

Factors Responsible for Non-compliance among Tuberculosis Patients in Kailali District, Nepal

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Abstract

Introduction	Tuberculosis is an important health problem: it is estimated to be among the leading causes of death and disability among the economically active segment of the world's population. It primarily impacts low income countries where resources for dealing with health are severely constrained. Even so, tuberculosis control merits priority as an intervention in the health sector, as national tuberculosis programmes are among the most cost-effective of any health intervention in low income countries.
Objectives	To identify the factors responsible for non-compliance among tuberculosis patients in Kailali district Nepal.
Methods	A cross-sectional study was conducted between December 2004 to March 2005, among 130 compliant and 25 non-compliant tuberculosis patients, randomly selected four DOTS treatment centres, using a structured questionnaire with face to face interview. Patients were deemed to be non-compliant when they had missed more than 7 consecutive days of treatment.
Results	About half (48%) of non-compliant were more likely to think that treatment could be stopped once they were free of symptoms and thought they were cured. Adherence proportion was high among the higher education group ($p<0.05$). The overall knowledge scores ($p<0.001$) were statistically significant difference between the compliant and non-compliant patients. A significant relationship was found between compliance behavior and availability of health workers at DOTS centre ($p<0.05$), DOT ($p<0.001$), mode of transportation, and traveling time ($p<0.001$).
Conclusion	Compliance is affected by educational level, knowledge, availability of health workers, DOT, and traveling time. It could be improved by provision of more information about tuberculosis and expansion of DOTS near to the patient's home.
Keywords	Tuberculosis, DOTS, Compliance, Kailali, Nepal

Introduction

Tuberculosis (TB) is one of the major public health problems. World Health Organization (WHO) and International Union Against TB and Lung Disease (IUATLD) recommend use of the Directly Observed Treatment Short-course (DOTS) strategy to avoid incomplete treatment and multidrug resistance (resistance to at least isoniazid and rifampicin) TB^{1,2}. Directly Observed Treatment (DOT) is one of the key components of this strategy. DOT is, the patient should be directly observed as he or she swallows each dose of anti-TB treatment for at least the first two months of treatment by a trained person. It is estimated that six out of 10 adults in Nepal are infected with TB³. About 5000-7000 people die from TB each year⁴.

In 2004, the tuberculosis (TB) case notification rate was 131 per 100,000 population⁴.

In 1995, the government of Nepal developed a 5-year development for the revised National Tuberculosis Programme (NTP) based on DOTS strategy. Four urban and suburban pilot sites were selected for the implementation of health facility based DOTS and it was introduced in April 1996.⁵ Treatment regimens consists of 2 months health worker observed treatment, followed by 6 months treatment collected weekly from health facilities (2HRZE/6HE)⁵.

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Kailali was one of pilot sites for DOTS implementation in 1996. This site introduced a strict policy of health facility based DOTS and had thorough monitoring and supervision from district and central NTP staff. This is one of the high TB cases districts, has an estimated annual risk of TB infection (ARTI) of 2 percent⁴. It accounted about 2.9 percent of the national TB cases with notification rate 144/100,000 population in 2003/2004⁴. Tuberculosis patients are treated using a combination of four drugs, administered by directly observed therapy at a clinic daily in intensive phase and weekly supply during the continuation phase⁵. Patients are considered to be non-compliant when they have missed more than 7 consecutive days of treatment. If patients are identified as non-compliant, the members of the local DOTS committee visit their home to trace them. If patients subsequently fail to attend they are revisited⁶. Approximately 7 percent of patients became defaulter and 85 percent of the patients were successfully treated in 2003/2004⁴.

Defaulting from treatment results in persistent transmission of the tubercle bacilli within the community, increased morbidity and cost to TB control programmes⁷. It can also lead to relapse and drug-resistant TB, and is said to be one factor responsible for the persistence and resurgence of TB⁸.

Studies in India⁹, Swaziland¹⁰, South Africa¹¹, and Zambia¹² indicate that poor knowledge about the length of treatment accounts for default. Patient's defaulting behavior occurs when their symptoms of TB disappear and they feel well after few months of TB treatment. A study in Ethiopia found that default is higher among patients who need travel longer distances to health centre and pay for consultation¹³. There is no previous studies in this district that examined factors affecting patients' compliance with DOTS therapy. We thus conducted this study with the objectives: to identify TB patients' socioeconomic, knowledge, and accessibility factors with DOTS.

Methods

Study design

A cross sectional study was carried out between December 2004 and March 2005 among tuberculosis patients were being treated under DOTS therapy.

Sample size calculation

At the time of this study there were 8 DOTS centres functioning as per the NTP policies. Fifty percent of the DOTS centres were randomly selected. All the patients registered between January and March 2005 had been interviewed. Patients were categorized as compliant and non-compliant by reviewing treatment cards and tuberculosis register kept in DOTS treatment centres.

The sample size for this study was calculated using EPI-INFO version 6.04 (a statistical program for

epidemiology and microcomputers Atlanta, GA: Centres for Disease Control and Prevention, 1995), taking a precision 5 percent, 80 percent treatment success rate with DOTS and confidence level 95 percent.

Questionnaire administration:

A standard questionnaire was prepared in English and translated into Nepali. All data were collected by use of a pre-tested questionnaire. Direct interviews with trained interviewers were carried out between December 2004 and March 2005 among 130 compliant and 25 non-compliant patients. Verbal consent was obtained and confidentiality was maintained throughout the study.

The questionnaire consisted socio-demographic characteristics (age, sex, marital status, educational status, and occupation), knowledge (sign and symptoms of TB, cause of TB, transmission of TB, method of diagnosis, duration of TB treatment, and benefit of DOTS), availability of health services (DOT provider, health education, directly observed treatment), and accessibility to DOTS clinic (distance, traveling time, waiting time, travel cost and mode of transportation).

Statistical analysis

Data from questionnaire were checked before data entry. Descriptive statistics were used to examine the subjects' characteristics. For the comparison between compliant and non-compliant, the chi-squared test was used to compare proportions, and the Student t-test was used to compare means. Summation scores for patients' knowledge were calculated. Knowledge of tuberculosis and its treatment were assessed by eight questions. One point was awarded for each correct answer, to a maximum score of eight. Data was analyzed using SPSS version 10 (SPSS for Windows, SPSS Inc. Chicago, IL, USA) systems.

Results

Socio-Demographic factors

A total of 155 interviews were conducted in the study: with 130 patients in the compliant group and 25 in the non-compliant group. The mean (standard deviation) age of the patients in the study sample was 35.9 (14.5) years. The largest age groups were those between 15 and 34. Non-compliant were found higher (44%) between this age group. However, we failed to demonstrate statistically significant difference. The non-compliant sample was 56 percent were male, 92 percent were married, 44 percent were farmer, and 72 percent were illiterate. Table 1 compares the demographic characteristics on the compliant and non-compliant; significant difference was noted in the level of education ($p=0.019$) only.

Table 1: Number and percentage of compliance by socio demographic characteristics

Characteristics	Compliant (n = 130)	Non-compliant (n = 25)
n (%)	n (%)	
Age group		
15-34	67 (51.6)	11 (44.0)*
35-54	47 (36.1)	9 (36.0)
>54	16 (12.3)	5 (20.0)
Mean=35.9, SD=14.5, min.=15, max.=78		
Sex		
Male	84 (64.6)	14 (56.0)*
Female	46 (35.3)	11 (44.0)
Marital status		
Single	22 (16.9)	2 (8.0)*
Married	108 (83.1)	23 (92.0)
Occupation		
Farmer	53 (40.8)	11 (44.0)*
Daily wage laborer	9 (6.9)	4 (16.0)
Housewife	30 (23.1)	7 (28.0)
Government service	2 (1.5)	0 (0.0)
Private service	11 (8.5)	2 (8.0)
Own business	13(10.0)	0 (0.0)
Others	12 (9.2)	1 (4.0)
Educational status		
Illiterate	52 (40.0)	18 (72.0)**
Primary	33 (25.3)	5 (20.0)
Secondary	28 (21.5)	1 (4.0)
Higher	17 (13.1)	1 (4.0)

*P>0.05, ** P<0.05

Knowledge about disease and treatment

Table 2 summarizes the responses of the study participants about knowledge of TB and its treatment. The mean (SD) knowledge score for the compliant sample was 5.65 (1.48) and for non-compliant sample it was 4.36 (1.47). The mean knowledge score of the compliant group (70.63%)

was 16.13 percent higher than non-compliant group (54.5%). The difference between the samples was statistically significant ($p<0.001$). Very few compliant (37.7%) and even fewer of the non-compliant (20%) were aware of the causative agent of TB. Coughing for two weeks or more

was the most commonly cited symptom of TB for both compliant (80.8%) and non-compliant (80%) patients. Compliant patients (71.5%) stated that TB is spread by droplets while this was cited by 56 percent of non-compliant

patients. Majority (86.2%) of the compliant patients agreed that "treatment can be stopped after declaring cured by health workers after final sputum examination" whereas this rate was only 16 percent of the non-compliant patients.

Table 2: Number and percentage of respondents classified by correct answers related to knowledge about disease and treatment

Knowledge statement	Correct answer	
	Compliant No. (%) N=130	Non-compliant No. (%) N=25
The cause of TB is bacteria	49 (37.7)	5 (20.0)
The most important symptom of TB is coughing for two weeks or more	105 (80.8)	20 (80.0)
The main source of transmission of TB is droplet through air	93 (71.5)	14 (56.0)
TB is diagnosed with sputum examination	105 (80.8)	16 (64.0)
The most important benefit of DOTS is DOTS completely cures the TB disease	110 (84.6)	20 (80.0)
The major side effect of TB drugs is jaundice	33 (25.4)	7 (28.0)
Duration of full course of treatment is 8 months	128 (98.5)	23 (92.0)
Treatment can be stopped after declaring cured by health workers after final sputum examination	112 (86.2)	4 (16.0)
(Score out of 8) Mean ± SD	5.65±1.48	4.36±1.47

Reasons for non-compliance (table 3)

Of the non-compliant patients, 48 percent thought they were cured, 28 percent reported inconvenient opening time of DOTS clinic, and 16 percent said they did not know the length of treatment with DOTS.

Availability of health care services (table 4)

Almost similar proportion of compliant and non-compliant patients was likely to be received health education in their every visit to DOTS centre. Significant relationship was found between compliance and availability of DOT provider to every visit of DOTS clinic ($p=0.017$). Of the non-compliant patients, only 60 percent were received directly observed treatment at their every visit to DOTS clinic compared with 90 percent of the compliant

patients. Statistically significant association were observed between compliance and availability of DOT at DOTS clinic ($p<0.001$).

Accessibility to health care facilities (table 5)

Distance to the clinic for patients ranged from 1 to 12 km with a median of 2 km. No statistically significant differences were detected between distance and compliance with DOTS ($p=0.61$). The mean commuting time to the DOTS clinic was 25.3 ± 19.8 minutes (range 0 to 120 minutes). Majority (80%) of the non-compliant patients were more likely to have longer traveling time (>30 minutes).

Table 3: Reasons for non-compliance with DOTS

Reason for not complying	Number (n=25)
Cannot afford travel cost	1 (4%)
Side effects of TB drugs	1 (4%)
Don't know treatment duration	4 (16%)
Thought cured	12 (48%)
Inconvenient opening time	7 (28%)

Statistically significant differences were found between traveling time and compliance with DOTS. Most of the non-compliant (76%) went to the DOTS clinic on foot compared with 47.7 percent of the compliant patients. Mode of transportation and compliance with DOTS differed

significantly between compliant and non-compliant participants ($p=0.012$).

Discussion

TB control programs currently emphasize the DOTS strategy, promoted by World Health Organization (WHO) and International Union Against Tuberculosis and Lung Disease (IUATLD). Direct observation and supervision of patients is assumed to be more effective than self-administration to ensure that patients successfully complete the recommended six-to-nine month chemotherapy. Success in TB detection and treatment requires specific behaviors from patients and health care providers within contexts that facilitate those practices. Promoting adherence by directly observed treatment is much more important than expanding resources on defaulter tracing which is difficult and often unproductive, especially in low income countries¹⁴.

Table 4: Relationship between availability of services and patient compliance with DOTS

Characteristics	Compliant (n =130)	Non compliant (n =25)
	n (%)	n (%)
Availability of health education in every visit in DOTS centre		
Yes	126 (97)	23 (92)*
No	4(3)	2 (8)
Availability of health worker to every visit at DOTS centre		
Yes	125 (96)	21(84)**
No	5 (4)	4 (16)
Availability of directly observed treatment		
Yes	117 (90)	15 (60)#
No	13 (10)	10 (40)

* p>0.05, **p<0.05, #p<0.001

The present study found that non-compliant TB patients had limited understanding and knowledge about TB, and its treatment, with a mean knowledge score of only 54.5 percent. Knowledge was significantly poorer among non-compliant than compliant groups which is consistent with Malaysian findings¹⁶. Poor compliance was encountered among Malaysian patients who had misconceptions and limited knowledge about the disease and its treatment. Studies in Vietnam¹⁷ and Malawi¹⁸ explored insufficient knowledge about the disease and duration of treatment was the main obstacles to compliance. Most of the non-compliant patients (84%) interrupted treatment soon after they felt better and/or around two months after initiating chemotherapy observed in the present study. It is also noted that patients became

The present study illustrated that the major factors influencing compliance behavior with DOTS in the Kailali district are educational status, knowledge about TB and its treatment, availability of DOT provider and DOT at every visit to the DOTS clinic, mode of transportation, and traveling time to DOTS clinic. The significant influence of education is consistent with results from Thailand¹⁵. It is likely that less educated patients will have higher non-compliance behavior with DOTS strategy. In addition, education is closely associated with knowledge of TB and its treatment pattern.

non-compliant because they thought they were cured. Findings from India¹⁹ suggest that patients' misconception of well-being with cure leads to default. Also, patients who did not know about potential side effects of medicines were more likely to default. Similar findings were observed in the studies of Bam TS et al²⁰, O'Boyle et al²¹, and White MC et al²², which showed that compliant patients were well-informed about the need to continue treatment. This indicates that compliance improves notably if health education session is available at DOTS clinic.

Another important finding in our study is that the availability of DOT provider and the quality of healthcare provider-patient interaction accounts for differences in treatment adherence. Study in South Africa¹¹ has reported that the quality of the health practitioner-patient

communication coupled with correct causative belief were strongly associated with compliance behavior. External constraints are also predictors of adherence. The present

study presented that non-adherence is higher among patients who need longer traveling time to DOTS clinic.

Table 5: Relationship between accessibility to health care facilities and patient compliance with DOTS

Characteristics	Compliant (n =130) N (%)	Non-compliant (n =25) N (%)
Mode of transportation		
On foot	62 (47.7)	19 (76.0)**
Own vehicle	46 (35.4)	3 (12.0)
Ricshaw	13 (10.0)	2 (8.0)
Bus	9 (6.9)	1 (4.0)
Distance (kilometer)		
m2	45 (34.6)	3 (12.0)*
2-4	62 (47.7)	14 (56.0)
>4	23 (17.7)	8 (32.0)
Median=2.0,Q1=1.0,Q3=4.0 min.=1,max.=12		
Traveling time (minutes)		
0-10	47 (36.2)	2 (8.0)##
10-30	41(31.5)	3 (12.0)
>30	42 (32.3)	20 (80.0)
Mean=25.3,SD=19.8; min.=0.0,max.=120		

*p>0.05, **p<0.05, ##p<0.001

This study also illustrated that patients may default on treatment because of inconvenient opening hours of DOTS clinic situated far from their homes. Very similar results are highlighted in the study of Ethiopia¹³, Thailand¹⁵, and India⁹, indicating that hard to reach to health centre and inconvenient opening time of the centre account for defaulting treatment.

The study has certain limitations. Validity was compromised because non-compliant was considered as patient who had interrupted more than a week consecutive treatment under DOTS strategy. There was potential selection bias from the selection of study DOTS treatment centres. Both compliant and non-compliant patients were various stages of treatment. As a result, recall bias might have happened.

Conclusion

It is worth mentioning here that this study was not resource concentrated and was accomplished in a short time frame. Such efforts may be useful to programme managers and policy makers in that they may give further insight into identifying problems that are not highlighted by regularly collected data. One of the basics of TB control is to enhance patient adherence, which is a multifaceted issue involving an array of barriers, some of which have been noted in this study. Enhancing treatment adherence is serious issue for TB control programmes, particularly in the Terai (plain areas) districts of Nepal, where a large proportion of tuberculosis patients are diagnosed and treated. In the study district, patients' educational level, awareness to disease and

DOTS strategy, and accessibility to DOTS clinic were found closely linked to improving compliance with DOTS.

Targeting the TB services to make it more acceptable and accessible to users, such as offering of different 'DOT' options, or expanding TB service near to the patients' home would be considered in improving adherence. Counseling and organizing health education sessions at the DOTS clinic enhances the patient's motivation and knowledge towards DOTS therapy to complete full course of TB treatment.

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