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Original Research Article

Tertiary care centre as safety net of tuberculosis diagnosis in National tuberculosis elimination programme in India

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ABSTRACT

Background: About one-fifth of the global gap in TB diagnosis was contributed by India which translates to roughly over half a million cases. Meanwhile the National tuberculosis elimination programme has made coordinated efforts to involve public and private health providers in accelerating TB notification. Government medical colleges which are tertiary care centres act as important catchment point for referral as well as for walk-in for tuberculosis diagnosis. The aim of the study was to evaluate the proportion of TB cases notified from various departments of medical colleges to NTEP for TB diagnosis and referral pattern of the presumptive TB patients.
Methods: This was a descriptive study. Data were collected of all presumptive TB patients referred from various departments of 4 selected tertiary care centres to NTEP for TB diagnosis between 1 January to 31 December 2018.
Results: A total of 1601 presumptive TB patients were registered in the study period, of whom 67% were microbiologically confirmed TB patients. Overall, 44% of presumptive TB patients were referred from the pulmonary medicine department, with 26%, 15%, and 4% from general medicine, surgery, and integrated counselling and testing centres departments respectively ($\chi 2=1856.647$, $p<0.000$).
Conclusions: Our study revealed that the proportion of TB patients notified by the medical colleges was high. Further strengthening of the referral system increases TB case detection thereby enabling early initiation of TB treatment leading.

Keywords: Tuberculosis, Referral system linkage, Tertiary care hospital, NTEP, TB, ICMR-NIRT

INTRODUCTION

The Government of India envisages achieving the United Nations sustainable developmental goal (SDG) of putting an end to tuberculosis (TB) before 2025, five years in advance of the global target.[1] According to WHO in 2019, of the 10 million people who fell ill with TB, 2.9 million people were not diagnosed or reported to the National TB program.[2] India accounts for about one-fifth of the global gap in TB diagnosis which translates to roughly over half a million cases.[3] Globally, India ranks the highest in TB burden with an incidence of 2.7 million cases and 79,144 TB deaths in 2019.[1,2] Strategies to improve TB diagnosis and to successfully treat them

remains a challenge in achieving the End TB Strategy.[4] TB healthcare delivery in India is provided by the public and private health sectors.[5] Public sector caters the patients within the programmatic setting as per by National tuberculosis elimination programme (NTEP) guidelines and are captured by the TB program notification system.[6] Meanwhile the NTEP has made coordinated efforts to involve public and private health providers in accelerating TB notification, yet the referral system linking the medical colleges and program is not optimal.[7] Furthermore, the information on the extent of notification by the Government medical colleges which are tertiary care centres act as important catchment point for referral as well as for walk-in for TB diagnosis. The aim of the study was to evaluate the proportion of TB cases notified from various departments of medical colleges to NTEP for TB diagnosis and referral pattern of the presumptive TB patients.

METHODS

A descriptive study involving record-based data review for one calendar year between 1 January to 31 December 2018. The study was conducted in four sites: RP medical college, Tanda, Himachal Pradesh; Government medical college, Hamirpur, Himachal Pradesh; Tirunelveli medical college, Tirunelveli, Tamil Nadu; Andhra medical college, Vishakapatnam, Andhra Pradesh (Figure 1).

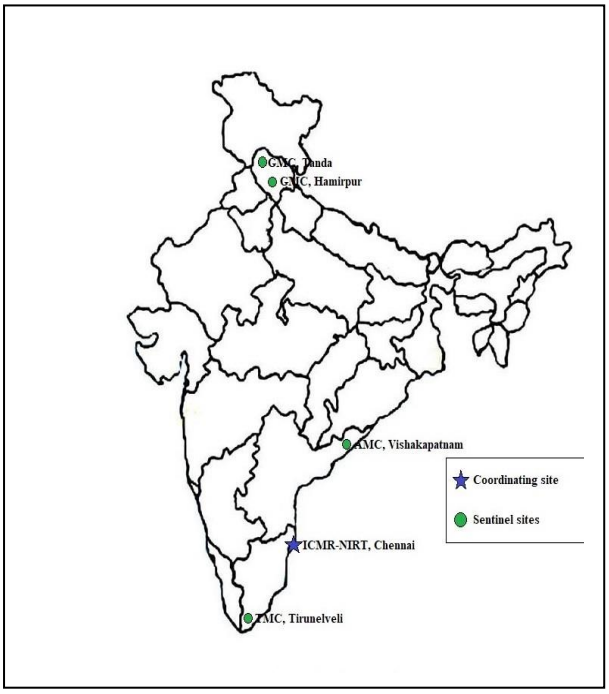

Figure 1: Referral system of tuberculosis diagnosis from various departments of medical colleges to TB program in India. (Dr. Rajendra Prasad government medical college, Tanda, Himachal Pradesh; Dr. Radhakrishnan government medical college, Hamirpur, Himachal Pradesh; Tirunelveli medical college, Tirunelveli, Tamil Nadu and Andhra medical college, Vishakapatnam, Andhra Pradesh.

All the study sites are tertiary care teaching medical college hospitals. This retrospective records at the NTEP centre located within the medical colleges were reviewed based on the inclusion of: both microbiologically and clinically diagnosed cases of pulmonary and extra-pulmonary tuberculosis registered in NTEP registers, registered in the calendar year of 2018 from 1 January to 31 December and Exclusion was those with improper and inadequate specimen analysis. NTEP provides testing facilities, consumables for testing, and logistic support to the medical colleges. The referral units in all medical colleges provide diagnostic services for patients with symptoms of both Pulmonary and extra pulmonary TB, treatment of inpatients, and referral services for outpatients as well as inpatients after they are discharged from the hospital. This study is coordinated by the Indian council of medical research (ICMR)-National institute of research in tuberculosis (NIRT), Chennai.

Data collection and analysis

Data were collected of all presumptive TB patients referred from various departments of medical colleges to NTEP for TB diagnosis between 1 January and 31 December 2018. Data analysis done with the help of software SPSS version 21 about the demographic characteristics (age and sex), referred departments, comorbidity (HIV and diabetes) and diagnostic profile (CBNAAT performed and rifampicin sensitivity).

RESULTS

A total of 1601 presumptive TB cases were found registered during the study period, out of which 3% comprise the age group less than 14 years of age. Of whom 67% were microbiologically confirmed TB patients. Patients were predominantly male (68%) and over 75% of them were in the productive age of between 25 and 64 years. 1453 (91%) of the patients had NIKSHAY ID. of the confirmed TB cases, 1010 (63%) of them were resistant to rifampicin.

Overall, 44% of presumptive TB patients were referred from the pulmonary medicine department, with 26%, 15% and 4% from general medicine, surgery and integrated counselling and testing centres (ICTC) department respectively ($\chi 2=1856.647$, $p<0.000$) (Table 3). HIV status was known in 1239 (77.4%) patients; 3 (0.2%) were HIV-positive.

Diabetes status was known in 999 (62.4%) patients; 179 (11.2%) were found to have diabetes (Table 1).

DISCUSSION

Tertiary care centre act as a final referral point of care and diagnosis and also as a walk-in centre for diagnosis and care based on geographical accessibility. The data from the tertiary care medical college hospitals from this study have important

implication. The spectrum of referral system depicts that there is not a single department like respiratory medicine where it is assumed that patients with TB symptoms will walk in. This study found that even the department of surgery continues to get presumptive TB cases highlighting the need for a robust referral and retention system, which act as final safety net in holding all the diagnosed TB patients treated and cured.

The participating medical colleges are the main tertiary care centres, where patients often present with advanced TB disease requiring inpatient care.[8] The study finding also warrant that in the Indian medical system, tertiary care hospitals are the last place meaning the patient will approach with an advanced stage of disease than to primary care. High rifampicin resistance in our study implicates either the individual first came in contact to these tertiary centres or they were missed in primary care level, the efforts for rapid diagnosis and starting them on early treatment should be of the highest standard with a strong mechanism to link further TB care with their respective primary health centre (PHC) to continue the treatment when discharged. Thus acting as a safety net in preventing these diagnosed cases from not missing.

Overall the age distribution of presumptive TB patients was in the age group between 14 to 64, similar to the national TB data showing similar prevalence.[1] This underscores the need to prioritize this age group who are presenting with TB symptoms especially the adolescent and adult population. Also indicating fewer or poor paediatric population record keeping.

Table 1: Demographic and co-morbidity details of microbiologically confirmed patients referred from medical colleges department to NTEP, 2018.

Variables	Total N (%)	Hamripur N (%)	Thanda N (%)	Tirunelveli N (%)	Visakhapatnam N (%)	P value
Total	1601 (100)	122 (7.6)	317 (19.8)	840 (52.5)	322 (20.1)	-
Age (years)						
<14	54 (3.4)	2 (1.6)	3 (1.0)	25 (3.0)	24 (7.5)	0.00
15-24	233 (14.6)	25 (20.4)	41 (13.0)	109 (13.0)	58 (18.0)	
25-34	221 (13.8)	11 (9.1)	51 (16.1)	99 (12.1)	60 (18.6)	
35-44	310 (19.4)	20 (16.4)	51 (16.1)	161 (19.1)	78 (24.2)	
45-54	293 (18.3)	19 (15.6)	57 (18.0)	170 (20.2)	47 (15.0)	
55-64	276 (17.2)	21 (17.2)	51 (16.1)	166 (20.1)	38 (12.0)	
>64	214 (13.4)	24 (19.7)	63 (20.0)	110 (13.1)	17 (5.2)	
Sex						
Female	515 (32.2)	34 (28.1)	89 (28.1)	275 (32.7)	117 (36.2)	0.116
Male	1086 (67.8)	87 (71.9)	228(71.9)	565 (67.3)	206 (63.8)	
HIV status						
Positive	3 (0.2)	1 (0.8)	2 (0.6)	0 (0.0)	0 (0.0)	0.00
Negative	1236 (77.2)	114(94.2)	315(99.4)	807 (96.1)	0 (0.0)	
Incomplete information	362 (22.6)	6 (5.0)	0 (0.0)	33 (3.9)	322(100)	
Diabetic status						
Diabetic	179 (11.2)	4 (3.3)	45 (14.2)	130 (15.5)	0 (0.0)	0.00
Non diabetic	820 (51.2)	85 (70.2)	94 (29.7)	641 (76.3)	0 (0.0)	
Unknown	602 (37.6)	32 (26.4)	178(56.2)	69 (8.2)	322 (100)	

In this study, the highest proportion of TB patients were linked to NIKSHAY.

As it captures patient management in real-time and also tracks the drug-sensitive and drug-resistant TB, resistance to rifampicin proportion was significantly higher when compared to national data.[9,10] This also explains the need to catch with them at the first point of diagnosis.

As it highlights the need for operational research priority of strengthening the referral system in the tertiary care hospitals of India and other high-burden countries with TB. To strengthen referral systems to catch all the presumptive cases at the first point of contact. This study is therefore timely both to inform policy and practice as well as to foster a referral system.

The study adhered to STROBE guidelines on reporting observational guidelines.[11]

The strengths of the study are that a large number of TB patients were included in the study; information was gathered from NTEP registers at respective medical colleges and thus we believe that the data are robust and reliable. Since we used routinely collected program data, the findings are likely to reflect the operational reality on the ground.

Table 2: Retrospective TB follow up history of microbiologically confirmed patients referred from medical colleges department to NTEP, 2018.

Variables	Total N (%)	Hamripur N (%)	Thanda N (%)	Tirunelveli N (%)	Visakhapatnam N (%)	P value
Total	1601 (100)	122 (7.6)	317 (19.8)	840 (52.5)	322 (20.1)	-
MTB						
Yes	1037 (64.8)	117 (96.7)	260 (82.0)	660 (78.6)	0 (0.0)	0.000
No	183 (11.4)	0 (0.0)	20 (6.3)	163 (19.4)	0 (0.0)	
Unknown	381 (23.8)	4 (3.3)	37 (11.7)	17 (2.0)	322 (100)	
Rifampicin resistance						
Yes	1010 (63.1)	116 (95.9)	254 (80.1)	640 (76.2)	0 (0.0)	0.000
No	25 (1.6)	0 (0.0)	4 (1.3)	21 (2.5)	0 (0.0)	
Unknown	566 (35.4)	5 (4.1)	59 (18.6)	179 (21.3)	323 (100)	
NIKSHAY ID						
Yes	1453 (90.8)	110 (90.9)	313 (98.7)	837 (99.6)	193 (59.8)	0.000
No	148 (9.2)	11 (9.1)	4 (1.3)	3 (0.4)	130 (40.2)	

Table 3: Referral Pattern of microbiologically confirmed patients referred from medical colleges department to NTEP, 2018.

Variables	Total N (%)	Hamripur N (%)	Thanda N (%)	Tirunelveli N (%)	Visakhapatnam N (%)
Total	1601 (100)	122 (7.6)	317 (19.8)	840 (52.5)	322 (20.1)
ENT	3 (0.2)	0 (0.0)	3 (0.9)	0 (0.0)	0 (0.0)
AYUSH	5 (0.3)	5 (4.1)	0 (0.0)	0 (0.0)	0 (0.0)
Cardiology	2 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.6)
Cytology	55 (3.4)	0 (0.0)	0 (0.0)	0 (0.0)	55 (17.0)
Dermatology and psychiatry	2 (0.2)	0 (0.0)	1 (0.3)	1 (0.1)	0 (0.0)
Emergency/causality	12 (0.7)	0 (0.0)	9 (2.8)	0 (0.0)	3 (0.9)
Endocrinology	3 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)	3 (0.9)
General medicine	422 (26.4)	112(92.6)	206(65.0)	0 (0.0)	104 (32.2)
Gynecology	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.3)
Integrated counselling test	68 (4.2)	0 (0.0)	1 (0.3)	0 (0.0)	67 (20.8)
Microbiology	1 (0.1)	0 (0.0)	1 (0.3)	0 (0.0)	0 (0.0)
Nephrology	7 (0.4)	0 (0.0)	0 (0.0)	3 (0.4)	4 (1.2)
Neurology	7 (0.4)	0 (0.0)	0 (0.0)	6 (0.7)	1 (0.3)
Non-governmental hospital (NGO)	4 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)	4 (1.2)
Orthopedics	18 (1.1)	1 (0.8)	1 (0.3)	11 (1.3)	5 (1.5)
Pediatrics	33 (2.1)	0 (0.0)	11 (3.5)	0 (0.0)	22 (6.8)
Private clinic/hospital	13 (0.8)	3 (2.5)	3 (0.9)	0 (0.0)	7 (2.2)
Pulmonary medicine	701 (43.8)	0 (0.0)	76 (24.0)	608 (72.4)	17 (5.3)
Self	2 (0.1)	0 (0.0)	2 (0.6)	0 (0.0)	0 (0.0)
Surgery	233 (14.6)	0 (0.0)	3 (0.9)	211 (25.1)	19 (5.9)
TB and HIV	9 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)	9 (2.8)

Limitations

Limitations of current study were; firstly, this is a study based on a review of routinely collected data by the TB program which are not always free from errors, which reflects the operational ground reality. Secondly, certain departments may be operationalizing not in a uniform way across the medical colleges. Third, a diagnostic algorithm for all presumptive TB patients may have changed, such as in the paediatric population, which was not captured in the records. Fourth, the study procedures involved in this retrospective data collection did not have any impact on notification, as it would have occurred in case of prospective study. Further, the data was based on a review of records, is limited by the quality of the data in the records, for example, we could not assess the treatment regimens on the notification and association of the referred clinical department.

CONCLUSION

Current study revealed that the proportion of TB patients notified by the medical colleges was high underlining the importance of these institutions in diagnosing and treating

cases which may have missed from the primary care level. Further strengthening of documentation, record keeping of the referral system may increase TB case detection thereby enabling early initiation of TB treatment leading to a decrease in TB burden. Strengthening of record keeping at the time of diagnosis will enable treatment adherence and improve notification to health system which were missed at the primary health level, this will augment efforts to achieve the government of India's target to end TB by 2025.

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