groups (Table 5).

**Discussion**

COVID-19 disrupts the delivery of healthcare services and disease management globally\(^2\). The short- and long-term impacts of such disruptions on disease management are being studied. This study reported the changes in the clinical presentation, care cascade, and treatment outcomes among patients with TB pre-and during/post-lockdown periods.

A change in the number of TB cases diagnosed during the lockdown period was not observed. However, previous studies have reported that case detection and smear-positive cases peak during the second quarter of the calendar year in northern India\(^2\). In this context, there must have been a higher number of cases during/post-lockdown, whereas no such rise was found. Hence, there may have been a fall in the case detection rate in our study area during the lockdown. This is in line with the reported notification rate of TB in India, which fell by 59–80% due to the lockdown\(^7,20\). Compared to the previous year (2019) notification in the study area based on NIKSHAY data, a 31% reduction during/post-lockdown period was noted. Similarly, low TB case detection and notification during the COVID-19 pandemic has
been reported in many countries.\(^2^2\)–\(^2^5\) Other than lockdown-related reasons, the reduction of TB cases could be true due to adherence to infection prevention and control (IPC) practices, such as the use of masks, no/decreased spitting in public places, physical distancing, and other measures at the individual level. However, further studies on the adherence to IPC measures within houses in India and its impact on reduced TB transmission individually and collectively are needed.

The higher proportion of weight loss as presenting complaints during/post-lockdown may have been due to the worsened nutritional status of the population, in general, owing to the lockdown.\(^7\) Significantly higher pulmonary TB cases after the lockdown indicated that EPTB cases were relatively underreported. This may be due to the (a) non-specific symptoms, (b) delayed treatment seeking due to the non-debilitating symptom pattern of EPTB and poor transport facility during the lockdown period, and (c) conversion of all district hospitals as dedicated COVID care centers where a majority of EPTB are routinely diagnosed. The significantly lower registration and higher pending dues after the lockdown under the NPY, which intends to provide nutrition support for TB patients, is a serious concern. As the families were already fighting the economic crunch due to the pandemic and lockdown, this delay in the release of NPY for TB patients would have added salt to the injury over and above the OOPE incurred for diagnosis.\(^7\)

Statistical models and expert consensus predicted a significant impact on TB services due to COVID-19, such as increased delay in diagnosis, treatment, and supply of drugs.\(^6\) Although a significantly high proportion of diagnostic delay was observed, the median number of healthcare visits remained similar and did not impact the TB treatment outcome after adjusting for other factors in our study.

Table 1  Sociodemographic, economic, and nutritional characteristics of the patients with tuberculosis diagnosed and initiated on treatment pre- and during/post-lockdown periods

| Characteristics | Pre-lockdown n (%) | During/post-lockdown n (%) | Total n (%) | P value |
|-----------------|-------------------|----------------------------|-------------|---------|
| Total           | 51                | 52                         | 103         | 0.15    |
| Median (IQR) age in years | 36.0 (24.0, 50.0) | 43.5 (30.5, 61.5) | 38.0 (27.0, 56.0) | 0.15    |
| Sex             |                   |                            |             |         |
| Male            | 30 (58.8)         | 38 (73.1)                  | 68 (66.0)   | 0.13    |
| Female          | 21 (41.2)         | 14 (26.9)                  | 35 (34.0)   |         |
| Education       |                   |                            |             |         |
| Illiterate      | 14 (27.5)         | 9 (17.3)                   | 23 (22.3)   | 0.16    |
| Upto primary    | 11 (21.6)         | 8 (15.4)                   | 19 (18.4)   |         |
| Primary to middle | 8 (15.7)      | 10 (19.2)                  | 18 (17.5)   |         |
| High to senior secondary | 14 (27.5) | 20 (38.5)                  | 34 (33.0)   |         |
| Graduate & above | 4 (7.9)       | 5 (9.6)                    | 9 (8.8)     |         |
| BPL status\(^a\) |                   |                            |             | 0.61    |
| Yes             | 14 (27.5)         | 12 (23.1)                  | 26 (25.2)   |         |
| No              | 37 (72.5)         | 40 (76.9)                  | 77 (74.8)   |         |
| Socio-economic status\(^b\) |                |                            |             |         |
| I (≥₹ 7,533)   | 0 (0)             | 4 (7.7)                    | 4 (3.9)     | 0.34    |
| II (₹ 3,766–7,532) | 5 (9.8)      | 6 (11.5)                   | 11 (10.7)   |         |
| III (₹ 2,260–3,765) | 8 (15.7)    | 6 (11.5)                   | 14 (13.6)   |         |
| IV (₹ 1,130–2,259) | 20 (39.2)   | 20 (38.5)                  | 40 (38.8)   |         |
| V (₹ <1,130)   | 18 (35.3)         | 16 (30.8)                  | 34 (33.0)   |         |
| Median (IQR) Weight (kg) | 49.0 (40.0, 55.0) | 50.0 (42.0, 55.0) | 50.0 (42.0, 55.0) | 0.75    |
| BMI (kg/m\(^2\)) (n=102)\(^c\) |            |                            |             |         |
| Underweight (<18.5) | 29 (58.0) | 36 (69.2)                  | 65 (63.7)   | 0.68    |
| Normal (18.5–22.9) | 13 (26.0) | 10 (19.2)                  | 23 (22.5)   |         |
| Overweight (23.0–24.9) | 6 (12.0) | 4 (7.7)                    | 10 (9.8)    |         |
| Obese (≥25.0)  | 2 (4.0)           | 2 (3.8)                    | 4 (3.9)     |         |

Pre-lockdown: Jan. 1–Mar. 23, 2020; During/post-lockdown: Mar. 24–Jun. 30, 2020; ₹: Indian Rupee; IQR: Interquartile range; BPL: Below poverty line; BMI: Body Mass Index; kg/m\(^2\): Kilogram per metre\(^2\); \(^a\)Rural Poverty line- Rs. 1128 and Urban Poverty line- Rs. 1529; \(^b\)BG Prasad Socio-economic classification; \(^c\)BMI of one patient diagnosed during pre-lockdown is missing.
The delay could be due to (a) overlap of TB and COVID-19 symptoms and the stigma they may face if they reveal the symptoms and are found positive for COVID-19, (b) the primary focus of identifying and testing all suspected COVID-19 by healthcare providers and deployment of most of the health system resources in the prevention and control of COVID-19, and (c) transport-related problems. Previous studies during the pre-COVID-19 era across India have also reported a significant proportion as well as the duration of delays in the diagnosis and treatment of TB.

The lockdown independently affected TB treatment outcomes, that is, patients diagnosed during/post-lockdown had a 2–27% lower proportion of favorable outcomes compared to that in the pre-lockdown period. The same can be further proved through multicentric studies across states to reshape the NTEP. Similar observations were made in Northern Italy, where significantly higher adverse outcomes were observed during the COVID-19 pandemic.

Table 2: Clinical characteristics and receipt of monetary support among patients with tuberculosis diagnosed and initiated on treatment before and after the lockdown periods

| Characteristics                  | Pre-lockdown n (%) | During/post-lockdown n (%) | Total n (%) | P value |
|----------------------------------|--------------------|----------------------------|-------------|--------|
| **Symptom profile**              |                    |                            |             |        |
| Cough                            | 31 (60.8)          | 37 (71.2)                  | 68 (66.0)   | 0.41   |
| Fever                            | 32 (62.7)          | 39 (75.0)                  | 71 (68.9)   | 0.18   |
| Weight loss                      | 14 (27.5)          | 26 (50.0)                  | 40 (38.8)   | 0.02   |
| Hemoptysis                       | 7 (13.7)           | 11 (21.2)                  | 18 (17.5)   | 0.32   |
| Others                           | 20 (39.2)          | 16 (30.8)                  | 36 (35.0)   | 0.47   |
| **Contact history**              |                    |                            |             |        |
| Yes                              | 18 (35.3)          | 12 (23.1)                  | 30 (29.1)   | 0.17   |
| No                               | 33 (64.7)          | 40 (76.9)                  | 73 (70.9)   |        |
| **First health-related contact** |                    |                            |             |        |
| Government doctor                | 24 (47.1)          | 20 (38.5)                  | 44 (42.7)   | 0.71   |
| Private doctor                   | 20 (39.2)          | 22 (42.3)                  | 42 (40.8)   |        |
| Rural health practitioner        | 6 (11.8)           | 7 (13.5)                   | 13 (12.6)   |        |
| Others                           | 1 (2.0)            | 3 (5.8)                    | 4 (3.9)     |        |
| Median (IQR) healthcare visits before diagnosis | 3 (2, 5) | 3 (2, 5) | 3 (2, 5) | 0.73 |
| **Total OOPE until diagnosis (Rs)** | 2,260.0 (450.0, 4,320.0)   | 2,350.0 (573.8, 5,445.0) | 2,300.0 (550.0, 4,800.0) | 0.92 |
| **OOPE per visit until diagnosis (Rs)** | 500.0 (168.3, 1,376.7)   | 583.8 (139.5, 1,302.5) | 542.5 (150.0, 1,368.3) | 0.93 |
| **Type of patient**              |                    |                            |             |        |
| New TB                           | 40 (78.4)          | 41 (78.8)                  | 81 (78.6)   | 0.96   |
| Previously treated               | 11 (21.6)          | 11 (21.2)                  | 22 (21.4)   |        |
| **Site of TB**                   |                    |                            |             |        |
| Pulmonary                        | 32 (62.7)          | 43 (82.7)                  | 75 (72.8)   | 0.02   |
| Extrapulmonary                   | 19 (37.3)          | 9 (17.3)                   | 28 (27.2)   |        |
| **Treatment category**           |                    |                            |             |        |
| Drug sensitive                   | 51 (100)           | 50 (98.1)                  | 102 (99.0)  | 1.0    |
| INH resistant                    | 0 (0.0)            | 1 (1.9)                    | 1 (1.0)     |        |
| **NPY registration**             |                    |                            |             |        |
| Yes                              | 49 (96.1)          | 42 (80.8)                  | 91 (88.5)   | 0.07   |
| No                               | 1 (2.0)            | 5 (9.6)                    | 6 (5.8)     |        |
| Don’t know                       | 1 (2.0)            | 5 (9.6)                    | 6 (5.8)     |        |
| **NPY dues (N=91)**              |                    |                            |             |        |
| No dues                          | 30 (61.2)          | 15 (35.7)                  | 45 (49.5)   | 0.02   |
| Dues pending                     | 13 (26.5)          | 23 (54.8)                  | 36 (39.6)   |        |
| Don’t know                       | 6 (12.2)           | 4 (9.5)                    | 10 (11.0)   |        |
| Median (IQR) months of pending NPY instalments | 3.0 (2.0, 3.8) | 2.0 (1.0, 4.0) | 3.0 (1.0, 4.0) | 0.38 |

Pre-lockdown: Jan. 1–Mar. 23, 2020; During/post-lockdown: Mar. 24–Jun. 30, 2020; IQR: Interquartile range; OOPE: Out of pocket expenditure; INH-isoniazid; NPY: Nikshay Poshan Yojana; ‘Abdominal pain (5), breathlessness (5), swelling in neck (5), chest pain (4), myalgia (3), joint pain (3), pain in neck (2), weakness (2), vomiting (1), back pain (1), leg pain (1), swelling over vaginal region (1), throat pain (1), kidney problem (1), loss of appetite (1). Medical shop (4). Lymph node (13), abdomen (4), plural (8), The place of TB is either abdomen or plural (1), bone (2).
more, the favorable treatment outcome was low among previously treated patients, which was proven through various studies in the past\textsuperscript{30,31}.

**Strengths and limitations**

To our knowledge, this is the first community-based study to quantify the impact of the lockdown during the COVID-19 pandemic on the TB care cascade and treatment outcomes in rural India. An interviewer-administered tool in the community setting was used. The study included all patients diagnosed under a programmatic setting during the study period. Recall bias of the events before and during diagnosis/treatment due to the retrospective design of the study is one of the study limitations. Although the study was conducted in only one TB unit, it can be generalized to similar units in rural areas. Only drug-sensitive TB cases were

### Table 3  Diagnosis-related care cascade among patients with pulmonary tuberculosis diagnosed and initiated on treatment before and after the lockdown periods

| Characteristics | Pre-lockdown (n=32) n (%) | During/post-lockdown (n=43) n (%) | Total (n=75) n (%) | P value |
|-----------------|--------------------------|----------------------------------|-------------------|--------|
| Median (IQR) number of healthcare visits before diagnosis | 3.0 (2.0, 4.0) | 3.0 (2.0, 5.0) | 3.0 (2.0, 4.0) | 0.50 |
| Presence of diagnostic delay | | | | |
| Yes | 18 (56.3) | 35 (81.4) | 53 (70.7) | 0.02 |
| No | 14 (43.8) | 8 (18.6) | 22 (29.3) | |
| Median (IQR) days of diagnostic delay | 26.0 (14.0, 53.0) | 33.0 (15.8, 81.3) | 29.0 (15.5, 73.0) | 0.35 |
| Reasons for diagnostic delay\textsuperscript{a} | | | | |
| Previous doctors did not suspect TB | 8 (44.4) | 19 (54.3) | 27 (50.9) | |
| Did not take illness seriously | 7 (38.9) | 12 (34.3) | 19 (35.8) | |
| Non-availability of transport | 2 (10.6) | 10 (28.6) | 12 (22.6) | |
| Did not know where to go | 1 (5.6) | 4 (11.4) | 5 (9.4) | |
| Due to lockdown | 0 (0.0) | 3 (8.6) | 3 (5.7) | |
| Others\textsuperscript{b} | 5 (27.8) | 3 (8.6) | 8 (15.1) | |

Pre-lockdown: Jan. 1–Mar. 23, 2020; During/post-lockdown: Mar. 24–Jun. 30, 2020; Diagnostic delay: Delay (in days) from date of eligibility for sputum examination to actual diagnosis; IQR: Interquartile range; \textsuperscript{a} More than one option may be selected by each patient; \textsuperscript{b} no attender was available to accompany (2), afraid that it will be corona (1), due to financial issues (1), death in the family (1), migrant worker (1), patient was feeling better in between (1), took medicine from local practitioner (1).

### Table 4  Treatment-related care cascade among patients with tuberculosis diagnosed and initiated on treatment before and after the lockdown periods

| Characteristics | Pre-lockdown (n=51) n (%) | During/post-lockdown (n=52) n (%) | Total (n=103) n (%) | P value |
|-----------------|--------------------------|----------------------------------|-------------------|--------|
| Presence of pre-treatment delay | | | | |
| Yes | 12 (23.5) | 9 (17.3) | 21 (20.4) | 0.47 |
| No | 39 (76.5) | 43 (82.7) | 82 (79.6) | |
| Median (IQR) days of pre-treatment delay | 6.5 (3.3, 12.5) | 4.0 (2.0, 8.5) | 6.0 (2.5, 10.5) | 0.19 |
| Reasons for pre-treatment delay\textsuperscript{a} | | | | |
| Patient could not be reached | 5 (41.7) | 3 (33.3) | 8 (38.1) | |
| Non-availability of transport | 4 (33.3) | 4 (44.4) | 7 (33.3) | |
| Patient was not aware of the place of treatment | 3 (25.0) | 3 (33.3) | 6 (28.6) | |
| Others\textsuperscript{b} | 6 (50.0) | 3 (33.3) | 9 (42.9) | |
| Treatment outcomes | | | | |
| Cured/Treatment completed | 47 (92.2) | 42 (80.8) | 89 (86.4) | 0.15 |
| Failure | 0 (0.0) | 6 (11.5) | 6 (5.8) | |
| Death | 2 (3.9) | 1 (1.9) | 3 (2.9) | |
| Multidrug resistant TB | 1 (2.0) | 1 (1.9) | 2 (1.9) | |
| Treatment continuing | 1 (2.0) | 2 (3.8) | 3 (2.9) | |

Pre-lockdown: Jan. 1–Mar. 23, 2020; During/post-lockdown: Mar. 24–Jun. 30, 2020; IQR: Interquartile range; \textsuperscript{a} more than one option may be selected by each patient; \textsuperscript{b} hospital closed (3), patient forgot (2), non-availability of treatment provider (1), holiday (1), went to wrong treatment centre (1), anti-tuberculosis drug was not available (1), was given some other medicine & sent back (1).
included; hence, the findings are not applicable to drug-resistant TB cases.

**Conclusion**

The lockdown has impacted drug-sensitive TB management services in rural northern India. Symptom and disease (PTB/EPTB) patterns changed during and after the lockdown. NPY registration and its disbursement need to be quickly revamped to improve nutritional support and treatment outcomes. The care cascade delays are still high among patients with TB, irrespective of the lockdown status. With the successive waves of COVID-19 imminent in India, studies on drug-resistant TB and privately treated patients are urgently needed.

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