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Factors Associated with Tuberculosis Reinfection and Treatment Failure in Taung Sub-District, South Africa

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ABSTRACT The purpose of this study was to determine factors associated with TB re-infection and treatment failure in the Taung sub-district. In a cross-sectional design a questionnaire was interview-administered to 100 Regimen 2 patients systematically recruited at Taung district hospital. The results show that the combined proportion of patients who were re-treated after poor compliance was 46.9% (RD=Retreatment after default: 25.5% and RI=Reinfected: 21.4%); only 3.1% were on Regimen 2 due to treatment failure, and 90.8% of the respondents were previously treated for TB after 1995. More than half (57%) were HIV positive, of which most (87.5%) had a CD4 cell counts of less than 200, 72.5% had experienced the stigma of having TB, and almost half (48%) took traditional medicines or herbs other than TB treatment. A number of factors influencing TB treatment adherence were identified including age, alcohol and tobacco use, access to health facility, family support, TB stigma and TB treatment availability which should be considered in the local TB control programme.

INTRODUCTION

South Africa has one of the highest estimated tuberculosis (TB) rates in the world, ranking fifth highest among 22 countries with a high burden of TB. Tuberculosis is the second most serious infectious disease in South Africa and has been made a priority programme by the National Department of Health (USAID 2010). Multi-drug resistant (MDR) and extensively drug-resistant (XDR) TB have exacerbated the situation. South Africa has 0.7 percent of the world's population and 28 percent of the world's population of HIV and TB co-infected individuals (USAID 2010). An estimated 73% of new patients with TB in South Africa are co-infected with HIV. Patients with TB and HIV are almost twice as likely to get multidrug-resistant TB as well as extensively drug-resistant TB and have high mortality rates due to TB and HIV co-infection (USAID 2010).

In sub-Saharan Africa, rates of tuberculosis (TB) recurrence after treatment completion of up to 20/100 person years are reported (Korenromp et al. 2003). Verver et al. (2005) found in a study in Cape Town that recurrent TB occurred in 108 of 612 (18%) patients, of whom 61 of 447 (14%) experienced recurrence after successful treatment, and 47 of 165 (28%) experience recurrence after default. The reinfection disease rate after successful treatment was estimated at 2.2 per 100 person-years. Sterling et al. (1999) did a study to determine the relapse rate after short course (6 month) treatment of tuberculosis in HIV-infected and uninfected persons and found that HIV-infected patients required more time to complete therapy, but their sputum culture converted to negative within the same period as HIV negative patients or patients whose HIV status was unknown.

Previous studies found the following factors to associated with defaulting TB treatment and TB treatment adherence: *Health system factors*: poor training and supervision of health community workers, lack of flexibility for treatment supervisors, inadequate supplies for treatment centres, centralised treatment delivery, the quality of the patient-provider relationship and counselling, accessibility, lack of TB transmission, medication side effects; *patient factors*: gender, lack of social support from family or friends during treatment, alcohol use, smoking, not on antiretroviral therapy (ART) and visiting alternative health care providers (Amuha et al. 2009; Bagchi et al. 2010; Sardar et al. 2010; South African Medical Research Council 2002; Verver et al. 2005; Waisbord 2004).

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Recently Taung district hospital in the North-West Province, South Africa has seen a large number of patients who require Regimen 2 TB treatment, a re-treatment regimen for patients with TB relapse, TB treatment failure or treatment after interruption. Patients who are re-treated for TB are a huge burden to the hospital as it is expensive to treat those who have TB reactivation or TB treatment failure (Taung District Hospital 2007). In addition, these patients are at risk of developing Multiple Drug Resistant TB (MDR-TB), which is easily transmissible and difficult to treat. There is a need to investigate the reasons for this high rate (28% in 2007) of patients who are experiencing TB treatment failure and reactivation in the Taung district. Recurrent TB cases not only consume resources, but also have a more difficult regimen, increase TB transmission in the community, cause additional morbidity and mortality, and erode faith in the National TB Program amongst patients, staff, and community (Taung District Hospital 2007).The aim of this study was to determine the factors responsible for TB treatment failure and re-infection in patients with TB (N=98) at a district hospital in Taung, North West Province, South Africa.

METHOD

Study Setting

Taung is situated in the Bophirima district in the North West province. The estimated population is 182,167 (2001 Census), living on a total area of 4,560 sq km; 90% of Taung is said to be rural. Greater Taung is comprised of five sub-districts, namely Taung central, Pudumong, Pamperstad, Molelema and Reiveilo. The study was conducted at Taung district hospital. Patients with TB re-infection, TB treatment failure and those who defaulted or interrupted treatment are admitted at the hospital from the out-patient department (OPD) and from Taung district clinics, in order to initiate Regimen 2 treatment. On admission, the patients are entered onto the TB Register. In 2005, Taung district hospital records showed that of all the patients on the register, 28% are on Regimen 2. The TB register indicates whether the patient is being treated for the first time or is being re-treated for re-infection, treatment failure or default. Patients who stay nearer the hospital attend the TB OPD at Taung Hospital, and were interviewed as outpatients.

Sample and Procedure

The study used a cross-sectional descriptive method, where patients who are on Regimen 2 TB treatment were sampled using face-to-face interviews by an external trained research assistant. All consecutive patients on Regimen 2 TB treatment (N=100) at Taung district hospital, North-West Province, during the course of the study (3 months) were interviewed with a semi-structured questionnaire. Patients with TB relapse, TB treatment failure and those who defaulted or interrupted treatment are admitted at the hospital from the out-patient department and from Taung district clinics, in order to initiate Regimen 2 treatment. On admission, the patients are entered onto the TB Register. The TB register indicates whether the patient is being treated for the first time or is being re-treated for re-infection, treatment failure or default. Sample size calculation using Epi Info: confidence 95%, 5% significant, worst acceptable result 50%, sample size is 93, increase to 100. In all 100 patients on Regimen 2 TB treatment (75 in-patients and 25 out-patients) were interviewed. No patients refused to be interviewed.

The University of Limpopo's (Medunsa Campus) Research, Ethics and Publications Committee granted permission to conduct the study. Permission from the North West Government Department of Health was also obtained and the Chief Executive Officer of Taung Hospital gave permission to proceed. Informed consent was obtained prior to the patients' participation in the study.

***Inclusion Criteria*:** Patients with TB re-infection, TB treatment failure and those who defaulted or interrupted treatment in order to initiate Regimen 2 treatment and 18 years and above.

Operational Definitions

1. *Treatment After Relapse*: A sputum smear or culture-positive pulmonary patient with TB who received treatment and was declared cured or treatment completed at the end of the treatment period and has now developed sputum smear or culture positive

pulmonary TB again within two years (Department of Health 2009:58).

2. *Treatment After Failure*: A pulmonary patient with TB who is still sputum smear or culture positive at the end of the treatment period (Department of Health 2009: 59).
3. *Treatment After Default*: A client who completed at least one month of treatment and returns after having interrupted treatment for two months or more, and is still smear or culture positive or has signs of active TB on clinical and radiological assessment (Department of Health 2009:37).
4. *Retreatment Cases:* Retreatment patients include all TB patients with TB who were treated for 4 weeks or more in the past and who are now smear or culture positive or who have clinically been diagnosed with TB (failure, relapse, return after default). The standard regimen for retreatment cases is regimen 2: 2(HRZES) / 1(HRZE) / 5(HRE) [Rifampicin (R), Isoniazid (H), Pyrazinamide (Z), Ethambutol, Streptomycin; Dose mg/kg 10,5,25,15,20, and 15 respectively] (Department of Health 2009:37).

Measure

A structured questionnaire was used to collect data for this study composed of questions developed to determine the demographic (gender, race, age, marital status, formal education and place of residence) and socio-economic profiles (employment status, type of housing, water sources, sanitation, electricity, income, subjective economic status) of patients on Regimen 2. In addition, access to health services or to TB treatment (distance to clinic and hospital, level of difficulty to access clinic and hospital, availability of TB treatment at clinic) TB treatment history (previous TB treatment, adherence to TB treatment, mode of administration of TB treatment, use of traditional medicine while on TB treatment, length of TB symptoms before diagnosed, family support, health care provider relationship), health status (subjective health status, history of hospital admissions, history of chronic conditions including asthma, epilepsy, hypertension and diabetes mellitus, medication for chronic conditions, HIV status and CD4 count) and substance use (alcohol, tobacco) was assessed. TB treatment adherence was assessed with the question "Did you take treatment as prescribed?" Response options included "yes" or "no", while TB treatment interruption was assessed with the question "Did you ever interrupt TB treatment?" Response options included "yes" or "no".

Data Analysis

Data was analysed with EpiInfo (version 6.04) and SPSS version 14. The descriptive statistics was used to describe the variables in frequency, percentage mean and standard deviation as appropriate. Pearson Chi-square was used to test associations of each variable (socio-demographic, health care, health and social variables) and TB treatment adherence (taking treatment as prescribed and interrupted treatment). The contingency coefficient was calculated to indicate the strength of the association.

RESULTS

Sample Characteristics

The final sample consisted of 98 participants, 68 men (69.4%) and 30 women (30.6%); 2 questionnaires were discarded (because it appeared false information was provided when comparing with medical file information). All were from the Black African population group, 54.5% were 18 to 40 years old, 77.6% were single, and 40.8% had secondary education. For one-third (33.6%), the main source of income was social grants, most (80.6%) had an income of less than R1000 (US$=125) a month and most (70.4%) considered themselves to be at a difficult or very difficult economic level. Most were living in brick houses (75.5%), with more than 2 rooms (75.5%) and with more than four people (73.5%) living in them (see Table 1).

Access to Health Facilities

Half (50%) of patients stay less than five (5) kilometres (kms) from a clinic. Another 35.7% travel a distance of between 5-10 kms to the clinic, meaning that 86.7% Regimen 2 patients are not staying more than 10 kms from clinics. This may indicate that clinics in the Greater Taung sub-district are not very far from patients.

Table 1: Socio-economic characteristics of the study sample, N=98

Socio-economic variables		*N*	*%*
Gender	Male	68	69.4
	Female	30	30.6
Age	18-40	54	54.5
	41 and older	45	45.5
Marital Status	Single	76	77.6
	Married	15	15.6
	Divorced	2	2.0
	Widowed	5	5.1
Education	None	29	29.5
	Primary school	29	29.6
	Secondary school	40	40.8
Source of Income	Self	20	20.4
	Family member	45	46.0
	Social grant (pension, child support, disability)	33	33.6
Combined Monthly Income	Less than R500	18	18.4
	R500-R1000	61	62.2
	R1000-R2000	6	6.1
	More than R2000	13	13.3
Perception of Economic Level	Quite well or comfortable	7	7.1
	Average	22	22.5
	Difficult	60	61.2
	Very difficult	9	9.2
Housing	Brick	74	75.5
	Mud, shack, etc.	24	24.5
Number of Rooms in House	1-2 rooms	24	24.5
	>2 rooms	74	75.5
Number of People in House	1-3	26	26.5
	4-6	47	48.0
	More than 6	25	25.5
Water Source	Tap water	94	95.9
	Borehole, other	4	4.1
Electricity	Not available	19	19.4
	Sometimes available	20	20.4
	Always available	59	60.2

This shows that more than two-thirds of patients have access to a clinic in less than a 10 kms radius. Almost all (90.8%) of patients have access to normal clinics; 9.2% patients are serviced by a mobile ambulance service, which visits fortnightly or monthly. **A**lthough we have 86.7% Regimen 2 patients not staying more than 10 kms from clinics, 41% of respondents said that they find it difficult getting to the clinics. However, more than half (54.1%) of respondents said it was easy getting to the clinics. The patients complained of the lack of a public transport system within the rural areas, resulting in the patients having to walk to the clinic.

TB Treatment Issues

Most patients, 35.7%, were RC (Retreatment after previous cure), followed by RD (Retreatment after default) at 25.5% and RI (Retreatment after failure) at 21.4%. This means that 46.9% of patients had either defaulted or interrupted TB treatment. **A**lmost all (89.8%) reported that TB treatment was always available at local health facilities and most patients were not supervised when taking TB treatment (71.4% were self-administering the treatment). Some patients (14.3%) were on chronic medication, 8.7% diabetes mellitus and 5.6% were on antiretroviral therapy. Most patients reported good family support during TB treatment (77.5%). Most (84.7%) indicated that they would take TB treatment as prescribed, while 39.9% patients had interrupted treatment. More than half (57%) of the respondents were HIV positive, most (83.7%) had a CD4 count of less than 200. A significant number of respondents (43.9%) took traditional medicine, after being diagnosed with TB; 38.8% drunk alcohol and 34.7% smoked (see Table 2).

Table 2: TB treatment characteristics, health status and access to treatment of study sample, N-98

Variables	*N*	*%*
Availability of TB Treatment at Health Facilities		
Always available	88	89.8
Not always available	9	9.2
Person Who Administered the Treatment		
Self	70	71.4
Someone staying with	24	24.5
Clinic nurse	4	4.1
TB Treatment Taken as Prescribed	83	84.7
Interrupted Treatment	39	39.8
Used Traditional Medicines	43	43.9
Family Support During Treatment		
Poor	22	22.5
Good	76	77.6
Used Chronic Medicines	14	14.3
Received TB Treatment Education	86	87.8
Treatment Status		
RC= Retreatment after Previous Cure	35	35.7
RAC= Retreatment after Completion	14	14.3
RF= Retreatment after Failure	3	3.1
RI= Reinfected	21	21.4
RD= Retreatment after Default	25	25.5
Previous Treatment		
Before 1990	6	6.1
1991-1995	3	3.1
1996-2000	26	26.5
2001-2006	63	64.3
HIV Status		
HIV positive	55	55
HIV negative	29	29
Unknown	16	16
CD4 cell count		
<200	48	87.3
≥200	7	12.7
Drinks Alcohol	38	38.8
Smokes Tobacco	34	34.7

Association between Socio-economic Variables and Prescribed Treatment and Treatment Interruption

Out of 12 socio-economic variables, only one variable was found to be significantly associated with taking treatment as prescribed. The results of the Chi-square test and contingency coefficient found a significant difference in taking treatment as prescribed in a proportion between younger and older patients. The older patients took treatment as prescribed (97.7%), more than the younger age group (75.9%); likewise the younger patients had more often treatment interruptions than the older patients (see Table 3).

Association between Health Care Variables and Prescribed Treatment and Treatment Interruption

Out of the 9 health care variables, 2 variables (finding it easy to get to hospital and time travelling to nearest clinics) were found to be associated with taking treatment as prescribed. Further, the non-availability of TB treatment at the clinic was found to be associated with interrupting TB treatment (see Table 4).

Association between Health and Social Variables and Prescribed Treatment and Treatment Interruption

The results of the Chi-square test and contingency coefficient found a significant association between TB stigma and taking treatment as prescribed. Alcohol use, smoking, TB stigma and poor family support were found to have a significant association with interrupting treatment (see Table 5).

DISCUSSION

This study shows that most patients on Regimen 2 in Taung sub-district are RC (retreatment after previous cure) at 35.7%. The proportion

Table 3: The association between socio-economic characteristics of patients with TB with taking treatment as prescribed and interrupted treatment

Socio-demographics variables		*Taking treatment as prescribed*			*Interrupted treatment*		
		%	*χ^2*	*Contingency co-efficient*	*%*	*χ^2*	*Contingency co-efficient*
Age	Young adults age 18-40	75.9	9.41**	.31**	50.0	5.60*	.24*
	Older adults age > 40	97.7			26.7		
Sex	Male	86.5	0.20	.04	39.1	.01	.01
	Female	83.3			40.0		
Marital Status	Unmarried (single, divorced, separated)	83.1	2.95	.17	40.5	.27	.05
	Married	100.0			33.3		
Level of Education	No Education	79.3	1.44	.10	40.0	.11	.02
	Primary education	87.5			37.5		
	Secondary education	89.7			41.4		
Employment Status	Employed	94.1	1.87	.11	23.5	2.16	.15
	Unemployed and pensioners	84.0			42.7		
Housing	Brick houses	67.6	0.23	.05	37.4	2.89	.17
	Mud, shack and others	82.6			54.2		
No. of Rooms in the House	1-2 rooms	79.2	1.11	.01	54.2	2.90	.17
	> 2 rooms	87.8			34.7		
No. of People in the House	1-3 people	92.3	1.56	.11	38.5	0.01	.01
	> 3 people	83.3			39.7		
Source of Water	Tap water	86.2	0.39	.06	40.0	0.36	.06
	Others	75.0			25.0		
Having Electricity	Not available	78.9	0.88	.09	47.4	0.63	.08
	Available	87.3			37.5		
Total Income per Month	> R 500	88.9	0.18	.04	33.3	0.98	.00
	R 500 -R 2000	85.1			42.6		
	> R 2000	84.6			30.8		
Perceived Economic Level	Conformable and average	75.9	3.26	.18	34.5	0.4	.06
	Difficult and very difficult	89.9			41.4		

** Significant at p-value < .01

Table 4: The association between health care variables and prescribed treatment and treatment interruption

Variables		*Taking treatment as prescribed*			*Interrupted treatment*		
		%	χ^2	*Contingency co-efficient*	*%*	χ^2	*Contingency co-efficient*
Type of Clinics	Mobile clinic	77.8	.51	.07	33.3	-.15	.04
	Normal clinic	86.5			40.0		
Easy to Get to Nearest Clinics	Easy	79.6	3.48	.19	33.3	2.10	.15
	Difficult	93.0			47.7		
Time to Nearest Clinics	30 minutes and less	82.9	3.19	.18	39.8	.03	.02
	> 30 minutes	100			37.5		
Easy to Get to the Nearest Hospitals	Difficult	70.0	8.52**	.30**	40.0	.00	.00
	Easy	92.5			39.7		
Time to Nearest Clinics	>30 minutes	82.9	3.19*	.18*	44.7	.74	.09
	≤ 30 minutes	100			36.1		
Availability of TB Treatment at Clinic	Always available	86.4	.49	.07	36.0	5.97**	.24**
	Not always available	77.8			77.8		
Relationship with Health Professionals	Poor	78.9	.75	.09	57.9	3.32	.19
	Good	86.8			35.1		
Clinic Education	Poor	88.5	1.16	.11	38.7	.083	.03
	Good	80.6			33.3		
Administering of Treatment	Self	85.7	.00	.00	42.3	.86	.09
	Others	85.7			32.1		

* Significant at p–value < .05, ** Significant at p-value < 0.01

of patients who are RD (retreatment after default) is 25.5% and those who interrupt treatment, RI (re-treatment after interruption) was 21.4%. The combined proportion of patients who defaulted and interrupted TB treatment was 46.9%. A large proportion of patients who were not supervised in taking their Regimen 1 treatment, that is,71.4% self-administered TB treatment. DOTS, Directly Observed Treatment Short Course, are a strategy recommended for

Table 5: The association between health and social variables and prescribed treatment and treatment interruption

Health and social variables		*Taking treatment as prescribed*			*Interrupted treatment*		
		%	χ^2	*Contingency co-efficient*	*%*	χ^2	*Contingency co-efficient*
Chronic Medicine	Yes	100	2.72	.17	42.9	.08	.03
	No	83.3			38.8		
HIV Status	Positive	83.3	.56	.07	43.6	.93	.10
	Negative or unknown	88.6			34.1		
Alcohol Use	Yes	78.9	2.32	.15	51.3	3.81*	.20*
	No	90.0			31.7		
Smoking	Yes	79.4	1.69	.13	52.9	3.98*	.20*
	No	89.1			32.3		
Use of Traditional Medicine	Yes	85.7	.05	.02	48.8	3.27	.18
	No	87.3			30.9		
Perceived TB Danger	DangerousNot dangerous and no idea	83.1	2.76	.17	39.8	.00	.00
		100.0			100.0		
Perceive Consequences of TB	DangerousNot dangerous and no idea	85.4	.02	.01	41.0	.31	.06
		86.7			33.3		
Perceive TB Treatment Effective	YesNo	84.7	.41	.06	39.5	.02	.01
		91.7			41.7		
TB Stigma	Yes	90.1	4.49*	.21*	32.4	5.89**	.24**
	No	73.1			59.3		
Family Support	Poor	81.0	.49	.07	63.6	6.96**	.26**
	Good	87.0			32.5		

*Significant at p–value <.05

TB programs that ensure that patients take all their drugs and complete their treatment (www.stoptb.org, 2007). Monitoring and observation of patients on TB treatment is one of the components of DOTS. Lertmaharit et al. (2005) found that patients who received DOTS were more likely to have excellent adherence than those who received self-supervision of TB treatment. However, in this study the Chi-square test did not find any significant correlation between the method of administering TB treatment and taking treatment as prescribed or interrupting treatment. The study found that most patients on Regimen 2 TB treatment were facing economic hardships. Bophirima district (of which Taung is a sub-district) where the study took place is the most socially deprived district in the North West Province (Day et al. 2009). TB is fuelled by poverty (Waisbord 2004). This study shows that economic hardship is associated with patients on Regimen 2 TB treatment (Lertmaharit et al. 2005). The majority of the study patients were male (69.4%). A study by Santha et al. (2000) also reported that higher default rates were associated with being male. Bashour and Mamaree (2003) conducted a prospective study of gender and TB outcome and found that the delay in TB diagnosis was significantly longer among males, compliance with treatment tended to be higher and the treatment success rate was significantly higher among females than males.

The results of the Chi-square test found a significant difference of proportion between patients taking treatment as prescribed and treatment status. This indicates that in a significant number of patients who comply poorly with TB treatment, most do not take treatment as prescribed, with a large number interrupting treatment. Poor adherence with the antimicrobial regimen has historically been cited as one of the most challenging problems for tuberculosis treatment (Singleton et al. 1997). Although for most patients health facilities were nearby, a substantial number (43.8%) of respondents found it difficult to get to clinics. In fact "finding it easy to get to hospital and time travelling to nearest clinics" were found to be associated with taking treatment as prescribed. Studies have demonstrated a robust association between external constraints and patient delay. Distance from clinics (for example, rural areas in the Gambia, Tanzania, and Zambia) account for a longer delay (Waisbord 2004). Shargie and Lindtjørn (2007) found among pulmonary tuberculosis patients in Southern Ethiopia that distance from home to treatment centre and necessity to use public transport to get to a treatment centre to be independently associated with defaulting from treatment. Waisbord (2004) found poor public health systems to be one of the factors that fuel TB. However, the findings of this study suggest that the Taung sub-district Department of Health does well in ensuring that TB treatment is always available at the clinics. However, the 9.2% of respondents who reported that treatment is not always available, interrupted treatment more than those who always find treatment at their clinics. Tobacco and alcohol use was found to be associated with TB treatment interruption, which is conforming to some other studies (Amuha et al. 2009; Bagchi et al. 2010; South African Medical Research Council 2002).

The study found low family support, as also found in a study by Lertmanharit et al. (2005). Lack of family support was also associated with interrupting TB treatment. A high proportion (87.8%) did receive education about TB treatment on diagnosis of TB in the first episode. Patients who have experienced stigma (32.1%) interrupted treatment, less than those who never experienced stigma (59.3%). These findings suggest that stigma is not a deterrent in complying with TB treatment at Taung sub-district. Studies demonstrate that stigma deters people from seeking care and diagnosis. More recently, the HIV/AIDS stigma affects patients with TB, particularly in communities where HIV/AIDS is prevalent - as shown in studies in Ethiopia, Pakistan, and Thailand, resulting in patients with TB suffering double stigma (Waisbord 2004). However in Taung sub-district, stigma does not seem to be a deterrent in taking treatment correctly (taking treatment as prescribed and not interrupting treatment). Almost half (43.9%) used traditional medicine with their Regimen 1 treatment, and another 4.1% have been handed some remedies by relatives during Regimen 1 treatment, meaning that 48% of the respondents have taken traditional medications, herbs or home remedies when taking their Regimen 1 treatment. However, the Chi-square test did not find a significant association between the use of traditional medicine and interrupting TB treatment or taking treatment as prescribed. Studies in Tanzania have found that in some communities, patients with low knowledge are more likely to visit traditional

healers and pharmacists rather than DOTS providers (Waisbord 2005).

Most patients are HIV positive: 55% of respondents were HIV positive, 29% HIV negative and 16% did not have HIV results. However, if we look at the HIV rate amongst patients with HIV results, 65.4% are HIV positive. HIV increases the rate of recurrent TB (Korenromp et al. 2003) which may be due to either endogenous reactivation (true relapse) or exogenous re-infection (Daley 1993). Most (87.5%) HIV positive patients had a CD4 count less than 200. There is emerging evidence that TB accelerates HIV disease, with more rapid progression to AIDS and death. This accelerated HIV disease progression is thought to be induced by immune stimulation. In-vitro studies have shown that TB increases the ability of HIV to replicate by activating CD4+ T-lymphocytes and macrophages harbouring latent TB (Wilson et al. 2002).

LIMITATIONS

This study used a cross-sectional design and therefore no causal inferences can be made. In addition, the study was conducted only in one district hospital, and therefore findings cannot be generalized. Finally, self-reported measures of TB adherence were used having the limitation of social desirability bias. Some bias may have been reduced by having used an external research assistant who was not part of the health care staff of the hospital. In addition to self-report, medical file information could have been used to assess TB medication adherence.

CONCLUSION

The study found that the combined proportion of patients who defaulted and interrupted TB treatment was 46.9%. Clients on Regimen 2 TB treatment were mainly single men, unemployed and living below the poverty line. A number of factors influencing TB treatment adherence were identified including age, alcohol and tobacco use, access to health facility, family support, TB stigma and TB treatment availability which should be considered in the local TB control programme.

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