

PATIENT CHARACTERISTICS ASSOCIATED WITH NON-ADHERENCE TO ANTI TUBERCULOSIS TREATMENT IN SRI LANKA

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ABSTRACT

Introduction: Sri Lanka had achieved a significant improvement in the tuberculosis control including a reduction of the default rate since introduction of the DOTS strategy to the National TB control Programme in 1997. Patients' adherence to anti TB treatment may be measured using either process oriented or outcome oriented definitions. Default rate is an outcome oriented definition that may be used as an indicator of poor patient adherence to anti TB treatment. One of the main obstacles in achieving the best tuberculosis (TB) control is that patients do not complete full course of anti TB treatment. A prospective cohort study was carried out with the objective to identify patient characteristics that associate with defaulting anti tuberculosis treatment

Methodology: This was a prospective cohort study of new smear positive pulmonary tuberculosis patients registered for treatment between 1.6.2008 and 31.8.2008 in seven districts in Sri Lanka. Data on the patient characteristics and the plan of management were collected at the beginning of the treatment using a pre tested structured questionnaire. During the follow up and at the end of the treatment, results of sputum microscopy and the treatment outcome were recorded. The patients who interrupted treatment for 2 months or more (defaulters) during the course of treatment were again investigated in the field. In the statistical analysis, patient characteristics of the defaulters were compared with the characteristics of patients who were cured.

Results: There were 22 defaulters giving a default rate of 4.59%. Being a male, poor educational background, having a casual job, regular smoking, and regular alcohol use were significantly associated with defaulting treatment ($p < 0.05$). Sinhalese had lower default rate than other ethnic groups. At the field investigation, 43% of the defaulters were found not living in the addresses given to the treatment providers. Field investigators have further reported that financial reasons, substance abuse, feeling well, and lack of family support also as causes of defaulting treatment.

Conclusion: Identification of risk factors by careful patient interview, early home visit, and monitoring of patient behaviour early in the course of treatment will help to predict whether adherence is likely to be a problem. So that, the treatment provider will be able to arrange a flexible and patient centered approach to ensure maximum adherence.

Key words: Non-adherence, Anti-TB Treatment, Sri Lanka

INTRODUCTION

Patients' adherence to anti TB treatment may be measured using either process oriented or outcome

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oriented definitions.¹ Default rate is an outcome oriented definition that may be used as an indicator of poor patient adherence to anti TB treatment. One of the main obstacles in achieving the best tuberculosis (TB) control is that patients do not complete full course of anti TB treatment. Review of annual reports of the National Programme for TB Control in Sri Lanka since year 2000 to 2008 reveals that default rate accounted for a large proportion of unfavourable treatment outcomes in any category of tuberculosis patients registered

for anti TB treatment. Non-adherence to correct treatment increases the risk of spreading the TB infection in the community and development of drug resistance in the patient.²

Sri Lanka had achieved a significant improvement in the tuberculosis control including a reduction of the default rate since introduction of the DOTS strategy to the national TB control programme in 1997. The default rate of 14.8 among new smear positive pulmonary TB patients registered in the year 2000 was gradually reduced up to 6.2 among those registered in 2005.^{3,4} In the same category of patients the cure rate increased from 74.9 to 82.9 during the same period. The Fixed Dose Combination (FDC) chemotherapy was then introduced in 2005 to simplify administration of drugs and to improve the patient adherence to correct treatment regimen. FDC drugs too are said to be a quality combination of anti TB drugs. However, annual statistics of the national programme in subsequent years did not indicate a significant improvement of treatment success including reduction of default rate (Table 1). Reasons for non progression of treatment success may be multifactorial including patients continue to interrupt anti TB treatment.

Table 1. Selected outcome indicators of new sputum positive PTB cases registered in Sri Lanka 2000-2007

Year	Total number registered	Cure rate	Default rate
2000	4314	74.9	14.8
2001	4316	77.0	13.2
2002	4297	77.5	12.1
2003	3652	77.7	10.6
2004	4302	81.6	8.4
2005	4841	82.9	6.2
2006	4431	83.3	6.7
2007	4477	83.6	7.1

Source – National Programme for Tuberculosis Control and Chest Diseases

In practice it is the patient who is frequently blamed for interrupting the treatment. Literature review reveals that factors associated with adhering to anti TB treatment are multiple. These factors include patient characteristics, the relationship between healthcare provider and patient, social support, cultural influence, the treatment regimen

and the health care setting.^{1,5} It is interesting to investigate risk factors for non-adherences in the Sri Lankan context too. The aim of this study was to identify patient characteristics that associate with defaulting anti TB treatment.

METHODOLOGY

This was a prospective cohort study conducted in seven districts - Anuradhapura, Badulla, Colombo, Galle, Kegalla, Kurunegala, and Nuwara Eliya. The criterion used to select districts for the study was to have a proportionate representation of urban, rural, and estate populations in Sri Lanka in the study sample. All the selected districts had district TB clinics and qualified staff, laboratory facilities, and substantial number of patients attending for anti TB treatment. The study sample comprised of all new smear positive pulmonary tuberculosis patients registered for anti tuberculosis treatment (ATT) between 1.6.2008 and 31.8.2008. Ethical clearance was obtained from the Ethical Review Committee, Faculty of Medicine, University of Peradeniya, Sri Lanka. The patients were recruited for interview after obtaining informed consent to participate in the study.

An interviewer administered pre-tested structured questionnaire was used to collect data. Each patient's demographic profile, smoking, drug abuse and alcohol habits, details of past illnesses, and details of pre-treatment sputum examination results were recorded at the time of starting anti TB treatment. Patients who reported smoking more than 5 cigarettes a day for the last 5 years were considered as regular smokers and patients who reported consuming alcohol at least once a week for the last 6 months were considered as regular drinkers. Persons who have admitted themselves as current drug users (those who inhale or inject narcotic substances at present) were recorded as drug users. During the follow-up, sputum examinations (*DS X 2*) were done at two, five and six months of treatment. At the end of one year, treatment outcomes of all patients were recorded.

Patients who had been reported as having interrupted treatment continuously for more than 2 months during the course of treatment were identified as defaulters. These patients were

selected to analyse their personal characteristics that are associated with default. A field investigation was carried out using a check list to find out more information about these defaulters. The check list included a number of items to inquire whether the defaulter had given correct answers at the initial interview, level of the family support, was service provider unsupportive, financial status of the patient, and any other factors that contributed to the defaulting treatment.

Data collection was conducted by a group of trained data collectors under the direct supervision of the District Tuberculosis Control Officers (DTCO) of the respective district chest clinics. Each group comprised of a medical officer, a nursing officer and a field investigator (Public Health Inspector).

Patient characteristics that are associated with defaulting treatment were analyzed using the data collected by the questionnaire. In the statistical analysis, selected variables of defaulters were compared with the same variables of patients who had been reported as cured at the end of six months of treatment. The statistical tests (chi squared tests) were carried out using Minitab 14 statistical software. The $p < 0.05$ was considered as statistically significant. Findings of field investigations were summarized at the end of statistical data analysis.

RESULTS

A total of 462 new smear positive PTB patients had been enrolled from the seven districts during the study period. Four patients were excluded from the sample as they had been in different categories of treatment. Therefore the actual sample size was 458.

Personal characteristics of the patients

The patients of the sample were aged between 11 and 83 years with a mean of 43.6 years (SD 15.81Y). Majority of the patients were males (71.62%). Sinhalese constituted 75.8% of the entire sample. A majority of the respondents (58.73%) had studied up to the level of secondary school education while 7.4% had never gone to school. A majority of the patients (86.2%) reported living

in the own residence and most of the others were living in a close relative's house. More than 80% of the patients were identified as economically active (employed, house wives or studying) at the time of diagnosis (Table 2). A majority (79%) of patients had expressed willingness to attend a local health centre for daily observed treatment while 6% had strongly refused to do so.

Table 2. Demographic profile of the patients (n = 458)

Variable	Number	Percentage
Age (Years)		
< 15	04	00.87
16 – 30	103	22.49
31 – 45	129	28.17
46 – 60	162	35.37
61 <	60	13.10
Sex		
Male	328	71.62
Female	130	28.38
Ethnicity		
Sinhalese	347	75.76
Tamil	52	11.35
Moor	52	11.35
Other	07	01.54
Highest level of education		
Not gone to school	34	07.42
Primary	143	31.22
Secondary	269	58.74
Higher	12	02.62
Current place of residence		
Permanent (own)	395	86.24
Street	04	00.87
Work place	12	02.62
Boarding house	07	01.53
Hostel	03	00.66
Relatives house	32	06.99
Prison	05	01.09
Occupation		
Permanent employee in government or private sector	68	14.85
Self employed	71	15.50
Casual labourer	91	19.87
Agricultural worker	40	08.73
Student	28	06.11
House wife	74	16.16
Retired or other	53	11.57
Un – employed	33	07.20

Nearly one third (31%) of the sample was identified as regular smokers and one fifth (20.5%) of the sample was identified as regular drinkers. A few patients (3.7%) had reported as having abused narcotic drugs (Table 3). Of the total, none of the female patients were identified as either regular smokers or alcohol and narcotic drug abusers.

Table 3. Distribution of patients by smoking, alcohol and drug abuse (n = 458)		
Variable	Number	Percentage
Smoking		
Regular smoker	141	30.79
Never / occasional	317	69.21
Alcohol use		
Regular drinker	94	20.52
Never / occasional	364	79.48
Narcotic drug use		
Yes	17	3.71
No	426	93.01
Not known	15	03.28

A total of 77 (17.9%) patients had reported as having diabetes mellitus and 25 (5.81%) patients had reported as having chronic respiratory diseases (Table 4). Eighteen patients had reported as having multiple diseases which included diabetes (16), respiratory diseases (3), renal diseases (1), liver disease (1), and other diseases (14) in 2 or more combinations. Grading of the initial bacillary load in sputum samples was recorded in 426 patients and a majority (45.5%) had one plus (Table 5).

Table 4. Presence of co-morbidity reported by the patients (n = 430)		
Disease	Number	Percentage*
Diabetes	77	17.91
Renal diseases	04	00.93
Liver diseases	01	00.23
Cancer	01	00.23
Respiratory diseases	25	05.81
Other	26	06.04
No disease	313	72.79

* Percentages will not add to 100 due to the presence of multiple responses

Table 5. Pre treatment sputum grading (n = 426)		
Grading	Number	Percentage
Scanty	24	05.64
One plus	194	45.54
Two pluses	93	21.83
Three pluses	115	26.99

Four hundred and thirty six (95%) patients had been started on ATT under directly observed treatment (DOT). Of them, 84.63% had been put on daily DOT and the balance had been put on intermittent DOT on regular basis. Five percent had self-administered treatment. For a majority (67.2%) of the patients, DOT was arranged only for the intensive phase of the treatment. Government health care workers accounted for 86% of the DOT supervisors. The remaining 14% comprised of community volunteers and health workers in the private sector.

Three hundred and seventy eight (82.53%) patients were reported as cured and 28 patients (6.11%) were reported as treatment completed. Thus the overall success rate was 88.64%. A total of 51 (11.14%) patients were found to have had unfavourable treatment outcomes (death, defaulted and treatment failure) (Table 6).

Table 6. Treatment outcome of the sample (n=458)		
Outcome	Number	Percentage
Cured	378	82.53
Treatment completed	28	06.11
Transferred out	01	00.22
Death	22	04.80
Defaulted	21	04.59
Failure	08	01.75
Total	458	100.00

Twenty one patients had defaulted treatment, giving a default rate of 4.59%. Among them, 10 (48%) had defaulted during the intensive phase of treatment. The Colombo district reported the highest (7.6%) default rate. According to the questionnaire all defaulters had been arranged DOTS in government health centres either daily (80%) or intermittent (20%) basis. Ninety percent of them had voluntarily consented that they could attend the treatment centre daily for treatment.

Of the total of 378 patients who reported as cured we selected those who had converted sputum at the end of the intensive phase of treatment and remained negative at the end of 5 and 6 months. There were 335 such patients. Personal characteristics of those patients were then compared with the defaulters using chi-squared test. Being a male, poor educational background,

having a casual job, and regular smoking and regular alcohol use were significantly associated with defaulting treatment (Table 7). Ethnic groups other than Sinhalese had relatively higher default rate while age, type of residence, initial sputum grading, and co-morbidity did not show a significant association with defaulting treatment.

The field investigation of defaulters revealed that 9 (43%) of the defaulted patients were not living in the addresses given to the district chest clinic and therefore were untraceable. Among the remaining defaulters, the reasons for default according to the opinions of the field investigators were financial constrains, substance abuse, feeling well, and lack of family support.

DISCUSSION

Sri Lanka has achieved global targets of case detection and treatment success in 2005. The case detection rate for 2007 was 85.6% and treatment success for the 2006 cohort of new smear-positive cases was 87%.⁶ However, among the unfavourable treatment outcomes, proportion of default is substantial.⁶ Adhering to daily treatment is not an easy task for a patient or a treatment provider. In this study, 21 patients had defaulted treatment for two months or more giving a default rate of 4.59. Being a male, being a casual employee, poor educational background, being a regular smoker and regular use of alcohol were significantly associated with defaulting treatment. None of the female patients of the sample had reported regular smoking and alcohol use, and only less than 1% had reported having casual jobs. These could be the main contributing factors for reporting significantly low default rate among female patients. A relatively higher percentage of patients in minority ethnic groups (Tamil and Moor) had defaulted treatment (Table 7). The place of residence, whether permanent or not, did not show a significant difference in relation to defaulting treatment. However, field investigation revealed that 43% of defaulted patients were not living in the addresses given to the district chest clinics. But, they all had indicated at the initial interview that they lived in permanent residences.

In a study conducted in Singapore, self-reported

reasons for default had been described as financial difficulties, pressure of work, side effects, hospital admission, and physical hardships.⁷ Poor interaction between DOT providers and patients had been demonstrated as a cause of poor treatment adherence in Nepal.⁸ The present study showed that all defaulters had been arranged DOT in government health centres and nearly 50% of them had defaulted treatment during intensive phase of treatment. Health workers in the state health institutions are the main category of DOT providers in Sri Lanka. We observe that excessive use of state health centre based DOT carries certain disadvantages for patients. For example, some patients have to travel long distances for treatment on daily basis spending more money and experiencing physical hardships. Due to non-flexibility in time in the state health service, patients tend to lose their working time and therefore lose income when they attend for daily DOT. Similar problems of attending DOT centres were also reported in Nepal.⁹ The same study further reported that social stigma attached to the disease, poor patient counseling by treatment providers, and consultation of traditional healers by TB patients also contributed to defaulting treatment. A study conducted in the Kandy district, Sri Lanka investigated the usefulness of recruiting trained family members as DOT providers in selected patients.¹⁰ The results were encouraging in relation to treatment adherence. According to that study, the important prerequisites to ensure successful family DOT include correct selection of patients and DOT providers, giving adequate instruction for treatment adherence, and regular monitoring of drug intake by home visits.

We observed some limitations of our study. The present study did not systematically investigate the service factors associated with defaulting treatment. However some weaknesses of the service were identified while investigating defaulted patients in the field. For example, a large number of defaulters had not given proper information about their place of residence. This had not been identified by the treatment providers until those patients were investigated in the field for defaulting treatment. The calculated default rate for the study sample was 4.59. According to the

Table 7. Comparison of selected variables of defaulters with those of patients who cured within six months of treatment						
Variables	Cured patients		Defaulters		χ^2	P value
	Number	%	Number	%		
Sex						
Male	233	92.46	19	7.54	4.18	0.04
Female	102	98.07	02	1.93		
Age						
< 45	171	95.54	8	4.46	1.32	0.25
≥ 45	164	92.65	13	7.35		
Ethnicity						
Sinhalese	262	95.27	13	4.73	2.98	0.08
Other	73	90.12	8	9.88		
Education						
≤ Primary	109	87.20	16	12.80	16.528	0.000
≥ Secondary	226	97.83	05	2.17		
Residence						
Permanent	289	94.13	18	5.87	0.005	0.943
Other	46	93.87	03	6.13		
Occupation						
Permanent	55	96.49	02	3.51	4.976	0.026
Casual	60	84.51	11	15.49		
Smoking						
Regular smoker	87	89.69	10	10.31	4.67	0.031
Other	248	95.75	11	4.25		
Use of alcohol						
Regular drinker	61	85.91	10	14.09	10.705	0.001
Other	247	96.14	11	3.86		
Initial sputum grading						
Scanty & one plus	173	94.53	10	5.47	0.226	0.635
Two & three pluses	139	93.29	10	6.71		
Co- morbidity						
Reported "yes"	87	96.66	3	3.34	1.56	0.212
Reported "no"	226	93.00	17	7.00		

annual statistics of the seven districts default rate of same category of patients in the same year was 7.1. One possibility for reporting higher default rate in the annual statistics may be due to miscounting of TB deaths as defaulters without investigating the reason for default. On the other hand health workers of the respective districts may have taken extra precautions to reduce the incidence of premature interruption of treatment by the study sample.

CONCLUSION

Demographic factors identified as risk factors for defaulting treatment are not amenable to intervention for immediate behaviour change.

Identification of risk factors by careful patient interview, early field investigation (home visit), and monitoring of patient behaviour early in the course of treatment will help to predict whether adherence is likely to be a problem. So that, the treatment provider can plan a flexible patient centered approach to ensure maximum adherence. Service factors that associate with premature interruption of treatment by patients should also be investigated and corrected.

ACKNOWLEDGEMENTS

This study was funded by the GFATM. We are grateful to the patients who participated in this study. We sincerely thank the staff of the chest

clinics for collecting data and Dr. Hemantha Herath (consultant community physician, Ministry of Health) for technical advice.

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