

Treatment outcome of tuberculosis patients at Adare general Hospital, Hawassa, Southern Ethiopia (A five year retrospective study)

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Research note

Keywords: TB treatment outcome, Tuberculosis, DOTS, Treatment success rate

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Abstract

Objective This institution based retrospective study was conducted to determine the treatment outcome of TB patients and investigate and associated risk factors among TB patients registered at Adare general Hospital, Southern Ethiopia. **Result** Among 1122 cases 620 (55.3%) were male, 748(66.7%) were from urban areas, 319 (28.4%) were smear positive, 352 (31.4%) were smear negative and 451 (40.2%) were extra pulmonary patients. Of the 1122 284 (25.3%) were cured, 753(67.1%) completed treatment, 29(2.6%) defaulted, 53(4.7%) died and 3 (0.3%) had treatment failure. The overall mean treatment success rate was 92.4%. The risk of unsuccessful TB treatment outcome was significantly higher among TB patients from rural areas (AOR = 0.435, 95% CI: 0.279, 0.679); patients with extra pulmonary TB (AOR = 0.877, 95% CI; 0.671, 1.146), and HIV positive TB patients (AOR = 5.478, 95% CI; 3.474, 8.639) were more likely to have poor treatment outcomes as compared to their counter parts. **Key words:** TB treatment outcome, Tuberculosis, DOTS, Treatment success rate.

Background

Tuberculosis, which caused by *Mycobacterium Tuberculosis*[1], is a major public health problem in the world being among the ten top leading diseases that cause death [2]. Ten million people were infected and 1.6 million died due to TB [3]. About 56%cases were from South-East Asia and Western Pacific Regions and 29% were from Africa where the highest rate of death occur [4].

Among 30 high TB burden countries globally, Ethiopia ranks seventh and theestimated TB prevalence rate in the country was 27/1000000 population with an estimated incidence rate of 224 per 100,000 population [3]. Annually there are an estimated 5000 or more MDR-TB cases, hence, among 27 high MDR-TB burned countries, Ethiopia was placed at rank of fifteenth [5]. Minister of health indicated that TB was the leading cause of morbidity, the third leading cause of hospital admission, and the second cause of death [6]. Globally accepted TB intervention strategy was Directly Observed Treatment Short Course (DOTS). Since, 1992 DOTS strategy was started was implemented at national level [6] and all public, private and non-governmental health facilities provide the service [7]. Health institution based studies conducted in the country indicated the treatment outcome showed increment after the delivery of DOTS services[8-12], though there were various challenges [13, 14]. Adare General Hospital implemented DOTS program starting national scale up period, however the institutional status of treatment outcome and associated challenges were not studied so far. Therefore, this retrospective study was aimed to assess the treatment outcome of TB patients and identify associated risk factors among TB patients in Adare general Hospital.

Methods

Study area and design

Hawassa, is located about 275km South of Addis Abeba, it lies at 7°5' latitude N and 38°29' Longitude E at an altitude of 1708 masl (meter above sea level). Based on 2007 national census Hawassa town has 329, 734 inhabitants, 169, 677 were males and 160, 057 were females. Adare general Hospital is located at the center of the city and has 70 functional beds. The hospital has one DOTS clinic that performing activities based on the national TB Program guideline[6]. Institutional based retrospective study was conducted by reviewing registration book of tuberculosis patients registered and treated from 2014-2014 at DOTS clinic of Adare Hospital.

Data collection and analysis

Data with complete information of TB patients registered at DOTS TB Clinic were collected retrospectively using a structured checklist. Data was entered and analyzed using SPSS version 20 statistical software. Frequency and percentage of data was determined using descriptive statistics. Bivariate and multivariate analysis were computed to assess the association between TB treatment outcomes and independent variables. Crude and adjusted odd ratio were computed to evaluate the strength of association. $P < 0.05$ was considered as statistically significant.

Operational Definition

The following clinical case and treatment outcome operational terms were used in this article based on standard definitions NLCP adopted from WHO [6]

Smear-positive pulmonary TB (PTB+): A patient with at least two sputum specimens which were positive for acid fast bacilli (AFB) by microscopy, or a patient with only one sputum specimen which was positive for AFB by microscopy, and chest radiographic abnormalities consistent with active PTB.

Smear-negative pulmonary TB (PTB-): A patient with symptoms suggestive of TB, with at least two sputum specimens which were negative for AFB by microscopy, and with chest radiographic abnormalities consistent with active PTB, or a patient with two sets of at least two sputum specimens taken at least two weeks apart, and which were negative for AFB by microscopy, and radiographic abnormalities consistent with PTB and lack of clinical response to one week of broad spectrum antibiotic therapy.

Extra pulmonary TB (EPTB): This included TB of organs other than the lungs, such as lymph nodes, abdomen, genitourinary tract, skin, joints and bones, the meninges and others. Diagnosis of EPTB was based on fine needle aspiration cytology or biochemical analyses of cerebrospinal/pleural/ascitic fluid or histopathological examination or strong clinical evidence consistent with active EPTB, followed by a decision of a clinician to treat with a full course of anti-TB chemotherapy. In all the cases of EPTB, sputum examinations and chest radiographs were used to rule out involvement of the lung parenchyma. This hospital lacks the facilities for culture and drug susceptibility testing.

Categories of treatment outcomes

Successful outcome: If TB patients were cured (negative smear microscopy at the end of treatment and on at least one previous follow-up test) or completed treatment with resolution of symptoms.

Unsuccessful outcome: If treatment resulted in treatment failure (remaining smear-positive after 5 months of treatment), defaulted (patients who interrupted their treatment for two consecutive months or more after registration), or died.

Results

Socio-demographic and clinical characteristics of the patients

Among the total registered TB patients with complete record (n=1122), (55.3%) were males and (66.7%) were urban residents. Majority (61.5%) of the cases were in the age group of 15-34. PTB⁺, PTB⁻ and EPTB cases were (28.4%), (31.4%) and (40.2%) respectively. Most of the TB patients were new (94.8%), while relapse, transfer and treatment after failure accounts for (4.3%), (0.7%) and (0.2%) respectively. All registered cases for anti-TB treatment were tested for HIV voluntarily and 21.2% were HIV positive (Table 1).

Treatment outcome of the participants

The treatment outcome of most the cases was promising, (67.1%) were completed anti-TB treatment and (25.3%) cured. Treatment failure, died and defaulters were (0.3%), (4.7%) and (2.6%), respectively. Majority of treatment failure and defaulter were in the age range of 45-64 years and the high rate of death 15% was registered by HIV/TB co-infected patients (Table 2).

Treatment success rate and its associated factors

The treatment success rate was 51% in males and 41.4% in females. Majorities 63% of the patients with successful outcome were urban residents. The highest treatment success rate was observed in the age group 0-14 and 45-54 years. The treatment success rate of EPTB, PTB⁻ and PTB⁺ patients was 37.3%, 29.2% and 25.9% respectively. The success rate among new and relapse cases was 88.6% and 3.8% respectively.

HIV status, residence, and type of TB showed significant association with treatment outcome $P < 0.05$. The risk of unsuccessful TB treatment outcome was significantly higher among TB patients from rural areas (AOR = 0.435, 95% CI: 0.279, 0.679). Patients with EPTB were more likely have poor treatment outcome as compared to patients with PTB⁺ and PTB⁻ (AOR = 0.877, 95% CI; 0.671, 1.146). HIV positive

TB patients were more likely to develop risk of poor treatment outcomes as compared to their counterparts (AOR = 5.478, 95% CI; 3.474, 8.639) (Table 3).

Discussion

Males account for more than half of the study participants, correspondingly studies conducted in different health institutions in the county also indicated that more males were involved [15, 16]. However finding from studies conducted in Gambella [17] and Raya Kobo [18] were in contrast. Most (83.4%) of the study participants were 15–54 years old, WHO also reported that the productive age was more affected by Tuberculosis [19]. The situation might have negative impact on the economic and social development of the community and the nation at large. Majority (59.8%) were pulmonary TB patients, and (40.2%) were extra pulmonary TB patients and as to the TB profile data high proportions of TB patients were EPTB and smear negative PTB, which is comparable to other TB profile data in the country [15, 20-23].

The treatment success rate 92.4% was lower than the success rate 94.8% from northwest Ethiopia[22]. However, it was higher than that of Tigray, Northern Ethiopia, 89.2% [21], Gambella, Western Ethiopia 86.1% [17], Dilla, Southern Ethiopia 85.3% [15], Nekemte Western Ethiopia 70.8% [24] and Hossana, South Ethiopia 43.3% [25]. The unsuccessful TB treatment outcome rate was 7.6%, which is lower than unsuccessful treatment outcome reported from Dilla 14.7% [15], Gambella 13.9% [17] and Tigray 10.8% [21]. This could be associated with differences in socio-demographic characteristics of the patient, appropriateness of the institutional setup, follow-up and counseling of patients in DOTS clinics, and knowledge and attitude towards and side-effect due to DOTS [26].

The death rate 4.7% was lower than other report from Ethiopia 5% [18], Nigeria 6.5% [27] and Zimbabwe 8.7% [28]. But higher than the death rate reported from elsewhere in Ethiopia 3% and 3.4% [25, 15], Turkey 2.4% [29] and Brazil 2.8% [30]. The default rate 2.6%, was lower than the rate in different areas of Ethiopia 3.2%, 8% and 11.1% [21, 32, 15], Uzbekistan 6% [31], Turkey 3.9% [29] and Nigeria 9.8% [27]. Which, might be due to a better supervision and health education activities.

Treatment failure rate 0.3% was in consistent with the rate of reported from other study in Ethiopia 0.3% [15], and higher than treatment failure rate in Malaysia 0.2% [33]. Nonetheless the rate observed in this study was lower than findings from Ethiopia 0.5, 2.2%, and 3.7% [25, 18, 21], Uzbekistan 3% [31], Turkey 1.1% [29], Brazil 2.1% [30] and Nigeria 1.5% [27]. The overall TB-HIV co infection rate was 21.2%, which was lower than that of Gonder, North west Ethiopia 52.1% [10] and Gambella region 26.12% [17]. However,

it was higher than 12.7% Debre Tabor, Northwest Ethiopia [34], 16.5% Hossana, Southern Ethiopia [25], 11.7% Gojam, Northwest Ethiopia [22] and 17.1% Nekemte, Western Ethiopia [24].

As compared to HIV negative TB patients, HIV positive TB patients were more likely to develop risk of poor treatment outcomes (AOR = 5.478, 95% CI: 3.474, 8.639). This finding was in line with findings in other part of Ethiopia [21, 35], Somalia [36] South Africa [37], Finland [38] and Brazil [30]. The risk of poor treatment outcomes could be due to the fact that HIV infection decline CD4 cells count progressively by about 50-80 cells/mm³ per year and hence the immune status of the individual might not be efficient enough to prevent the dissemination of *Mycobacterium tuberculosis* in the body [39]. Also it might be associated to co-administration of ART along with anti-TB therapy, which can lead to drug-drug interactions, overlapping drug toxicities and immune reconstruction syndrome [40].

Patients from rural settlement were more likely exposed to poor treatment outcomes as compared to those in urban (AOR = 0.435, 95% CI: 0.279, 0.679). The result was in consistent with studies conducted in Southern Ethiopia [15, 41] and Central Ethiopia [42], but in contrary to study conducted in, Southern Ethiopia [43]. As suggested by [41] the lower treatment success in rural residents could be associated with lower awareness of TB treatment and the long distance between their homes and the treatment centers. Patients who presented extra pulmonary TB (EPTB) were more likely exposed for risk of poor treatment outcomes as compared to the patients with smear positive (PTB+) and smear negative (PTB-) (AOR = 0.877, 95% CI: 0.671, 1.146). The finding was in line with the study conducted in Hossana, South Ethiopia [25], but in contrary with the finding of study conducted in North West Ethiopia [22].

Conclusions

As the five years retrospective study indicated the DOTS strategy improved TB treatment success in Adare hospital. Treatment outcome rate of registered patients in the study area was high and has met the target success rate set by WHO. Residence, HIV status and TB category are main predictors for unsuccessful treatment outcome. Hence, awareness creation through health education for rural patients and regular follow of patients with unsuccessful outcome on the way of treatment is essential.

Limitations

A limitation of this study could be that since the data collected is retrospective secondary data and the data source (which was the standard TB register) did not capture detailed information, hence in some cases there was missing and/or inaccurate data. Moreover, the data was collected from one site, Adare Hospital which might not be representative to give general conclusion since patients from other facilities have different profile.

Abbreviations

AOR: Adjusted odds ratio

DOTs: Direct observed treatment strategies

EPTB: Extra pulmonary TB

FMOH: Federal ministry of health

MTB: Mycobacterium tuberculosis

NTLCP: National tuberculosis and leprosy control program

SNNPR: Southern nations nationalities and peoples region

SPSS Statistical package for social science

PTB: Pulmonary tuberculosis

TB: Tuberculosis

WHO : World Health Organization

Declarations

Ethical Considerations

Institutional ethical clearance was obtained from the ethical Review Committee of Hawassa University. The supportive letter was obtained from Hawassa University and approved by Adare Hospital Medical director office to utilize the retrospective data. Permission to adopt a map of Hawassa city was obtained from Hawassa City administration.

Consent for publication

Not applicable

Availability of data and materials

All data generated and analysed during the present study are included in this manuscript and accessed from corresponding author as required.

Conflict of interests

The authors declare that they have no conflict of interests.

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Authors' contributions

BT and ZB conceive the idea and developed proposal. BT collected the data, entered the data and conducted data analysis. ZB and SA analyze the data further, interpreted the results and reviewed the initial and final drafts of the paper; finally SA critically reviewed and wrote the manuscript and submit for publishing. All authors read and approved the final manuscript ahead of submitting for publication.

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Tables

Table 1: Socio-demographic and disease related characteristics of registered TB patients in Adare Hospital, South Ethiopia, from 2014 to 2018.

Variable	Frequency	Percentage (%)
Sex		
	620	55.3
	502	44.7
Male		
Female	748	66.7
	374	33.3
Residence		
Urban		
Rural		
Age in years		
0-14	101	9
	362	32.3
15-24	328	29.2
	172	15.3
25-34	74	6.6
	50	4.5
35-44	35	3.1
45-54		
55-64		
≥65		
Microscopy profile of TB		
PTB+	319	28.4
PTB-	352	31.4
EPTB	452	40.2
Category of TB patients		
New	1064	94.8
Relapse cases	48	4.3
Treatment after failure	2	0.2
Transfer in	8	0.7
HIV test result		
Unknown	6	0.5
	238	21.2
Positive	878	78.3
Negative		

Table 2: Tuberculosis treatment outcomes by demographic and profile of TB patients in Adare Hospital, South Ethiopia, from 2014-2018.

Variables		Successful		Unsuccessful			Total N (%)
		Cured N (%)	Completed N (%)	Died N (%)	Defaulter N (%)	Failure N (%)	
Sex	Male	172 (27.7)	401(64.7)	28(4.5)	18 (2.9)	1 (0.2)	620(55.3)
	Female	112 (22.3)	352 (70.1)	25(5)	11 (2.2)	2 (0.4)	502(44.7)
Residence	Urban	183(24.5)	524(70.1)	27(3.6)	13(1.7)	1(0.1)	748(66.7)
	Rural	101(27)	229(61.2)	26(7)	16(4.3)	2(0.5)	374(33.3)
Age	0-14	9 (8.9)	88 (87.1)	1(1)	2(2)	1(1)	101(9)
	15-24	111 (30.7)	231 (63.8)	9 (2.4)	10(2.8)	1(0.3)	362(32.3)
	25-34	98 (29.9)	211 (64.3)	14(4.3)	5(1.5)	0(0.0)	328(29.2)
	35-44	32 (18.6)	12 (70.3)	12(7)	7(4.1)	0(0.0)	172(15.3)
	45-54	19 (25.6)	45 (60.8)	8(10.8)	1(1.4)	1(1.4)	74(6.6)
	55-64	8 (16)	31 (62)	7(14)	4(8)	0(0.0)	50(4.5)
	≥ 65	7 (20)	26 (74.3)	2(5.7)	0(0.0)	0(0.0)	35(3.1)
Microscopy profile of TB	PTB+	278 (87.1)	12 (3.8)	15(4.7)	13(4.1)	1(0.3)	319(28.4)
	PTB-	4 (1.1)	324 (92.1)	20(5.7)	4(1.1)	0(0.0)	352(31.4)
	EPTB	2 (0.4)	417 (92.5)	18(4)	12(2.7)	2(0.4)	451(40.2)
HIV status	Unknown	0(0.0)	6(1)	0(0.0)	0(0.0)	0(0.0)	6(0.5)
	Positive	40 (16.8)	151 (63.4)	35(15)	11(4.6)	1(0.4)	238(21.2)
	Negative	244 (27.8)	596 (68)	18(2)	18(2)	2(0.2)	878(78.3)
Over all Total		284 (25.3)	753 (67.1)	53 (4.7)	29 (2.6)	3 (0.3)	1122 (100)

Table 3. Factors associated with TB treatment outcome treated in Adare hospital Hawassa, South Ethiopia, from 2014-2018.

Variables	Total no	Treatment outcome			COR		AOR	p-value
		Successful	(%)	Unsuccessful (%)				
Residence								
Urban	748	707(63)		41(3.7)	1		1	
Rural	374	330(29.4)		44(3.9)	2.29(1.47, 3.58)	0.00	0.43(0.27,0.67)	0.00
HIV status								
Positive	238	191(17)		47(4.2)	1.34(0.11, 0.28)	0.00	5.47(3.47, 8.63)	0.00
Negative	884	846(75.4)		38(3.4)	1		1	
Types of TB								
PTB+	319	290(25.8)		29(2.6)	1.31(0.78, 2.21)		0.95(0.55, 1.65)	0.87
PTB-	352	328(29.3)		24(2.1)	1			
EPTB	451	419(37.3)		32(2.9)	0.96 (0.59,1.70)		0.70(0.26, 1.86)	0.478