FACTORS AFFECTING TUBERCULOSIS RETREATMENT DEFAULTS IN NANDED, INDIA

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Abstract. This study was carried out to determine factors affecting tuberculosis retreatment defaults in Nanded, India. All patients registered as tuberculosis retreatment cases (*n*=107 excluding deaths during treatment) were interviewed by home visits. Their sociodemographic characteristics and treatment history were recorded and later compared with their treatment outcomes. Among the patients registered for re-treatment of tuberculosis (*n*=112), 24 (21.4%) defaulted on treatment. The rate of default was 25.8% among those who had previously defaulted on treatment. Those who were employed, illiterate and alcoholics were 3.5, 3.5 and 3.4 times more likely to default, respectively, than others; these differences were significant.

Key words: tuberculosis, retreatment, compliance, factors

INTRODUCTION

India has been credited as being a pioneer of modern day directly observed treatment-short-course (DOTS) through qualitative research (WHO, 2001). Tuberculosis control activities in India are implemented under the Revised National Tuberculosis Control Program (RNTCP) and DOTS is the principle component of this program. RNTCP is recognized as the largest and the fastest expanding program in the world (Agarwal, 2005; Central TB Division, 2006). Although following up with people who default on DOT is an impor-

tant component of TB control, a significant proportion of patients do not complete treatment. Treatment compliance is especially important in re-treatment [Category (Cat) II] cases where treatment is lengthy, more intensive and has higher rates of resistance to one or more first line anti-TB drugs (Abate *et al*, 1998). Also chances of drug resistance increase with poor compliance of these patients (Kuadan *et al*, 2000; Espinal *et al*, 2001; Tuberculosis Research Center, 2001). This compliance problem emphasizes the need to determine the factors affecting defaults in these patients.

Tuberculosis control in the study area

The RNTCP has been implemented in Nanded, India since March 2003, with one urban tuberculosis unit consisting of four designated microscopy centers (DMCs) and 30 DOTS centers. When the data from the previous year were reviewed, a default

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Table 1
Previous treatment outcomes and status after retreatment.

Previous treatment status	Retreatment status		Total
	Completed treatment	Defaulted treatment	
Completed treatment	49 (72.1)	16 (66.7)	65 (70.7)
Defaulted treatment	19 (27.9)	08 (33.3)	27 (29.3)
Total	68 (73.9)	24 (26.1)	92 (100)

rate of 20.7% among retreatment cases was seen. Such a trend without any intervention will ultimately lead to high proportion of multi-drug resistant (MDR) tuberculosis, treatment failures and deaths among these cases. Therefore, the present study attempted to determine the default factors.

MATERIALS AND METHODS

Nanded is a holy city in Marathwada Province, of central India situated on the bank of the Godavari River. The population of Nanded City during the study period was 450,000 (Data obtained from City Tuberculosis Officer of the area).

Study population

One hundred twelve patients were registered for retreatment at the Nanded Tuberculosis Unit from January to December 2005. All these patients were followed up for treatment compliance and outcomes of treatment. Treatment cards and the tuberculosis register were reviewed to obtain this information. The definitions used for this study were those from the RNTCP guidelines (Central TB Division, 2005). The program defines a default as any TB patient not taking anti-TB drugs for two months or more consecutively after starting treatment. When a patient who has previously defaulted on treatment returns

for treatment, they are registered as treatment after default.

Data collection and analysis

This study was carried out from January 2005 to March 2007. Data were entered into Microsoft Excel and further analyzed with Epi Info (Version 3.5.1) and SPSS (15.0 Windows Evaluation Version September 2006). Proportions, the chi-square test, and the Fisher exact test were utilized as tools for bivariate analysis. Independent risk was evaluated by logistic regression. Differences in subgroups were expressed as 95% confidence interval (95% CI).

RESULTS

Of the 112 patients registered for retreatment of tuberculosis during the study period, 65 were smear positive, 42 were smear negative and 5 had extra pulmonary tuberculosis. Out of 65 smear negative cases, 13 had previously defaulted on treatment. Therefore, the default rate for smear positive tuberculosis retreatment patients was 20.0%. During the study, 15 patients died and the remaining 97 patients were available for assessment of outcome at the end of treatment. Eleven smear positive patients remained smear positive even after retreatment for five month and were registered as failure cases.

Table 1 shows the relationship be-

Table 2
Factors affecting treatment default in retreatment patients.

Factor	Defaulted (%)	Non-default[a] (%)	Total (%)	Level of significance
Sex				
Male	22 (28.2)	56 (71.8)	78 (80.4)	$p = 0.09$
Female	2 (10.5)	17 (89.5)	19 (19.6)	(Fisher exact test)
Religion				
Muslim	9 (36.0)	16 (64.0)	25 (25.8)	$\chi^2=2.38$
Hindu	11 (20.0)	44 (80.0)	55 (56.7)	$p=0.30$
Others	4 (23.5)	13 (76.5)	17 (17.5)	df=2
Marital status				
Married	20 (27.8)	52 (72.2)	72 (74.2)	$\chi^2=0.82$
Unmarried	4 (16.0)	21 (84.0)	25 (25.8)	$p= 0.3645$
Literacy				
Illiterates	17 (42.5)	23 (57.5)	40 (41.2)	$\chi^2 =9.96$
Literates	07 (12.3)	50 (87.7)	57 (58.8)	$p=0.0016$ df= 1
Employment				
Employed	15 (40.5)	22 (59.5)	37 (38.1)	$\chi^2=6.70$
Unemployed	09 (15.0)	51 (85.0)	60 (61.9)	$p=0.0096$ df= 1
Alcohol use				
Alcoholic	17 (40.5)	25 (59.5)	42 (43.3)	$\chi^2=8.41$
Non alcoholic	07 (12.7)	48 (87.3)	55 (56.7)	$p=0.0037$
Type of family				
Nuclear	6 (20.0)	24 (80.0)	30 (30.9)	$\chi^2=0.22$
Joint	18 (26.9)	49 (73.1)	67 (69.1)	$p=0.6$
Overcrowding				
Present	17 (28.8)	42 (71.2)	59 (60.8)	$\chi^2=0.84$
Absent	07 (18.4)	31 (81.6)	38 (39.2)	$p=0.35$
History of TB				
Present	3 (6.0)	2 (40.0)	05 (05.2)	$p=0.09$
Absent	21 (22.8)	61 (77.2)	92 (94.8)	(Fisher exact test)
Age (yrs)				
<14	0 (0)	1 (100.0)	1 (1.0)	$\chi^2 = 1.68$
15-24	3 (17.6)	14 (82.3)	17 (17.5)	$p= 0.079$
25-34	8 (25.8)	23 (74.2)	31 (32.06)	df= 4
35-44	7 (35.0)	13 (65.0)	20 (20.6)	
45-54	5 (21.7)	18 (78.3)	23 (23.7)	
55-64	1 (25.0)	3 (75.0)	4 (04.1)	
≥65	0 (0)	1 (100.0)	1 (01.0)	

[a]completed treatment
TB, tuberculosis

tween previous treatment default and status after retreatment, there was no significant relationship observed ($p=0.62$). Patients whose treatment was curtailed due to death ($n=15$) or failure ($n=5$) were excluded from analysis. Table 2 shows bivariate analysis performed on factors affecting default in retreatment cases. Literacy

Table 3
Factors associated with default and level of significance in logistic regression model.

Factor	Adjusted odds ratio	95% CI	p-value
Sex	3.962	0.61-25.77	0.150
Illiteracy	3.518	1.10-11.24	0.034
Employment	3.517	1.09-11.33	0.035
Alcoholism	3.414	1.04-11.22	0.043
Type of family	0.666	0.19-2.37	0.530
Overcrowding	1.257	0.37-4.25	0.713
History of TB	1.146	0.11-11.98	0.910

TB, tuberculosis

status, employment and alcoholism were found to be significantly associated with treatment default. Table 3 shows the independent association among these factors for treatment default by logistic regression. People who were illiterate, employed or alcoholics had 3.5, 3.5 and 3.4 times, respectively, the risk of defaulting during treatment of tuberculosis.

DISCUSSION

In the present study, the default rate among retreatment cases was 20.0%, which is higher than the national average (16.5%) during the study period (Central TB Division, 2008). During the initial years of implementation of DOTS, the default rate (especially in the retreatment category) was high. In a study of retreatment outcomes of smear positive tuberculosis cases in Bangalore City (Sophia *et al*, 2002) the default rate was 43.8%. In a study of tuberculosis retreatment cases in Morocco (Ottmani *et al*, 2006) the default rate was 27.9%. Although the DOTS program was functioning during the three years before commencement of the present study, the findings are consistent with other studies at the national level, defaulting on previous treatment is not significantly associated

with retreatment default (Table 1). However, some studies observed defaulters of previous treatment were potential defaulters during retreatment (Sophia *et al*, 2003).

Illiteracy (p=0.001), alcoholic addiction (p=0.003) and employment (p=0.009) were found to be significantly associated with treatment default. A study in India reported male gender (p=0.023, 95% CI 1.15-6.7) and alcoholism (p<0.0000, 95% CI 2.1-7.5) were risk factors for defaulting on treatment among tuberculosis retreatment cases (Sophia *et al*, 2003) (Table 2).

These three factors were further confirmed to be independently associated with defaulting by multiple logistic regression. Male gender (p=0.0001) and a history of prior TB treatment (p=0.01) have been reported to be associated with defaulting on retreatment (Sophia *et al*, 2002). In an Urban Tuberculosis Control Programe at the Denver Metro Tuberculosis Clinic bi-variate analysis revealed male gender, alcohol abuse and homelessness were significantly associated with non-compliance to DOTS (Burman *et al*, 1997). Multivariate logistic regression confirmed alcohol abuse (OR 3.0; 95% CI 1.2-7.5; p=0.02) and homelessness (OR 3.2; 95% CI 1.5-7.2; p=0.004) as factors

significantly associated with non-compliance to tuberculosis treatment.

Continued monitoring of treatment outcomes for relapses, failures and defaults is essential to assess the performance of tuberculosis control programs at the national level and to identify the most effective approaches for improving TB control (Ottmani *et al*, 2006). Counseling has been shown to be an important tool to address defauling on treatment (Liefooghe *et al*, 1999), thereby, reducing defaults during anti-TB treatment.

We recommend previous treatment defaults should be addressed seriously to prevent defaults on retreatment and development of drug resistance. Risk factors, such as illiteracy, employment and alcoholism needs to be further studied and appropriate modifications of the program need to be made to reduce treatment defaults and increase success rates.

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