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To evaluate the RNTCP through assessment of treatment outcome of the pulmonary tuberculosis patients under RNTCP in tuberculosis units

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Abstract

Background: Tuberculosis is a very ancient disease of mankind; its description has been found in Hippocrates (460-377BC) observation, the ancient Buddhist and Chinese writing.

Objective: To evaluate the RNTCP through assessment of treatment outcome of the pulmonary tuberculosis patients registered for treatment under RNTCP in Tuberculosis Units of Satara district, Maharashtra.

Study design: Cross-sectional study.

Setting: Under District Tuberculosis Centre, Satara involving all the ten Tuberculosis Units (TUs) namely, Umbraj, Satara, Karad, Patan, Vaduj, Koregaon, Wai, Man, Phaltan and Belair.

Participants: Thus fifty (50) slides of sputum smear positive slides for tuberculosis and fifty (50) slides of sputum smear negative slides for tuberculosis were selected randomly.

Sampling: Simple random sampling.

Study period: From 2012 to 2014.

Results: The performance indicators regarding treatment outcome among pulmonary tuberculosis cases, the cure rate among all tuberculosis units on an average was 48.7% in 2012 which rose to 53.7% in 2014. Whereas treatment completion rate among pulmonary tuberculosis cases was found decline from 36.6% in 2012 to 30.6% in 2014. However majority of tuberculosis units have achieved success rate of more than 85% (>85%) except Bel-Air and Karad tuberculosis units where death rate and transferred out rate was also found higher though these two tuberculosis units are functioning in jurisdiction of tertiary care centre.

Conclusion: The overall success rate and treatment completion rate for pulmonary tuberculosis is found coincidentally with the national targets given by the RNTCP.

Keywords: Pulmonary tuberculosis, treatment outcome, RNTCP, tuberculosis units, cure rate, treatment completion rate, success rate

Introduction

Total population suffering from active disease in India is 14 million of which 3 to 3.5 million are positive for sputum (20% to 25% of total). About one million sputum positive cases are added every year^[1].

India has the largest number of tuberculosis cases in the world, accounting for nearly one fifth of the global burden^[2]. 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^[3]. The case fatality rate of tuberculosis is high, approximately 50% of untreated cases die of the disease. One out of every three HIV/AIDS (Human Immuno deficiency Virus/ Acquired Immuno deficiency Syndrome) patients has tuberculosis. The latest WHO report on the global status of Multi Drug Resistant (MDR) tuberculosis lists Henan Province, China as a hot spot for its high number of MDR-TB cases. Around 5.3% of new tuberculosis cases in China are Multi Drug Resistant^[4]. Still the transmission is higher and mortality and morbidity related to tuberculosis is higher may be due to co-infection with HIV/AIDS, Malnutrition and emergence of MDR-TB. Thus the current study is to evaluate the RNTCP through assessment of treatment outcome of the pulmonary tuberculosis patients registered for treatment under RNTCP in Tuberculosis Units of Satara district, Maharashtra.

Materials & Methods

The present record based, observational cross-sectional study was carried out under District Tuberculosis Centre, Satara involving all the ten Tuberculosis Units namely, Umbraj, Satara, Karad, Patan, Vaduj, Koregaon, Wai, Man, Phaltan and Belair. 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. Permission for the study was obtained from the College authorities prior to commencement.

Data Collection

The data collection regarding performance of each Tuberculosis Units was carried out retrospectively by obtaining information regarding case detection activities under RNTCP like staffing pattern, their position and training. Information was obtained pertaining to diagnostic activities. Investigator visited each tuberculosis units and collected information through the laboratory registers, referral registers and treatment registers.

Random Blinded Re-Checking (RBRC) 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 from each DMC. Thus fifty (50) slides of sputum smear positive slides for tuberculosis and fifty (50) slides of sputum smear negative slides for tuberculosis were selected randomly. All the selected slides were re-examined by the laboratory technician of respective Designated Microscopic Centre in the presence of Medical Officer and Investigator.

Performance Indicators

^[5] For the evaluation of Revised National Tuberculosis Control Programme following outcome indicator for pulmonary tuberculosis were calculated:

Outcome Indicators

- 1) Cure rate among pulmonary tuberculosis cases.
- 2) Treatment completion rate among pulmonary tuberculosis.
- 3) Success rate among pulmonary tuberculosis cases.

Statistical Analysis: Data was entered in Excel and Tuberculosis Units wise proportions and performance indicators pertaining to treatment activity and sputum smear conversion were calculated for years 2012, 2013 and 2014.

Results

Out of 2503 pulmonary tuberculosis cases were on treatment under DTC, maximum patients were from Karad (13.3%), Satara (12.3%), Belair (12%) and Patan (12%) TU's. From other TU's 6 to 9.6% patients of pulmonary tuberculosis were on treatment. It was observed that cure rate among pulmonary tuberculosis was from minimum of 42.8% at Belair to the maximum of 59.6% at Umbraj tuberculosis unit. The cure rate of above 50% in 2012 was reported by the TU's Umbraj (59.6%), Wai (54.5%), Dahiwadi (53.7%) and Vaduj (53.1%). Treatment completed was reported minimum of 28.2% by Umbraj TU to maximum of 45.9% by Satara TU. On an average the treatment complete rate was 36%. The success rate of pulmonary tuberculosis cases were reported above the norms of RNTCP by Dahiwadi (96.3%), Satara (91.5%) and Koregaon (91.5%). The TU's which fulfilled the targets of success rate of 85-90% were Wai (89.1%), Umbraj (87.8%), Phaltan (87.5%) and Patan (85.9%). The success rate below 80% was reported by Karad TU (76%) and Belair TU (72.1%). The death rate was found above the norms (<4%) of RNTCP in all the TU's except Dahiwadi (1.8%), maximum death rate was reported in Karad TU (12.9%). Failure rate was observed on an average 1.5% under Satara DTC of which the maximum failure rate of 2.7% was reported by Karad TU. The transferred out cases was seen highest in Belair TU (18.8%), whereas all the other tuberculosis units had a transferred rate of less than 2%. Regarding default rate, high default rate than the norms of RNTCP (<5%) was observed in Vaduj (6.6%) and Karad (6.3%) TU, whereas other TU's have reported default rate less than 3.5%. Regarding performance on treatment outcome Karad tuberculosis unit has reported low success rate and consistently high rates of death, failure, transferred out and default in 2012, this might be due to majority of the cases report to the peripheral institution under Karad TU which is the tertiary care centre receives severe cases of pulmonary tuberculosis as well as the post of medical officer is vacant at the same DMC and DOT centre. Table 1

Table 1: Treatment outcome of Pulmonary tuberculosis at sub-district level 2012

TB Units	TPTB (On treatment)	Cure	Treatment Complete	Success Rate	Death	Failure	Trf Out	Default
Umbraj	213(8.5)	127(59.6)	60(28.2)	187(87.8)	15(7)	4(1.9)	1(0.4)	6(2.8)
Satara	307(12.3)	140(45.6)	141(45.9)	281(91.5)	13(4.2)	3(1)	0(0)	10(3.3)
Karad	333(13.3)	145(43.5)	108(32.4)	253(76)	43(12.9)	9(2.7)	7(2.1)	21(6.3)
Patan	298(11.9)	145(48.7)	111(37.2)	256(85.9)	28(9.4)	3(1)	1(0.3)	10(3.4)
Vaduj	211(8.4)	112(53.1)	67(31.8)	179(84.8)	14(6.6)	4(1.9)	0(0)	14(6.6)
Koregaon	222(8.9)	103(46.4)	100(45)	203(91.4)	10(4.5)	4(1.8)	3(1.4)	2(0.9)
Wai	211(8.4)	115(54.5)	73(34.6)	188(89.1)	17(8.1)	2(0.9)	0(0)	4(1.9)
Dahiwadi	164(6.6)	88(53.7)	70(42.7)	158(96.3)	3(1.8)	0(0)	0(0)	3(1.8)
Phaltan	240(9.6)	114(47.5)	96(40)	210(87.5)	15(6.2)	4(1.7)	3(1.2)	8(3.3)
Bel Air	304(12.1)	130(42.8)	89(29.3)	219(72.1)	19(6.2)	5(1.6)	57(18.8)	4(1.3)
DTC	2503	1219(48.7)	915(36.6)	2134(85.2)	177(7.1)	38(1.5)	72(2.9)	82(3.3)

Out of 2640 pulmonary tuberculosis cases on treatment under DTC, maximum patients were from Belair (15.2%), Satara (13.6%), Karad (12.6%) and Patan (12.3%) TU's. From other TU's 6 to 9.7% patients of pulmonary tuberculosis were on treatment. It was observed that cure

rate among pulmonary tuberculosis was from minimum of 33.4% at belair to the maximum of 58.4% at Wai Tuberculosis Unit. The cure rate of above 50% in 2013 was reported by the TU's Wai (58.4%), Umbraj (56.5%), Koregaon (53.2%) and Dahiwadi (53%). Treatment

completed was reported minimum of 34.4% by Umbraj TU to maximum of 52.5% by Satara TU. On an average the treatment complete rate was 43%. The success rate of pulmonary tuberculosis cases were reported above the norms of RNTCP by Dahiwadi (98.2%), Koregaon (94%), Satara (93.3%), Wai (93.2%) and Umbraj (90.9%). The TU's which fulfilled the targets of success rate of 85-90% were Patan (89.5%) and Phaltan (85%). The success rate below 80% was reported by Karad TU (79.4%) and Belair TU (76.8%). The death rate was found above the norms (<4%) of RNTCP in all the TU's except Dahiwadi (0.6%), Koregaon (3%) and Satara (3.3%), maximum death rate was reported in Karad TU (16.1%). Failure rate was observed on an average 1.3% under Satara DTC of which the maximum

failure rate of 2.1% was reported by Karad and Umbraj TU's. The transferred out cases was seen highest in Belair TU (14.5%), whereas all the other tuberculosis units had a transferred rate of less than 2.5%. Regarding default rate, at DTC was 1.9% and all TU's default rate were within norms (<5%) of RNTCP with Vaduj TU reporting the default rate of 5%. Regarding performance on treatment outcome Karad tuberculosis unit has reported low success rate and consistently high rates of death, failure, transferred out and default in 2013, this might be due to majority of the cases report to the peripheral institution under Karad TU which is the tertiary care centre receives severe cases of pulmonary tuberculosis as well as the post of medical officer is vacant at the same DMC and DOT centre. Table 2

Table 2: Treatment outcome of Pulmonary tuberculosis at sub-district level 2013

TB Units	TPTB (On treatment)	Cure	Treatment Complete	Success Rate	Death	Failure	Trf Out	Default
Umbraj	186(7.04)	105(56.5)	64(34.4)	169(90.9)	9(4.8)	4(2.1)	0(0)	4(2.2)
Satara	360(13.6)	147(40.8)	189(52.5)	336(93.3)	12(3.3)	4(1.1)	1(0.3)	7(1.9)
Karad	335(12.6)	150(44.8)	116(34.6)	266(79.4)	54(16.1)	7(2.1)	1(0.3)	7(2.1)
Patan	325(12.3)	125(38.5)	166(51.1)	291(89.5)	26(8)	4(1.2)	0(0)	4(1.2)
Vaduj	219(8.3)	96(43.8)	87(39.7)	183(83.6)	21(9.6)	4(1.8)	0(0)	11(5)
Koregaon	201(7.6)	107(53.2)	82(40.8)	189(94)	6(3)	2(1)	0(0)	4(2)
Wai	190(7.2)	111(58.4)	66(34.7)	177(93.2)	9(4.7)	1(0.5)	0(0)	3(1.6)
Dahiwadi	168(6.4)	89(53)	76(45.2)	165(98.2)	1(0.6)	0(0)	1(0.6)	1(0.6)
Phaltan	255(9.7)	101(39.6)	114(44.7)	215(84.3)	22(8.6)	5(2)	6(2.4)	7(2.7)
Bel Air	401(15.2)	134(33.4)	174(43.4)	308(76.8)	30(7.5)	2(0.5)	58(14.5)	3(0.7)
DTC	2640	1165(44.1)	1134(43)	2299(87.1)	190(7.2)	33(1.3)	67(2.5)	51(1.9)

*figures in parenthesis are percentages

Out of 2253 pulmonary tuberculosis cases on treatment under DTC, maximum patients were from Belair (18.3%), Satara (13.7%), Patan (11.7%) and Karad (11%) TU's, whereas from other TU's 6 to 9.4% patients of pulmonary tuberculosis were on treatment. It was observed that cure rate among pulmonary tuberculosis was from minimum of 35.1% at belair to the maximum of 63.2% at Vaduj Tuberculosis Unit. The cure rate of above 50% in 2014 was reported by all TU's except Belair. Treatment completed was reported minimum of 9.2% by Vaduj TU to maximum of 42.7% by Koregaon TU. On an average the treatment complete rate was 30.6%. The success rate of pulmonary tuberculosis cases were reported above the norms of RNTCP by Dahiwadi (99.3%), Koregaon (95.1%) and Wai (93.2%). The TU's which fulfilled the targets of success rate of 85-90% were Satara (88.7%), Umbraj (87.7%), Phaltan (87.7%) and Patan (87.1%). The success rate below 80% was reported by Vaduj (72.4%), Belair (73.4%) and Karad

TU (74.5%). The death rate was found above the norms (<4%) of RNTCP in all the TU's except Dahiwadi (0%) and Koregaon (2.4%), maximum death rate were reported at Vaduj TU (15.1%) and Karad TU (13.1%). Failure rate was observed on an average 6.1% under Satara DTC of which the maximum failure rate of 20.3% was reported by Belair TU followed by Karad TU (6.5%). The transferred out cases at DTC was less than 1%. Regarding default rate, at DTC was 2.3% and all TU's default rate were within norms (<5%) of RNTCP except Vaduj TU(7.2%). Regarding performance on treatment outcome Karad tuberculosis unit has reported low success rate and consistently high rates of death, failure, transferred out and default in 2014, this might be due to majority of the cases report to the peripheral institution under Karad TU which is the tertiary care centre receives severe cases of pulmonary tuberculosis as well as the post of medical officer is vacant at the same DMC and DOT centre. Table 3

Table 3: Treatment outcome of pulmonary tuberculosis at sub-district level 2014

TB Units	TPTB (On treatment)	Cure	Treatment Complete	Success Rate	Death	Failure	Trf Out	Default
Umbraj	195(8.7)	106(54.4)	65(33.3)	171(87.7)	13(6.7)	5(2.6)	2(1)	4(2.1)
Satara	309(13.7)	194(62.8)	80(25.9)	274(88.7)	19(6.1)	5(1.6)	2(0.6)	9(2.9)
Karad	247(11)	150(60.7)	34(13.8)	184(74.5)	34(13.8)	16(6.5)	2(0.8)	11(4.5)
Patan	264(11.7)	137(51.9)	93(35.2)	230(87.1)	15(5.7)	9(3.4)	1(0.4)	9(3.4)
Vaduj	152(6.7)	96(63.2)	14(9.2)	110(72.4)	23(15.1)	5(3.3)	3(2)	11(7.2)
Koregaon	164(7.3)	86(52.4)	70(42.7)	156(95.1)	4(2.4)	2(1.2)	0(0)	2(1.2)
Wai	155(6.9)	83(53.5)	61(39.4)	144(92.9)	9(5.8)	2(1.3)	0(0)	0(0)
Dahiwadi	142(6.3)	86(60.6)	55(38.7)	141(99.3)	0(0)	0(0)	0(0)	1(0.7)
Phaltan	212(9.4)	127(59.9)	59(27.8)	186(87.7)	17(8)	9(4.2)	0(0)	0(0)
Bel Air	413(18.3)	145(35.1)	158(38.3)	303(73.4)	18(4.3)	84(20.3)	3(0.7)	5(1.2)
DTC	2253	1210(53.7)	689(30.6)	1899(84.3)	152(6.7)	137(6.1)	13(0.6)	52(2.3)

*figures in parenthesis are percentages

Discussion

In the present study the cure rate among pulmonary tuberculosis cases (Cat-I and Cat-II) were reported 48.7% at district level Satara in 2012, 44.1% in 2013 and 53.7% in 2014. At sub-district level high cure rate among all Tuberculosis Units that is >50% was reported by Umbraj, Wai, Dahiwadi and Vaduj Tuberculosis Units in 2012 all these areas are non-hilly. In 2014 the cure rate was found >60% in Satara, Karad, Vaduj and Dahiwadi Tuberculosis Units. The treatment completion rate was reported higher in all the Tuberculosis Units from 2012 to 2014 in comparison with Revised National Tuberculosis Control Programme guidelines^[5, 6]. In the present study in 2012 and 2013 treatment completion rate was reported minimum of 28.2% in Umbraj TU to maximum of 45.7% in Satara TU. Whereas in 2014, the treatment completion rate reported was less by Vaduj (9.2%) to maximum 42.7% by Karad tuberculosis unit. The success rate above 90% was achieved by Satara, Koregaon, Dahiwadi in 2012, Umbraj, Satara, Koregaon, Wai, Dahiwadi in 2013 and Koregaon, Wai, Dahiwadi in 2014. Majority of Tuberculosis Units have shown average of around 85% success rate achievement in pulmonary tuberculosis cases. Similar findings of average cure rate was given by A Mishra *et al.*^[7] Md Shamim Akhtar *et al.*^[8] and Simmi Tiwari *et al.*^[9]. However all of them reported poor cure rate among Cat-II cases. Prasad R *et al.*^[10] have achieved success rate of >90% similar to the Tuberculosis Units Satara, Koregaon, Wai of the present study.

The average death rate among pulmonary tuberculosis cases was 7.1% in 2012, 7.2% in 2013 and 6.7% in 2014. Satara, Koregaon, Dahiwadi have reported less death rate as per (<4%) Revised National Tuberculosis Control Programme guidelines.^[6, 7] Md Shamim Akhtar *et al.*^[8] and Aswin A.V *et al.*^[11] were reported less proportion of death rate among pulmonary tuberculosis cases. Whereas Mahesh C *et al.*^[12] reported very high proportion of death rate among pulmonary tuberculosis cases.

Regarding failure and transferred out rates/proportions all the Tuberculosis Units have achieved the targets of <3% failure and transferred out proportion except Bel-Air TU where transferred out cases were much higher in comparison with national figures^[6, 7]. Prasad R *et al.*^[10] Md Shamim Akhtar *et al.*^[8], Mahesh C *et al.*^[12] reported less than 3% of failure rate whereas higher rate of failure has been reported by Simmi Tiwari *et al.*^[9] and L. DaCosta *et al.*^[13]. This failure rate may be higher in these studies due to patients may not have awareness regarding DOT therapy under Revised National Tuberculosis Control Programme, as these studies were carried out when the country was covered fully first time by Revised National Tuberculosis Control Programme (RNTCP). The default rate in the current study was achieved below 5% (<5%) as per RNTCP guidelines^[6, 7] by all the Tuberculosis Units (TU's) in all the three years except Vaduj TU. This default rate in Vaduj TU might be due to involvement of untrained DOT providers (40%). Prasad R *et al.*^[10] and Md Shamim Akhtar *et al.*^[8] reported similar findings. Whereas Mahesh C *et al.*^[12] have reported high default rates. This high default rate may be due to poor patient's compliance which in turn might be the impact of poor awareness and patients DOT providers communication.

Conclusion

The overall success rate and treatment completion rate for

pulmonary tuberculosis is found coincidentally with the national targets given by the RNTCP. Though at some tuberculosis units there are high death rates and transferred out rates, patients are satisfied with the services availing under RNTCP.

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