Research Article

Assessment of case detection performance of tuberculosis patients registered for treatment in tuberculosis units of Satara district, Maharashtra

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ABSTRACT

Background: Tuberculosis is a chronic, communicable, infectious disease caused by mycobacterium tuberculosis bacilli usually affecting lungs primarily resulting in pulmonary tuberculosis. **Objective:** The objective of this study was to evaluate the Revised National Tuberculosis Control Program (RNTCP) through the assessment of case detection performance of the patients registered for treatment under RNTCP in tuberculosis units (TUs). **Materials and Methods:** The present record-based, observational cross-sectional study was carried out under district tuberculosis centre, Satara, involving all the 10 TUs. District tuberculosis centre is located in the campus of District Hospital, Satara. The functioning of RNTCP under district tuberculosis centre at the level of TUs was studied from 2012 to 2014. Fifty slides of sputum smear positive and 50 slides of sputum smear negative for tuberculosis were selected randomly. **Results:** Tuberculosis suspect rate was found consistently increasing from 2012 to 2014 in majority of TUs except Umbraj TU. Sputum positive rate was also consistently low in Umbraj TU. Sputum positive smear rate was higher in Bel-Air TU consistently from 2012 followed by Satara TU. Annualized new smear-positive case detection rate was higher in Satara and Bel-Air TUs in 2012; however, it was within the range of 68–83% in 2012 which rose to 86.9% in 2013 at Koregaon and 89.5% at Wai TU in 2014. **Conclusion:** Tuberculosis suspect rate is consistently low at both Umbraj and Bel-Air TU. Sputum smear-positive rate is consistently higher at Satara and Bel-Air TU.

KEY WORDS: Revised National Tuberculosis Control Program; Sputum Positive Rate; Case Detection Performance; Tuberculosis Units; Sputum Smear Negative

INTRODUCTION

In 1992 the Government of India together with WHO and Swedish International Development Agency reviewed the national programme and found completion rate of treatment was only 30%, inadequate budget, shortage and irregular drugs supply with multiplicity of treatment regimens, poor quality of sputum microscopy and undue emphasis on X-ray diagnosis. More emphasis on case detection rather than cure, poor organizational setup and poor Institutional Ethics Committee (IEC) activities, and resistance from medical fraternity of general health services with non-availability of trained staff.[1] So launched its revised strategy RNTCP with objectives of achieving at least 85% cure rate through directly observed treatment short course (DOTS) and 70% case finding of the estimated cases.[2] This revised strategy was introduced in the country as a pilot project since 1993 in a phased manner and proposed to be expanded throughout the country by the year 2005.[3]

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India has the largest number of tuberculosis cases in the world, accounting for nearly one-fifth of the global burden.[4] Tuberculosis is responsible for 5% of all death worldwide and 9.6% of adult deaths in the 15–59 years old economic productive age groups.[5] Around 5.3% of new tuberculosis cases in China are multidrug resistant.[6] The key of this strategy is to cure tuberculosis through directly observed treatment at a time and place convenient to the patient.[7]

Thus, the current study is an attempt to evaluate the RNTCP through the assessment of the case detection performance of the patients registered for treatment under RNTCP in tuberculosis units (TUs) of Satara district, Maharashtra.

MATERIALS AND METHODS

The present record-based, observational cross-sectional study was carried out under district tuberculosis centre, Satara, involving all the 10 TUs, namely, Umbraj, Satara, Karad, Patan, Vaduj, Koregaon, Wai, Man, Phaltan, and Bel-Air. District tuberculosis centre is located in the campus of District Hospital, Satara. The functioning of RNTCP under district tuberculosis centre at the level of TUs was studied from 2012 to 2014. Ethical clearance was obtained from IEC before the commencement of the study. Written permission from district tuberculosis officer, verbal permission from medical officer of each TU, and individual informed verbal consent was obtained telephonically.

Data Collection

The data collection regarding performance of each TU was carried out retrospectively by obtaining information regarding case detection activities under RNTCP such as staffing pattern, their position, and training. Information was obtained pertaining to diagnostic activities. Investigator visited each TU and collected information through the laboratory registers, referral registers, and treatment registers. To access the functioning of Designated Microscopic Centres (DMC) in the form of microscopic activities such as sample collection, slide preparation, procedure, examination of slides, disinfection of collected samples, and slides. One DMC was selected randomly from each TU. Thus, a total of 10 DMCs were visited to access microscopic activities at DMC level.

Random blinded rechecking of sputum smear-positive slides and sputum smear-negative slides for tuberculosis was carried out. From each DMC, five sputum smear-positive slides for tubercle bacilli and five sputum smear-negative slides for tubercle bacilli were selected randomly. Thus, 50 slides of sputum smear positive for tuberculosis and 50 slides of sputum smear negative for tuberculosis were selected randomly and were crosschecked for quality microscopy. All the selected slides were reexamined by the laboratory technician of respective DMC in the presence of medical officer and investigator. Investigator was observing the procedure of slide preparation, method of disinfection, and method of slide examination by laboratory technician. The verification of obtained results was carried out in comparison with the original results by the medical officer in the presence of investigator.

All the patients of randomly crosschecked sputum smear-positive slides for tuberculosis, that is, 50 patients were telephonically interviewed for evaluation of quality services provided under DOTS strategy at DOT providers level.

Performance Indicators

For the evaluation of RNTCP, the following performance indicators pertaining to case detection were calculated:[8]

i. New sputum positive rate
ii. Proportion of new sputum positive cases
iii. Proportion of pulmonary tuberculosis cases
iv. Proportion of extrapulmonary cases
v. Proportion of pediatric tuberculosis cases among all tuberculosis cases.

Statistical Analysis

Data were entered into Excel and TUs wise proportions and performance indicators pertaining to case detection were calculated for 2012, 2013, and 2014.

RESULTS

It was observed that in 2012, the population under DTC was 3,043,171. Out of this population, the total outpatients department (OPD) attendance was 818,894 (27%). Out of this OPD attendance, the chest symptomatic was 26,283 which comes to 3.2%; out of this chest symptomatic, 23,736 (90%) were referred for sputum examination, only 7% sample found sputum positive. On repeat sputum examination, 9% were diagnosed as having sputum positive tuberculosis. Thus, in 2012, total sputum positive cases were 1743 (7.3% of chest symptomatic). Among all newly detected 2878 tuberculosis cases, 2323 (80.8%) were new pulmonary tuberculosis cases. It was observed that a total of 3427 cases of tuberculosis, pulmonary tuberculosis cases were 2875 (84%) and extrapulmonary tuberculosis 552 (16%) [Table 1].

It was observed that in 2013, the population under DTC was 3,082,934. Out of this population, the total OPD attendance was 819,099 (26.6%). Out of this OPD attendance, the chest symptomatic was 26,924 which comes to 3.2%; out of this chest symptomatic, 91.6% were referred for sputum examination, only 7.6% sample found sputum positive. On repeat sputum examination, 6.6% were diagnosed as having sputum positive tuberculosis. Thus, in 2013, total sputum positive cases were 1941 (7.2% of chest symptomatic). Among all newly detected 3041 tuberculosis cases, 2450 (81.6%) were new pulmonary tuberculosis cases. It was observed that a total of 3592 cases of tuberculosis, pulmonary

Table 1: Case detection activities at subdistrict levels in 2012

TB units	Outpatients department (a)	Chest symptomatic (b)	Ref for Sp examination (c)	Sp+ve (d)	Repeat Sp examination (e)	Repeat Sp+ve (f)	Total NSP(d+f)	NSN (g)	NPTB (d+f+g)	EPTB (h)	NTB (d+f+g+h)	Old Sp +ve (i)	Only PTB (d+f+g+i)	Total TB
Umbraj	59,533	2014	2002	123	83	0	123	56	179	45	224	41	220	265
Satara	38,065	2776	2776	305	95	23	328	61	389	126	518	95	484	610
Karad	12,0387	3881	3841	259	151	8	267	90	357	57	414	110	467	524
Patan	78,408	2317	2149	164	43	5	169	66	235	29	264	67	302	331
Vaduj	84,197	2586	2586	123	69	0	123	58	181	28	209	35	216	244
Koregaon	88,288	2539	2481	117	57	14	131	48	179	35	214	42	221	256
Wai	68,287	2160	1848	107	131	6	113	46	159	52	211	42	201	253
Dahiwadi	72,079	1916	1836	93	63	11	104	34	138	27	165	26	164	191
Phaltan	10,5039	3079	3003	125	46	2	127	69	196	59	255	49	245	304
Bel-Air	10,4611	3015	1214	256	52	2	258	52	310	94	404	45	355	449
DTC	818,894 (27)*	26,283 (3.2%)	23,736 (90.3)	1672 (7)	790	71 (9)	1743 (7.3)	580	2323 (80.8)	552 (16)	2878	552	2875 (84)	3427

*Figures in parenthesis are percentages

Table 2: Case detection activities at subdistrict levels in 2013

TB units	Outpatients department (a)	Chest symptomatic (b)	Ref for Sp examination (c)	Sp+ve (d)	Repeat Sp examination (e)	Repeat Sp+ve (f)	Total NSP (d+f)	NSN (g)	NPTB (d+f+g)	EPTB (h)	NTB (d+f+g+h)	Old Sp +ve (i)	Only PTB (d+f+g+i)	Total TB
Umbraj	57,696	1910	1910	115	92	0	115	41	156	61	217	39	195	256
Satara	70,597	3441	3441	344	64	16	360	55	415	124	539	70	485	609
Karad	10,1822	3754	3723	279	113	0	279	106	385	62	447	85	470	532
Patan	78,848	2481	2334	189	28	6	195	61	256	34	290	78	334	368
Vaduj	79,002	2360	2331	138	54	1	139	35	174	31	205	51	225	256
Koregaon	71,280	2304	2254	137	15	3	140	21	161	36	197	40	201	237
Wai	72,497	2489	2076	130	146	8	138	44	182	52	234	41	223	276
Dahiwadi	71,227	2029	2029	120	89	12	132	26	158	24	182	11	169	193
Phaltan	10,0439	3211	3138	175	68	0	175	46	221	50	271	45	266	316
Bel-Air	11,5691	2945	1443	265	65	3	268	74	342	117	459	90	432	549
DTC	819,099 (26.6)*	26,924 (3.2)	24,679 (91.6)	1892 (7.6)	734	49 (6.6)	1941 (7.2)	509	2450 (81.6)	591 (16.4)	3041	550	3000 (83.5)	3592

*Figures in parenthesis are percentages

tuberculosis cases were 3000 (83.5%) and extrapulmonary tuberculosis 591 (16.45%) [Table 2].

It was observed that in 2014, the population under DTC was 3,043,171. Out of this population, the total OPD attendance was 864,425 (28.4%). Out of this OPD attendance, the chest symptomatic was 28,292 which comes to 3.2%; out of this chest symptomatic, 91.8% were referred for sputum examination, only 6.02% sample found sputum positive. On repeat sputum examination, 7.49% were diagnosed as having sputum positive tuberculosis; thus, in 2014, the total sputum positive cases were 1618 (6.2% of chest symptomatic). Among all newly detected 2665 tuberculosis cases, 2090 (78.4%) were new pulmonary tuberculosis cases. It was observed that a total of 3164 cases of tuberculosis, pulmonary tuberculosis cases were 2589 (81.8%) and extrapulmonary tuberculosis 575 (18%) [Table 3].

DISCUSSION

From 2012 to 2014, almost 26–28% of population were visited OPD under at the level of TUs. Among them, chest symptomatic was only 3.2% in each year, among all the symptomatic cases on an average, 91.2% of cases were referred for sputum microscopy and among them only 6.9% were found sputum smear positive for tuberculosis from 2012 to 2014. Similar finding regarding sputum positivity was reported by Kaore *et al*.[9] (7.11%), whereas Verma *et al*.[10] (26.4%) reported very high sputum positivity than the present study. Although the tuberculosis suspect rate was higher in all the TUs from 2012 to 2014; consistently, the sputum positive rate was found between 6% and maximum 21%. In all the TUs, sputum smear-positive rate was either declined or remained consistent only in Bel-Air TU though the declining pattern of sputum positive rate was reported, in comparison with other TUs, the positive rate was higher in all the 3 years which is comparable with the finding of Verma *et al*.[10]

Out of all newly detected tuberculosis cases, 80.8%, 81.6%, and 78.4% were pulmonary tuberculosis cases and 16%, 16.4%, and 18.6% were extrapulmonary tuberculosis cases, respectively, in the year 2012, 2013, and 2014. Bisoi *et al*.[11] detected 67% new pulmonary tuberculosis cases and 33% extrapulmonary tuberculosis cases among newly detected tuberculosis cases, whereas Mukherjee *et al*.[12] studied in West Bengal and reported 77.8% new pulmonary tuberculosis cases and 23.2% extrapulmonary tuberculosis cases among newly detected tuberculosis cases. Among all newly detected tuberculosis cases, they found that 50% were new sputum positive and 50% were sputum negative pulmonary tuberculosis cases. DaCosta *et al*.[13] also found that 67.47% of pulmonary tuberculosis cases and 32.52% were extrapulmonary tuberculosis cases. In comparison with these studies, the finding of the present study seen higher.

Table 3: Case detection activities at subdistrict levels in 2014

TB Units	Outpatients department (a)	Chest symptomatic (b)	Ref for Sp examination (c)	Sp+ve (d)	Repeat Sp examination (e)	Repeat Sp+ve (f)	Total NSP (d+f)	NSN (g)	NPTB (d+f+g)	EPTB (h)	NTB (d+f+g+h)	Old Sp +ve (i)	Only PTB (d+f+g+i)	Total TB
Umbraj	59,269	1780	1780	114	70	0	114	47	161	56	217	41	202	258
Satara	72,914	3328	3328	302	64	18	320	68	388	97	485	80	468	565
Karad	10,0123	4028	4011	241	127	0	241	39	280	72	352	65	345	417
Patan	83,680	2421	2362	154	30	3	157	49	206	42	248	63	269	311
Vaduj	74,353	2379	2379	93	24	0	93	20	113	31	144	36	149	180
Koregaon	75,082	2103	2097	101	22	6	107	30	137	55	192	34	171	226
Wai	81,338	2367	2142	106	147	5	111	13	124	38	162	43	167	205
Dahiwadi	79,787	2370	2303	93	79	14	107	22	129	21	150	13	142	163
Phaltan	108,563	4122	4060	147	46	0	147	29	176	70	246	49	225	295
Bel-Air	129,316	3394	1505	214	98	7	221	155	376	93	469	75	451	544
DTC	864,425 (28.4)*	28,292 (3.2)	25,967 (91.8)	1565 (6)	707	53 (7.5)	1618 (6.2)	472	2090 (78.4)	575 (18)	2665	499	2589 (81.8)	3164

*Figures in parenthesis are percentages

This difference may be due to study considered the reports after 2012 and the comparison study was carried out before 2006. The rate of new sputum cases in all the TUs in 2012 was ranging from 65% to 84%, in 2013 minimum of 72% to maximum of 87%, and in 2014 minimum of 58% to maximum of 89.5% which suggest that there is increase in new sputum smear-positive pulmonary tuberculosis cases among newly detected pulmonary tuberculosis cases. Whereas annualized new sputum positive case rate was below the target given by per RNTCP,[8] in all the TUs during the year 2012 except Satara and Bel-Air TUs which was seen consistently higher in all the 3 years in comparison with other TUs. Among the pulmonary tuberculosis, the pediatric pulmonary tuberculosis cases reported minimum of 2.2% to maximum of 24% in 2012, in 2013 maximum up to 25%, and in 2014 almost up to 30%. The high proportion of pediatric cases was reported consistently higher in all the 3 years in TUs Satara, Patan, and Bel-Air which are partially to fully hilly areas. Regarding pediatric extrapulmonary tuberculosis cases were initially reported less in 2012 in comparison with 2013 which was dropped again in 2014; the highest pediatric extrapulmonary tuberculosis cases were reported by Satara TU which is located in District Hospital, Satara. Ruchi and Thakur[14] reported pediatric tuberculosis minimum of 4.4% in rural TUs to the maximum of 47.5% from urban TUs. The current study finding corresponds to this study which was carried out in Varanasi, Uttar Pradesh. Whereas Mukherjee *et al.*[15] reported 3.4% of pediatric tuberculosis cases from rural TUs of West Bengal.

Among all the pulmonary tuberculosis cases, majority of TUs have reported high proportion of females affected by pulmonary tuberculosis cases in 2012, which was found reduced in 2013 and 2014.

CONCLUSION

Tuberculosis suspect rate is consistently low at both Umbraj and Bel-Air TUs. Sputum smear-positive rate is consistently higher at Satara and Bel-Air TUs as these both TUs are located at tertiary care center. Annualised new sputum smear positive case detection rate though it is consistently low at Bel-Air TUs, the annualised total case detection rate notified is higher. In comparison with new pulmonary tuberculosis case detection rate, the notification rate of extrapulmonary cases among pediatric age group is higher in Satara TUs which is located itself in District Hospital, Satara.

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REFERENCES

1. Kishore J. National Health Programs of India. 11th ed. New Delhi: Century Publications; 2014.
2. Khatri GR. Status report on first 1, 00, 000 patient. Indian J Tuberc 1999;46:157-66.
3. Editorial. Indian J Tuberc 1996;43:3.
4. RNTCP Status Report, Annual Report; 2006. Available from: http://www.tbcindia.org/documents.asp#.
5. World Health Organization. World Health Reports 1999; Making a Difference; Report of Director Gen. Geneva: World Health Organization; 1999.
6. World Health Organization. Stop TB India: Revised National TB Control Program and Results Updated. Geneva: World Health Organization; 2006.
7. Introduction: Tuberculosis Control: Health Programme. Available from: http://www.gujhealth.gov.in/health-programmes/tb/index.htm.
8. Supervision and Monitoring Strategy in Revised National Tuberculosis Control Program; 2012.
9. Kaore NM, Date KP, Thombare VR. Increased sensitivity of sputum microscopy with sodium hypochlorite concentration technique: A practical experience at RNTCP center. Lung India 2011;28:17-20.
10. Verma A, Mishra M, Singh A, Chaudhri S, Pandey S. Outcome of cases under revised national tuberculosis control programme at designated microscopy centre of tertiary level hospital and medical college at Kanpur, Uttar Pradesh. J Clin Sci Res 2013;2:126-31.
11. Bisoi S, Sarkar A, Mallik S, Haldar A, Haldar D. A study on performance, response and outcome of treatment under RNTCP in a tuberculosis unit of Howrah district, West Bengal. Indian J Community Med 2007;32:204-8.
12. Mukherjee A, Saha I, Sarkar A, Chowdhury R. Gender differences in notification rates, clinical forms and treatment outcome of tuberculosis patients under the RNTCP. Lung India 2012;29:120-2.
13. DaCosta AL, Keny SJ, Lawande DJ. Treatment outcome of pulmonary and extra-pulmonary tuberculosis patients in TB and chest disease hospital DOT centre, Goa, India. Int J Curr Microbiol Appl Sci 2016;5:437-41.
14. Ruchi, Thakur HP. Characteristics of childhood tuberculosis patients registered under RNTCP in Varanasi, Uttar Pradesh. Indian J Public Health 2013;57:36-9.
15. Mukherjee A, Chowdhury R, Singla R, Saha I, Dutta R, Das T, *et al.* Comparison between childhood and adult tuberculosis in a rural tuberculosis unit of West Bengal: A retrospective study. Lung India 2014;31:116-20.

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