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Tuberculosis treatment outcomes among tuberculosis/ human immunodeficiency co-infected cases treated under directly observed treatment of short course in Western Ethiopia

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A five year (2009 to 2013) retrospective cohort study was conducted to assess the treatment outcome of tuberculosis (TB) and human immunodeficiency (HIV) co-infection patients from April to May, 2014 in six randomly selected health institutions providing Directly Observed Treatment, Short-Course (DOTS) program in Western Ethiopia. In the selected health institutions, sputum and blood samples were collected and processed using standard laboratory procedures. Bivariate and multivariate logistic regression analyses were used to assess the association between treatment outcomes and predictor variables. A total of 201 tuberculosis and human immunodeficiency co-infected patients were involved in the study: 15.9% were cured, 44.8% were treatment completed, 17.4% were died during follow-up, 10.0% were defaulted, and 11.4% transferred out to other health institutions. The overall treatment success rates in the last five year was 60.7% and the associated predictors were antiretroviral therapy (ART) status, year of treatment, and sputum examination follow up status at second and fifth month. Therefore, actions targeting (sputum follow up and time to start ART for tuberculosis and human immunodeficiency co-infection patient) on these predictors are necessary to improve the treatment success rate.

Key words: Treatment outcome, HIV/TB co-infected, DOTS, Western Ethiopia.

INTRODUCTION

Tuberculosis (TB) and Human immunodeficiency virus (HIV) co-epidemics remain a major public health challenge, particularly in low income countries. In 2011, 1.1 million (13%) of the 8.7 million people who developed TB worldwide were HIV-positive; the highest rates of HIV co-infection were reported for TB patients in the African Region where 46% of those with an HIV test result were HIV-positive (compared with 44% in 2010). The rate of

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TB/HIV co-infection in Africa region has increased from 44% in 2010 to 46% in 2011. Moreover, among the 41 priority lists of TB/HIV co-infected countries in the world, 28 were from Africa with range of 8% in Ethiopia and 77% in Swaziland (WHO, 2012). A recent Ethiopia National TB/HIV Sentinel Surveillance showed that the prevalence of HIV among the TB patients registered was 20% (FMOH, 2013).

In Ethiopia, a standardized TB prevention and control program incorporating Directly Observed Treatment, Short-Course (DOTS) started as a pilot in 1992, at Arsi zone in Oromia region (Wood et al., 2007). Then, DOTS strategy has been subsequently scaled up and implemented at a national level. Currently, the DOTS geographic coverage has reached 90%, whereas the DOTS health facility coverage is 75% (Wood et al., 2007). In high HIV prevalent countries, the control targets HIV related TB continues to be increasing even in well-established TB program (at least 85% cure rate among new sputum smear positive TB cases) (FMOH, 2008; FMOH, 2009). This implies that asserting a very good TB program with effective implementation of DOTS would not be sufficient to control TB (WHO, 2009a). This is attributable to factors such as over diagnosis of sputum smear negative TB, under diagnosis of sputum smear-positive TB, low cure rates, high morbidity, mortality and default rates during treatment (FMOH, 2009 and WHO, 2004), and a typical clinical presentation of TB in HIV infected patients (Mahajan and Verma, 2008). Consequently, HIV-infection leads to diagnostic challenges and delays in identifying TB that profoundly impacts treatment outcome (Mahajan and Verma, 2008). The HIV pandemic is a forceful contributor to the incidence of TB. Globally, from the year 1990 to 2004, TB incidence increased from 125 cases to 142 cases per 100,000 populations, primarily because of the HIV pandemic (Mukadi et al., 2001).

The goal of TB/HIV collaborative activities is to reduce mortality, default and relapse, and to prevent drug resistance (FMOH, 2008; FMOH, 2009; Shargie and Lindtjørn, 2005; WHO, 2009; Debebe and Worku, 2012). However, the TB treatment outcome among HIV/TB co-infection patients under DOTS was not well studied in western Ethiopia. Thus, the study was to assess the TB treatment outcomes among TB/HIV co-infected cases treated under DOTS over the course of five consecutive years (2009 to 2013) in Western Ethiopia.

MATERIALS AND METHODS

Study area and context

The retrospective cohort study was conducted to investigate treatment outcomes among TB/HIV co-infected patients on DOTS program in Western Ethiopia. Study participants were all TB patients attending TB treatment under DOTS program from 2009 to 2013 in six randomly selected health institution providing DOTS Services in Western Ethiopia. The randomly selected health institutions were: Nekemte Referral Hospital, Nekemte Health Center, Awash Higher Clinic, National Higher Clinic, Red Cross Clinic and Abdi Clinic during the study period. The health institutions provided DOTS service for the people living in the area. The patients were diagnosed, registered, treated, and referred to other DOTS clinics following the National Tuberculosis and Leprosy Control Program (NTLCP) guideline adopted from WHO (FMOH, 2008).

Study design and data collection

A five year (2009 to 2013) retrospective cohort study was conducted from April to May, 2014 in six health institutions providing DOTS program in Western Ethiopia. The socio demographic data (such as sex, age and residence), HIV status, ART status, TB form, category of TB at the start, and the treatment outcomes of the TB patients were collected from the TB Unit Registers. The study excluded TB patient having incomplete data on HIV status.

In the study, institution sputum status was determined for the presence of *Mycobacterium tuberculosis* using Ziehl-Nelson's staining method as described by Cheesebrough. (2006) and following the NTLCP (FMOH, 2008) guide line, adopted from WHO. Further confirmation of a positive sample was done by microscopy. The selected health institutions confirm the HIV status of TB patients before the patient started TB treatment regime. The HIV status was determined following national guideline and according to the manufacturer's instructions. The national HIV test algorithm guideline has three tests to confirm HIV sero-positivity. The Shangai Kehua Bio-enginnering Co, Ltd. China (KHB) was used for the first screening and positive samples were re-tested with STAT PAK (Chembio HIV1/2 STAT PAK Assay, USA) and those who were again positive were considered HIV-positive. Those who were negative on STAT PAK were then tested with the third agglutination test, Unigold (Trinity Biotech PIC, Bray, Ireland). Patients who were positive on the third test were also considered positive. In all tests, appropriate positive and negative controls obtained from the manufacturers were included.

Definition of forms of TB and treatment outcome

According to the standard definitions of the NLCP (FMOH, 2008), adopted from WHO, there are three types of TB considered in this study and defined for the clinical case as follows: The first is Smear-positive pulmonary TB (PTB+) and it is identified if a patient had at least two initial sputum smear examinations positive for acid-fast bacillus (AFB) by direct microscopy, or one initial smear-positive examination for AFB by direct microscopy and a positive culture, or a patient has one initial smear-positive examination for AFB by direct microscope and radiographic abnormalities consistent with active TB as determined by a clinician. The second type was smear-negative Pulmonary TB (PTB^-) and it was characterized by a patient having: (1) symptoms suggestive of TB with at least three initial smear-negative examinations for AFB by direct microscopy and no response to a course of broad-spectrum antibiotics; (2) three smear-negative examinations by direct microscopy, and radiological abnormalities consistent with pulmonary tuberculosis, and decision by a clinician to treat with a full course of anti-tuberculosis; or (3) a diagnosis based on a positive culture for *M. tuberculosis* after three initial smear-negative examinations by direct microscopy. The third type is extra pulmonary TB (EPTB). In this case TB occurs in organs other than the lungs, proven by one positive-culture from specimens of an extra-pulmonary site or histo-pathological evidence from a biopsy, or TB based on strong clinical evidence consistent with active EPTB and the decision by a physician to treat with a full course of anti-TB therapy. Treatment outcome is defined as follows: (1) Cured, a patient who was initially

sputum smear-positive and who was sputum smear-negative in the last month of treatment and on at least one previous occasion; (2) Treatment completed, when a patient completes treatment but did not meet the criteria for cure or failure. This definition applies to sputum smear-positive and sputum smear-negative patients with pulmonary TB and to patients with Extra-pulmonary tuberculosis (EPTB); (3) Died, when patient died from any cause during treatment time; (4) Failed, when a patient was initially sputum smear-positive and when a patient remained sputum smear-positive at for 5 months or later during treatment; (5) Defaulted, when a patient whose treatment was interrupted for 2 consecutive months or more; (6) Transferred out, if treatment result is unknown due to transfer out to another health facility; (7) Successfully treated, when a patient was cured or completed the treatment.

Data quality assurance

To assure the data quality, the trained data collectors were informed on how to maintain the completeness, accuracy and consistency of the collected data. As well as pre-developed data collection sheet was used.

Data analysis

The collected data were entered, cleaned and analyzed by using Statistical Package for the Social Sciences (SPSS) version 20 statistical software. The results were presented using descriptive methods in the tables and figures. The overall treatment success rate calculated as the ratio of treatment cured and completed cases with the died, defaulter and transfer out cases. The association and strength between the dependent and independent variables were assessed using binary and multiple logistic regression models at 95 confidence interval.

Ethical consideration

Before any attempt to collect data, the protocol was approved by Institutional Review Board (IRB) of College of Medical and Health Sciences, Wollega University. Official permission was also obtained from respective institutions official. The anonymity was warranted for all those records reviewed.

RESULTS

A total of 201 TB/HIV co-infected patients were involved in the study, of which (52.7 %) were females. The patients had a mean, standard deviation and median age of 32.06, 11.148 and 31.00, respectively. Most of the patients were urban residents (95.5), within 15 to 44 age range (83%), on co-trimoxazole preventive therapy (CPT) (80.1%), enrolled HIV care (59.2%) and started ART (antiretroviral) treatment 134 (66.7%). In terms of patients' categories, (94.0%) patients were new cases. The dominate form TB were smear negative pulmonary TB (PTB-) (47.3) followed with extra pulmonary TB (EPTB) (31.3%). Most of the study participants were taking their treatment at Nekemte Health Center (50.2%) and Nekemte Referral Hospital (43.3%). The frequency of all form of TB is increasing in the last five year with peak at 2011 (Table 1).

Treatment outcomes

A detailed summary of treatment outcomes of the study participants is presented in Table 2. A total of 201 TB/HIV co-infected patients were analyzed: 32 (15.9%) were cured, 90 (44.8%) were treatment completed 35 (17.4%) were died during follow-up, 20 (10.0%) were defaulted, and 23 (11.4%) transferred out to another health institutions. The trends in cure rate steady increased from 0 to 23.5% and death rate from 6.2 to 31.0% between 2009 to 2010 but sharply decline in the later years. However, the defaulters' rate was decline over the study period (Table 2.). The death rate were higher among rural dweller (22.2%), male (19.0%), 15 to 24 and 35 to 44 years age group (22.2%), smear negative pulmonary PTB- (20.0%), attend treatment at Nekemte Referral Hospital (21.8), and those who did not start current procedural terminology (CPT) (20.0%) and ART (26.9%).

Treatment success rate and its predictors

The overall treatment success rates in the last five year were 60.7%. The trends in treatment success rate increased progressively from 12.5% in 2009 to 84.3% in 2013. In bivariate analysis, year of treatment, sputum examination follow us, starting CPT, HIV care and ART treatment were significantly associated with treatment success rate. However, addresses, sex, age range, form of TB, Patient category and treatment center were not significantly associated. Controlling the effect of confounding factors patient staring ART status, and patients having sputum examination follow up status at second and fifth month had more treatment success rate than their counter part with 0.36 (adjusted odd ratio: AOR (0.178 to 0.746)), 0.062 (AOR (0.013 to 0.296)) and 0.062 (AOR (0.013 to 0.296)), respectively. And also, the study participants attending treatment in 2009, 2010, 2011 and 2012 year had less treatment success rate compare with that of 2013 with AOR of 24.7(4.0 to 150.1), 3.8(1.24 to 11.79), 4.9(1.8 to 12.84) and 2.902.90 (1.03 to 8.19), respectively (Table 3).

DSCUSSION

Many studies assessed the treatment outcome of TB patient attending DOTS services among the general population in different countries including Ethiopia. However, tuberculosis treatment outcome of TB/HIV co-infected cases were not well document for TB/HIV co-infected patient for countries like Ethiopia having high HIV prevalence despite HIV-infection among TB has profoundly impacts on the treatment outcome (Mahajan and Verma, 2008). This study has discussed the tuberculosis treatment outcome of TB/HIV co-infection cases attending DOTS program over the course of five consecutive years (2009 to 2013) in Western Ethiopia.

Table 1. Baseline characteristics of HIV/TB co-infected patients treated in Western Ethiopia.

Character		Frequency	Percentage (%)
Address	Urban	192	95.5
	Rural	9	4.5
Sex	Male	95	47.3
	Female	106	52.7
Age	2-14	10	5.0
	15-24	27	13.4
	25-34	77	38.3
	35-44	63	31.3
	45-54	19	9.5
	≥54	5	2.5
CPT started	Yes	161	80.1
	No	40	19.9
Enrolled HIV care	Yes	119	59.2
	No	82	40.8
ART status	Started	134	66.7
	Naïve	67	33.3
Year	2009	16	8.0
	2010	29	14.4
	2011	63	31.3
	2012	42	20.9
	2013	51	25.4
Patient category	New	189	94.0
	Other	12	6.0
TB form	SPPTB	43	21.4
	SNPTB	95	47.3
	EPTB	63	31.3
Treatment center	Nekemte Hospital	87	43.3
	Nekemte Health Center	101	50.2
	Other health institutions*	13	6.5

*National Higher Clinic, Awash Higher Clinic, Red Cross Clinic and Abdi Clinic.

In this retrospective cohort study; a total of 201 TB/HIV co-infected patients were involved. Out of these, 52.7 were female. Other studies support this finding (Wondimeneh et al., 2012). This is probably related to the high incidence of HIV infection in females which pre-disposes them to TB as the former is known to activate dormant TB Women, who have a higher susceptibility to HIV infection, and are usually exposed to sexual activities earlier than men mainly for economic reasons. Furthermore, most African women being subservient subordinated to their husbands have little or no say in issues relating to sexual relationships (Pefura et al., 2012). In agreement with the previous studies conducted in Kano, Nigeria (Dauda, 2010), 83% of the participants were from the reproductive and productive age group in the study. This may be related to patients' being in a sexually active age group in which both TB and HIV prevail most (Tessema et al., 2009; Berhe et al., 2012). This might indicate the negative

Table 2. Tuberculosis treatment outcomes of HIV/TB co-infected patients on DOTS program in Western Ethiopia from 2009 to 2013.

Character		Treatment outcome n (%)						Total N (%)
		Cured (%)	Completed (%)	Died (%)	Failure (%)	Default (%)	Transfer out (%)	
Address	Urban	31 (16.1)	87 (45.3)	33 (17.2)	1 (0.5)	18 (9.4)	22 (11.5)	192 (95.5)
	Rural	1 (11.1)	3 (33.3)	2 (22.2)	0	2 (22.2)	1 (11.1)	9 (4.5)
Sex	Male	13 (13.7)	42 (44.2)	18 (18.9)	0 (0)	11 (11.6)	11 (11.6)	95 (47.3)
	Female	19 (52.7)	48 (17.9)	17 (16.0)	1 (0.9)	9 (16.0)	12 (8.5)	106 (52.7)
Age	2-14	1 (10.0)	6 (60.0)	1 (10.0)	0 (0)	0 (0)	2 (20.0)	10 (5.0)
	15-24	5 (18.5)	11 (40.7)	6 (22.2)	0 (0)	2 (7.4)	3 (11.1)	27 (13.4)
	25-34	15 (19.5)	30 (39.0)	9 (11.7)	1 (1.3)	10 (13.0)	12 (15.6)	77 (38.3)
	35-44	6 (9.5)	31 (49.2)	14 (22.2)	0 (0)	8 (12.7)	4 (6.3)	63 (31.3)
	≥45	5 (20.8)	12 (50.0)	5 (20.8)	0 (0)	0 (0)	2 (8.3)	24 (11.9)
CPT started	Yes	30 (18.6)	78 (48.4)	27 (16.8)	1 (0.6)	8 (5.0)	17 (10.6)	161 (80.1)
	No	2 (5.0)	12 (30.0)	8 (20.0)	0 (0)	12 (30.0)	6 (15.0)	40 (19.9)
Enrolled HIV care	Yes	21 (17.6)	62 (52.1)	17 (14.3)	1 (0.8)	5 (4.2)	13 (10.9)	119 (59.2)
	No	11 (13.4)	28 (34.1)	18 (22.0)	(0)	15 (18.3)	10 (12.2)	82 (40.8)
ART status	Started	25 (18.7)	71 (53.0)	17 (12.7)	1 (0.7)	9 (6.7)	11 (8.2)	134 (66.7)
	Naïve	7 (10.4)	19 (28.4)	18 (26.9)	0 (0)	11 (16.4)	12 (17.9)	67 (33.3)
Year	2009	0 (0)	2 (12.5)	1 (6.2)	0 (0)	10 (62.5)	3 (18.8)	16 (8.0)
	2010	5 (17.2)	11 (37.9)	9 (31.0)	0 (0)	1 (3.4)	3 (10.3)	29 (14.4)
	2011	10 (15.9)	24 (38.1)	13 (20.6)	1 (1.6)	7 (11.1)	8 (12.7)	63 (31.3)
	2012	5 (11.9)	22 (52.4)	9 (21.4)	0 (0)	1 (2.4)	5 (11.9)	42 (20.9)
	2013	12 (23.5)	31 (60.8)	3 (5.9)	0 (0)	1 (2.0)	4 (7.8)	51 (25.4)
Patient category	New	28 (14.8)	85 (45.0)	35 (18.5)	1 (0.5)	19 (10.1)	21 (11.1)	189 (95.5)
	Other	4 (44.4)	2 (22.2)	0 (0)	0 (0)	1 (11.1)	2 (22.2)	9 (4.5)
TB form	PT B+	32 (74.4)	0 (0)	5 (11.6)	1 (2.3)	3 (7.0)	2 (4.7)	43 (21.4)
	PTB-	0 (0)	54 (56.8)	19 (20.0)	0 (0)	10 (10.5)	12 (12.6)	95 (47.3)
	EPTB	0 (0)	36 (57.1)	11 (17.5)	0 (0)	7 (11.1)	9 (14.3)	63 (31.3)
Treatment center	NRH	9 (10.3)	41 (47.1)	19 (21.8)	1 (1.1)	4 (4.6)	13 (14.9)	87 (43.3)
	NHC	22 (21.8)	39 (38.6)	15 (14.9)	0 (0)	16 (15.8)	9 (8.9)	101 (50.2)
	OHIs	1 (7.7)	10 (76.9)	1 (7.7)	0 (0)	0 (0)	1 (7.7)	13 (6.5)
	Total	32 (15.9)	90 (44.8)	35 (17.4)	1 (0.5)	20 (10.0)	23 (11.4)	201 (100)

NRH=Nekemte Referral Hospital, Nekemte Health Center, OHIs=other heath institution

the negative impact of TB/HIV co-infection on the socio-economic condition of the society. The dominate forms of TB in the study were Southern Nations Nationalities and Peoples (SNNP) and EPTB which have been described elsewhere (Wondimeneh et al., 2012; Deribew et al., 2010; Pefura et al., 2012). The finding was largely in agreement with published literature. The overall treatment success in this study 60.7% which was lower than the nationwide success rate in Ethiopia 82.7% (Getahun et al., 2013) and the global treatment success rate among all newly-diagnosed cases 85% and among patients with smear-positive 87% in 2012 (WHO, 2012) but higher than the study done in Kano, Nigeria (40%) (Dauda, 2010). This lower success rate of 60.7% observed in this study was related to high death rate of 17.4%, default rate (10.0%) and transfer out rate (11.4%) in the study. These support the reason for many countries that are failing to achieve adequate treatment outcomes

Table 3. Factors associated with TB Treatment success rate among TB/HIV co-infected cases registered during 2009 to 2013 in Western Ethiopia.

Character		Number (%) with treatment success	Total number (%) of TB/HIV cases examined	Crude odd ratio (95% CI)	Adjusted odd ratio (95% CI)
Address	Urban	118 (61.5)	192 (95.5)	0.50 (0.13-1.92)	-
	Rural	4 (44.4)	9 (4.5)	1	-
Sex	Male	55 (57.9)	95 (47.3)	1.249 (0.709-2.203)	-
	Female	67 (63.2)	106 (11.3)	1	-
Age	2-14	7 (70.0)	10 (5.0)	1.041 (0.207-5.226)	-
	15-24	16 (59.3)	27 (13.4)	1.67 (0.519-5.368)	-
	25-34	45 (58.4)	77 (38.3)	1.72 (0.64-4.648)	-
	35-44	37 (58.7)	63 (31.3)	1.70 (0.62-4.70)	-
	≥45	17 (70.8)	24 (11.9)	1	-
CPT started	Yes	108 (67.1)	161 (80.1)	3.784 (1.827-7.838)*	.779 (0.23-2.59)
	No	14 (35.0	40 (19.9)	1	1
Enrolled HIV care	Yes	83 (69.7)	119 (59.2)	2.542 (1.418-4.557)*	1.024(.427-.45)
	No	39 (47.6)	82 (40.8)	1	1
ART status	Started	96 (71.6)	134 (66.7)	3.984 (2.146-7.395)*	.36 (.178-.746)*
	Naïve	26 (38.8)	67 (33.3)	1	1
Year	2009	2 (12.5)	16 (8.0)	37.62 (7.13-198.42)*	24.7 (4.0-150.1)*
	2010	16 (55.2)	29 (14.4)	4.367 (1.526-12.49)*	3.8 (1.24-11.79)*
	2011	34 (54.0	63 (31.3)	4.58 (1.85-11.307)*	4.9 (1.8- 12.84)*
	2012	27 (64.3)	42 (20.9)	2.98 (1.116-7.98)*	2.90 (1.03-8.198)*
	2013	43 (84.3)	51 (25.4)	1	1
Patient category	New	113 (59.8)	189 (95.5)	.74 (0.18-3.064)	-
	Other	6 (66.7)	9 (4.5)	1	-
TB form	PTB+	32 (74.)	43 (21.4)	.458 (0.19-1.07)	-
	PTB-	54 (56.8)	95 (47.3)	1.01 (0.53-1.926)	-
	EPTB	36 (57.1)	63 (31.3)	1	-
Treatment center	NRH	50 (57.1)	87 (43.3)	4.07 (0.85-19.47)	-
	NHC	61 (60.4	101 (50.2)	3.60 (0.759-17.137)	-
	OHIs *	11 (84.6)	13 (6.5)	1	-
Sputum smear examination at 2nd mouth	Done	34 (85.0)	40 (19.9)	.213 (0.085-0.535)*	.062 (.013-.296)*
	Not done	88 (54.7)	161 (80.1)	1	1
Sputum smear examination at fifth mouth	Done	34 (97.1)	36 (17.9)	.213 (0.085-.535)*	.062 (.013-.296)*
	Not done	88 (72.1)	165 (82.1)	1	1
Sputum smear examination at seven mouth	Done	32 (97.0)	33 (16.4)	.036 (0.005-.27)*	.197 (.006-6.84)
	Not done	90 (53.6)	168 (83.6)	1	1

NRH=Nekemte Referral Hospital, Nekemte Health Center, OHIs=other heath institution, *Statistical significance (P<0.05), 1 =Reference group, 95%CI=95% confidence interval.

due to patients default, transfer, reinfection and in some cases high death rates (Maher et al., 1996). The observed progress in the trend of treatment success from 2009 through 2013 in the current study was similar to the findings of the study in South Ethiopia (Shargie and Lindtjørn, 2005), Addis Ababa (Getahun et al., 2013), and Enfraz Health Center (Endris et al., 2014). This progress may be partly explained by the improvement in the diagnosis of the diseases and expansion of health institution. The overall default rate in the current study was 10.0% which was higher than the average (6.20%) observed among the 22 high burden countries (Getahun et al., 2013) and Kano, Nigeria (9%) (Dauda, 2010).

The default rate of TB patients decreasing across the years in this study was in contrary to the study done in Gambella Regional Hospital (Damte et al., 2013). The observable difference in default rate and trend in the study area partly elucidated by valuable effect of DOTS, increasing of patients' awareness on infectious diseases, satisfaction with the health provider and expansions of health institutions in the country. The overall death rates were 17.4% in this study. This was in slightly agreement with the study done in Kano, Nigeria (16%) (Dauda, 2010), but higher than in the study done at Southern Ethiopia (13.5%) (Shaweno and Worku, 2012). The observable difference might be due to weak smear result follow up and defaulter tracing mechanism were significant study participants had not smear result follow up record in second, fifth and seventh months.

In the study, the controlling effect of confounding factors, ART status, year of treatment, and sputum examination follow up status at second, and fifth month were predator factors that affect the treatment success rate. This could be observed by effect of smear examination follow up on treatment success as shown on the study conducted in Kano, Nigeria (Dauda, 2010), where the high sputum conversion rate for HIV positive patients during second month and fifth month sputum follow is an indication that the smear examination follow up during DOTS has the capacity for achieving good results even in settings with high HIV prevalence. On the other hand, the effect of ART treatment on disease prognosis of the TB disease treatment related to the immune improvement of patients after starting ART treatment in addition to the TB drug. Apart from such important findings, this study is not without limitation. As common for secondary data studies, important variables; CD4 level, and full data for smear result follow ups were not present in the registration book.

Conclusion

A total of 201 TB/HIV co-infected patients were involved in the study: 15.9% were cured, 44.8% were treatment completed, 17.4% were died during follow-up, 10.0% were defaulted, and 11.4% transferred out to another health institution. The mean treatment success rate of TB/HIV co-infected patients that attended DOTS program in Western Ethiopia was 60.7% and the trend of treatment success rate was improved across the course of study period. However, there was significant number of lost to follow-up. The rate of treatment success was significantly associated with ART status, year of treatment, and sputum examination follow up status at second and fifth month. Therefore, actions targeting (sputum follow up and time to start ART for TB/HIV infected patient) on those predictors are necessary to improve the treatment success rate of TB/HIV co-infected patients.

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Conflict of interest

The authors declare no conflict of interest. Eyasu Ejeta, Tadesse Birhanu and Tsedeke Wolde designed the study, analysis data and drafted the manuscript. All authors read, critically revised and approved the final manuscript.

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