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Full Length Research Paper

A retrospective study on the outcomes of tuberculosis treatment in Felege Hiwot Referral Hospital, Northwest Ethiopia

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In this study, we investigated the outcomes of tuberculosis treatment at Felege Hiwot Referral Hospital in northwest Ethiopia. According to the World Health Organization (WHO), treatment outcome is an important indicator for tuberculosis (TB) prevention and control programme. We analyzed the records of 756 tuberculosis patients registered for treatment in Felege Hiwot Referral Hospital from January, 2010 to 2012. From the total of 756 TB patients, 331 (43.8%) were pulmonary tuberculosis (PTB) and 425 (56.2%) were extrapulmonary tuberculosis (EPTB) cases. Among the study subjects, 191 (25%) were Human immunodeficiency virus (HIV) seropositive. Of all patients, treatment outcome was classified as successfully treated 193 (26%), defaulted in 19 (2.5%), died in 44 (5.8%), treatment failed in 4 (0.5%) and transferred out in 496 (68.6%) patients. The percentage of deaths and defaulters was higher in females than in males. Being an older age group (p = 0.004), a rural resident (p = 0.000) and EPTB patients (p = 0.004) were associated with a lower treatment success rate, which are serious public health concerns that need to be addressed urgently. Therefore, treatment plans that emphasize Directly observed treatments (DOTS) for at-risk patients have the greatest success in improving tuberculosis treatment outcome in the region. Urgent need for strengthening treatment outcome monitoring to ensure effective program implementation and case management system in the study area is strongly recommended.

Key words: Treatment outcomes, tuberculosis patients, northwest Ethiopia.

INTRODUCTION

Tuberculosis (TB) is one of the leading causes of death in the world. Globally, around 8.8 million people develop tuberculosis and 1.45 million people die every year due to TB, of which 0.35 million deaths are associated with HIV-TB co-infection (WHO, 2011). An increased incidence of tuberculosis is found mostly in Africa and Asia, where the highest prevalence of co-infection with HIV and *M. tuberculosis* also occurs (Issar, 2003; WHO, 2005). The global burden of death and disease caused by TB is

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concentrated particularly in low-income countries. Sub-saharan Africa, including Ethiopia, is the area of highest prevalence of TB infection and in 2008, a WHO report showed that Ethiopia ranks seventh among the world's 22 countries with a high tuberculosis burden (WHO, 2008). At present, TB (all cases) is ranked fourth among leading causes of hospital admission and second in causes of hospital death in Ethiopia (MOH, 2004). According to the 2011 WHO report, the prevalence and mortality rate of all forms of TB in Ethiopia was estimated to be 623 and 42 per 82,950 individuals, respectively (WHO, 2011).

The WHO has implemented the Standardized Directly Observed Treatment, Short Course (DOTS)/Stop TB Strategy to scale up TB prevention and control. The TB control program in Ethiopia introduced DOTS as a pilot programme in 1992 and at Felege Hiwot Referral Hospital in 2000. DOTS geographical coverage reached 100% in 2006. However, the case detection rate is still below 50% (WHO, 2010). In the country, the health facility coverage is 75% (MOH, 2008). Although the WHO recommends routine culture and drug susceptibility testing for *M. tuberculosis* in order to effectively and timely follow-up on treatment outcomes, many developing countries including Ethiopia, do not perform it. It has been shown that patients taking drugs directly under the observation of health care providers have a paramount importance in achieving a high treatment success rate of 96.5% (Chaulk and Kazandjian, 1998).

Studies from developing countries have also reported that DOTS was significantly associated with a higher treatment success rate than self-administered therapy, as well as a lower tuberculosis-related mortality rate (Sumartojo, 1993). Besides the association of DOTS with treatment success rate, DOTS also aims to significantly decrease the occurrence of primary and acquired drug resistance and relapse (Weis et al., 1994). Even though the objectives of TB treatment are curing the patient, preventing the spread of tuberculosis infection, and preventing the emergence of new drug resistant strains, these plans are not achieved in many regions of the world (WHO, 2003) due to several factors that affect treatment success. These include: the severity of disease, co-infection with HIV and/or other diseases, multidrug resistance, poverty, and also the support provided to the patient.

Recommendations on how to evaluate treatment outcomes using standardized categories have been issued by the WHO in 2008. These categories were defined to assess the risk of future relapse and drug resistance. In Ethiopia, where there is no strong surveillance system, possible recognition and amendment of system failures is impossible. Some DOTS experiences in Ethiopia have been reported (Ramos et al., 2008; Tessema et al., 2009; Yassin et al., 2003). However, the level of treatment outcomes and associated risk factors has not been assessed in Felege Hiwot Referral Hospital. This study is aimed at investigating the outcomes of tuberculosis treatment in Felege Hiwot Referral Hospital, northwest Ethiopia.

MATERIALS AND METHODS

Study location

The study was conducted at Felege Hiwot Referral Hospital in Bahir Dar, which is the capital city of Amhara National Regional State, 565 km away from Addis Ababa. The hospital is a tertiary health care level hospital serving the population of Bahir Dar town and remote areas of northwest Ethiopia. The total population served by the hospital is about 12 million. In the hospital, DOTS clinic is operating under the National Tuberculosis and Leprosy Program (NTLCP) of Ethiopia, under which patients are diagnosed with tuberculosis by examination of morning sputum smears by Zeihel-Nieelsen staining, for the presence of Acid fast bacilli (AFB), chest radiographs, and for EPTB, pathological investigations were used. Patients are referred to the DOTS clinic where they are registered and treated according to the National Tuberculosis and Leprosy Control Program (NTLCP) (MOH, 2008).

Study design and data collection

A two-year retrospective descriptive analysis to assess treatment outcomes and risk factors of 756 TB patients registered from January, 2010 to 2012 was carried out in Felege Hiwot Referral Hospital's DOTS clinic. All 756 TB patients registered at the DOTS clinic were followed up during their course of treatment to assess treatment outcome. Demographic data such as patient's age, sex, address, as well as the study subject's clinical data HIV serostatus, tuberculosis type, and treatment outcome were included in the registration form. Patients' treatment outcomes were evaluated in accordance with the NTLCP which is adopted from the WHO (MOH, 2008) and classified as: cured (finished treatment with negative bacteriology result at the end of the treatment), treatment completed (finished treatment but without bacteriology result at the end of their treatment), defaulted (patients who interrupted their treatment for two consecutive months or more after registration), treatment failure (remaining smear-positive at five months despite correct intake of medication), died (patients who died from any cause during the course of treatment), transferred out (patients whose treatment result is unknown due to transfer to another health facility), successfully treated (a patient who was cured or completed treatment), and unsuccessful treatment (patients whose treatments were interrupted, transferred out or failed on treatment). Patients were provided with free TB medications for a period of 6 to 8 months by the DOTS centre in the hospital. Patients were followed up regularly until completion of their treatment.

Statistical analysis

Data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS) software package, Version 16. For categorical outcomes, we calculated relative risks from the proportions in each group and tested the differences using the Chi-square test or the Fisher exact test. A p-value less than or equal to 0.05 was considered significant.

Ethical permission

Institutional ethical permission was obtained from the Research and Publication Committee Ethical Review Board of the Bahir Dar

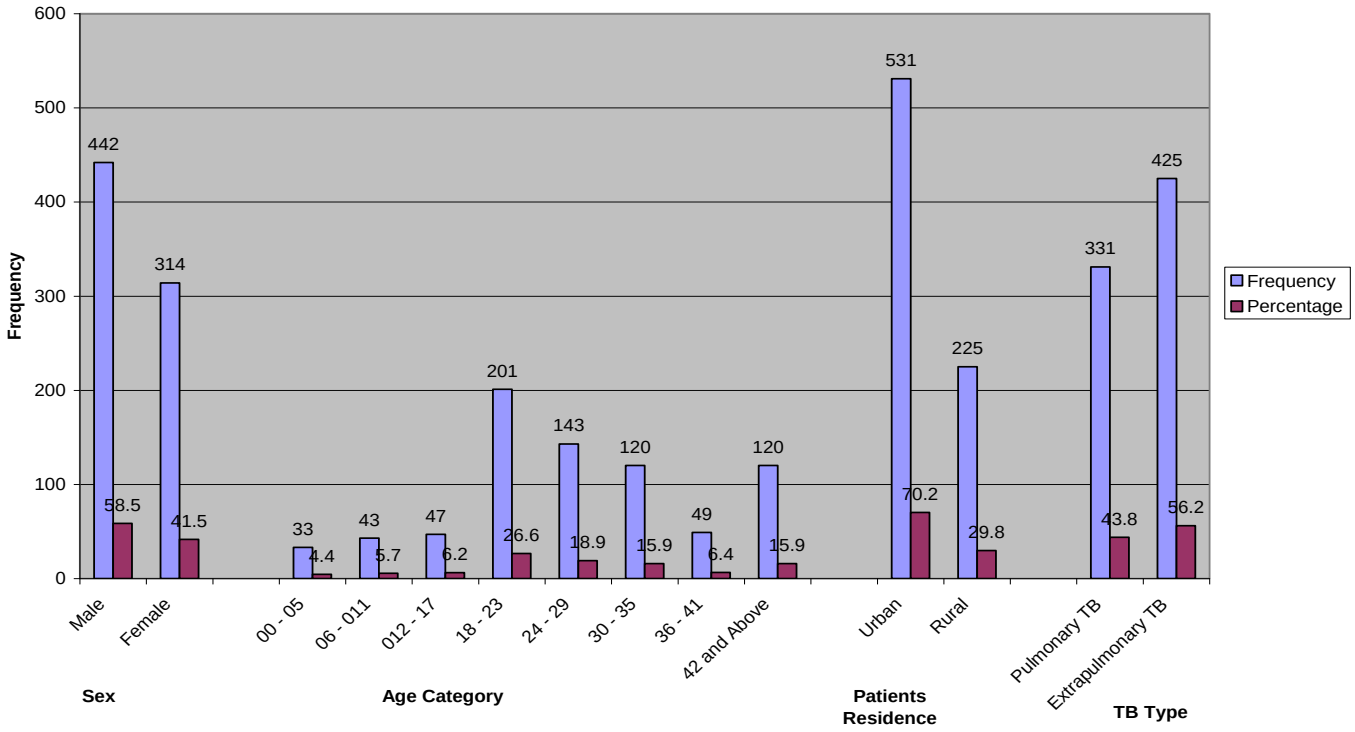

Figure 1. Distribution of TB patients (n = 756) by sex, age category, patients residence and TB type in Felege Hiwot Referral Hospital, Bahir Dar, North west Ethiopia 2010 to 2012.

University, Ethiopia

RESULTS

Demographic characteristics of study subjects

Out of 756 tuberculosis patients recorded at Felege Hiwot Referral Hospital between January, 2010 and 2012, 331 (43.8%) cases were PTB and 425 (56.2%) were EPTB patients. Of the total TB patients registered, 442 (58.5%) were males and 314 (41.5%) of them were females. The mean age of the patients was 29 years, ranging from 1.2 to 81 years. Four hundred and sixty four (61.4%) of the patients were in the age group 18 to 35 years. Figure 1 shows the general characteristics of the patients. Among the study subjects, 191 (25%) were HIV seropositive. Out of these, 94 (49.2%) were males and 97 (50.8 %) were females. One hundred and fifty-five (81.1%) of the subset were from urban areas and the majority of them were also in the age group of 18 to 35 (Figure 2).

Treatment outcomes

The treatment outcomes of 756 tuberculosis patients are shown in Table 1. A successful treatment outcome (finished treatment with negative TB bacteria result at the end of treatment and finished treatment, but without bacteriology result at the end of treatment) was achieved in 193 (26%) of the cases in the study. Meanwhile, only 19 treatment defaulters (2.5%), 44 deaths (5.8%), and 4 treatment failures (0.5%) were recorded. Four hundred and ninety-six (65.6%) patients were transferred out to other clinics in the same region. In this study, a higher death rate 3.3% (n = 25), failure rate 0.4% (n = 3), and defaulter rate 1.5% (n = 11) was recorded for female patients as compared to male patients. Table 2 shows the treatment outcome of seropositive tuberculosis patients by different characteristics.

Factors associated with TB treatment success

Patients with mean age greater than 29 had a significantly lower treatment success rate than other age groups who were being treated for TB, making a treatment success of 29.5% (RR = 1.6, 95% CI = 1.18 to 2.05, p = 0.004). Patients who were being treated for EPTB had lower treatment success than patients being treated for PTB (RR = 1.4, 95%CI = 1.13 to 1.84, p = 0.004). As expected, the study revealed that the risk associated with unsuccessful treatment outcome for people living in rural areas could be as much as seven times higher than for urban residents (RR = 7.0, 95% CI = 3.89 to 12.63, p = 0.000) (Table 3).

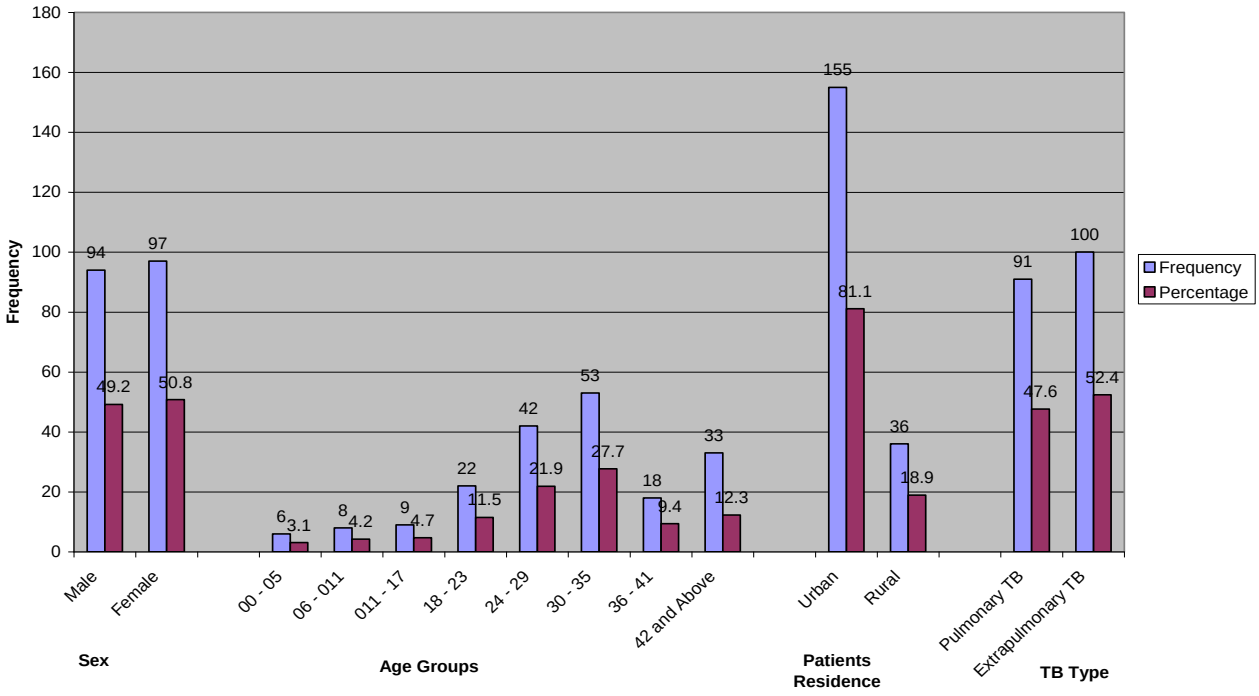

Figure 2. Seropositvity distribution of TB Patients (n = 191) by sex, age groups, patients residence and TB type in Felege Hiwot Referral Hospital, Bahir Dar, North west Ethiopia, 2010 to 2012.

Table 1. Treatment outcome of TB patients (n = 756) by sex, age group, residence, and tuberculosis type, Felege Hiwot Referral Hospital, Northwest Ethiopia, 2010 to 2012.

Characteristics	Treatment outcome						Total
	Cured N (%)	Rx completed N (%)	Died N (%)	Failure N (%)	Defaulted N (%)	Transferred out N (%)	
Sex							
Male	20(2.7)	99(13.1)	19(2.5)	1(0.1)	8(1.0)	295(39.0)	442
Female	13(1.7)	61(8.1)	25(3.3)	3(0.4)	11(1.5)	201(29.6)	314
Age (years)							
0-5	*	9(1.2)	*	1(0.1)	*	23(3.0)	33
6-11	*	6(0.8)	4(0.5)	2(0.3)	*	31(4.1)	43
12-17	1(0.1)	9(1.2)	1(0.1)	1(0.1)	1(0.1)	34(4.5)	47
18-23	20(2.6)	42(5.6)	3(0.4)	*	4(0.5)	132(17.5)	201
24-29	5(0.7)	46(6.0)	10(1.3)	*	2(0.3)	80(10.6)	143
30-35	4(0.5)	22(2.9)	15(2.0)	*	5(0.7)	74(9.8)	120
36-41	1(0.1)	9(1.2)	5(0.7)	*	*	34(4.5)	49
≥42	2(0.3)	17(2.2)	6(0.8)	*	7(0.9)	88(11.6)	120
Residence							
Urban	29(3.9)	153(20.3)	40(5.3)	*	8(1.0)	301(39.8)	531
Rural	4(0.5)	7(0.9)	4(0.5)	4(0.5)	11(1.5)	195(25.8)	225
TB type							
PTB	33(4.4)	69(9.1)	17(2.2)	4(0.6)	9(1.2)	199(26.3)	331
EPTB	*	91(12.0)	27(3.8)	*	10(1.3)	297(39.3)	425

Rx: Treatment, PTB: pulmonary tuberculosis, EPTB: extraplumonary tuberculosis, *: not applicable.

Table 2. Treatment outcome of seropositive tuberculosis patients by sex, age group, residence, and tuberculosis type (n = 191), Northwest Ethiopia, 2010 to 2012.

Characteristics	Treatment outcome						Total
	Cured N (%)	Rx completed N (%)	Died N (%)	Failure N (%)	Defaulted N (%)	Transferred out N (%)	
Sex							
Male	4(2.1)	17(8.9)	12(6.3)	*	*	61(31.9)	94
Female	3(1.6)	19(9.9)	17(8.9)	2(1.0)	2(1.0)	54(29.3)	97
Age in years							
0-5	*	*	*	1(0.5)	*	4(2.1)	5
6-11	*	1(0.5)	3(1.6)	1(0.5)	*	5(2.6)	10
12-17	1(0.5)	3(1.6)	1(0.5)	*	*	4(2.1)	9
18-23	1(0.5)	6(3.1)	1(0.5)	*	*	12(6.3)	20
24-29	2(1.0)	11(5.8)	4(2.1)	*	*	27(14.2)	44
30-35	2(1.0)	10(5.2)	10(5.2)	*	2(1.0)	28(14.7)	52
36-41	1(0.5)	2(1.0)	5(2.6)	*	*	11(5.8)	19
≥42	*	3(1.6)	5(2.6)	*	*	24(15.6)	32
Residence							
Urban	7(3.7)	33(17.2)	27(14.2)	2(1.0)	*	86(45.0)	155
Rural	*	3(1.6)	2(1.0)	*	2(1.0)	29(15.2)	36
TB type							
PTB	7(3.7)	19(9.9)	14(9.3)	2(1.0)	*	49(25.7)	91
EPTB	*	17(8.9)	15(7.9)	*	2(1.0)	66(34.5)	100

Rx: Treatment, PTB: pulmonary tuberculosis, EPTB: extraplumonary tuberculosis, *: not applicable.

Table3. Association between different factors, which may affect treatment outcome among tuberculosis patients (n = 756), Northwest Ethiopia, 2010 to 2012.

Characteristics	Successful treatment = 193 N (%)	Unsuccessful treatment = 563 N (%)	Total (N = 756)	RR (Risk ratio 95% CI)	P-value
Sex					
Male	119(26.9)	323(73.1)	442(58.5)	1.00	
Female	74(23.6)	240(76.4)	314(41.5)	1.1 (0.88-1.47)	0.311
Age (Years)					
≤29	138(29.5)	329(70.5)	467(61.8)	1.00	
>29	55(19)	234(81)	289(38.2)	1.6 (1.18-2.05)	0.004
Residence					
Urban	182(34.3)	349(65.7)	531(70.2)	1.00	
Rural	11(4.9)	214(95.1)	225(29.8)	7.0(3.89-12.62)	0.000
TB type					
PTB	102(30.8)	229(59.2)	331(43.8)	1.00	
EPTB	91(21.4)	334(78.6)	425(56.2)	1.4(1.13-1.84)	0.004
HIVserostatus					
Positive	43(22.5)	148(77.5)	191(25.3)	1.00	
Negative	139(24.6)	426(75.4)	565(74.7)	0.9(0.68-1.23)	0.625

DISCUSSION

The present study found that the successful treatment rate of all tuberculosis cases 193 (26%) treated at the DOTS clinic in Felege Hiwot Referral Hospital was not satisfactory. This finding can be contrasted to rates from the 2005 WHO report on global tuberculosis control, the treatment success rate among 22-high burden countries varied from 60% in Uganda to 93% in China, with an average of 83% (WHO, 2005). Likewise, in 2011, the study conducted by Chennaveerappa et al. (2011) in India has reported a treatment success rate at 83%. Furthermore, a study conducted in the southern part of Ethiopia showed that the treatment success rate of all tuberculosis cases was 49% (Shargie and Lindtjørn, 2005).

Ramose et al. (2008) and the NTLCP reported 70 and 78% treatment success rates, respectively (MOH, 2008). The low treatment success rate observed in the present study might be due to the high transferred-out rate (65.6%); it is impossible to know the treatment outcome for patients who were transferred out. Concurrent with other studies conducted in India (Chennaveerappa et al., 2011; Faustini et al., 2005), this study also found a death rate of 5.8%. Moreover, the death rate of patients steadily increased in older age groups. Similar findings were reported from the studies conducted in Gondar University Hospital, northwest Ethiopia (Tessema et al., 2009), southeast Ethiopia (Ramose et al., 2008), and Eastern Taiwan (Jyh Lee et al., 2007). Older age has been reported to be a risk factor for death due to lowered immunity and co-morbidities (Cayla et al., 2004). The defaulter rate in this study (2.5%) was lower than in other studies conducted elsewhere in the country 11.3, 36.4% and 6% (Ramose et al., 2008;Tessema et al., 2009; Yassin et al., 2003), respectively. Ditah et al. (2008) reported 20% defaulter rate. This lower defaulter rate in this study might be due to proper supervision and health education in the study area.

In this study, the high death rate (3.3%) and treatment default rate (1.5%) that were recorded for female patients deserves special attention. Strengthening monitoring, supervision, and health education to reduce deaths and treatment interruption in females should be among the top priorities in the study region.

Ditah et al. (2008) reported that the treatment failure rate in Zimbabwe and in other high TB burden countries was 0.1 and 1.5%, respectively. Tessema et al. (2009) also reported only a 0.2% treatment failure rate, while there were 0.5% treatment failures in the patients of our study group. In this study, the patients from rural areas had a significantly lower treatment success rate compared to patients from urban areas (RR = 7.0, 95%CI = 3.89 to 12.62, p = 0.000); the lower treatment success rate in rural patients is probably due to lower awareness of TB treatment and the long distance between their homes and the treatment center (Ramose et al., 2008).

Close monitoring and health education for rural patients is of great importance. The patients in the mean age groups greater than 29 had a significantly lower treatment success rate compared to other age groups (RR = 1.6, 95%CI = 1.18 to 2.05, p = 0.004); older age has been reported to be a risk factor for death, partly due to co-infection and general physiological deterioration with age, and thus it is crucial to exercise close monitoring of TB treatment also in older patients (Tessema et al., 2009). Patients with PTB had a significantly higher treatment success rate compared to patients with EPTB (RR = 1.4, 95% CI = 1.13 to 1.84, p = 0.004). This might be due to delayed diagnosis of EPTB patients, which we suspect increases tuberculosis mortality.

HIV infection increases the chance of tuberculosis reactivation and infection (Ramose et al., 2008). In this study, the HIV prevalence rate of 25% recorded among TB patients is much lower than in the previous reports from Gondar of 52.1% (Kassu et al., 2007), and higher than in reports by Ramos et al. (2008) (1.7%). The present study found that the treatment success rate of all TB-HIV co-infection cases treated under the DOTS program at Felege Hiwot Referral Hospital was 23% (n = 191). The death rate among TB-HIV co-infection was 15.2%, the failure rate was 1%, and defaulted rate was 1.0%, indicating that special attention to HIV-positive TB cases is required in the study region. The present study demonstrated that patients with PTB-HIV co-infection were more likely to have favorable treatment outcome (13.6%) than EPTB-HIV co-infection cases (8.9%), possibly because their illness is more severe and symptomatic (Tekle et al., 2002). Though not statistically significant, this study showed that the treatment success rate for HIV negative tuberculosis patients 24.6% (n = 139) was higher than for HIV positive patients 22.5% (n = 43), indicating that HIV testing before treatment is crucial.

These findings are subject to at least three limitations. First, selection bias, second, the hospital is a referral hospital and patients came from other health facilities to be diagnosed. Third, the patients were then admitted to the hospital and after finishing the intensive phase, transferred out to their nearby health facilities. Thus cured, failure, default and death were not detected. Nevertheless, our study tried to provide base line information about treatment outcome of TB patients. The results of this study also indicate that TB is still a major public health problem in Felege Hiwot Referal Hospital.

Conclusion

The treatment success rate of tuberculosis patients treated at the Felege Hiwot Referral Hospital DOTS clinic in northwest Ethiopia was not satisfactory (26%). A high proportion of patients were transferred out (65.6%), (5.8%) died, (0.5%) failed, and (2.5%) defaulted. The percentage of deaths and defaulters was higher in females

than in males, and patients from rural areas had a significantly lower treatment success rate compared to cases from urban areas, which are serious public health concerns that need to be addressed urgently. Also, we were able to demonstrate from our data that HIV negative patients being treated for TB were associated with better treatment outcome. We conclude that treatment plans that emphasize DOTS for at-risk patients have the greatest success in improving tuberculosis treatment outcome in the region. Urgent need for strengthening a coordinated tuberculosis control program and treatment outcome monitoring is strongly recommended. Future research should be done to indentify causes of a common reason for unsuccessful treatment outcome in TB patients.

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