

Research Article

Mortality and Associated Factors Among HIV/TB Co-infected Patients Under ART Clinic in Dire Dawa, Ethiopia, 2023

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Abstract

Background: Tuberculosis (TB) remains a significant public health concern globally, especially among HIV-positive individuals. The study aimed to investigate the factors associated with mortality among HIV/TB co-infected patients receiving antiretroviral therapy (ART) in Dire Dawa, Ethiopia. **Methods:** A retrospective follow-up study was conducted at Dilchora Referral Hospital among 434 HIV/TB co-infected patients enrolled in ART from January 2008 to January 2023. Standardized checklist was used for data collection and taken from patient's medical cards and database system. Binary logistic regression was used to identify baseline factors associated with mortality. **Results:** The study found a mortality rate of 31% among HIV/TB co-infected patients. Factors such as WHO clinical stage III (AOR: 9.3, 95% CI: 3.03, 28.34) and WHO clinical stage IV (AOR: 11.3, 95% CI: 3.5, 36.34) and underweight and overweight body mass index were (AOR: 2.6, 95% CI: 1.35, 4.83) and (AOR: 21.4, 95% CI: 8.24, 55.5), poor ART adherence (AOR: 4.24, 95% CI: 2.25, 7.98), alcohol consumption (AOR: 3.15, 95% CI: 1.69, 5.87), and smoking (AOR: 4.12, 95% CI: 2.32, 7.29) were associated with increased odds of mortality. **Conclusion:** The study underscores the importance of identifying and addressing baseline factors that contribute to mortality in HIV/TB co-infected patients. Interventions targeting factors like clinical staging, adherence to ART, and lifestyle habits could help reduce mortality rates in this population.

Keywords

Mortality, HIV/TB Co-infection, Antiretroviral Therapy, Ethiopia

1. Introduction

Tuberculosis (TB) is a major public health concern and it is among the top 10 causes of mortality globally [1]. Globally, the number of cases of tuberculosis (TB) increased to 10.6 million (95% UI: 9.9–11.4 million) in 2022 from the highest projections of 10.3 million in 2021 and 10.0 million in 2020. Of these cases, 1 million (10%) involved adults liv-

ing with HIV [1, 2]. Furthermore, 374,000 of the anticipated 1.3 million TB deaths occurred among PLHIV [3]. Anyone can contract tuberculosis anywhere. However, those who have HIV 18-fold increased risk of contracting tuberculosis [4]. The primary cause of death for HIV-positive individuals is tuberculosis (TB), which accounts for around one-third of

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all AIDS-related fatalities worldwide [4]. Tuberculosis killed 214,000 HIV-positive individuals in 2020. The World Health Organizations of African region has the greatest percentage of TB episodes co-infected with HIV, with some regions of southern Africa surpassing 50% [4].

There were projected to be 1.4 million deaths among HIV-negative people and 187,000 deaths among HIV-positive people in 2021, for a total of 1.6 million fatalities, over the best estimates of 1.5 million in 2020 and 1.4 million in 2019 and back with 2017 [5, 6]. In 2021 Eighty-two percent of tuberculosis mortality among HIV-positive and HIV-negative individuals were concentrated in the regions of Africa and South-East Asia combined [5, 6]. Despite making up only 15% of the global population, the region was responsible for 31% of tuberculosis-related deaths and 23% of newly diagnosed cases in 2021. This corresponds to an estimated 500,000 TB deaths and 2.5 million cases of the disease. Approximately 20% of newly diagnosed cases of tuberculosis were recorded among individuals living with HIV/AIDS [5]. A few nations in the region have a disproportionately high rate of tuberculosis-related deaths. For instance, of all the TB deaths in the African continent, the predicted number of deaths in 2021 in the Democratic Republic of the Congo, Nigeria, and South Africa accounted for 48% [7, 8].

HIV/TB co-infection mortality continues to be the highest in Sub-Saharan Africa [9, 10]. Ethiopia was placed seventh out of 22 severely impacted nations. The estimated HIV prevalence (ages 15–49) and estimated AIDS death (ages 15 and over) for Ethiopia were 0.8 and 9,700, respectively, according to the 2021 Global HIV/AIDS Epidemic Report [11]. Ethiopia is one of the 30 countries with the highest rates of tuberculosis (TB), tuberculosis/human immunodeficiency virus (TB/HIV), and multi-drug resistant tuberculosis (MDR-TB) [12]. In 2018, there were an estimated 165,000 cases of tuberculosis (151/100,000 population) worldwide; 1600 cases of MDR-TB incident cases; and 24,000 cases of tuberculosis deaths (22/100,000 population) [12]. 7.34 percent of TB patients also have HIV, with notable regional differences ranging from 0.7 percent in Oromia to 14.5 percent in Afar [12]. Furthermore, a prior study on the geographical codistribution of HIV, TB, and malaria in Ethiopia found that the national prevalence of the three diseases were 1.02 percent for malaria, 0.39 percent for TB, and 1.54% (95% CI 1.40 to 1.70) for HIV. Significant subnational variance was anticipated, with the regions of Gambela (4.52% Addis Ababa (3.52%), and Dire Dawa (2.67%) had the highest estimated HIV prevalence [13]. Whereas the highest rates of tuberculosis were found in Dire Dawa (0.96%) and Gambela (0.88 %) [13].

Widespread antiretroviral therapy (ART) for HIV-positive patients, isoniazid preventative therapy, infection control, and the WHO's three I's strategy of increased case-finding have all been public health measures targeted at lowering TB incidence rates [14]. Nonetheless, prior research on HIV/TB co-infected individuals in sub-Saharan Africa has demonstrated that the majority of TB patients had low CD4 counts

and were not on antiretroviral therapy (ART) at the time of TB diagnosis [15–17]. Associated factor for HIV-TB co-infection was linked to low CD4 cell counts and lack of drug responsiveness [18, 19], Smear negativity, age, and cancerousness. Lower death rates were achieved by women's literacy and improved nutritional status [20]. Status of marriage, degree of education, weight under 50 kg, and CD4 level less than 200 cells/mm³ in patients at WHO clinical stage III [19] to determine the mortality from HIV/TB co-infected. Similar study also revealed that live in a rural area, use drugs, have a chronic illness, have more than five family sizes, have a baseline CD4 level of 200 to 499 cells/mm³ and have a count of fewer than 200 cells/mm³ [20].

HIV/TB co-infection still public health problem worldwide. As of our knowledge in the study area a few study conducted on similar topic and also the previous literatures were used short period of follow up data. But in this study a 15-year retrospective data analysis allows for a comprehensive examination of mortality in specific study area. Therefore, such study is important to increase the awareness and understanding of communities and healthcare provider about factors associated with HIV and TB. So, the aim of this study to assess the magnitude and associated factors of mortality among HIV/TB co-infection patients under ART clinic in Dire Dawa, Ethiopia, 2023.

2. Methods

2.1. Study Design and Setting

This study was a hospital based retrospective follow-up study addressing the mortality and associated factors among HIV/TB co-infected patients. It used data from the HIV/TB co-infected patients attending the ART clinic from January, 2008 to January, 2023 in Dilchora Referral hospital in Dire Dawa city administration, Ethiopia. Dire dawa is located the eastern part of the country, which is 525 km far away from the capital of the country Addis Ababa. Dilchora referral hospital serves as a referral hospital for the entire Eastern part of Ethiopia, including Dire Dawa city administration, Eastern Oromia, Dire Harari regional state, the Somali regional state. There are six public hospitals in Dire Dawa. Out of six public Hospitals, Dilchora is the only referral hospital in the city administration. So Dilchora Referral Hospital is selected purposively due to high volume of patients. This hospital was primarily founded in response to the increasing demand. It functions perfectly for the region's healthcare services. As a result, the hospital features more than 100 beds and cutting-edge medical equipment. Also comprising X-ray, CT, and ultrasound equipment. As a result, the hospital offers many different services. ART, general medicine, surgery, pediatrics, obstetrics, and gynecological services are mostly included. Data were extracted from March 5 to May 1, 2023 by reviewing patients ART logbooks and charts.

2.2. Population

The source population was all patients with co-infections of HIV and TB who enrolled at the Dilchora referral hospitals in Dire Dawa. HIV/TB co-infected patients who were carefully selected among HIV/TB patients registered in hospitals between January 1, 2008, and January 1, 2023 made up the study population. Included were the whole medical data of every patient with co-infections of HIV and TB who was recorded in a hospital between January 1, 2008, and January 1, 2023. Patients' records that had missing values for the variable of interest and their status neither died nor alive were excluded. The medical data of the patients who were transferred out, lost to follow up, withdrawal in general the patient status were not died or alive were excluded.

2.3. Sample Size Determination and Sampling Technique

The sample size for this study was determined using a single population calculation with a 95 percent confidence interval (CI), 5 percent margin of error, and the proportion death taken from previous study that 35.4 percent of HIV/TB co-infected was used [20]. The minimum sample size that would be 352. After adding a 10 percent non-response rate for missing data, the sample size became 387.

$$n = \frac{(Z_{\alpha/2})^2 * p(1-p)}{d^2} = \frac{(1.96)^2 * 0.354(1-0.354)}{0.05^2} = 352$$

All patients co-infected with TB and HIV who were registered and receiving follow-up care from 1 January 2008 to 1 January 2023 were included in the current study. During the study period, a total of 753 HIV/TB co-infected patients were enrolled in the ART clinic and 434 people were found to be fulfill the inclusion criteria. As a result, 319 were rejected due to the aforementioned exclusion criteria. As a result, 434 patients with both TB and HIV were included in the study because of their status showed either died or alive.

2.4. Operational Definition

Mortality: is defined as confirmed HIV/AIDS-related death with the certification of death by a medical practitioner, or a verbal or telephone confirmation of death from a relative or friend.

Adherence to ART: Was classified based on the percentage of drug dosage calculated from the total monthly doses of ART drugs. (Good >95%, fair 85–94%, and poor <85%) [21].

2.5. Data Collection Instruments and Procedures

Data were collected from patients' chart files using a

checklist which was prepared by adopting from national ART guideline. Charts were retrieved by using the patient medical record number and ART registration number which is found on the data base of the health facilities. Preliminary testing was conducted for the check list before the actual data collection and some variables such as viral load, drug resistance and socioeconomic status were omitted because of incomplete medical records. Otherwise, the checklist was inclusive of the different socio-demographic variables (sex, age, education status, marital status, religion, occupation and residence) and clinical characteristics (CD4 count, BMI, hemoglobin level, drug adherence, functional status, CPT and WHO clinical stages) which were assumed as possible determinants of TB occurrence among people with HIV. Data quality was assured by pre-tested data collection and by trained data collectors. Completeness and consistency of data was checked by professionals and data clerks before and after data entry.

2.6. Data Processing and Analysis

The data was collected and entered in-to Epidata version 4.6. After the extracted data were checked, cleared and coded and STATA version 17 were used for further statistical analysis. Frequency and percentage were determined for descriptive analysis of socio-demographic, clinical and behavioral factors of the study subjects. Multivariable logistic regression was used by entering all variables with p- value < 0.25 in the bivariate analysis. Finally, logistic regression with backward elimination variable selection method with p- value < 0.05 was used to identify the determinant factors associated with HIV/TB co-infection. The Hosmer Lemeshow test of goodness of fit was used to model diagnosis with p- value > 0.05 provided good fit for the model. Therefore, the p- value obtained for Hosmer Lemeshow test of goodness of fit from the final model were 0.261 which is less 0.05 implies that the data was good fit for model.

2.7. Ethical Consideration

Ethical Clearance was obtained from the IRB office of the school of public health, university of Addis Ababa with grant number (Ref. No. SPH/154/2023). Permission was obtained from the Dire Dawa city administration health bureau and Waiver letters would be obtained from the medical director of the Dilchora Referral hospital in order to access the medical records of patients (Ref. No. 604/2023). The study was conducted retrospectively, and some patients were already dead at the beginning of the study. In addition, our data did not contain any personally identifiable patient data and were subject to strict confidentiality measures during data collection. Due to these factors, the medical directors of the Dilchora Referral Hospital waived written informed consent. The collected information was only used for the study purpose. The study confirm that all methods

were carried out in accordance with relevant guideline and regulations.

3. Results

3.1. Socio-Demographic Information of the Study Participants

Four hundred thirty four of HIV/TB co-infected patients were eligible for the study. Of these patients, 242 (55.76%) were female. The mean age at the start of ART was 35.4 years with standard deviation of 11.7 years, most of the patients 148 (34.1%) were categorized under 35-44 years. 386 (88.94%) of the patients lived in urban. Of the total number of patients, 140 (32.26%) and 154 (35.48%) were never married and married, respectively. Of the 434 study participants, 183 (42.17%) had attended primary school, followed by no formal education, 121(27.88%). Regarding the occupational status of the patients, 102 (23.50%) patients whose occupation status was not reported. Of these, 254 (58.53%) were Orthodox followers and 302 (69.59%) of patients were disclosed their HIV status (Table 1).

Table 1. Baseline socio demographic information for patients with HIV/TB co-infections receiving ART at Dilchora Referral Hospital in Dire Dawa, Ethiopia, 2023.

Variables	Categories	Frequency	Percentage (%)
Sex	Male	192	44.24
	Female	242	55.76
Age	<15	22	5.07
	15-24	45	10.37
	25-34	124	28.57
	35-44	148	34.10
Residence	>44	95	21.89
	Urban	386	88.94
	Rural	48	11.06
	Never married	140	32.26
Marital status	Married	154	35.48
	Divorced	71	16.36
	Widowed	43	9.91
	separated	26	5.99
Occupation status	Government Employed	35	8.06
	Private Em-ployed	14	3.23

Variables	Categories	Frequency	Percentage (%)
Occupational status	Student	26	5.99
	Housewife	52	11.98
	Merchant	77	17.74
	Others ^a	128	29.49
	unknown	102	23.50
	No formal education	108	24.88
Educational status	Primary	183	42.17
	Secondary	121	27.88
	Tertiary	22	5.07
Religion	Muslim	141	32.49
	Orthodox	254	58.53
	Others ^b	39	8.99
HIV Disclo-sure	Yes	302	69.59
	No	132	30.41

Note: Others^a: include daily worker, farmer, driver and jobless. Others^b: include protestant and catholic.

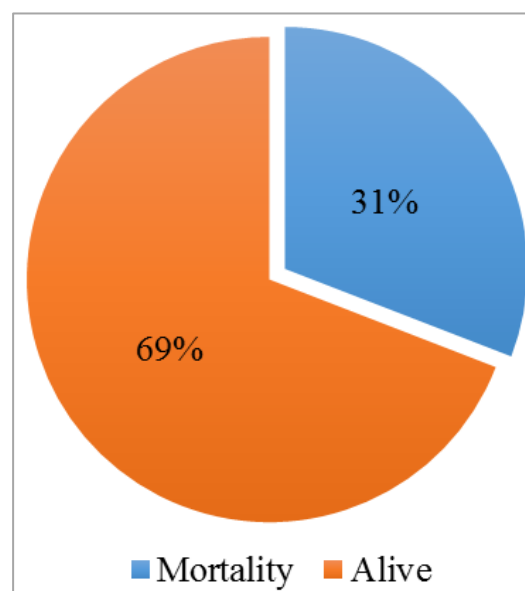


Figure 1. Magnitude of mortality among HIV/TB co-infection patients in Dilchora referral hospital in dire dawa Ethiopia, 2023.

The proportion of mortality among HIV/TB co-infected patients in dire dawa Dilchora referral hospital was 134 (31%) whereas 300 (69%) of the participants were alive on ART (figure 1).

From all participants, the majority 127 (29.26%) their baseline opportunistic infection was unknown, whereas from

having comorbidity 82 (18.89%) patients had oral candidiasis followed by diarrhea 70 (16.13%), and severe anemia 38 (8.76%) (figure 2).

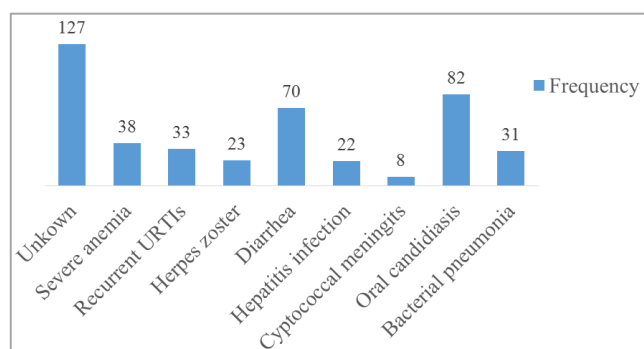


Figure 2. Opportunistic infection contribute to mortality from HIV/TB co-infection patients in Dilchora referral hospital in dire dawa Ethiopia, 2023.

3.2. Clinical Characteristics of HIV/TB Co-infected Individuals and Behavioral Patterns

Of all participants, the majority (44.24%) were classified as WHO clinical stage III at the start of the study. More than half of the patients were underweight (53.23%). Regarding the use of CPT, the majority (87.56%) had taken co-trimoxazole therapy, and 27.88% of the study participants were smokers. 24.42% of the study participants had poor drug adherence to ART. Of the total number of HIV-infected patients, 65.9% were infected with pulmonary tuberculosis, and 51.38% of patients had a CD4 count of less than 200 cells/l (Table 2).

Table 2. Baseline clinical characteristics of HIV/TB co-infected persons attending the ART clinic at Dilchora Referral Hospital, Dire Dawa, Ethiopia, 2023.

Variables	Categories	Frequency	Percentage (%)
Clinical stages	Stage I	67	15.44
	Stage II	102	23.50
	Stage III	192	44.24
	Stage IV	73	16.82
BMI	Underweight	231	53.23
	Normal	180	41.47
	Overweight	23	5.3
Functional status	Ambulatory	144	33.18
	Bedridden	98	22.58
	Working	192	44.24

Variables	Categories	Frequency	Percentage (%)
Site of TB infection	Pulmonary	207	47.70
	Extrapulmonary	227	52.30
CD4 cell count	< 200	223	51.38
	≥200	211	48.62
Hemoglobin level	<10	122	28.11
	≥10	312	71.89
Opportunistic infection	Yes	297	68.43
	No	137	31.57
Adherence status	Good	244	56.22
	Fair	84	19.35
	Poor	106	24.42
CTP	Yes	380	87.56
	No	54	12.44
Drinking alcohol	Yes	94	21.66
	No	340	78.34
Smoking status	Yes	121	27.88
	No	313	72.12

3.3. Factors Associated with Mortality Among HIV/TB Co-infected Patients

During Bivariable analysis, age, WHO clinical stage, BMI, functional status, site of TB infection, hemoglobin, drug adherence, smoking status and alcoholic status were all candidate variables for multivariable analysis. However, in the multi-variable logistic analysis, only WHO clinical stage, BMI, drug adherence, smoking and alcohol drinking statistically significant variables. patients who were belong to WHO clinical stage III (AOR: 9.3, 95% CI: 3.03, 28.34) and WHO clinical stage IV (AOR: 11.3, 95% CI: 3.5, 36.34) were 9.3 and 11.3 times more likely to death from HIV/TB co-infection when compared to clinical stage I. Participants who had underweight and overweight body mass index were (AOR: 2.6, 95% CI: 1.35, 4.83) and (AOR: 21.4, 95% CI: 8.24, 55.5) were 2.6 and 21.4 times more likely to death from HIV/TB co-infection than normal body mass index. Study participants who had poor ART drug adherence (AOR: 4.24, 95% CI: 2.25, 7.98) were 4.24 times more likely to death from HIV/TB co-infection than good drug adherence. Those study participants who were drinking alcohol 3.15 times more likely to increase the odds mortality from HIV/TB co-infection compared to the counterparts. On the other hand, patients who were smoking (AOR: 4.12, 95% CI: 2.32, 7.29) were 4.12 times more likely to increase the odds of mortality among HIV/TB co-infected patients (Table 3).

Table 3. Results of the bivariate and multivariable logistic regression model for HIV/TB co-infected patients attending the ART Clinic at Dilchora Referral Hospital, Dire Dawa, Ethiopia, 2023.

Variables	Categories	COR (95%CI)	AOR (95%CI)	P-value
Age	<15	1	1	
	15-24	2.6 (0.65, 10.20)	2.0 (0.47, 8.52)	0.351
	25-34	3.2 (0.91, 11.59)	2.3 (0.69, 10.13)	0.154
	35-44	3.4 (0.97, 12.14)	2.3 (0.59, 8.75)	0.232
	≥ 45	2.1 (0.58, 7.88)	1.6 (0.38, 6.31)	0.538
Clinical stage	Stage I	1	1	
	stage II	0.67 (0.22, 2.02)	1.9 (0.49, 7.26)	0.357
	Stage III	4.6 (2.0, 10.68)	9.3 (3.03, 28.34)	0.0001*
	stage IV	7.6 (3.11, 18.44)	11.3 (3.5, 36.68)	0.0001*
BMI	Normal	1	1	
	Underweight	3.02 (1.82, 5.01)	2.6 (1.35, 4.83)	0.004*
	Overweight	10.5 (5.27, 20.76)	21.4 (8.24, 55.5)	0.0001*
Functional status	Ambulatory	1.35 (0.82, 2.20)	1.6 (0.93, 3.15)	0.131
	Bedridden	3.0 (1.79, 5.05)	2.8 (1.42, 5.38)	0.112
	Working	1		
Site of TB infection	Pulmonary	1.42 (0.94, 2.14)	1.69 (0.97, 2.94)	0.062
	Extrapulmonary	1	1	
Hemoglobin	<10	2.1 (1.34, 3.23)	1.66 (0.92, 2.99)	0.091
	≥10	1	1	
Drug Adherence	Good	1	1	
	Fair	2.1 (1.20, 3.74)	1.9 (0.89, 3.99)	0.110
	Poor	4.2 (2.62, 6.84)	4.24 (2.25, 7.98)	0.0001*
Drinking alcohol	Yes	3.17 (2.02, 4.99)	3.15 (1.69, 5.87)	0.0001*
	No	1	1	
Smoking status	Yes	5.2 (3.36, 8.09)	4.12 (2.32, 7.29)	0.0001*
	No	1	1	

* Statistically significant variables, COR: crude odds ratio, AOR: adjusted odds ratio, CI: confidence level, 1: reference category

4. Discussion

HIV/TB co-infection was a major public health problem in the world wide. The aim of this study was addressed the mortality and associated factors among HIV/TB co-infected patients under ART clinic in Dire Dawa, Ethiopia, 2023.

In the current study, the proportion of mortality of HIV/TB co-infected patient was 31% (95% CI: 27%, 35%). This study agree or in line with study conducted in south of

Brazil 27.4% [22], in Suriname 29.5% [23], southern Ethiopia 29.7% [24]. In the contrary, this study result was higher than study conducted in Harar Ethiopia 7.7% [25], Mizan Tepi Ethiopia 22.8% [26], Mizan Tepi Ethiopia 21.8% [15], Mekelle Ethiopia 23% [27], Mumbai 18% [28], china 17.7% [29]. Lower than study conducted in Debra Tabor Ethiopia 35.39% [17] Brazil 40% [30]. The observed discrepancy may be attributed to variations in the quality of care provided at the TB/HIV clinic, including appropriate follow-up by the clinician, health education, and counseling. A further

plausible rationale could be that certain earlier research included patients who were transferred out of the final analysis [31, 32]. And not balance of follow up time and sample size difference of several studies. In this study using 15 year retrospective data however, the other study less than this study.

Our study's noteworthy finding indicated that patient death in cases of co-infection with HIV and tuberculosis may be influenced by WHO clinical stages IV and III. This study's findings showed that patients in WHO clinical stage III had a nine-fold increased risk of dying from HIV/TB co-infection, while patients in WHO clinical stage IV had an eleven-fold increased risk compared to those in WHO clinical stage I. This result is confirmed by several previous studies [9, 16, 17, 19, 33, 34]. According to the WHO staging of HIV/AIDS, HIV patients in stage 3 have a higher risk of developing TB. In addition, people with advanced WHO clinical stages are at increased risk of opportunistic infections. Another significant factor in this study was BMI, which was significantly associated with TB co-infection in study participants living with HIV/AIDS. Patients with an underweight BMI had a 2.6-fold higher risk of death (AOR: 2.6, 95% CI: 1.35, 4.83) than patients with a normal BMI. This result is consistent with a study conducted in the Amhara region [16, 34, 35]. In addition patients with overweight BMI potentially associated factors with mortality among HIV/TB co-infection. The odds of mortality from HIV/TB co-infection was twenty one times more likely patients with overweight body mass index (AOR: 21.4, 95% CI: 8.24, 55.5).

Patients with co-infections of HIV and TB who did not adhere to their antiretroviral therapy regimens were at four times higher risk of death than those who did (AOR: 4.24, 95% CI: 2.25, 7.98). Because ART enhances patients' immune systems and lowers their chance of death, this shows the positive impact of adhering to the treatment. Ethiopian research has been used to support this study [24, 35, 36]. One of the most prevalent behavioral risk factors for death from co-infection with HIV and tuberculosis is alcohol intake. According to this study, patients who drink alcohol have a higher chance of passing away from co-infection with HIV and tuberculosis. It made sense in light of previous research [37]. Conversely, research indicated that alcohol intake was not a risk factor, but smoking was [36]. Smoking is another behavioral risk factor responsible for death from HIV/TB co-infected patients. In this study, the odds of smoker patients among HIV/TB co-infection were four times more likely to die from the infection (AOR: 4.12, 95% CI: 2.32, 7.29). This study in line with study conducted in Ethiopia [36] which states that smokers lose weight because of their low appetite for food, and this leads them to be non-adherent to medication, food, and time. According to a review research, lifestyle and HIV are typically related; the relationship between TB, smoking, and HIV has been studied for many years. It has been demonstrated that TB infection and the progression from infection to active TB disease are linked in at least 30%

of HIV-positive people who are exposed to tobacco smoke, either passively or actively. The link between TB and HIV smoking individuals could have multiple causes. Smoking impairs immune function and damages the cilia, which are microscopic hair-like structures in the airways that provide protection, increasing the risk of tuberculosis in HIV patients [38]. Smoking has been proven to be strongly related with tuberculosis mortality and recurrence in HIV patients. Evidence seems to be sufficient to infer that HIV increases the risk of tuberculosis in smokers [38, 39].

5. Limitation of the Study

Being a retrospective study, there may have been limitations related to data availability, completeness, and accuracy in the medical records reviewed. There could have been potential selection bias in the inclusion of patients in the study, which may have influenced the results. The study may not have accounted for all possible confounding variables that could have influenced the outcomes of mortality among HIV/TB co-infected patients. The study was conducted in a single center, which may limit the generalizability of the findings to other healthcare settings or regions.

6. Conclusion and Recommendation

In this study the proportion of mortality was high. Patients with advanced WHO clinical stages, BMI, poor drug adherence, alcohol consumption, and smoking habits had a higher risk of mortality. These findings have important implications for the treatment and care of HIV/TB co-infected patients in similar settings. Early identification of risk factors and targeted interventions can help improve outcomes for HIV/TB co-infected patients and enhance the quality of care provided to this population.

Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
ART	Anti-Retroviral Treatment
BMI	Body Mass Index
CPT	Co-trimoxazole Preventive Treatment
HIV	Human Immunodeficiency Virus
PLHIV	People Living With HIV/AIDS
TB	Tuberculosis
WHO	World Health Organization

Ethics and Consent

Ethical Clearance was obtained from the IRB office of the school of public health, university of Addis Ababa with grant number (Ref. No. SPH/154/2023). Permission was obtained from the Dire Dawa city administration health bureau and Waiver letters would be obtained from the medical director

of the Dilchora Referral hospital in order to access the medical records of patients with Reference number (Ref. No. 604/2023). The study was conducted retrospectively, and some patients were already dead at the beginning of the study. In addition, our data did not contain any personally identifiable patient data and were subject to strict confidentiality measures during data collection. Due to these factors, the medical directors of the Dilchora Referral Hospital waived written informed consent. The study was conducted according to the Declaration of Helsinki.

Author Contributions

Feyisa Shasho Bayisa: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Software, Visualization, Writing – original draft

Teshome Demi Nimani: Data curation, Software, Writing – review & editing

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Data Availability Statement

Upon request, the respective author will make the data available.

Conflicts of Interest

The authors declare no conflicts of interest.

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