

Comparing the Treatment Outcomes of Tuberculosis Patients in Private Clinic with Governmental Health Centre in Jimma City, Ethiopia.

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Research article

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**Comparing the Treatment Outcomes of Tuberculosis Patients in
Private Clinic with Governmental Health Centre in Jimma City,
Ethiopia.**

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Abstract

Background: Tuberculosis is a common and often deadly infectious disease caused by various strains of mycobacterium, usually mycobacterium tuberculosis in humans. Tuberculosis has long been major cause of morbidity and mortality particularly where the diagnostic and control program is not far extended.

Objective: - To compare the treatment outcomes and to describe the social demographic factors associated with Tuberculosis patient in private clinic with governmental health centre in Jimma city, Ethiopia from September 12, 2007 to September 10, 2017.

Methods and Materials: - A ten years retrospective systemic record review was conducted to compare the treatment outcomes and to describe the social demographic factors associated with Tuberculosis patient in private clinic with governmental health centre in Jimma city, Ethiopia from September 12, 2007 to September 10, 2017. Data was collected by using questionnaire formats. Since all serial numbers of the patients were used no sampling technique was needed. Finally data was analyzed by SPSS/EPI INFO.

Result: The present study revealed that within ten years duration private clinic gives anti-TB treatment coverage for 582 patients whereas governmental clinic gives for 510 patients.

The treatment success rate of the private clinic is 98.1% which is 1.03 fold than the governmental health center (95.3%). Governmental health center defaulting rate was triple fold of the private clinic 4.1% and 1.2% receptively, while the treatment failure of private clinic was 0.2%, but no treatment failure in governmental health center.

Conclusion and Recommendation-Age, educational level and the types of TB diagnosis and treatment outcome of the patients were statistically associated in both sectors. Better counseling and awareness about the disease should have to be given for every anti-TB treatment receiving patients despite of their educational level and occupational status in both sectors.

Keywords: Tuberculosis, Treatment outcome, Comparing, Governmental health center, Private clinic

Strength of the Study

- The study helps to describe the association of social demographic factors with Tuberculosis patients and their treatment outcome.
- This study is useful to assess and to compare the treatment outcomes of tuberculosis patients in government health centre and private clinic since there is no previous similar study in the area.
- To compare the extent of tuberculosis treatment burden which handled between the sectors.
- Further, more the findings will act as baseline for further studies more over finding will help to formulate strategies to give the appropriate tuberculosis care and to sensor what really affect the outcome.
- Also how private clinics are helping the government health institutions by providing anti-TB regime relative to the similar catchment population with the government and what is behind on the numbers difference value.

Limitation of The Study

- Data accuracy is under question with some incomplete subjects since it is a secondary data.
- The sources of this study is Jimma health center and Jimma medium clinic records; hence, the result may lack external validity.
- Lack of stable internet from Ethiopia during data collection.

Chapter 1: Background

TB is a major public health problem throughout the world and one of the leading causes of death worldwide. One third of the world's population is infected with TB [1]. The foundation of the current global TB strategy began in the 1990s, when the increasing trends of TB led to the creation of directly observed treatment- short course (DOTS) strategy. The multidimensional DOTS framework has been implemented in 184 countries and over 132 million patients have been treated with DOTS resulting in more than 125 million being cured [2, 3, 4, 5]. In 2016, 10.4 million people around the world became sick with TB disease. There were 1.7 million TB-related deaths worldwide. TB is a leading killer of people who are HIV infected, in 2016, 40% of HIV deaths were due to TB [6]. TB incidence falls 1.5% per year globally but challenged by the emergence and increase in drug resistance TB worldwide and association of TB and HIV infections also TB control has been hindered with poor treatment outcome up to death and TB still remains one of the world's major threat to public health [7, 26].

Tuberculosis is the still problem in Ethiopia, the trend of TB incidence is still rise in contract the global trend is falling. The Emergence of resistance TB and high prevalence of MDR TB in Ethiopia is one threatening and drawback factor for TB control program. We can prevent the emergence of acquired resistance by using the good practice which is the simplest and easiest way to prevent the complicated and serious disease [8]. Ethiopia ranks 3rd in Africa and 8th among the 22 highest tuberculosis (TB) burdened countries in the world [7]. In 2016/2017 TB case notification rate is 123 per 100, 000 population. 40% bacteriology confirmed new and relapse, 29% clinically diagnosed new, 31% diagnosed EPTB and previously treated TB accounts 4.2% of the total TB case detected. TB case detection rate of 64%, treatment success rate of 94%, and cure rate of 85% [9-10]. The burden of TB is the highest in Oromia region according to the national 2017 report, registered 68,106 cases of TB [9-10]. For drug resistant TB, Ethiopia is one of the 27 high MDR-TB countries; it is ranked 15th with more than 5000 estimated MDR-TB patients each year. There are a cumulative total of 3,767 MDR TB patients were enrolled in second line drug (SLD), in 2017, 706 RR/MDR-TB cases are diagnosed and enrolled to second line anti TB drug; the treatment success rate of MDR TB reached 71.3% [10-11].

This study is useful to assess and to compare the treatment outcomes of tuberculosis patients in government health centre and private clinic which helps to identify the extent of tuberculosis treatment burden which handled between the sectors. Further, more the findings will act as baseline for further studies more over finding will help to formulate strategies to give the appropriate tuberculosis care and to sensor what really affect the outcome.

Chapter 2: Methods

2.1: Study Area Population

The study was being conducted in Jimma health center and Jimma medium clinic. The public health center gives service for 42,164 populations in its catchments area and the private medium clinic has 40,104 population in its catchment area. According to 2017 Jimma town health bureau, the town has 1 specialized hospital, 1 zonal hospital, 1 private hospital, 4 health center, 2 NGO, 2 health post and 28 private clinics. Among them TB treatment is available in 4 private clinics, 1 private hospital, 2 NGOs and the rest all governmental health sectors [12-13].

2.2: Study Design

A ten year retrospective systemic record review was conducted in Jimma health center and Jimma medium clinic. All patient who took anti-TB treatment from the registration used Since September 12, 2007 to September 10, 2017 included in the study. The survey included the following: Age Sex Occupational status, Educational status, Treatment outcome, Types of TB, Category of patients. Data was collected by the trained and assigned TB and leprosy unit personnel in the private and public health sectors.

2.2.1: Treatment Outcome Definition

TB treatment outcome categories were defined according to WHO and the International Union against Tuberculosis and Lung Disease guideline [14]. WHO defines treatment success as the sum of patients who are cured and those who have completed treatment? In line with WHO criteria, treatment outcomes were categorized into:

1. Successful outcome- if PTB patients were cured (i.e., negative smear microscopy at the end of treatment and on at least one previous follow-up test) or completed treatment with resolution of symptoms.
2. Unsuccessful outcome – if treatment of PTB patients resulted in treatment failure (i.e., remaining smear-positive after 5 months of treatment), default (i.e., patients who interrupted their treatment for two consecutive months or more after registration), or death.

2.3: Statistical Analysis

The collected data was checked for completeness and analyzed by using IBM version 23 SPSS/EPI INFO. Relationships between treatment outcomes and potential predictor variables were assessed using multivariate logistic regression model.

Chapter 3: Result

3.1: Socio-Demographic and Clinical Characteristics of the Patients with the TB Trend

A total of 510 and 582 patients were followed anti TB treatment in the governmental and private clinic respectively. The majority of the patients in governmental clinic were females constituted 53.7% (n=274) and Males in private clinic constituted 50.9 % (n=298). In both sectors majority of patients were between the age 15-49 years which accounted for 82.3% (n=420) in governmental health center and 74.2% (n=432) in private clinic with the mean age of 34.4 and 32.4 years respectively. In both sectors new patients were the majority number 91.2 % (n=465) and 96.9 % (n=564) where as 3.1 % (n=16) and 1.0 % (n=6) were transferred in, 3.7 % (n=19) and 0.5 % (n=3) were relapse, 2.0 % (n=10) and 1.5 % (n=9) were others in governmental health center and private clinic respectively. Regarding category of TB, in both sectors Extra pulmonary tuberculosis constituted similar number 48.4 % (n=247) in governmental health center and 41.8 % (n=243) in private clinic, while smear negative pulmonary tuberculosis was 3.9 % (n=20) in governmental health center and 35.1 % (n=204) in private clinics. Smear positive pulmonary tuberculosis in governmental health center is higher than the private clinic 47.6 % (n=243) and 23.2 % (n=135) respectively. 92 patients had the data for occupational status and educational level, 50 patients were from the governmental health center and 42 from the private clinic which have been taken from March 12 – August 11 and from September 4 - April 3, 2015 respectively. The majority of educational level was higher educated patients which is similar in both sectors 34 % (n=17) and 35.7 % (n=15). Occupational status of governmental health center patients were governmental employee 20 % (n=10) whereas 21.4 % (n=9) of private clinic patients were students. **(Table 1)**

Table1: *Distribution of Sex, Age, educational level, occupational status, Category of patients and Types of TB diagnosis in Jimma health center and Jimma medium clinic, Jimma town, Oromia region, south west Ethiopia from Sept 11, 2006 – Sept 10, 2017.*

Characteristics		Gov't Health Center N (%)	Private Clinic N (%)
Sex			
	Male	236 (46.3)	296(50.9)
	Female	274(53.7)	286(49.1)
	Total	510(100)	582(100)
Age			
	0-14	30(5.9)	67(11.5)
	15-49	420(82.3)	432(74.2)
	50+	60(11.8)	83(14.3)
	Total	510(100)	582(100)
Educational level			
	cannot read and write	5(10)	5(11.9)
	1-4 grade	6(12)	3(7.1)
	5-8 grade	7(14)	8(19)
	9-12 grade	15(30)	11(26.2)
	higher education	17(34)	15(35.7)
	Total	50(100)	42(100)
Occupational status			
	student	6(12)	9(21.4)
	daily laborer	8(16)	5(11.9)
	merchant	9(18)	6(14.3)
	governmental employer	10(20)	7(16.7)
	farmer	1(2)	1(2.4)
	other	16(32)	14(33.3)
	Total	50(100)	42(100)
Category of Patient			
	New	465(91.2)	564(96.9)
	Relapse	19(3.7)	3(0.5)
	Transfer In	16(3.1)	6(1)
	Other	10(2)	9(1.5)
	Total	510(100)	582(100)
Type of TB			
	EPTB	247(48.4)	243(41.8)
	P.NEG	20(3.9)	204(35.1)
	P.POS	243(47.6)	135(23.2)
	Total	510(100)	582(100)

3.1.1: Trend of Tuberculosis Case

The ten years all form of TB trend was analyzed and the private clinic anti TB treatment coverage was decreased through years which reaches to 2% on Sept 10, 2017 from 20% of Sept 2009, while for the past four years Sept 12, 2013 to Sept 10, 2017 the governmental clinic shows revitalization of anti TB treatment coverage. **(Figure 1)**

3.2: Treatment Outcome of TB

The ten years treatment outcome for 1092 patients from both sectors were analyzed. Hence, the majority of patients were completed the anti TB treatment in both sectors 49.2 %(n=251) in governmental health center and 76.3% (n=444) in private clinic also the cure rate was 46.1 %(n=235) and 21.8 %(n=127) respectively. Whereas the default rate was 4.1% (n=21) and 1.2% (n=7) in governmental and private sectors respectively. In both sectors 3 patients were died. No treatment failure patients documented in governmental health center whereas 0.2% (n=1) in private clinic. The overall treatment success rate of the private clinic is higher than the governmental health center 98.1 %(n= 571) and 95.3 %(n= 486) respectively. Also the overall unsuccessful treatment outcome rate of governmental health center was 4.7 %(n=24) which is higher than 1.9% (n=11) of the private clinic. **(Figure 2)**

Among the sectors the majority of patients under the age of 15-49 years old is completed the treatment in private clinic than the governmental health center 72.7% (n=314) and 46% (n=193) respectively. Female patients were more defaulter than male patients in both sectors 4.7% (13) in governmental and 1.7% (5) in private clinic. Three patients are died in all types of TB and they were new in governmental health center while Two EPTB and one P.NEG patients are died those were New and transfer in respectively. 96.7 % (n=235) smear positive pulmonary TB patients were cured in governmental health center while 90.4% (n=122) smear positive pulmonary TB patients were cured in private medium clinic. **(Table 2)**

Table 2: *Distribution of age, sex, educational level, occupational status, types of TB and category of patients in relation to their treatment outcome in Jimma health center and Jimma medium clinic, Jimma town, Oromia region, south west Ethiopia from Sept 11, 2006 – Sept 10, 2017.*

Characteristics	Treatment Outcome (%)											
	Completed		Defaulter		Cured		Died		Failure		Total (%)	
	Gov't	Private	Gov't	private	Gov't	Private	Gov't	Private	Private	Gov't	Private	
Age												
0-14	26(86.7)	63(94)	0	0	4(13.3)	4(6)	0	0	0	30(5.9)	67(11.5)	
15-49	193(46.0)	314(72.7)	19(4.5)	6(1.4)	206(49)	110(25.5)	2(0.5)	1(0.2)	1(0.2)	420(82.3)	432(74.2)	
50+	32(53.3)	67(80.7)	2(3.3)	1(1.2)	25(41.7)	13(15.7)	1(1.7)	2(2.4)	0	60(11.8)	83(14.3)	
Total	251	444	21	7	235	127	3	3	1	510	582	
Sex												
Male	107(45.3)	219(74)	8(3.4)	2(7)	119(50.4)	72(24.3)	2(0.8)	2(0.7)	1(0.3)	236(46.3)	296(50.9)	
Female	144(52.6)	225(78.7)	13(4.7)	5(1.7)	116(42.3)	55(19.2)	1(0.4)	1(0.3)	0	274(53.7)	286(49.1)	
Total	251	444	21	7	235	127	3	3	1	510	582	
Educational level												
Illiterate	1(20)	1(20)	4(80)	2(40)	0	0	0.0	2(40)	0	5(10)	5(11.9)	
1-4 grade	4(66.7)	2(66.7)	1(16.7)	1(33.3)	1(16.7)	0	0.0	0	0	6(12)	3(7.1)	
5-8 grade	6(85.7)	6(75)	0	1(12.5)	1(14.3)	1(12.5)	0.0	0	0	7(14)	8(19)	
9-12 grade	13(86.7)	10(90.9)	1(6.7)	1(9.1)	1(6.7)	0	0.0	0	0	15(30)	11(26.2)	
higher education	12(70.6)	5(33.3)	0	0	5(29.4)	10(66.7)	0.0	0	0	17(34)	15(35.7)	
Total	36	24	6	5	8	11	0.0	2	0	50	42	
Occupational status												
student	5(83.3)	7(77.8)	0	0	1(16.7)	2(22.2)	0.0	0	0	6(12)	9(21.4)	
daily laborer	4(50)	2(40)	3(37.5)	1(20)	1(12.5)	1(20)	0.0	1(20)	0	8(16)	5(11.9)	
merchant	6(66.7)	5(83.3)	0	1(16.7)	3(33.3)	0	0.0	0	0	9(18)	6(14.3)	
Gov't employer	9(90)	4(57.1)	0	1(14.30)	1(10)	2(28.6)	0.0	0	0	10(20)	7(16.7)	
farmer	1(100)	1(100)	0	0	0	0	0.0	0	0	1(2)	1(2.4)	
other	11(68.8)	5(35.7)	3(18.8)	2(14.3)	2(12.5)	6(42.90)	0.0	1(7.1)	0	16(32)	14(33.3)	
Total	36	24	6	5	8	11	0.0	2	0	50	42	
Types of TB												
EPTB	233(94.3)	237(97.5)	13(5.3)	2(0.8)	0	2(0.8)	1(0.4)	2(0.8)	0	247(48.4)	243(41.8)	
P.NEG	16(80)	198(97.1)	3(15)	2(1)	0	3(1.5)	1(5)	1(0.5)	0	20(3.9)	204(35.1)	
P.POS	2(0.8)	9(6.7)	5(2.1)	3(2.2)	235(96.7)	122(90.4)	1(0.4)	0	1(0.7)	243(47.6)	135(23.2)	
Total	251	444	21	7	235	127	3	3	1	510	582	
Patient Category												
New	231(49.7)	434(77)	17(3.7)	6(1.1)	214(46)	121(21.5)	3(0.6)	2(0.4)	1	465(91.2)	564(96.9)	
Relapse	4(21.1)	1(33.3)	1(5.3)	1(33.3)	14(73.7)	1(33.3)	0	0	0	19(3.7)	3(0.5)	
Transfer In	10(62.5)	3(50)	2(12.5)	0	4(25)	2(33.3)	0	1(16.7)	0	16(3.1)	6(1)	
Other	6(60)	6(66.7)	1(10)	0	3(30)	3(33.3)	0	0	0	10(2)	9(1.5)	
Total	251	444	21	7	235	127	3	3	1	510	582	

3.3: Treatment Outcome and Its Associated Predictors

Multivariate logistic regression analysis was carried out to predict factors affecting the treatment outcome with socio-demographic and clinical risk factors including age, sex, educational level, and occupational status, the type of TB and treatment category of patients. The proportion recorded on multivariate logistic model as having an unsuccessful treatment outcome varied by age group, educational level and the type of TB.

The risk of unsuccessful treatment outcome was 1.26 (95% CI: 0.96-2.24) and 2.16 (95% CI: 0.67-3.09) times higher among 15-49 years old TB patients in governmental and private clinics respectively compared to those aged 0-14 years and over 50 years old patients. In other predictor the illiterate patients in the governmental health center had 3.63 (95%CI: 1.98-5.45) times and 2.73 (95%CI: 1.18-4.31) in private clinic experience greater risk of unsuccessful treatment outcome compared to the literate patients. The governmental health center had higher Poor treatment outcome in EPTB type of patients (AOR=2.12, CI 1.02-3.67) than the private clinic (AOR=1.84, CI 1.01-3.78) which compares with their counterparts of type TB. Sex, occupational status and category of patients did not show any statistically significant association with unsuccessful treatment outcome in the multivariate analysis (**Table 3**).

Table 3. *Logistic regression analyses of factors associated with treatment outcome of TB patients in Jimma health center and Jimma medium clinic, Jimma town, Oromia region, south west Ethiopia from Sept 11, 2006 – Sept 10, 2017.*

Characteristics	N (%)		N (%) of Unsuccessful Treatment outcome				AOR(95%CI)		p-value	
	Gov't	Private	Gov't	Private	Gov't	Private	Gov't	Private		
Age										
0-14	30(5.9)	67(11.5)	0	0	-	-	-	-		
15-49	420(82.3)	432(74.2)	21(5)	8(1.8)	1.26(0.96-2.24)	2.16(0.67-3.09)	0.016	0.013		
50+	60(11.8)	83(14.3)	3(5)	3(3.6)	1.00(reference)	1(Reference)	Reference	Reference		
Sex										
Male	236(46.3)	296(50.9)	10(4.2)	5(8)	0.86(0.72-1.31)	1.34(0.51-2.98)	0.239	0.934		
Female	274(53.7)	286(49.1)	14(5.1)	6(2)	1.00(reference)	1(Reference)	Reference	Reference		
Educational level										
Illiterate	5(10)	5(11.9)	4(80)	4(80)	3.63(1.98-5.45)	2.73(1.18-4.31)	0.019	0.009		
1-4 grade	6(12)	3(7.1)	1(16.7)	1(33.3)	1.61(0.89-2.34)	1.92(0.82-2.63)	0.027	0.005		
5-8 grade	7(14)	8(19)	0(0)	1(12.5)	-	1.03(0.72-2.66)	-	0.003		
9-12 grade	15(30)	11(26.2)	1(6.7)	1(9.1)	1.00(reference)	0.78(0.38-2.89)	Reference	0.002		
higher education	17(34)	15(35.7)	0(0)	0	-	1(Reference)	-	Reference		
Occupation status										
student	6(12)	9(21.4)	0	0	0.48(0.29-2.12)	1.24(0.89-2.12)	0.467	0.621		
daily laborer	8(16)	5(11.9)	3(37.5)	2(40)	1.73(0.64-2.64)	1.01(0.64-2.64)	0.374	0.554		
merchant	9(18)	6(14.3)	0	1(16.7)	0.98(0.72-2.45)	0.72(0.58-2.45)	0.892	0.241		
governmental employer	10(20)	7(16.7)	0	1(14.3)	2.21(1.98-4.78)	1.91(0.98-2.68)	0.188	0.836		
farmer	1(2)	1(2.4)	0	0	1.37(0.84-3.12)	1.26(0.74-2.61)	0.976	0.496		
other	16(32)	14(33.3)	3(18.8)	3(21.4)	1(Reference)	1(Reference)	Reference	Reference		
Type of TB										
EPTB	247(48.4)	4(1.6)	14(5.7)	247(43.4)	2.12(1.02-3.67)	1.84(1.01-3.78)	0.001	0.004		
P.NEG	20(3.9)	3(2)	4(20)	207(35.6)	1.66(1.21-2.87)	0.47(0.24-2.71)	0.003	0.021		
P.POS	243(47.6)	4(2.9)	6(2.5)	138(25.4)	1.00(reference)	1(Reference)	Reference	Reference		
Patient Category										
New	465(91.2)	564(96.9)	20(4.3)	9(1.7)	1.67(1.26-3.89)	0.98(0.38-2.19)	0.161	0.651		
Relapse	19(3.7)	3(0.5)	1(5.3)	1(33.3)	0.91(0.78-3.2)	1.28(0.76-1.72)	0.739	0.892		
Transfer In	16(3.1)	6(1)	2(12.5)	1(16.7)	1.28(0.89-3.12)	1.85(0.62-3.22)	0.862	0.278		
Other	10(2)	9(1.5)	1(10)	0	1.00(reference)	1(Reference)	Reference	Reference		

Chapter 4: Discussion

Correct treatment of TB aims of curing patient, interrupting transmission of TB to other person and preventing bacilli from becoming drug resistant. As such insuring successful treatment completion might be required addressing multiple factors beyond simple supervision of drug intake [15-16]. In one of the health indicators of sustainable development goal is to bring the non-completion of TB treatment below 10% in order to have treatment success of 85% for all detected smear positive cases [17-18]. Different studies showed that the currently running on DOTS strategy has increased treatment success rate. In Ethiopia national treatment success is 94% in 2017 [19].

Both sectors almost have the same catchment area. The present study revealed that within ten years duration private clinic gives anti-TB treatment coverage for 582 patients whereas governmental clinic gives for 510 patients. The treatment success rate of the private clinic is 98.1% which is 1.03 fold than the governmental health center (95.3%). Governmental health center defaulting rate was triple fold of the private clinic 4.1% and 1.2% receptively, while the treatment failure of private clinic was 0.2%, but no treatment failure in governmental health center. One a five year retrospective study showed in southern Ethiopia, the overall mean treatment success rate of the TB patients was 85.2% [25]. Similar study shows in Mogadishu, Somalia successful treatment outcomes were 81.8% among TB patients in. Specific successful treatment outcomes included cured (61.6%) and treatment completed (20.3%). Specific unsuccessful treatment outcome included treatment failed (6.8%), defaulters (6.2%), transferred (2.9%) and died (2.3%) [22]. Also in Thailand Treatment outcomes were unsuccessful for 237 (33%) patients in private facilities, and for respectively 1018 (23%) and 655 (29%) patients in small and large public facilities [23]. Available from: One study shows in Kampala, Uganda public clinics provided more appropriate care for tuberculosis patients than private clinics. Only one-third of the private clinics practiced a minimal standard of appropriate tuberculosis care. Public clinics are under the supervision of the Uganda NTLF, so their practices are standardized by the use of guidelines [20]. Similar results were reported from a study done in Korea [21]. **(Figure 2).**

In both sectors 15-49 years of age of patients had high treatment success rate, whereas children's didn't account defaulting rate. Males treatment success rate in both sectors were higher

than the females 98.31% in private and 95.76% in governmental health center with their respective of 97.9% and 94.8% respectively. Whereas the defaulting rate of both sex in governmental sector is higher than the private sector 18.88% of females and 35.62 % males with their respective 5.92% females and 14.3% males respectively. In both sectors the treatment success rate was higher with their educational level better, most of the defaulting patients were illiterate patients. Smear positive pulmonary TB prevalence in governmental health center was double higher than the private clinic, whereas the number of pulmonary negative TB patients of private clinic were 30 times folds of the governmental health center. This is due to lack of x-ray technology with untrained professional for further Tuberculosis diagnostic criteria. The success rate of smear pulmonary positive patients were almost the same, whereas smear negative pulmonary TB patients and EPTB treatment success rate was 98.6% and 98.3% in private clinic respectively which is higher than that of the governmental health center 80% and 94.3%. One study in Tigray region, Ethiopia showed Out of the 407 PTB patients (221 males and 186 females) aged 15 years and above, 89.2% had successful and 10.8% had unsuccessful treatment outcome [24]. Newly diagnosed tuberculosis patient treatment success rate in the private clinic is higher than the governmental health center 98.5% and 95.7% respectively. While the defaulting rate after relapse of the disease in private clinic is 33.3% which is higher than the governmental health center 21.1% (**Table 2**).

Beside of Anti-TB treatment being free of payment this difference may be due to awareness about drug adherence also difference in socioeconomic status. This shows good progress of DOTS strategy and decrease of noncompliance in both sectors.

Age, educational level and the types of TB diagnosis with the treatment outcome of the patients were statistically significant ($p < 0.05$) and associated in both sectors. While Sex, category of the patient and occupational status of the patients and their treatment outcome were not statistically significant ($p > 0.05$). The literacy level plays greater role for treatment success rate. Hence the current study revealed the poor treatment outcome is observed in uneducated patients. (**Table 3**).

4.1: Conclusion

The key to control TB is rapid detection and cure of infectious cases by TB control programmers. The public health priority of national TB control programmers is to work towards the objectives to treat successfully 85%. Ensuring adherence to treatment is very important to achieve this priority [10]. According to the result of this study both sectors achieved the expected WHO targets by newly recommended strategy for TB treatment, DOTS and treatment success is much better to standard. This shows good progress of DOTS strategy and decrease of noncompliance in this area. Age, educational level and the types of TB diagnosis and treatment outcome of the patients were statistically associated in both sectors.

4.2: Recommendation

TB control program is adequate therefore this program should encourage and supported and continued in both sectors. Better counseling and awareness about the disease should have to be given for every anti-TB treatment receiving patients despite of their educational level and occupational status in both sectors. The extent of tuberculosis and its treatment burden is handled more in private clinic than the governmental health center, specially smear negative pulmonary TB which is 30 folds higher. This number indicate the second option to diagnosis tuberculosis is not well experienced, in turn tells us lack of the x-ray technology with well-trained health professionals. Beside of it needs a time and better economy, governmental health centers also recommended to fulfill the diagnostic material, like X-ray. The findings will act as baseline for further studies.

Abbreviation

JMC – Jimma medium clinic

TB – Tuberculosis

JHC – Jimma health center

AIDS – Acquired immune deficiency syndrome

AFB – Acid-fast bacilli

ARI – Annual risk of TB infection

DOTS – Directly observed treatment of short course

EPTB – Extra pulmonary tuberculosis

HIV – Human immune deficiency virus

MDR-TB – Multi drug resistance tuberculosis

MOH – Ministry of health

PTB – Pulmonary tuberculosis

TLCP – TB and leprosy control program

PTB +ve – smear +ve pulmonary TB

PTB- ve – Smear -ve pulmonary TB

WHO – World health organization

NTCP – National tuberculosis control program

TLCP – TB and leprosy control program

Declaration

1. Ethical Approval and Consent to Participate

I have received the ethical approval from Public Health Research Center, Tsinghua University, Beijing, china and mainly from Jimma Town health office, Jimma health center and from Jimma medium clinic with their respective TB treatment personnel's. Since it is secondary data, we didn't expect participants verbal approval.

2. Consent for Publication

Not Applicable

3. Availability of data and materials

It is secondary data. Hence, we don't have the consent from the patients, but the raw data is in my hand.

4. Competing interests

The authors declare that they have no competing interests

5. Funding

No funding was obtained for this study.

6. Authors' Contributions

EG analyzed and interpreted the patient data CF supervising over all of the study.

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