

Impact of Lockdown on Tuberculosis Management during SARS-Cov-2 Pandemic : Urban & Rural Scenario of Surat

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Abstract:


Introduction: India has highest burden of tuberculosis cases both drug sensitive as well as drug resistance in the world. Covid-19 pandemic had affected infectious diseases like TB, HIV, Malaria in developing countries like India. Here, we aimed to study the impact of lockdown on diagnosis and management of tuberculosis in Surat, Gujarat, India due to SARS-Cov-2. **Method:** Cross sectional survey of Tuberculosis patients regarding problems faced during lockdown involving all 18 TB unit of Surat Municipal Corporation (SMC) was done, 15 patients were randomly selected by simple random sampling of line list of patients of each unit and secondary data analysis, data was collected from District Tuberculosis centre for rural part and SMC for urban part. **Results:** In this study we compared data 5 months before and after lockdown i.e. November 2019 to March 2020 and April 2020 to August 2020, comparison of diagnostic tests like sputum examination by staining, CBNAAT, and first line Line Probe Assay (LPA) which shows significant reduction in number of test. Also the number of cases of pulmonary as well as drug sensitive, drug resistance and no of referral cases too were significantly decreased during and after lockdown. However, treatment success rate and case fatality rate remain the same as five months before and after the lockdown. **Conclusion:** Comparison of diagnostic test of TB showed significant reduction in number of tests done during and after lockdown. It was also observed that no major issues were faced by patients from health care provider side of National Tuberculosis Elimination Programme.

Key words: Cartridge- based nucleic acid amplification test (CBNAAT), Lockdown, Line probe assay (LPA), National Tuberculosis Elimination Programme

Introduction:

As a response to COVID-19 pandemic, India entered the phase of nationwide lockdown on 24 March 2020.^[1] Before the emergence of COVID-19, India was directing its forces against existing

infectious diseases such as Tuberculosis (TB), with a target of eliminating TB by 2025. India has the highest burden of both drug sensitive and resistant TB.^[2] Multidrug-resistant Tuberculosis (MDR-Tuberculosis) remains a public health crisis and a

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health security threat. WHO estimates that there were 484000 new cases with resistance to Rifampicin – the most effective first-line drug, of which 78% had MDR-Tuberculosis.^[3] Health services, including national programs to combat Tuberculosis, need to be actively engaged in ensuring an effective and rapid response to COVID-19 while ensuring that Tuberculosis services are maintained. It was modeled that if the COVID-19 pandemic led to a global reduction of 25% in expected TB detection for 3 months, then there could be a 13% increase in TB deaths, along with bringing about major setbacks in the achievements gained through efforts till date.^[4] It was estimated that between 2020 and 2025 an additional 1.4 million TB deaths could be registered as a direct consequence of the COVID-19 pandemic.^[5] The National Tuberculosis Elimination Programme (NTEP), released guidelines during this lockdown period in India to continue uninterrupted services, including TB diagnosis, treatment, public health action as well as benefit transfers.^[6] Present study aims to document the present situation of TB related services in Surat district of Western India, which is a prototype of Indian cities, strengthened with well established health systems, but challenged by the socioeconomic composition of the community and migration, by comparing pre and post lockdown situation of services of National Tuberculosis Elimination Programme (NTEP).

Objectives:

- a) To compare indicators of TB management (diagnosis, treatment and outcome) during COVID-19 lockdown, compared to five months before lockdown.
- b) To document problems (issues in accessibility of treatment, social stigma, delay in diagnosis) faced by Tuberculosis patients because of lockdown due to Covid-19 pandemic.

Method:

Secondary data analysis of Surat district data collected from District Tuberculosis centre for rural patients and Surat Municipal Corporation (SMC) for urban patients was carried out to compare total

number of cases diagnosed and registered as new or previously treated pulmonary and extra pulmonary cases, newly diagnosed drug resistant cases and outcomes in terms of cured, treatment completed, failure and success and case fatality rate in the months during pre lockdown (November 2019 to March 2020) and during lockdown (April 2020 to August 2020). Cross sectional survey of TB patients regarding problems faced by them during lockdown was carried out in 270 TB participants who were randomly sampled from 18 TB units of Surat, after taking written informed consent, using a semi structured questionnaire.

Assuming drop in diagnosis of Tuberculosis by 80 % as per some newspaper articles^[7] because of lockdown, and the total number of Tuberculosis patients in first quarter (January 2020 to March 2020) in Surat district to be 6000, as per the data received from District Tuberculosis Centre, Surat, the sample size came out to be 237 which was calculated from open epi software. Assuming 10 % non response rate, final sample size came to be 260. However, data was collected from 270 participants (15 patients randomly each from 18 TB units of Surat). The patients of pediatric age group, HIV co-infection and those receiving care from private health care providers were not included in this study. The study was approved by the Human Research and Ethics Committee (HREC).

Statistical analysis: Data collected was entered in MS office Excel version 2010 and analysed using Statistical Package for Social Sciences (SPSS) version 16. The programme data and data obtained in the survey were analyzed to identify significant differences between prior to lockdown and during lockdown period, using appropriate tests of significance.

Results:

In this study, we compared data of 5 months before and after lockdown i.e., November 2019 to March 2020 and April 2020 to August 2020.

Table 1 depicts the differences in the mean number of diagnostic tests done for Tuberculosis 5

Table 1: Comparison of Diagnostic tests done before and after lockdown

Test done	November 2019 to March 2020	April 2020 to August 2020	t value	p value
	Rural			
Sputum examination (Mean \pm SD)	3373 \pm 968	1366 \pm 119	7.78	0.0002
CBNAAT (Mean \pm SD)	676 \pm 118	220 \pm 57	4.60	0.0016
Urban				
Sputum examination (Mean \pm SD)	5756 \pm 277	1981 \pm 809	9.87	0.000009
CBNAAT (Mean \pm SD)	1632 \pm 140	542 \pm 39	16.77	0.0000162
Rural and Urban				
Cultures done (Mean \pm SD)	399 \pm 111	324 \pm 119	1.03	0.33
FL-LPA done	26 \pm 4	9 \pm 8	4.2	0.003

Table 2: Comparison of cases detected before and after lockdown

Cases detected	November 2019 to March 2020	April 2020 to August 2020	t value	p value
	Rural			
Pulmonary Tuberculosis cases (Mean \pm SD)	193 \pm 28	93 \pm 15.9	6.85	0.00013
Extra Pulmonary Tuberculosis cases (Mean \pm SD)	61 \pm 10	29 \pm 7	5.47	0.0005
Urban				
Pulmonary Tuberculosis cases (Mean \pm SD)	740 \pm 99	211 \pm 91	8.76	0.000022
Extra Pulmonary Tuberculosis cases (Mean \pm SD)	387 \pm 72	151 \pm 81	4.85	0.0012

months before and after lockdown. The number of diagnostic tests (sputum smear examination and CBNAAT) for TB dropped significantly in both urban and rural Surat ($p = 0.0002$ and $p = 0.0016$) during lockdown. However, the number of TB cultures performed did not differ significantly. Other diagnostics tests like First Line LPA, testing reduced

significantly after lockdown ($p = 0.03$). Cases detection, Pulmonary TB in particular, reduced significantly (Table 2) in both urban and rural areas ($p < 0.001$).

Table 3 shows comparison of mean number of Tuberculosis cases registered based on Drug sensitivity 5 months before and after lockdown.

Table 3: Comparison of Tuberculosis cases registered based on Drug sensitivity 5 months before and after lockdown

Cases detected	November 2019 to March 2020	April 2020 to August 2020	t value	p value
	Rural			
Drug sensitive Tuberculosis (Mean \pm SD)	236 \pm 22	252 \pm 25	- 1.05	0.32
Drug resistant Tuberculosis (Mean \pm SD)	4.2 \pm 2.2	10.8 \pm 5.9	- 2.35	0.046
Urban				
Drug sensitive Tuberculosis (Mean \pm SD)	577 \pm 68	570 \pm 7.9	0.14	0.88
Drug resistant Tuberculosis (Mean \pm SD)	26.6 \pm 6.7	36.2 \pm 4.8	- 2.59	0.031

Table 4: Comparison of referral 5 months before and after lockdown

Cases detected	November 2019 to March 2020	April 2020 to August 2020	t value	p value
	Rural			
No of presumptive Tuberculosis cases referred (Mean \pm SD)	2771 \pm 391	989 \pm 209	8.98	0.00001
Cases referred from private (Mean \pm SD)	71 \pm 15	33 \pm 10	4.61	0.0017
Urban				
No of presumptive Tuberculosis cases referred (Mean \pm SD)	5756 \pm 277	1981 \pm 808	9.87	0.00009
Cases referred from private (Mean \pm SD)	631 \pm 127	256 \pm 66	5.85	0.0003

Statistically significant difference in drug resistant cases detected of both rural and urban areas has been observed. However, no statistically significant difference was observed in drug sensitive cases. The number of cases referred for diagnosis and management of Tuberculosis to District Tuberculosis

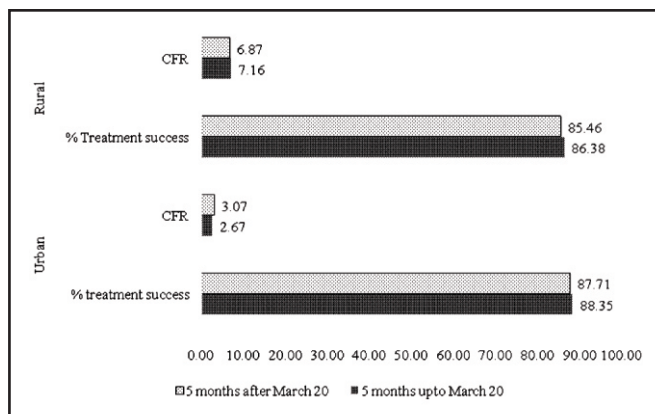
Centre in urban and tertiary care center from rural area had also been significantly decreased. Similarly, cases referred from private have also been significantly reduced in both urban and rural areas (Table 4).

Table 5: Comparison of positivity among Sputum and CBNAAT tested 5 months before and after lockdown

Rural				
Duration	Sputum +ve	Sputum -ve	χ^2 value	p value
November 2019 to March 2020	1084	16530	9.013	0.0026
April 2020 to August 2020	501	6459		
	CBNAAT +ve	CBNAAT -ve		
November 2019 to March 2020	1083	2286	120.5	< 0.000001
April 2020 to August 2020	543	528		
Urban				
	Sputum +ve	Sputum -ve		
November 2019 to March 2020	1082	27692	25.14	0.0000532
April 2020 to August 2020	487	9427		
	CBNAAT +ve	CBNAAT -ve		
November 2019 to March 2020	2108	6034	52.16	< 0.000001
April 2020 to August 2020	894	1810		

Both Case Fatality Rate and treatment success rate have remained similar before and during lockdown, suggesting that treatment aspect has not been affected by lockdown (Figure 1).

Figure 1: Comparison of Treatment success and Case fatality Rate (CFR) before and after lockdown



Statistically significant higher positivity has been reported for both Sputum and CBNAAT testing in both rural and urban area during and after lock down as compared to scenario before lockdown (Table 5). This is because though the number of tests have decreased after lockdown, judgment of health care workers to clinically identify and refer Tuberculosis

among presenting patients to testing has remained intact, resulting in paradoxically increased positivity for Tuberculosis.

Patients of Tuberculosis on treatment during lockdown were interviewed using semi structured questionnaire for assessing the problems faced by them for access of treatment and diagnosis during the lockdown period. Experiences shared by them do not show any major issues from health care provider side of NTEP program (Table 6)

Discussion:

India is one of the high burden countries in terms of both drug sensitive and resistant TB, contributing to nearly 26% of the global cases of TB.^[8] India has committed itself to TB elimination by 2025, five years before the global target.^[2] The cornerstone of the National TB Elimination Programme has been early case detection and prompt treatment. During the COVID 19 lockdown, it was expected that the number of TB cases reported would decline, due to various reasons, including lack of manpower and reallocation of financial and other resources to COVID-19 response activities.^[8] The WHO issued a guidance to all countries to continue or minimize the disruption

Table 6: Experiences shared by Tuberculosis patients during lock down (n=270)

Questions	Response n (%)		
	Satisfactory	Non satisfactory	
Staff cooperation during lockdown	270 (100)	0 (0)	
Any problems faced in access of treatment and diagnosis?	Yes	No	
	34(12.6)	236(87.4)	
Requirement of consultation at tertiary care centre	Yes	No	
	45(16.7)	225(83.3)	
Access to emergency services like ambulance in case of emergency	Emergency service was required and accessible	Emergency service was required, but not accessible	No emergency
	22(8.2)	0(0)	248(91.8)
Management of Adverse drug reaction	Management done	Management not done	No adverse drug reaction reported
	26(9.7)	0(0)	244(90.3)
	Yes	No	
Money deposited in the account as per Government rules	225(83.3)	45(16.7)	
Patient faced financial issues during lockdown	88(32.6)	182(67.4)	
Patient faced social stigma during lockdown	29(10.8)	241(89.2)	
Advice on treatment given by DOTS provider during lockdown	94(34.8)	176(65.2)	
Practice of prevention control measures by patients during lockdown	270(100)	0(0)	

of TB services, through expanded use of digital technology, home based treatment and reducing the number of movements.^[9] There were apprehensions regarding the increase in the number of TB cases due to poverty and malnutrition during the period of lockdown.^[10] In view of all these guidelines and opinions, India adopted several of these strategies, including use of digital technology through the NIKSHAY, NIKSHAY AUSHADHI and state based IT platforms,^[11] with special emphasis on uninterrupted drug delivery to the patient.^[12] As expected, there was a reduction in the number of cases notified, from both private and public sectors during the months of lockdown, when compared to before that. The

estimated number of the diagnosis of number of new cases of tuberculosis detected as of April 27, 2020 in government healthcare centres saw a significant fall to 34,342 compared to 1,56,000 cases in April month of 2019, a 78% decrease.^[2] This study was able to document the decline in the actual number of patients screened by sputum smear by 2.4 times, in both urban and rural Surat. Similarly, the number of cases diagnosed with TB also declined. However, it was appreciated that positivity rate was higher during and after lockdown, perhaps because the clinicians and health workers were able to identify and test the patients with TB symptoms, as before. This decline in absolute number of tests and

increased positivity show that while the hospital based passive case detection and testing has been maintained well even during lockdown, the large proportion of people who were usually screened through active surveillance, such as migrants and remote villages, has reduced. This could be due to several operational issues, such as use of GeneXpert machines for COVID-19 testing instead of diagnostic testing for TB, reassignment of staff in national TB programmes to COVID-19 related duties and reallocation of budgets^[8]. Moreover, about 58% of Surat's urban population are migrants,^[13] working in the diamond and textile industries of the city. The lockdown saw a reverse migration of these migrants to their home towns, while the unlock phase saw them return gradually to the city. Case detection in the impoverished migrant population through active surveillance is a priority under National Programme, which has been affected in the lockdown period. Similarly the number of people attending the OPD of hospitals had also decreased, contributing to the low absolute number of people screened.

The study results suggest that there was no additional impact on indicators of continuum of care, such as the treatment success rates and Case Fatality Rate during the lockdown. Similarly, the study participants were generally satisfied with the amount of care that they received.

The study results show that the operational mechanism for case detection through passive surveillance, linkage and retention in care for such patients was maintained well throughout the lockdown period. Thus, the strategies adopted during the COVID-19 lockdown and "unlock" phase have contributed significantly in maintaining the essential services to patients reaching the health care facility. The Central TB Division of National TB Elimination programme has issued rapid response plan in September 2020 to address the issues of decreased testing and reporting, including the introduction of bi-directional TB-COVID screening.^[14]

Conclusion: Comparison of diagnostic test of TB showed significant reduction in number of tests done

during and after lockdown. Though, the number of cases of pulmonary, extra pulmonary drug sensitive, drug resistant and number of referral cases detected during and after lockdown were not significantly different as compared to scenario before lockdown. It was also observed that no major issues were faced by patients from health care provider side of National Tuberculosis Elimination Programme.

Recommendations:

The study results show that the operational mechanism for case detection through passive surveillance, linkage and retention in care for such patients was maintained well throughout the lockdown period. However, the gap that has arisen due to low coverage of active surveillance and migration will now have to be addressed vigorously. This would require widespread community sensitization, involvement and revamped active surveillance. Tuberculosis should be included in active surveillance of COVID-19 to reach towards the goal to eliminate TB.

Declaration:

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Conflict of Interest: Nil

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