RESEARCH ARTICLE

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Patients' adherence to anti-tuberculosis medicines and associated factors for non-adherence at a tertiary teaching hospital, South West Ethiopia

Güneybatı Etiyopya, üçüncü basamak eğitim hastanesinde hastaların antitüberküloz tedavisine uymaları ve bu tedaviye uymamaya ilişkin faktörler

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ABSTRACT

Introduction: Tuberculosis is the global problem, which may infect one third of the world population annually. A major contributor for the re-emergence of TB is lack of adherence to anti-TB drugs. Non-adherence to anti-TB treatment is the persistent problem throughout the world, including the developing and developed countries.

The main objective of this study was to determine the rate of non-adherence to anti-TB treatment and associated factors for non-adherence among TB patients in Jimma University Specialized Hospital.

Materials and Methods: Prospective cross sectional study was conducted in TB clinic of Jimma University Specialized Hospital using pretested structured questionnaire from February 10, 2013, to February 20, 2013

Results: From a total of 67 patients interviewed during the study period, majority of them (83.58%) were between 18-40 years. About 88% of patients were adherent to their medication and the rest missed doses at least once during the course of their treatment. The main reasons for non-adherence were lack of family support (37.50%) and far distance from hospital (25%). Less education and HIV positive have association with non-adherence ($p< 0.001$).

Conclusion: Generally the adherence to anti-TB treatment among TB patients in Jimma University Specialized Hospital was good, even though some patients were missing their treatments.

Keywords: *Adherence, tuberculosis, treatment failure, directly observed therapy, Jimma University Specialized Hospital*

ÖZ

Giriş: Tüberküloz, her yıl dünya nüfusunun üçte birine bulaşan küresel bir sorundur. Tüberkülozun tekrar ortaya çıkmasına neden olan başlıca etkenlerden biri antitüberküloz tedavisine uymamadır. Antitüberküloz tedavisine uymama, gelişmekte olan ve gelişmiş ülkeler dahil olmak üzere tüm dünyada devam etmekte olan bir sorundur.

Amaç: Bu çalışmanın amacı, Jimma Üniversitesi Hastanesindeki tüberkülozlu hastaların antitüberküloz tedavisine uymama oranlarını ve buna ilişkin faktörleri saptamaktı.

Materyal ve Metod: 10-20 Şubat 2013 tarihleri arasında önceden test edilmiş yapılandırılmış anket kullanılarak Jimma Üniversitesi Hastanesinin tüberküloz kliniğinde prospektif enine kesit çalışması yürütüldü.

Bulgular: Çalışma dönemi süresince görüşülen toplam 67 hastanın büyük çoğunluğu (%83,58) 18-40 yaş arasındaydı. Hastaların yaklaşık %88'i ilaç tedavisine uyarken geri kalanı tedavi seyri boyunca en az bir kez doz atlamıştı. Tedaviye uymamadaki başlıca sebepler aile desteği olmayışı (%37,50) ve hastaneden uzakta olmalarıydı (%25). Düşük eğitim düzeyi ve HIV-pozitifliği, tedaviye uymama ile ilişkiliydi ($p< 0.001$).

Sonuç: Bazı hastalar tedaviyi aksatsalarda Jimma Üniversitesi Hastanesindeki tüberkülozlu hastaların antitüberküloz tedavisine uyma oranları iyiydi.

Anahtar Kelimeler: *Uyum, tüberküloz, tedavi başarısızlığı, doğrudan gözetim tedavisi, Jimma Üniversitesi Hastanesi*

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INTRODUCTION

World health organization estimates that about 2 billion population of the world is infected with TB and 8.7 million incident case of TB in 2011 with 1.4 million populations died of it. Geographically Africa and Asia are with highest burden of TB. China and India, combined have almost 40% of the world TB case. African region has approximately one quarter of the world cases and highest rate of cases and death relative to the other countries population (1). TB started to be recognized as a public health problem about 55 years age. According to the ministry of health TB is the leading cause of morbidity, the third cause of hospital admission and the second cause of death in Ethiopia after malaria. Direct observed therapy, short course (DOTS) was fully implemented in Ethiopia in 1994 by Ethiopian national TB control program consisting of 2 month intensive phase with rifampicin, isoniazid, pyrazinamide and ethambutol to be taken directly observed therapy (DOT) followed by 4-6 months continuation phase with rifampicin and isoniazid (2,3). If treatment is taken incorrectly or incompletely, resistance to TB drugs can be developed and a cure becomes much more difficult, or impossible in some cases (4). Non-adherence to anti-TB treatment is the persistent problem throughout the world, including the developing and developed countries. In developing countries it is as high as up to 60% (5). Defaulting from treatment has been one of the major obstacles to treatment management and important challenge of TB control. Inability to complete prescribed regimen is an important case for treatment failure and relapse, multi drug resistant and ongoing transmission of infection (6,7).

There are numerous factors for non-adherence to anti-TB treatment particularly in developing countries, such as poverty, difficulty of family support, social stigma, treatment side effect, subsequent hospitalization, behavior of health service providers, education level, relieved symptoms, worry of danger of drugs, co-morbid condition and financial burden (8). Therefore overcoming the reason for non-adherence to the treatment will significantly help in planning and implementing the future strategies for the control of the disease (9). According tostudy done in India, majority of study population (45%) was in age group of 31-45 years, which is the productive age. Eighty five percent of non-compliant patients believed anti-TB drugs to be bad for them. Similarly 87% believed to stop anti-tuberculosis treatment very prematurely as soon as symptoms disappear, while 13% believed to continue as per DOTS volunteer advice. The study revealed that the non-compliance of DOTS was significantly high among those who were less educated, unskilled worker, low family income and upper lower class family (10). As study from Namibia (n= 26) factors contributing to non-compliance are feeling better (27%), distance (31%), lack of family support (15%), non-availability of food 2 (8%), side effects (8%), other reasons (8%) and medicines not working (4%), long waiting times at the clinic, and lack of knowledge of TB or treatment (11). Study done in Peru revealed that, non-adherence to treatment was associated with the male sex, poverty feeling discomfort during treatment, a prior history of non-compliance and illegal drug use (12). According to study from Russia, substance abuse was identified as the only factor that was strongly associated with non-adherence with odds ratios for baseline alcohol dependence -4.38 (13). In Pakistan, out of 500 diagnosed patients of tuberculosis, 40 (8%) patients developed MDR-TB. Poor compliance to the anti-tuberculosis treatment (36.6%), extra pulmonary tuberculosis secondary tuberculosis (35%) and Smoking (12.9%) were the main contributing factors in MDR-TB (14). Regarding the issue of health care costs; globally, poor adherence has been estimated to cost approximately $177 billion annually in total direct and indirect health care costs (15). Report from Turkey; revealed that 65.5% and 34.5% met the criteria for adherence and non-adherence respectively. Higher adherence was observed in females than males (79.2% versus 58.4% respectively). Older patients were more non-adherent. The adherence rate in non-smokers was significantly higher than of smokers (81.4 versus 52.4%) respectively (16). The cohort study done in Cameroon on 1688 patients, 337 (20%) defaulted from treatment. Median duration to treatment discontinuation was 90 days, and 62% of treatment discontinuation occurred during the continuation phase. Hospitalization during the intensive phase and non-consenting for HIV screening were the main determinants of defaulting from treatment in multivariable analysis (17). As reports from Uganda, on non-adherence to anti-TB treatment among TB/HIV co-infected patients, identified that being on continuous phase, alcohol consumption, smoking and HIV positive are highly associated with non-adherence (18). Even though Ethiopia is one of the countries with highest burden of TB, the state of adherence to anti-TB has not been well studied. So, this study was aimed to assess the rate of adherence of TB patients to their medication and the common associated factors contributing for non-adherence in Jimma University Specialized Hospital, Western Ethiopia.

MATERIALS and METHODS

Study Area and Period

This study was conducted in Jimma University Specialized Hospital (JUSH), South West Ethiopia from

February 10, 2013, to February 20, 2013. Patients obtaining different health service at the clinic are diagnosed at outpatient department or admitted to inpatient with TB cases and referred for follow up to TB clinic.

Study Design

A prospective cross sectional study was conducted from February 10, 2013, to February 20; 2013. Data was collected by face to face interview with the patients using structured questionnaires.

Source Population

All TB patients registered for TB treatment in Jimma University Specialized Hospital.

Study Population

The study was conducted on all adult TB patients who registered for TB treatment in TB clinic and are on treatment for at least one month during the study period. In this study no sampling was made, rather all TB patients who were attending TB clinic for atleast one month during the study period was included in the study.

Criteria for Exclusion

Patients who were on treatment not more than one month at the time of the study and those of younger than 18 years old were excluded from the study.

Data Collection and Instruments

Data was collected by using structured questionnaire by direct face to face interviewing witheach patient. Data was collected by two trained nurse staff through interview method on follow-up patients.

Data Analysis and Quality

Data was cleared, categorized, compiled and coded before analyzed by using the Statistical Package for the Social Sciences (SPSS) version 16.0 software for windows. Descriptive statistics were performed to obtain summary values of the study variables and was presented in tables and figures. The association between variables was calculated by online Chi-square test where necessary. A p-value of less than 0.5 was considered as a statistically significant association between variables in all tests. Completeness, accuracy and clarity of the collected data were checked carefully before data analysis was made. Any erroneous, ambiguous and incomplete data was excluded.

Ethics

A formal letter written from school of pharmacy, Jimma University to Student Research Program (SRP) and permission was obtained from Ethical Approval Committee. Verbal informed consent was obtained from the respondents and brief explanation of aim of study was provided. Strict confidentiality was assured through anonymous recording and avoiding patient identifying information. The raw data were kept secured in a locked cabinet in the researchers' office.

Definition of Terms

1. **Adherence to treatment:** is the extent to which patient's history of therapeutic drug taking coincides with prescribed treatment.
2. **Far distance:** distance greater than 10 km radius
3. **Near distance:** distance less than or equal to 10 km radius
4. **Relapse:** a patient who has been declared cured or treatment completed and in the past, but report back to health service and is found to be acid fast bacilli smear positive or culture positive.
5. **Treatment failure:** A patient who become smear positive after five month or more on treatment.
6. **Family support:** Helping the patients psychologically and reminding to take their medications on regular basis.
7. **Adherent:** Patients who takes their medication without missing any dose during their treatment period.
8. **Non-adherent:** Patients who missed their medication schedule at least once during their treatment period.

RESULTS

A total of 67 patients were included in the study. Most 56 (83.58%), of the respondents were in age group between 18-40. Only 11 (16.42%) of respondents were above the age of 41 years. Majority of respondents, 32 (47.76%) were muslim. Regarding marital status, 31 (46.27%) of the respondents were single and 28(41.79%) were married. As to the educational status of the respondents, 53 (79.11%) had completed at least primary education and 14 (20.89%) of them were illiterate. Majority of the respondents 54 (80.59%) were near distance to the hospital and only 4 (5.98%) of the respondents were far distance from the hospital (Table 1).

Most patients 54 (80.6%), were using social drugs from the respondents and the rest didn't use any type of social drugs (Figure 1). Regarding social drug use, 54 (80.60%) of patients drank coffee, 14 (20.89%) were khat chewers, 6 (8.95%) were smokers and only 2 (2.98%) were alcohol consumers (Table 2). Most of respondents, (n= 51), were on their continuous phase of their treatment and the rest (n= 16) were on the intensive (less than 2 months) of the treatment period (Figure 2). Majority of patients,

Table 1. Socio-demographic distribution of respondents in Jimma University Specialized Hospital TB clinic from February 10, 2013, to February 20, 2013.

	Male		Female		Total
Variables	**Number**	**%**	**Number**	**%**	**Number**
Age (in year)					
18-25	20	29.85	8	11.94	28
26-40	13	19.40	15	22.38	28
41-55	3	4.47	3	4.47	6
> 56	0	-	5	7.46	5
Marital status					
Married	13	19.40	15	22.38	28
Single	25	37.31	6	8.95	31
Widowed	5	7.46	3	4.47	8
Religion					
Orthodox	14	20.89	8	11.94	22
Muslim	20	29.85	12	17.91	32
Protestant	9	13.43	4	5.97	13
Education					
Illiterate	5	7.46	4	5.97	9
Primary	13	19.40	11	16.42	24
Secondary	8	11.94	5	7.46	13
Higher education	19	28.36	2	2.98	21
Occupation/					
Unemployed	14	20.89	4	5.97	11
Student	16	23.88	5	7.46	21
Employed	4	5.97	2	2.98	6
Merchant	3	4.47	7	10.45	10
Farmer	6	8.95	6	8.95	12
Distance from hospital (km)					
< 5	37	55.22	17	25.73	54
5-10	4	5.97	5	7.46	9
> 10	2	2.98	2	2.98	4

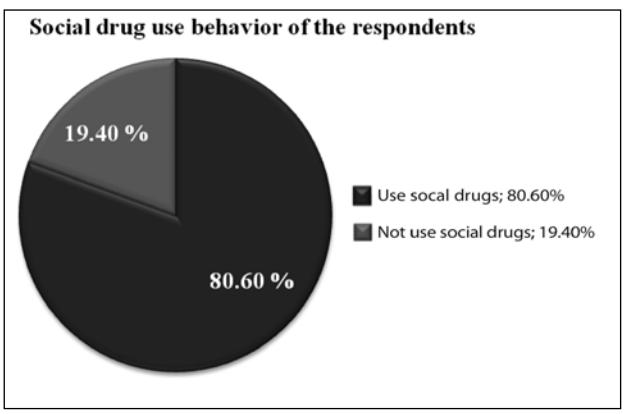

Figure 1. *Social drug use behavior of the respondents in Jimma University Specialized hospital TB clinic from February 10, 2013, to February 20, 2013.*

Table 2. Types of social drugs used by the respondents in Jimma University Specialized Hospital TB clinic from February 10, 2013, to February 20, 2013.

Type	Number	Percentage
Coffee	54	80.60
Khat	14	20.89
Cigarette	6	8.95
Alcohol	2	2.98

59 (88.06), were HIV negative among the respondents in Jimma University Specialized Hospital (Figure 3). From the total of 67 patients, 59 (88.06%) were adherent to their medication and 8 (11.94%) were non-adherent to their medication (Figure 4). The main reason for non-adherence was lack of treatment support from family 3 (37.5%) followed by extreme illness 2 (25%). Far distance and drug side effects had also some contribution for non-adherence (Table 3).

Of the eight (8) patients who were non-adherent, most of them 7 (87.5%) missed their medication for less than one month and only one patient missed his medication for more than two months. Two patients missed their medication in the past two days; three patients missed their medication in the past one week; two patients missed their dose in the past 2 weeks.

Most patients miss their medication during the continuous phase of the treatment 7 (13.46%) especially early months of continuous phase 15.39% (Table 4).

This study revealed that socio-demographic characteristics such as sex, age, religion and occupational status were not significantly associated with adherence. In addition, social drug use behavior and relationship with health professionals not associated with adherence. But, education level, Lack of family support and far distance from hospital were significantly associated with adherence. The HIV status of the respondents has association to non-adherence to anti-TB medication (Table 5).

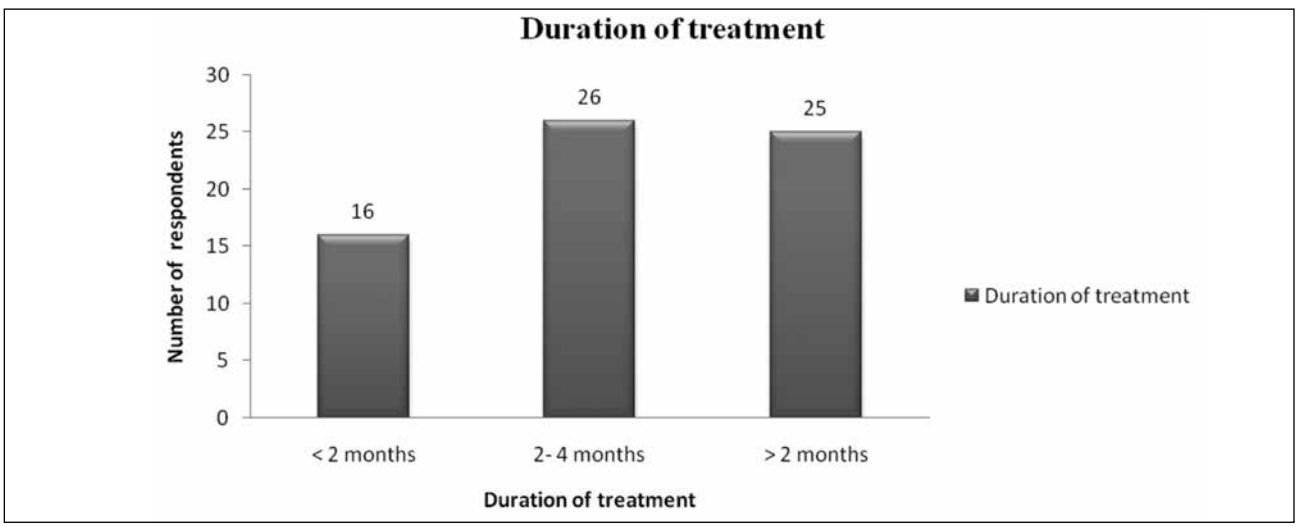

Figure 2. *Distribution of respondents by the phase of treatment in Jimma University Specialized Hospital TB clinic from February 10, 2013, to February 20, 2013.*

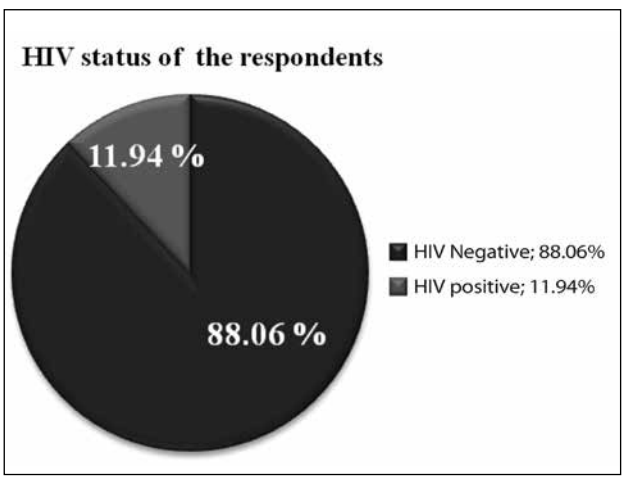

Figure 3. *Percentage of HIV status of respondent in Jimma University Specialized Hospital TB clinic from February 10, 2013, to February 20, 2013.*

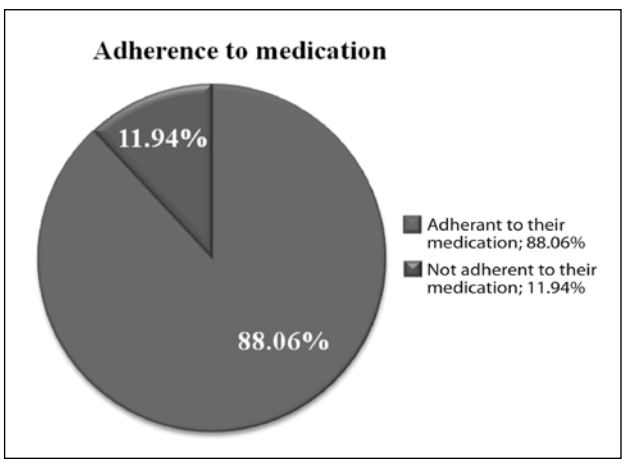

Figure 4. *Percentage of non-adherence to anti TB medications in Jimma University Specialized Hospital TB clinic from February 10, 2013, to February 20, 2013.*

Table 3. Reasons for missing treatment among non-adherent respondents in Jimma University Specialized Hospital TB clinic from February 10, 2013, to February 20, 2013.

S. No	Reason for missing treatment	Number	Percentage
1.	Lack of family support	3	37.50
2.	Hospital is too far to follow up treatment regularly	2	25
3.	Due to side effects of medicine	1	12.50
4.	Feeling better	1	12.50
5.	Extremely ill	1	12.50

Table 4. Association of adherence with the duration of treatment among respondents in Jimma University Specialized Hospital TB Clinic from February 10, 2013, to February 20, 2013.

	Adherent to their medication		Non-adherent to the medication	
Duration of treatment	Number	%	Number	%
< 2 month	15	93.75	1	6.25
2-4 month	22	84.61	4	15.39
> 4 month	22	88	3	12

Table 5. Association of different variables of the respondents with anti-TB treatment adherent versus non-adherent patients in Jimma University Specialized Hospital TB clinic from February 10, 2013, to February 20, 2013.

			Adherent		Non-adherent		
S. No	Variables		Number	%	Number	%	p
1.	Age (in year)	18-25	26	44.07	2	25	0.743
		26-40	23	38.98	4	50	
		41-55	5	8.47	1	12.50	
		> 56	4	6.77	1	12.50	
2.	Sex	Male	37	62.71	6	75	0.496
		Female	22	37.29	2	25	
3.	Marital status	Married	25	42.37	3	37.50	0.965
		Single	27	45.76	4	50	
		Widowed	7	11.87	1	12.50	
4.	Religion	Orthodox	18	30.50	4	50	0.378
		Muslim	30	50.85	2	12.50	
		Protestant	11	18.65	2	12.50	
5.	Educational status	Illiterate	5	8.47	4	50	0.014
		Primary	22	37.29	2	25	
		Secondary	12	20.34	1	12.50	
		Higher education	20	33.89	1	12.50	
6.	Distance	Near	57	96.61	6	75	0.015
		Far	2	3.39	2	25	
7.	Social drug	Yes	48	81.35	6	75	0.669
		No	11	18.65	2	25	
8.	Family support	Yes	43	72.88	5	62.50	0.031
		No	16	21.12	3	37.50	
9.	Good relation with health personnel	Yes	42	71.19	6	75	0.823
		No	17	22.81	2	25	
10.	HIV status	Positive	6	10.17	3	37.50	0.033
		Negative	53	89.83	5	62.50	

DISCUSSION

The organization of anti-TB treatment is the key to a programme's success. The uninterrupted availability of drugs and rigorous organization of treatment delivery will ensure patients' compliance with treatment. Better medication adherence has been associated with improved clinical outcomes, while poorer adherence has been shown to correlate with increased adverse events for patients with chronic conditions (15). Despite the use of anti-TB medication regimen has led to significant improvement in morbidityand mortality, unless the patients adhere to their medication, there would be persistent infectious ness, high rate of treatment failure and emergence of drug resistant TB may occur. Patients face a variety of barriers to medicine-taking, some of which are within their power to overcome and some of which may be structural, institutional, or otherwise beyond the individual's control (15). Unfortunately, health care providers and researchers have tended to see non-adherence as patient problem, ignoring environmental structural and operational factors. Hence measuring adherence and contributing factors has a vital role for program evaluation and intervention.

According to our study the patient adherence (88.06%) toanti-TB treatment was relatively good in contrast to the study done in Pakistan and Turkey; where 36.6% and 34.5% met the criteria of non-adherence, respectively (14,16). This may be due to the study was conducted in rural area of Turkey; where as in this study most of the patients are urban residents that may increase the awareness ofdrug adherence. Different factors found to have an effect on follow up treatment and contributed for non-adherenceof patients to treatment. Patients fail to adhere to their treatment due to various reasons. From this study lack of family support and distance from hospital were the main reasons for non-adherence as compared with study done in Peruinwhich distance was the main reason for non-adherence followed by feeling better and lack of family support (12). This may shows distance is the main barrier for adherence in TB patients, because TB treatment needs DOT principle which is difficult for patient to collect their medication every day from clinic.In contrast to study done in Cameroon (17), where defaulted patients from the treatment were during the continuous phase of the treatment, non-adherence is relatively low during continuous phase in our study. The reason may be due to all patients continuing their whole treatment length by DOT principle that may increases the patients' adherence and knowledge about their treatment.

Like study from India (10), majority of the patient with Tb- burden are within the productive age group, which may have adverse consequence on the national and global economy. From this study, like reports from Peru and Turkey males (n= 6) are more non-adherent to their medication, but, there no statistically significant association between sex and adherence status (12,16). Our study reveals that educational level is significantly associated with poor adherence. This could help to identify the group who are at risk of defaulting. Like survey done in India and Namibia, the non-compliance to DOTs was significantly high among those who were less educated, unskilled worker, low family income and lower class family. This is may be due to less understanding about the disease relapse, resistance and treatment failure in less educated patients (10,11). According to this study the social drug use have no significant association with non-adherence to anti-TB treatment. Conversely most previous studies concluded that, social drug use, as the main determinant of non-adherence to treatment. According to study done in Russia substance abuse as the only factor that was strongly associated with non-adherence (14). The study done in Turkey also indicated that adherence rate in non-smokers was significantly higher than of smokers (16). In this study low number of patients use cigarette and alcohol as a social drugs. And all of respondents use coffee as a social drug that may have no signific ant difference on adherence to treatment. Another finding of the present study was presence of significant association between HIV status and adherence. It was found that risk of non-adherence was low among HIV negative patients. Similarly, the study in Uganda on TB/HIV co-infected patients concluded that, being HIV positive as the significant determinant for non-adherence to anti TB drugs. It may be due to TB- HIV co-infected patients may experience the effect of both drugs or may lack family support due to social stigmatism, which contribute to non-adherence (18).

CONCLUSION

Majority of TB patients in our study were adherent to their medication even though some patients had missed their medication during their treatment follow up. The major reason for non-adherence to the treatment were lack of family support, far distance from hospital, lower education level and being HIV positive. Feeling better, extreme illness and drug side effects have also contributing for non-adherence to anti-TB treatment.

CONFLICT of INTEREST

We declare that there is no conflict of interest and we all contributed equally to this work.

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