

**STUDY OF TREATMENT OUTCOME OF NEW SPUTUM SMEAR
POSITIVE TB CASES UNDER DOTS – STRATEGY****DR. SULTAN RIZWAN AHMAD* ¹ AND DR. G. D. VELHAL²**

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ABSTRACT

Background: In India every year, 1.8 million new cases of TB occur, of which about 0.8 million are sputum positive pulmonary TB cases. This study attempts to find out the treatment outcomes of smear positive cases and factors that affect the outcome. **Methodology:** Community based prospective observational study was conducted in urban slums of Mumbai. Total 281 newly diagnosed sputum smear positive TB cases were selected, followed-up, and treatment outcome was obtained within 1 month after completion of continuous phase of treatment. **Results:** Tuberculosis is common among the illiterates (nearly 60 %) and labourers (53%), people below poverty line (90%), living in overcrowded houses (75%). In the present study, 42.7% were cured, 24.56% were treatment completed, 8.19% had died, and 4.98% were failure and 19.57% were defaulters after treatment. The cure rates and treatment completion were comparatively better in the age groups of 0-49 years (44.50 & 26.7%) and among females (53.85% & 32.31%). Defaulter, Death and failure are more in labourer (22.78%, 9.49 % & 7.59%) and illiterates (26.79%, 10.71% & 6.55%). Cure rates and treatment completion are low among smokers (39.1% & 21.85%) and tobacco chewer (29.73% & 16.22%). **Conclusion:** Lower cure rates and high defaulters are found to be associated with illiteracy and smoking, which can be modified by IEC and focus service delivery on high risk groups.

KEY WORDS: RNTCP, DOTS, Cured, Treatment completion, Defaulter**DR. SULTAN RIZWAN AHMAD**

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INTRODUCTION

Tuberculosis (TB) is one of the most ancient diseases. TB remains one of the biggest public health challenges facing the world today. Effective treatment against the disease has been available for over sixty years. Yet the disease is close to its highest levels ever and the World Health Organization declared TB as a global public health emergency in 1993¹. Despite the National TB Control Programme (NTP) being in existence since 1962, no appreciable change in the epidemiological situation of TB in the country has been observed. The HIV-AIDS epidemic and the spread of multi-drug resistance TB were threatening to further worsen the situation. In view of this, in 1992, Government of India, with WHO and SIDA reviewed the TB situation and performance of the NTP². To rectify lacunae, the Government of India, decided to give a new thrust to TB control activities by revitalizing the NTP, with assistance from international agencies. In 1993 the Revised National TB Control Programme (RNTCP) thus formulated with objective of at least 85 % cure rate among new sputum positive cases and detection of 70% of such type of cases, adopted the internationally recommended Directly Observed Treatment Short-course (DOTS)-Strategy, as the most systematic and cost-effective approach to revitalize the TB control programme in India.

Global scenario

The latest WHO report on tuberculosis states that the disease is a major cause of illness and death worldwide, especially in Asia and Africa. India, china, Indonesia, South Africa rank first to fifth respectively in terms of absolute number of cases. The 2007 estimate is that 8.8 million new TB cases occurred of which 7.4 million occurred in Asia and Sub – Saharan Africa with 1.6 million deaths¹. WHO estimated that 1.86 billion persons are infected with tuberculosis each year and 8.74 million of them develop tuberculosis and nearly 2 million die. This means that someone somewhere contracts TB every four seconds and one of them dies every 10 seconds³.

Indian scenario

India is highest burden country in the world and accounts for nearly 20% of the global burden of tuberculosis and two-thirds of the total cases in South-East Asia. Every year, 1.8 million new cases of TB occur in the country, of which about 0.8 million are highly infectious New Smear-Positive Pulmonary TB cases. Nearly 40 percent of the Indian population is infected with the TB bacillus. About 320,000 deaths occur each year, more than 1,000 every day, or two every three minutes⁴.

Justification of study

People living in urban slums are illiterate, and constitute the poor segment of the Indian population. They are more prone to tuberculosis due to various associated factors like frequent migration, socio-cultural behaviour, overcrowding, poor ventilation, air pollution. Because of poor knowledge and lack of health care services in urban slums they are at increased risk of treatment failure and defaulter. Under the TB control programme, priority is given to the smear-positive cases. Every smear-positive person if left untreated has potential to infect 10-15 persons per year, thereby increasing the pool of infected persons. Hence present study includes only new sputum smear positive cases because of their highest potential to infect others and hence priority for the cure. Present study made an attempt to find out the treatment outcomes of smear positive pulmonary tuberculosis cases and understand the factors influencing the outcome.

OBJECTIVES

- 1) To describe the distribution of new sputum smear positive TB cases according to social economic characteristics
- 2) To assess the treatment outcome of new sputum smear positive TB cases.
- 3) To assess the effect of socio economic factors on treatment outcome.

MATERIALS AND METHODS

The present community based, prospective, observational study was conducted over a

period of two and half years from April.2006 to September.2008, at Shivaji Nagar Urban Health Centre, Govandi which is a Designated Microscopy Centre (DMC) under RNTCP, located in eastern suburb of Mumbai. All newly diagnosed sputum smear positive TB cases (total 281), put on DOTS- strategy during the period 01/04/2006 to 31/03/2007 (4 quarters), belonging to the catchment area of Shivaji Nagar Urban Health Centre – DMC were included in the study. Patients were interviewed at their residence by the principle investigator with the help of preformed, pretested, semi-structured interview schedule, two times ,i.e. one month after initiation of treatment and one month after their treatment

outcomes were declared. Necessary permissions from the RNTCP authorities and local institution authorities were taken as per the protocol. Data collection tool included questions on socio-economic profile, personal habits, observance of DOT, difficulties in taking treatment, etc. Besides two direct interactions with the patients at their residences, they were also followed with TB register records while on treatment to ensure adherence to treatment and timely follow up sputum smear examinations. Data was entered using the MS Excel 2003 version, and descriptive and association analysis were done using SPSS version 11 and Graph Pad.

RESULTS AND DISCUSSIONS

Table 1
Distribution of TB cases (N = 281) according to social characteristics

Characteristics	Classes	Number	Percentage
Age	0-14	4	1.42
	15-49	187	66.55
	50 & above	90	32.03
Sex	Male	216	76.87
	Female	65	23.13
Literacy status	Illiterate	168	59.79
	Literate	113	40.21
Occupation	Labourer	158	56.23
	Business	23	8.19
	Professional	13	4.63
	Others	87	30.96
Marital status	Unmarried	26	9.25
	Married	215	76.51
	Diverse/separated	18	6.41
	widow/Widower	22	7.83
Type of family	Nuclear family	146	51.96
	Joint family	121	43.06
	Three Generation family	14	4.98
Economic status	Below poverty line	262	93.24
	Above poverty line	19	6.76
Over crowding	Present	213	75.80
	Absent	68	24.20
Type of habits*	smoking	197	70.11
	Tobacco chewing	37	13.17

*Multiple response**

TABLE 01: Majority of the study subjects belong to 15-49 years age group (66.5%). Similarly in a study done by Mayank Vats et al⁵ it was found that about 63% of patients were in the age group 21-40 years. In another

study done by Tachfouti N et al⁶ mean age of TB patients was 31.7 ± 12.0 years, which is the productive age. Hence it can be seen that TB seems more prevalent in the productive age group of 15-49 years, who are usually the

bread winners of their family, and their sickness can bring untold misery to their family. About three fourth (76%) of the study subjects were males. A similar finding was noted by Narang P, et al⁷ who in their study noted that, the prevalence of cases in both urban and rural area was higher in males. In another study done by Gopi P G. et al⁸ it was noticed that, 71% of the cases were males. Overall it seems to be a higher prevalence of infection in males compared to females, may be because they are more exposed to environmental factors causing Tuberculosis. In the present study nearly 60 % of study subjects were illiterate. In a study done by Mayank Vats, et al⁵ it was noticed that, 43% of TB cases were illiterates. Study conducted by Gopi PG, et al,⁸ noticed that 39% of the TB cases were illiterate. Tuberculosis is more common among the illiterates as compared to the literates⁴. Majority (53%) of patients were labourers. Jagodziński J, et al⁹ noticed that, nearly 57% of patients were labourers. Labourers seem to be more prone to TB infection because of various social factors like poor quality of life, poor housing, overcrowding, lack of education etc. In the study population, majority of the individuals were married (76%) and 52% of them

belonged to nuclear family. More than 90% of the study population was below the poverty line. The present study correlates with the following studies: Muniyandi M. et al¹⁰ noted that, the prevalence of TB was higher amongst the landless those living below the poverty line suggesting that TB disproportionately affects those with a low SLI (Standard Living Index). Mayank Vats, et al⁵ also noticed that, TB increases with low socioeconomic background (75%). Majority households of the study subjects were over crowded (75%), which highlights the influence of overcrowding in occurrence of tuberculosis. Poor housing and overcrowding are some of the other non-medical factors inter related with tuberculosis⁴. Tobacco consumption was the predominant habit - 70 % of study subjects were smoker while 13% were tobacco chewer. This finding is comparable to a study done by Mayank Vats et al⁵ that noticed about 61% of TB cases were smokers and Gopi P G, et al⁸ noticed that 41% TB cases were smokers. Smoking and alcoholism may alter the immunity status i.e. cell mediated responses, which is important to limit the multiplication and spread of bacilli, thereby predisposing the individual for tuberculosis.

Table 02
Treatment outcome

Treatment outcome	Number	Percentage
Cured	120	42.70
Treatment completed	69	24.56
Died	23*	8.19
Failure	14**	4.98
Defaulter	55	19.57
Total	281	100.00

*Among 23 deaths, 15 cases were Defaulters,
** among 14 failure cases, 10 were Defaulters

TABLE 02: In the present study, 42.7% were cured, 24.56% were treatment completed, and 8.19% died. Similar cure rates were seen in studies done by Salami AK, et al¹¹ where the cure rate was 43.7% and Neher A, et al¹² where the cure rate was 30-40%. In the present study defaulters were 19.57% which

was comparable to studies done by Dodar EA¹³ (14% defaulted), Masthi NR, et al¹⁴ (22% defaulted) and Egbewale BE, et al¹⁵ (14.4% defaulted),. In the present study failure rate was nearly 5% and was comparable to studies done by Kumar A et al¹⁶, (4.2%), and Egbewale BE et al,¹⁵ (3.8%).

Table 03
Association of Age with Treatment Outcome

Treatment outcome	0-49		50 & above		total	
	Number	percentage	Number	percentage	Number	percentage
Cured	85	44.50	35	38.89	120	42.70
Treatment completed	51	26.70	18	20.00	69	24.56
Died*	9	4.71	14	15.56	23	8.19
Failure**	6	3.14	8	8.89	14	4.98
Defaulter after treatment	40	20.94	15	16.67	55	19.57
Total	191	100.00	90	100.00	281	100.00

$\chi^2=14.373$, $df=4$, $P=0.0062$

TABLE 03: The cure rate was comparatively better in the age groups of 0-49 years. While failure and died were more in age group >50 years. Arora VK, et al¹⁷ noted that the younger TB patients showed better sputum conversion rate when compared to geriatric TB patients. This is because many other diseases are also present in old age that makes a person more at risk of death.

Table 04
Association of Sex with Treatment Outcome

Treatment outcome	Male		Female		total	
	number	percentage	Number	percentage	Number	percentage
Cured	85	39.35	35	53.85	120	42.70
Treatment completed	48	22.22	21	32.31	69	24.56
Died*	21	9.72	2	3.08	23	8.19
Failure**	12	5.56	2	3.08	14	4.98
Defaulter after treatment	50	23.15	5	7.69	55	19.57
Total	216	100.00	65	100.00	281	100.00

$\chi^2=13.938$, $df=4$, $P=0.0075$

TABLE 04: In the present study the cure rate was more in females (nearly 53%) when compared to males (nearly 39.35%). Similar findings were found in the study done by Dandona R, et al¹⁸ which showed that 79.9% of women and 74.4% of men were cured. Treatment completed is also more (32%) among females as compare to males. Study done by Date J and Okita K¹⁹ shows that more females than males completed treatment. Supervision by male relatives contributed to completion of treatment among female patients. In the present study the death rate

(9%), failure (5%), and defaulter (23%) were more in males. Study done by Dodor EA¹³ found that default from treatment was significantly associated with male sex¹³. A study done by Kolappan C et al²⁰ found that the standardized mortality ratio (SMR), was 9.1 for treatment failures and 7.8 for defaulters. As we have found that treatment failure and defaulter is more among male hence death is also high among male. Another reason could be, that males are exposed to many environmental factors, habitual smokers and alcoholics.

Table 05
Association of occupation with treatment outcome

Treatment outcome	Labourer		Business & Professional		Others		total	
	No	%	No	%	No	%	No	%
Cured	60	37.97	19	52.78	41	47.13	120	42.70
Treatment completed	35	22.15	13	36.11	21	24.14	69	24.56
Died*	15	9.49	1	2.78	7	8.05	23	8.19
Failure**	12	7.59	1	2.78	1	1.15	14	4.98
Defaulter after treatment	36	22.78	2	5.56	17	19.54	55	19.57
Total	158	100.00	36	100.00	87	100.00	281	100.00

$\chi^2=15.564$, $df=8$, $p=0.0491$

TABLE 05: Cure rate was high (52%) among professionals and businessmen while in labourer it was nearly 38%. Defaulters were more in labourer (22%) as compared to professionals and businessmen (5%). Death and failure is also high among the labourers,

9.49% and 7.59% respectively. Similar results were also found in a study done by Mishra P et al²¹ that Low socio-economic status and particularly lack of money, are important risk factors for defaulters to TB treatment.

Table 06
Association of Literacy status with treatment outcome

Treatment outcome	Illiterate		Literate		Total	
	number	percentage	Number	percentage	n	%
Cured	59	35.12	61	53.98	120	42.70
Treatment completed	35	20.83	34	30.09	69	24.56
Died*	18	10.71	5	4.42	23	8.19
Failure**	11	6.55	3	2.65	14	4.98
Defaulter after treatment	45	26.79	10	8.85	55	19.57
Total	168	100.00	113	100.00	281	100.00

$\chi^2=24.24$, $df=4$, $P<0.000$

TABLE 06: Cured and Treatment completed were more among literates (53.98% and 30%) than illiterates (35.12% & 20%). Defaulters were more among illiterates (26.79%) than literates (8.85%). Died and failure is also high among illiterate 10.71% and 6.55% respectively. Similar result is also found in a study done by de Albuquerque Mde F et al²²

that illiteracy is associated with three negative tuberculosis treatment outcomes (treatment failure, dropout, and death). This is because of lack of knowledge and ignorance about importance of prompt and adequate treatment among illiterates and hence adverse outcomes.

Table 07
Association of personal Habits* with treatment outcome**

Treatment outcome	Smoking		Tobacco Chewing	
	Number	Percentage	Number	Percentage
Cured	77	39.09	11	29.73
Treatment completed	43	21.83	6	16.22
Died	21	10.66	5	13.51
Failure	12	6.09	5	13.51
Defaulter after treatment	44	22.34	10	27.03
Total	197	100.00	37	100.00

***Multiple responses
Smoking: $\chi^2=13.145$, $df=4$, $p=0.0106$
Tobacco chewing: $\chi^2=11.799$, $df=4$, $p=0.0189$

TABLE 07: Cure rate was low among smokers (39%) and tobacco chewer (29%) similarly treatment completion was also low among smokers (21%) and tobacco chewers (16%), while death and failure were also high among smokers (10% and 6%) and tobacco chewers (13.5% and 13.5%). Similar result was also found in study done by Chiang YC et al²³ that a high level of tobacco consumption (>20 cigarettes per day) was significantly associated with a decreased odds of cure or treatment completion. Smoking and tobacco

may alter the immunity status and hence chance of failure increases.

CONCLUSION

Present community based descriptive epidemiological study concluded that Tuberculosis is prevalent in the productive age group of 15-49 years, and in males, maybe because they are more exposed to conducive environmental factors. Tuberculosis is

common among the illiterates (nearly 60 %), labourers (53%), people below poverty line (90%), and living in overcrowded houses (75%), all these are social factor that contributes to the occurrence and spread of tuberculosis. Smoking was the predominant habits among study population which make person more susceptible to TB infection. In the present study, 42.7% were cured, 24.56% were Treatment completed, 8.19% died, 4.98% were failure and 19.57% were defaulters after treatment. The cure rates and treatment completion were comparatively better in the age groups of 0-49 years and among female, while failure and death were more in age group >50 years and in males. Cure rate and treatment completed were high in professionals and businessmen and literates. Defaulter, Death and failure were more in labourer and illiterates. Cure rates and treatment completion were low among smokers and tobacco chewers while defaulter

death and failure were high among smokers and tobacco chewers. Lower cure rates and high defaulters were found to be more in illiterate and smokers, so there is lot of scope to involve more and more stakeholders of community like traditional healers, school teachers, community volunteers and local leaders, in strengthening relevant IEC measures. Mobilization of the community resources in the fight against tuberculosis in a planned manner under the leadership of local health functionaries may be of an immense help in this respects taking into account the socioeconomic profile of these patients.

LIMITATIONS

Influence of some of the important socio economic factors such as purchasing power of the study subjects, treatment initiation variables, pattern of receiving DOT, concurrent effect of other health problems are not covered in the present study.

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