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Research Article

Prevalence and Control of Tuberculosis in the Nilgiris District: A Two Years Retrospective Study

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Abstract

Background: Tuberculosis (TB) is a leading cause of morbidity and mortality in the world. Almost two million people develop TB in India. WHO recommends a directly observed treatment-short course (DOTS) strategy to achieve treatment goal, in which surveillance of treatment outcome makes an essential contribution to assess the effectiveness of control programs.

Objective: To measure the incidence and control of TB in the Nilgiris district.

Methodology: This retrospective study was conducted between November 2009 and April 2010 in the Nilgiris, Tamilnadu. TB cases of 2008 and 2009 were collected from district Revised National Tuberculosis Program Center (RNTCP) and analyzed using statistical package SPSS V.13 to study the epidemiological trend and to evaluate favorable and unfavorable outcomes.

Results: A total of 951 TB patients were registered for the study period. Among 473 cases in 2008, 431(91.12%) were newly diagnosed and remaining 42(8.88%) were re-treatment cases. 245(51.79%) were pulmonary sputum positive, 94(19.87%) pulmonary sputum negative and 134(28.32%) extra-pulmonary TB. Among the 478 cases in 2009, 427(89.33%) were newly diagnosed and 51(10.77%) were re-treatment cases. 216(45.18%) were pulmonary sputum positive, 110 (23.01%) pulmonary sputum negative and 152(31.79%) extra-pulmonary TB. Favorable outcomes show a significant (p=0.01) difference in patients who received category-III treatment in 2008 (43.76%) and 2009 (34.85%) respectively, where majority of them were treatment completers. Unfavorable outcomes show no significant difference (p>0.05) between patient receiving three categories of anti-TB treatments in 2008 and 2009 respectively.

Conclusions: Treatment success rate of DOTS during 2008 was 80.76% whereas in 2009 it was 77.77% which did not achieve the WHA 1991 criteria for monitoring TB control program.

Keywords: TB; Prevalence; Control

Introduction

Tuberculosis (TB) is a leading cause of morbidity and mortality caused by *Mycobacterium tuberculosis,* has affected mankind since 5000 years. In India each year almost two million people develop TB. It is estimated that annually around 330,000 Indians die due to TB [1,2]. There were an estimated 9.4 million incident cases (equivalent to 139 cases per 100000 population) of TB globally in 2008 which was an increase from the 9.3 million reported in 2007 and in 2010, there were 8.8 million (range, 8.5–9.2 million) incident cases of TB. Estimated epidemiological burden of TB in the year 2010 was found to be in the different countries population (thousands) were China 1,341,335, India 1,224,614 Brazil 194,946 and Pakistan 173, 593 [3,4]. Patient non-adherence to the treatment is interpreted as a failure, according to the stop TB partnership, the ultimate goal of eliminating TB is defined as 'the occurrence of less than 1 case per million populations per year by 2050 [5-7]. To achieve this goal, the World Health Organization (WHO) recommends a directly observed treatment-short course (DOTS) strategy, in which surveillance of treatment outcome makes an essential contribution to the assessment of effectiveness of control programs. [6]. DOTS also lead to significant reductions in the frequency of primary drug resistance, acquired drug resistance and relapse [7]. Globally, rate of treatment success for new smear-positive cases treated in the 2007 cohort was 86%. This is first time that the treatment success rate has exceeded the global target of 85%, which was set by the World Health Assembly (WHA) in 1991. Three regions such as; the Eastern Mediterranean (88%), Western Pacific (92%) and South-East Asia (88%) regions has exceeded the target, as did 53 other countries [1]. Main objective of this study was to evaluate the incidence and control of tuberculosis in the Nilgiris district for the year 2008 and 2009.

Methodology

In this retrospective case analysis study conducted between November 2009 and April 2010 after obtaining permission from Institutional Ethics Committee, JSS College of Pharmacy, Ooty and district Revised National Tuberculosis Control Program (RNTCP) centre, the Nilgiris. Retrospective cases of all TB patients registered from January 2008 to December 2009 in TB registers of different

Table 1: Treatment outcome of different classes of TB in 2008 and 2009.

Year	Treatment Outcome		Pulmonary Smear Positive (n=245)		Pulmonary smear negative (n=94)		Extra pulmonary (n=134)		Total (n= 473)	
			n	%	n	%	N	%	n	%
2 0 0 8 n=473	Favorable (n=409)	Cured	159	38.87	8	1.95	4	0.97	171	41.8
		Treatment Completed	39	9.53	80	19.55	119	29	238	58.19
		Total	198	48.41	88	21.51	123	30.07	409	100
	Unfavorable (n=64)	Default	14	21.87	4	6.25	3	4.68	21	32.81
		Failure	4	6.28	0	0	0	0	4	6.25
		Death	28	43.75	2	3.12	8	12.5	38	59.37
		Transferred Out	1	1.56	0	0	0	0	1	1.56
		Total	47	73.42	6	9.37	11	17.1	64	100

Year	Treatment Outcome		Pulmonary Smear Positive (n=171)		Pulmonary smear negative (n=72)		Extra Pulmonary (n=112)		Total (n=355)	
			n	%	n	%	n	%	n	%
2 0 0 9 n=355	Favorable (n=307)	Cured	110	64.33	2	2.78	2	1.79	114	32.11
		Treatment Completed	29	16.96	59	81.94	105	93.75	193	54.37
		Total	139	45.29	61	19.86	107	34.85	307	100.00
	Unfavorable (n=48)	Default	6	3.51	2	2.78	1	0.89	9	2.54
		Failure	4	2.34	2	2.78	1	0.89	7	1.97
		Death	18	10.53	7	9.72	3	2.68	28	7.89
		Transferred	4	2.34	0	0.00	0	0.00	4	1.13
		Total	32	68.68	11	22.91	5	10.41	48	100.00

RNTCP centers of the Nilgiris district at; Ootacamund, Coonoor and Pandhalur were collected along with complete patient profile and treatment outcome. A structured case documentation form was prepared for documentation of each case.

Data collection

Patient demographic, medical and treatment information such as; patient's age, sex, address, tuberculosis type, type of patient, category of treatment and treatment outcome were collected from the TB registers. Demographics of the patients were studied to find out the Prevalence of TB. Clinical history regarding present and past history of anti-Tubercular treatment (ATT), family history of TB and any other associated disease were collected from TB register. Incidence, prevalence and mortality of TB were also calculated.

Statistical analysis

All the data were analyzed by using the statistical package SPSS for windows, version 13. For categorical data, considering 95% confidence intervals with Odds ratio and compared with different groups. Multivariate analysis using linear regression model was used to analyze the association between treatment outcome and potential predictor variables, considering p value < 0.05 as statistically significant.

Results

A total of 951 TB patients were registered at different RNTCP units of the Nilgiris district from January 2008 to December 2009. Out of 951 cases, 473 cases were registered in 2008 and remaining 478 in 2009. Average age of TB patients reported in 2008 were 33.85(±

18.67) years, out of which 287(60.68%) male and 186 (39.32%) were females. 431(91.12%) cases were newly diagnosed and remaining 42 (8.88%) were re-treatment cases. 245(51.79%) were pulmonary sputum positive, 94(19.87%) pulmonary sputum negative and 134(28.32%) were extra-pulmonary TB. In 2009 reported cases average age of the patients were 34.71(±17.63) years, out of 478 cases, 263(55.02%) male and 215(44.98%) female. 427(89.33%) cases were newly diagnosed and 51(10.77%) re-treatment cases. It was observed that 216(45.18%) cases were pulmonary sputum positive, 110(23.01%) pulmonary sputum negative and 152(31.79%) were extra-pulmonary TB. Out of 478 cases registered in 2009, out come were documented only for 355 cases.

Outcome of different disease category

Disease categorization was done based on diagnosis as pulmonary sputum positive (PSP), pulmonary sputum negative (PSN) and extra pulmonary TB (EPTB). Outcomes of treatment given to various disease classes were evaluated separately. Overall favorable and unfavorable treatment outcomes were not significantly varied (p=0.9) between the years 2008 and 2009 among different disease classes. Details of treatment outcome are shown in Table 1. In 2008, unfavorable outcomes of PSP patients were significantly higher (p<0.001) than the favorable outcomes, whereas in PSN patients, the favorable outcome were significantly higher (p<0.001) than the unfavorable outcome. The treatment outcomes are illustrated in the Table 2. In 2009, the unfavorable outcome of PSP patients were significantly higher (p=0.005) than the favorable outcome and in case of EPTB. The favorable outcomes were significantly higher (p<0.001) than the unfavorable outcome. Outcome of PSN was similar to PSP

Table 2: Treatment outcome of different TB classes in 2008 and 2009.

Year	PSP			PSN			EP			TOTAL		
	FO	UFO	p value	FO	UFO	p value	FO	UFO	p value	FO	UFO	p value
2008	198	47	0.0001	88	6	0.001	123	11	0.33	409	64	0.0001
2009	139	32	0.005	61	11	0.609	107	5	0.007	307	48	0.0001

FO: Unfavorable Outcomes; UFO: Unfavorable Outcomes

but not statistically significant (p>0.05). Treatment outcomes are illustrated in the Table 2.

Success rate

Overall favorable treatment outcomes of different TB classes were considered to predict success rates of the two years under study. It was observed that in the year 2008 success rate was 80.76% where as in the year 2009 it was 77.77%.

Extra pulmonary TB

EPTB comprised 30.07 % (n= 286) of all 951 TB cases registered during the study period. It was observed that among all EPTB cases, 132(46%) were lymph node TB followed by 103(36%) pleural effusion (PLEF), 31(11%) of others and 20(7%) were abdominal TB.

Mortality rate

Mortality rate of TB cases was calculated for the respective years and it was found that a total of 76(7.99%) patients died due to TB the Nilgiris during 2008 and 2009. Overall mortality during 2008 was found to be 38(8.03%) and 37(7.88%) in 2009 which was not statistically significant (p<0.05). Incidence of death was higher in PSP cases (3.98%) than PSN (1.08%) & EPTB (1.32%) which was found to be highly significant (p<0.001). In overall mortality, 47(71%) were male compared to 19(29%) female, which was statistically significant (p<0.001). It was also found that, mortality was high in adults 53(83%), followed by geriatrics 9(14%) and pediatrics 4(6%) which was highly significant (p<0.001).

Odds ratio

In 2008, it was observed that female TB cases had significantly (p=0.01) higher treatment success rate than male. Among the special population, geriatrics had lower treatment success rate compared to adults and pediatrics, which was not statistically significant (p>0.1). Cases of PSP TB had significantly (p<0.001) lower treatment success rate compared to the other disease classes. On the other hand, highest treatment success rate was found among PSN TB cases (Table 3). In 2009, it was observed that female TB cases had significantly (p=0.01) higher treatment success rate than male. Among the special population, adults had lower treatment success rate when compared to pediatrics and geriatrics, which was statistically significant (p=0-03). Cases of PSP TB had significantly (p=0.01) lower treatment success rate compared to the other disease classes. On the other hand, highest treatment success rate was found among PSP TB cases (Table 3).

Discussion

A two year retrospective study in prevalence of TB in the Nilgiris district revealed that DOTS therapy has been a marginally success in the Nilgiris district. Treatment success rate of DOTS during 2008 was 80.76% whereas in 2009 it was much decreased to 77.77% which has not achieved the WHA 1991 criteria for monitoring TB control program. Out of 951 TB cases, complete information on treatment outcomes was available for 828 patients. The percentages of patients with treatment outcomes assessed in the study were as follows: 431(52.05%) cases were treatment completed, 285(34.42%) cure, 76(7.99%) death, 30(3.62%) default, 11(1.32%) failure, and 5(06%) cases were transferred out. This study finding suggests that male had higher risk of unfavorable treatment outcomes than the female. It was observed that TB was highly prevalent in the adult population (71.5%) and majority of the diseased patients were male (57.83%). Tessema B et al., supports the study by concluding that male (53.5%) and adults (56.3%) had the trend to be more likely to experience TB [8]. In the present study mostly affected disease class was PSP(42%) which was contradicting to the study conducted by Tessema B et al., with (28.3%) in EPTB, compared to (16.8%) in PTB [8]. Unfavorable outcomes were higher in PSP (19.18%) compared to PSN (6.38%) and EPTB cases (8.21%) which was statistically significant (p<0.001). This was contradicted by the study conducted by Mukharjee A et al., which reported that higher unfavorable treatment outcomes were observed in PSN cases [9,10]. In this study males had higher risk of unfavorable treatment outcomes than the females (Relative risk=1.14; 95% Confidence Interval: 1.01-1.29.) which is supported by Akinola et al., study [11]. The mortality rate in male (71.21%), were significantly higher than female (p<0.001). Datiko et al., conducted a study on the treatment outcomes of TB patients and reported the same [12]. In this study death rate among adults were higher (80%) compared to pediatrics and geriatrics which is contradictory to the study conducted by Akinola et al. [11]. This may be due to the reason that there was more number of adult male who were new PSP patients [11]. Among the EPTB cases registered, there were 46% of Lymph node TB followed by 36% Pleural effusion, 11% others (spine TB, brain TB, miliary TB, osteomyelitis, cervical TB) and 7% Abdominal TB. Fader et al., also concluded that Lymph node TB comprised the greatest number of EPTB cases (37.3%, n = 44) followed in descending order by central nervous system, skeletal, pleural and abdomen [13].

Conclusion

This study concludes that, treatment success rate of DOTS during 2008 was 80.76% whereas in 2009 it was 77.77% which was not achieved the World Health Assembly 1991 criteria for monitoring TB control program. To conclude, the treatment success rate decreased from 2008 to 2009.

Acknowledgment

Table 3: Various factors that might affect treatment outcome among TB patients in 2008 and 2009.

Year	Variables		Treatment success		Odds Ratio	95%CI	p value
			Yes	No			
2008	Gender	Male	239	48	0.47	0.25 – 0.88	0.01
		Female	170	16	2.13	1.13 – 4.06	0.01
	Special population	Pediatrics	102	6	3.21	1.28 – 8.53	0.005
		Adult	269	48	3.36	1.29 – 9.00	0.005
		Geriatrics	38	10	0.72	0.30-1.76	0.42
	Type of patient	PSP	198	47	0.34	0.18- 0.63	0.0001
		PSN	88	6	4.02	1.63 – 7.06	0.02
		EP	123	11	0.56	0.34- 0.90	0.011
Year	Variables		Treatment success		Odds Ratio	95%CI	p value
			Yes	No			
2009	Gender	Male	167	35	0.44	0.21 -0.91	0.015
		Female	140	13	2.26	1.10 – 4.69	0.015
	Special	Pediatrics	54	1	9.3	1.34-185.13	0.008
		Adult	226	42	0.4	0.15-1.03	0.03
		Geriatrics	27	5	0.83	0.28 – 2.60	0.71
	Type of patient	PSP	139	32	1.43	0.91 – 2.26	0.099
		PSN	61	11	0.55	0.34 -0.92	0.014
		EP	107	5	1.11	0.70 – 1.77	0.644

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