

**Predictors of defaulting from anti-tuberculosis treatment
in selected townships of Upper Myanmar**

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Defaulting from tuberculosis (TB) treatment is one of the major barriers to its control. The cure rate and treatment completion rate can be improved if the predictors of defaulting behavior are known in advance. A case-control study was conducted in TB centers of selected townships of Upper Myanmar from August 2006 to July 2007 to investigate the predictors of defaulting from treatment. Total 400 patients (100 with defaulting behavior and 300 regular treatment takers) participated in this study. The significant predictors were age more than 25 years, migratory patients, poor patients, patients with risk behaviors, patients not received early health education, patients lived more than 5 kilometers from clinics, patients who had to travel more than 15 minutes to clinic, and bad social dealing of staff. The changeable factors like risk behavior of patients, giving adequate and timely health education and patients' satisfaction with health services should be improved to reduce the default from anti-TB treatment.

INTRODUCTION

Tuberculosis (TB) remains a serious public health problem worldwide although it is a curable disease. WHO estimates more than eight million new cases and 1.87 million deaths each year due to TB [1]. Myanmar is one of the 22 countries with the highest burden of TB in the world and was ranked 19th position in 2005 [2].

In Myanmar, the treatment success rate has been achieved the WHO recommended rate of 85% in 2006 [3]. Yet, defaulter prevention is still essential for sustainability of treatment success rate as well as the prevention of relapse and drug resistance.

Several studies have investigated the possible risk factors associated with default from anti-TB treatment. Studies conducted in Africa, Asia and Latin America showed different reasons for default. The main reasons are lack of time to visit a health facility regularly [4, 5], lack of money for transport [4], poverty, lack of material incentives [6] and most of all lack of infor-

mation or insufficient health education [4, 6, 7, 8].

Even though it is a well-known phenomenon, in Myanmar, there are relatively few studies on possible causes of default from anti-TB treatment. A study in Kyaing-tone discovered that low education, lack of knowledge, ignorance and language barriers were major social factors influencing the default from treatment [9]. Social and economic problems of the patient, sense of wellbeing soon after treatment and problem encountered with health staff [10], traveling to other places, drug side effects [10, 11] were found to be the main reasons of defaulting in Yangon Division.

A better understanding of the various factors responsible for defaulting from treatment could help to achieve high cure rate and better patient compliance. Therefore, this study was conducted in Upper Myanmar to determine the predictors of default from anti-TB treatment in selected township TB centers.

MATERIALS AND METHODS

A case-control study was conducted from August 2006 to July 2007. All patients with defaulting behavior, patients who took anti-TB treatment with missing doses for less than 2 months and patients who missed from treatment more than 2 months, were investigated as cases while the regular treatment takers who took anti-TB treatment more than 5 months duration were treated as controls. Three regular treatment takers immediately registered after patient with defaulting behavior in the township TB register were taken as controls. The factors responsible for defaulting behavior were investigated retrospectively.

This study was conducted in selected township TB centers of Kyaukse, Myitthah, Singkaing, Tadaroo, Meiktila, Myingyan and Kyaukpadaung Townships.

Almost all cases with defaulting behavior during the study period were traced and included in this study. However, minority of recent defaulters who were not accessible to follow were excluded from the study.

The sample size was calculated using the Epi-table calculator program of Epi-Info version 6.04d software in the sample size calculation tab valid for case-control studies. The input criteria for sample size estimation were: assuming odds ratio worth detecting as 2, percentage of exposure among controls as 50%, 5% alpha risk, at 95% confidence interval, 20% power of the test and a ratio of 1:3 for cases to controls. The minimum number of cases required was 98, minimum number of controls required was 294 and thus the minimum sample size was 392. A total of 400 patients, 100 patients with defaulting behavior and 300 regular treatment taking patients were involved in the study.

The township TB registers were reviewed and the sputum positive pulmonary TB patients, both new (treatment category I) and old (treatment category II) were identified. Then their treatment regularity

was noted and the patients who had defaulting behavior were identified. The characteristics of cases and controls were compared to find out the predictors of default from treatment.

The questionnaire was tested for content validity to determine whether it measured what it was intended to test. Internal consistency of the items of the questionnaire was tested calculating Cronbach's alpha. Interrater and intrarater reliability of the questionnaire were also checked.

Irregular and regular treatment takers were interviewed using a pre-tested and structured questionnaire to collect information regarding the potential predictors of defaulting such as socio-demographic characteristics, knowledge of tuberculosis, accessibility to township TB centers, receiving health education and satisfaction with healthcare providers.

Summation scores for knowledge of TB and satisfaction with healthcare service provider were rated as adequate if the total scores obtained equal or more than the mean value. Those obtained below mean value were rated as inadequate.

Data were entered into computer using Epi-data version 3.02-software in the field. The record files were checked for completeness and accuracy as soon as the completion of daily data entry. Any incompleteness in the raw data was recollected as soon as possible before leaving from the field. Data analysis was performed by using R-Gui statistical software.

Ethical consideration

This study was approved by the Institutional Ethical Committee of Department of Medical Research, Upper Myanmar. The research work was inline with existing standard and routine procedures practiced by National TB Control Program. The fundamental principles of ethics and research on human participants were upheld throughout the study. For the confidentiality of the patients, interviews were carried out

after obtaining informed consent from each and every participant and the data were kept and analyzed under a secluded atmosphere.

RESULTS

Patients with defaulting behavior were taken as cases from selected township TB centers; 22 from Kyaukse, 4 from Singkaing, 3 from Myitthah, 2 from Tadaroo, 18 from Meiktila, 28 from Myingyan and 23 from Kyaukpadaung. Three regular treatment takers immediately registered after patient with defaulting behavior from the same township TB register were taken as controls. A total of seven irregular treatment takers, three in Myingyan, another three in Kyaukse and one in Singkaing were followed up through household visits, interviewed and returned to respective TB center. Three recently defaulted patients (identified in TB register) were lost to follow up, so that excluded from the study. Another three patients with defaulting behavior were identified again to fulfill the desired sample size.

Among the socio-demographic characteristics, age, occupation, income, risk habits and HIV status revealed significant determinants of defaulting behavior in anti-TB treatment. However, there was no significant difference in education, sex, marital status and treatment category between cases and controls (Table 1).

Regarding knowledge of TB, approximately half of the patients (in both case and control groups) could not give adequate information regarding cause of tuberculosis, mode of transmission, signs and symptoms, treatment availability, time of sputum recheck and duration of treatment. No significant difference was also found regarding sources of information ($p>0.05$).

Health education by township TB coordinator or assigned staff at township TB centers before and at the start of treatment revealed beneficial effect on treatment regularity (Table 2). Those patients who did not receive health education regarding mode

Table 1. Socio-demographic characteristics of patients enrolled in the study

Variable	Case n= 100 no. (%)	Control n= 300 no. (%)	Chi- square (for trend)	p value	Crude OR
<i>Age group (Years)</i>					
<25	13 (13)	96 (32)	15.55	0	1
25-44	47 (47)	134 (44.7)			2.59
45-54	14 (14)	25 (8.3)			4.14
≥55	26 (26)	45 (15)			4.27
<i>Occupation</i>					
Stable	74 (74)	257 (88)	11.13	0.001	1
Migrants	26 (26)	35 (12)			2.58
<i>Income (Kyats per month)</i>					
> 60,000	29 (29)	144 (48)	21.32	0	1
30,001-60,000	25 (25)	93 (31)			1.33
≤30,000	46 (46)	63 (21)			3.63
<i>Risk habit</i>					
Nil	33 (33)	178 (59.3)	6.59	0.01	1
Betel chewing	6 (6)	28 (9.3)			1.16
Smoking	25 (25)	59 (19.7)			2.29
Alcoholism	30 (30)	27 (9)			5.99
Multiple risk	6 (6)	8 (2.7)			4.05
<i>HIV status</i>					
Don't know	94 (94)	295 (98.3)	5.27	0.022	1
Positive	6 (6)	5 (1.7)			3.77

Table 2. Comparison on factors affecting accessibility to and satisfaction with health care provider

Variable	Case n= 100 no. (%)	Control n= 300 no. (%)	Chi- square (for trend)	p value	Crude OR
<i>Distance to clinic (km)</i>					
<5	21 (21)	168 (56.4)	33.69	0	1
15-May	24 (24)	42 (14.1)			4.57
>15	55 (55)	88 (29.5)			5
<i>Time to reach clinic (minutes)</i>					
<15	61 (61)	250 (83.6)	9.48	0.002	1
>35	39 (39)	50 (16.4)			3.2
<i>Waiting time (minutes)</i>					
≤15	41 (41)	173 (57.7)	9.83	0.002	1
16-30	43 (43)	102 (34)			1.78
>30	16 (16)	25 (8.3)			2.7
<i>Social dealing of staff</i>					
Very good	29 (29)	145 (48.3)	18.93	0	1
Good	59 (59)	148 (49.4)			1.99
Bad	12 (12)	7 (2.3)			8.57

of transmission of TB, importance of treatment regularity and danger of multi-drug resistant TB (MDR-TB) etc. were 4 times and patients who received health education during treatment were 2 times more likely to be taking treatment irregularly compared to those who received

health education before and at the start of treatment.

The distance between home and township TB center and time to reach TB center were found to be significant factors. Patients stayed 5 to 15 kilometers (km) and more than 15 km away from township TB centers were 4.6 times to 5 times more likely to be irregular treatment takers, respectively, compared to those patients stayed within 5 km from TB center. If the time to reach TB center was more than 15 minutes, those patients were more prone to be irregular treatment takers. However, cost for transportation was not a significant factor ($p>0.05$).

If the waiting time was more than 15 minutes, it might push the patient to be a defaulter. If patient had to wait 16-30 minutes, the likelihood of becoming an irregular treatment taker was 1.8 times. If waiting time was more than half-an-hour, the risk of developing treatment defaulter would be as high as 2.7 times compared to those with waiting time of less than 15 minutes.

Bad social dealing of staff in township TB centers was also associated with development of defaulting behavior. The patients taking treatment at TB center assigned by staff with bad social dealing were 8.6 times more likely to be irregular treatment takers compared to those treated by staff with good social dealing. Extra-charges such as registration fees, donation etc. showed no significant effect on treatment regularity.

Fear of drug side effects, sense of wellbeing soon after treatment, initial home visit of basic health staff and type of directly observed treatment (DOT) provider were not associated with defaulting from treatment ($p >0.05$).

Multiple logistic regression analysis was performed to determine the combined effect of predictors of defaulting from anti-TB treatment (Table 3). The independent variables significant at 0.05 level in bi-

variate analysis were included in multivariate model.

The significant predictors of defaulting from anti-TB treatment were: age more than 25 years (3.5 times), migratory patients (3.9 times), poor patients (monthly income 30,000 kyats or less) (2.7 times), patient with risk behaviors e.g. alcoholism, smoking, betel chewing (2.9 times), failure to give health education before and at the start of the treatment (4 times), patients stayed more than 5 km away from township TB center (4 times) and bad social dealing of staff (4.5 times).

Table 3. Multiple logistic analysis on predictors of defaulting from anti-TB treatment

Predictors	Adjusted O R	95%CI	p value
<i>Age (years)</i>			
≤25	1	Reference	
>25	3.48	(1.65-7.36)	0.001
<i>Occupation</i>			
Stable	1	Reference	
<i>HIV status</i>			
Not known	1	Reference	
Positive	3.67	(0.89-31.50)	0.057
<i>Health education</i>			
Before /start of treatment	1	Reference	
During treatment / no	4.25	(2.18-8.28)	0
<i>Distance to clinic(km)</i>			
≤5	1	Reference	
>5	4.34	(2.29-8.22)	0
<i>Traveling time to clinic (minutes)</i>			
≤15	1	Reference	
>15	2.25	(1.17-4.31)	0
<i>Waiting time (minutes)</i>			
≤15	1	Reference	
>15	1.73	(0.96-3.10)	0.065
<i>Social dealing of staff</i>			
Very good/ good	1	Reference	
Bad	4.49	(1.25-16.15)	0.022

DISCUSSION

Default from anti-TB treatment is a serious problem in TB control. The factors associated with defaulting from anti-TB treatment found in the present study were older age group, low income patients, migratory populations, persons with risk habits such as smoking, alcoholism, betel chewing, failure to give health education, long distance between residence and

township TB centers, prolonged traveling time, prolonged waiting time, and bad social dealing of health staff. As it is a behavioral problem, risk factors of defaulting from treatment vary from one context to another. The factors associated with defaulting from treatment found in literatures which were consistent with our findings included problem encountered with health staff, traveling to other places [10], long traveling time, the quality of communication between patients and health workers [6] and deficient health education to patients [12].

On the other hand, in one study, HIV infection was described as the most important risk factor associated with treatment default [13], which is quite different from the findings of our study. This might be due to the fact that, in our study, we just categorized patients into those with HIV infection and those who could not tell their HIV status. We did not know the actual HIV status of the patients. The subjective problems of sense of wellbeing soon after treatment, fear of drug side effects, and type of DOT provider are also important risk factors for default. However, these factors were not significant for defaulting from treatment in this study.

In our study, failure to give health education was strongly associated with defaulting from treatment. Moreover, only half of the patients (in both cases and controls) had adequate knowledge about TB. Therefore, healthcare providers in township TB centers should pay more attention to health education regarding the disease, importance of treatment regularity and danger of MDR-TB before and throughout the treatment course. This study evaluated certain potential determinants of defaulting from anti-TB treatment. However, further investigations are still needed why patients do not comply with the treatment. Qualitative approaches may also be needed to investigate the subjective reasons for defaulting from anti-TB treatment.

Predictors of defaulting from anti-TB treatment were multi-factorial. Those included

changeable as well as non-changeable factors. Non-changeable factors such as relatively older age group, low income patients and migratory populations should be considered as target groups in order to conduct intervention programs. For those patients, specific measures such as social support for older age group and low income patients and a flexible approach to ambulatory treatment for migratory population could be possible solutions.

The changeable factors should be corrected if possible e.g. prohibition of risk habits and behaviors such as alcohol drinking, smoking and betel chewing. Healthcare providers should consider patients' satisfaction by reducing waiting time, and practicing good social dealing. However, those factors are hard to change and may need more resources. Therefore, giving proper health education about the disease, importance of treatment regularity and danger of MDR-TB should be considered as a vital function of township TB centers to prevent defaulting from anti-TB treatment.

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