

Tuberculosis and Human Immune Deficiency Virus Co-Infection and Associated Factors at Debre Tabor Comprehensive Specialized Hospital, North central Ethiopia, 2020.

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Abstract

Background: Human immunodeficiency virus and tuberculosis are the leading independent global causes of death among patients with infectious diseases. Additionally, due to the shared immune defense mechanisms, they are the leading cause of co-morbidities globally. However, little information was found regarding the proportion of TB/HIV co-infection in the study area. Thus, this study assesses the proportion and associated factors of TB/HIV co-infection.

Objective: To assess the prevalence of Tuberculosis and Human Immune Deficiency Virus Co- Infection and Associated Factors among patients attended TB clinic in five years (May 2015–April 2020) at Debre Tabor Comprehensive Specialized Hospital, North central Ethiopia, 2020.

Methods: The Institutional based quantitative Retrospective cross sectional study was conducted among the records of 298 Tuberculosis patients registered for treatment in TB-HIV co-infection at Debre Tabor Comprehensive Specialized Hospital, North central Ethiopia, DOT's clinic from May 2015 to April 2020. Simple random sampling technique will be used to select Record data. Pre-tested Check list was used to collect data. Data was entered in Epi info version 7, and was analyzed using statistical package for social sciences version 20 software. Bivariate and multivariable logistic regression model was fitted to identify factors associated Tuberculosis Treatment Outcome. Odds ratio with 95% confidence interval was computed to determine the level of significance. P-value less than or equal to 0.05 considered as significance.

Results: In this Study, the overall prevalence of HIV among TB patient was 53 (17.8 %). In multivariable analysis Urban Residence [AOR (95 % CI)= 2.061(.942,4.510), Age category 18-30years [AOR (95 % CI)= 0.458(0.227,0.925)], and PTB SNPTB category (Types), ((AOR=2.896 [(95% CI:1.069,7.850)], PTB Smear Unknown (AOR= 12.225 [95% CI: 1.896,19.903], EPTB (AOR=11.225 [95% CI:1.138,17.695]) were remained significantly associated with the outcome variable with at 95% CI and P- value of ≤ 0.05 .

Conclusion: Generally this study shows relatively higher TB-HIV co-infection than a number of other studies held in different part of the country even though there was decreasing rate of TB-HIV co- infection in the study area from 44% to 17.8% in the last 4year. The TB-HIV co-infection was significantly associated with type of TB, age; residence and weight requires attention to reduce TB- HIV co-infection.

Keywords: - Tuberculosis, Co-infection, North central, Ethiopia

Background

The human immune deficiency virus (HIV)/ Acquired immunodeficiency syndrome (AIDS) has substantially altered the epidemiology of TB by increasing the risk of reactivating latent TB, increasing chance of TB infection once exposed to tubercle bacilli (re-infection) and by increasing the risk of rapid progression soon after infection (1).

A person infected with Mycobacterium tuberculosis (M.TB) only has a 10%

risk of developing TB during life time but for persons co- infected with both TB and HIV the annual risk of developing active TB disease exceeds 10%. HIV does not only increase the prevalence but also complicates the follow up and compromises the response to anti-TB treatment. The chance of acquiring TB is progressively increases with the advancement of HIV disease stage, TB tends to occur at any time in the course of HIV disease. It is the leading specific diagnosis among patients living with HIV/AIDS (1, 2).

Tuberculosis (TB) is a major public health problem throughout the world by infecting an estimated one-third of the world's population and putting them at risk of developing active disease during their lifetime. Tuberculosis is the leading cause of deaths every year among the infectious disease worldwide alongside HIV (3). Globally, there was an estimate 9 million incident cases of TB in 2013 of which around 1/6 co-infected with HIV. There were an estimated 1.1 million TB/HIV co-infected patients worldwide in 2011; 79% of these cases were in the African Region. The percentage of TB patients found to be HIV-positive in the 28 African countries in the list of 41 priority countries ranged from 8% in Ethiopia to 77% in Swaziland (4).

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According to the World Health Organization (WHO) estimation, about one third of the world's population is infected with tuberculosis bacteria, about 10 million cases of active disease are estimated to occur each year, and annually 3 million people die of tuberculosis (2).

A recent Ethiopia National TB/HIV Sentinel Surveillance showed that the prevalence of HIV among the TB patients registered was 20%. Although both TB and HIV infections are preventable, the global burden (especially in developing countries) of tuberculosis is increasing after the epidemic of HIV/AIDS as HIV/AIDS increases both new TB infections as well as latent TB to cause active TB as a result of compromised immunity in HIV/AIDS patients. The mortality and morbidity of patients with this co-infection is also high compared to isolated infections with TB or HIV (5).

The HIV/AIDS epidemic presents a major challenge to the control of TB in Ethiopia. The dual epidemic has a great deal of impact on the health sector. It increases TB and HIV burden, surges demand for care and worsens the situation of the already over-stretched health care delivery system in

the country. The expanded scope of the strategy for tuberculosis control in Ethiopia comprises interventions against tuberculosis and HIV. Therefore, the National Tuberculosis and HIV Prevention and Control programs must strengthen the health system's ability to respond to the healthcare needs of TB/HIV patients' in the country. Knowing the dual burden and shared deleterious consequences of the two diseases, the programs must not only collaborate to provide an integrated service for the co-infected patients, but also it must include the planning, monitoring and implementation of activities targeted for the co-infected patients (3). To decrease the disease burden, morbidity and mortality associated with TB/HIV co infection, WHO and Ethiopian national guideline for TB recommends; HIV testing and counseling of all patients known or suspected to have TB; HIV prevention for TB patients; treatment of TB in people living with HIV; providing co-trimoxazole preventive therapy to all HIV- positive TB patients; when to start antiretroviral therapy (ART) and what antiretroviral agents to use; drug susceptibility testing and patient monitoring; ensuring comprehensive HIV care and support services. Recommendations were implemented in collaboration between TB and HIV/AIDS programmers' at all levels and to reduce the burden of HIV in people diagnosed with TB. Similarly, collaboration is essential to reduce the burden of TB in people living with HIV (Three I's for reducing the burden of TB in persons living with HIV: Intensified case-finding (ICF), Isoniazid preventive therapy (IPT) and TB Infection control (IC) for people living with HIV. Despite those recommendations and measures, the TB/HIV co infection prevalence in Ethiopia is higher compared with the prevalence in western countries. This may be due to different socio demographic, economical or awareness risk factors, availability of trained staff, high prevalence of both individual disease entities (TB, HIV), availability of funds for researches (3, 6). There are a number of researches done in country level at different periods but there is only few researches done on the topic around North West Ethiopia. Even after those limited researches there is no identified change (decrement) in TB/HIV co infection prevalence and associated factors. Finally after conducting this research it is expected to determine the current TB/HIV disease burden and identify associated factors also expected to indicate appropriate intervention strategies and set recommendations, Tuberculosis and Human Immune Deficiency Virus Co-Infection and Associated Factors were not yet assessed. Therefore, this study was aimed to assess Tuberculosis and Human Immune Deficiency Virus Co-Infection and Associated Factors at Debre Tabor Comprehensive Specialized Hospital, North central Ethiopia, for the period covering from May 2015 to April 2020 (See Figure 1: Conceptual Framework).

MATERIALS AND METHODS

Study area and period

The study was conducted in South Gondar Zone. South Gondar Zone is one of the 11 Zones of the Amhara National Regional State and has a total of eighteen Wordas. Based on the information from South Gondar Zone Administrative Health Bureau, total population in South Gondar Zone is 2,609,823 among whom are a 49.9% male, and 50.1% are females. Weather

condition of south Gondar zone is 4% kola, 78.5% woynadega, 17% dega and 0.5% wurch. There were 11 health facilities (1 Comprehensive Specialized Hospital, 3 health centers, 4 health posts & 3 private clinics) providing health services during the data collection period (7). The study was conducted from From September 1st -30/2020.

Study design and participants characteristics

A facility based retrospective cross-sectional study was conducted involving mainly quantitative data will carried out on patients treated under DOTS program will do for Collecting patient information registered for TB treatment from May 2015 to April 2020 in Debre Tabor Comprehensive Specialized Hospital, North central Ethiopia, From September1-30/2020. The source population comprises all individuals was treat for TB under DOTS strategy between May 2015 to April 2020 at the study Comprehensive Specialized Hospital and who has treatment TB/HIV confection ascertained. The Study populations was all randomly select who are diagnosed with any form of TB whose outcome evaluated during study period, from TB registers of these Comprehensive Specialized Hospital. All subjects who was treat for TB under DOTS strategy between May 2015 to April 2020, complete socio demographic and clinical data, Patients diagnosed for any form of TB and started treatment from May 2015 to April 2020 was illegible for the study in Comprehensive Specialized Hospital, Ethiopia was include. TB patients under treatment and with incomplete socio-demographic data was excluding from the study.

Sample Size Determination and sampling procedure

The Sample size required to assess the outcome of interest was calculated using single mean proportion estimate by the prevalence of TB-HIV co-infection in Debre markos Referral hospital, Northwestern Ethiopia, was 44% (8), with a 5% margin of error, 95% confidence level.

Where n = Sample size needed

z = Standard normal variable at 95% confidence level (1.96) p = the prevalence of TB-HIV Co-infection was 44% (0.44%) d = Margin of error (0.05)

$Z_{\alpha/2}$ = Value of standard normal distribution corresponding to significant level of alpha (α) 0.05 which is 1.96,

An overall sample size of 298 patients record was required for the study. A Systematic random sampling technique was applied to select eligible patients for the study from list of register of the facilities proportionally according to patient load of hospital (See Figure 2: Schematic Presentation of the Sampling Procedure).

Study Variables

Dependent variable

TB and HIV Co-infected

Independent Variables

Socio-Demographic Characteristics Related Factors:

Sex, Residence, Age, and Weight (kg) of Adults

Distribution of type of TB, HIV status among children patients across Hospitals Related Factors: HIV status, Sputum smears result, Category of patient (outcomes), TB category, PTB category (Types), Year of treatment, CPT initiation for HIV positive, TB patients, ART initiation for HIV positive, TB patients, Smear result at 2nd month for PTB +ve patients, Smear result at 5th month for PTB +ve patients, Smear result at 6th month for PTB +ve patients, ART status, Diagnosis technique, Type of treatment, Past history of treatment, and Type of drug currently taken, sputum follow up test, four-week attendance in CP

Operational definition

PTB: refers to any bacteriologically confirmed or clinically diagnosed case of TB involving the lung parenchyma or the tracheobronchial tree with A persistent and progressive cough for two or more weeks, (cough of any

duration for HIV positives), often accompanied by non-specific systemic symptoms such as fever for more than 2 weeks, night sweats or Unexplained weight, is the commonest presentation of pulmonary tuberculosis (3).

✚ **EPTB:** refers to any bacteriologically confirmed or clinically diagnosed case of TB involving organs other than the lungs, patients may present with non-specific symptoms such as unintentional weight loss, night sweats and fever for more than 2 weeks. Other symptoms depend on the site or organ affected (3).

✚ **SPPTB:** Pulmonary positive TB case is defined as: - people who have at least one positive result on AFM microscopy; or a person whose Xpert MTB/RIF test result detected Mycobacteria with susceptibility to Rifampicin (3).

✚ **SNPTB:** Pulmonary Negative Tuberculosis is defined as people who have two negative result on AFB microscopy; and in whom, Xpert MTB/RIF test results detects on mycobacterium and Decision to empirically treat with full course of Ant-TB regimen is made with the help of evidences from supporting tests and with aid of sound clinical decision (3).

✚ **TB/HIV Co-infection:** patients diagnosed to have either PTB or EPTB concomitantly diagnosed to have HIV/AIDS infected if they tested positive for HIV as tested using enzyme linked immunosorbent assay, immunofluorescence, Western blotting or rapid test (3).

✚ **Incomplete data:** If any one of the information which was reviewed on log book (patient's age, sex, address, TB type, and weight and HIV status) was missed (8).

Data collection tools and techniques:

Data collection tools

Data was collected on standardized forms that included demographics Related Assessment (Sex, Residence, Age, and Weight (kg)), Distribution of type of TB, HIV status among Adults patients across Hospitals Related Assessment (HIV status, Sputum smears result, Category of patient (outcomes), TB category, PTB category (Types), Year of treatment, CPT initiation for HIV positive, TB patients, ART initiation for HIV positive, TB patients, Smear result at 2nd month for PTB +ve patients, Smear result at 5th month for PTB +ve patients, Smear result at 6th month for PTB +ve patients, ART status, Diagnosis technique, Type of treatment, Past history of treatment, and Type of drug currently taken, and Distribution of Treatment outcome among Adults patients across Hospitals related Assessment (TB treatment success, TB Treatment outcome of children patients across Hospitals) will make according to the recommendations of the MOH of Ethiopia, with using a pre-tested and structured the registration documents of each hospitals contain medical record reviews of patients, by using a prepared check list., which will adapted from WHO and published articles with some modifications to the local context (Adapted From Different Articles (3, 8-16)). A structured data extraction format was adapted from units TB register to collect patient information at the selected Hospitals. The data was collect from TB registers units by trained nurses in TB clinic of the facilities (Detail sees Annexes-2).

Data collection techniques

A total of four BSc nurses as data collector and two BSc nurses as a supervisor (who have an experience of data collection) were select. After briefly presenting the study purpose, data collectors from documents.

Data quality control

To ensure quality of the data, two day training was given for data collectors before the start of data collection. In order to check the functionality of data extraction form pretest will conduct on 5% of the

total sample size (Pre-test study was done before starting of the survey on 9 patients profile data; that was selected randomly to check the appropriateness and completeness of the check list) in out of selecting health facilities prior to the start of the actual study to test the fitness of the questionnaire for the study settings. The overall activities of data extraction were closely supervised by the principal investigator during data collection. All completed data extraction sheets will check for completeness before leaving the facility. The objectives of

the study were clearly explained to the data collectors as well as supervisors. Throughout the course of the data collection, data collectors and supervisors was supervised at each site, regular meetings was held between the data collectors, supervisor, and the principal investigator to discuss the problem arising in each interview, and detailed feedback was provided to the data collectors.

In addition, the collected data was check daily for its completeness, accuracy, and clarity by supervisors. The principal investigator checked every questionnaire before data entry. Data will kept in the form of a file in a private secured place.

Data processing and analysis

After checking the completeness of the data, it was entered into the computer and cleaned using Epi-info software for windows application version 7.2.0.1, by skilled data encoder and a 10% double data entry was employed to ensure the data quality. The collected data was thoroughly checked for Inconsistencies and outliers the data was import to SPSS for windows version 20 for analysis. Descriptive statistical methods were used to summarize patients' characteristics and determine the magnitudes of treatment outcomes. Bivariate logistic regression was applied to association was performed to assess the individual effects of predictor variables on treatment outcome of children and multivariate analysis was employed to examine the significance in both scenarios. Variable found to be significant. All variables with $P \leq 0.2$ in the bivariate analysis were included in the final model of multivariable analysis in order to control all possible confounders. AOR along with 95% CI were computed and P -value < 0.05 was considered to declare factors that have statistically significant association with the outcome by using multivariable analysis in the binary logistic regression. The goodness of fit was tested by Hosmer-Lemeshow statistic test. Finally; the result is presented in the form of texts, tables and graphs

ETHICAL CONSIDERATION

Ethical clearance was obtained from Ethical Review Committee of College of Health Science, Debre Tabor University. Letter of permission will give to South Gondar zone health department and Debre Tabor town health office and Debre Tabor Comprehensive Specialized Hospital. The patient data was accessed up on the approval of medical director of hospital. To ensure confidentiality, patient identifiers were not recorded in the data collection check list, and data was used only for the intended study.

RESULTS

Socio-demographic characteristics of study participants:

A total of 298 TB patients were enrolled and all were included in this study. Males constituted 163 (54.7 %) of the study participants. About 141(47.3 %) of the study participants were in the group of 18-30 years of age followed by age group >30 years which was 129 (43.3%) and 28(9.4%) were in <18 age groups. The patients had a mean; standard deviation and median age of 32.98, 15.33 and 28.50 respectively. Majority of participants weights were (40-55kg) 166 (55.7%), and regarding to residence majority of participants were Urban 208 (69.8) (Sees Table 1).

Clinical characteristics of all TB-HIV Co-infection patients Characteristics

Among patients for whom disease categories were documented 57 (19.1%) were smear positive pulmonary TB and 118 (39.6%) were smear negative pulmonary TB. Among TB category 172 (57.7%) were PTB. Categories of patients were also documented for all types of TB; of these 219 (73.5%) were classified as new cases. With regard to HIV status, 53(17.8%) were positive and, of those HIV positive,

49 (16.4%) and 51 (17.1%) initiated CPT (Cotrimoxazole Preventive Treatment) and ART (Antiretroviral Treatment), respectively. And among HIV positive 51 (17.1%) were On ART. Among Sputum smears result 132 (44.3%) were Negative. Concerning smear result, 4 (1.3%) was positive at the second

month. Among all TB patients enrolled in this study 216 (72.5%) completed treatment, 15(5.0%) defaulted, 9 (3.0%) died, 51 (17.1%), cured, 5(1.7%) Transfer out, and 2 (0.7%) were Treatment Failure. From the 398 patients evaluated for treatment outcome, 267 (89.6%) had successful treatment outcome and 31 (10.4%) had unsuccessful treatment outcome. Regarding to Type of treatment 221(74.2%) were New treatment regimen (Sees Table 2).

Prevalence of HIV/TB co-infection

The overall prevalence of HIV among TB patient was 53 (17.8%) (95% CI: 13.3-21.8) of Debre Tabor Comprehensive Specialized Hospital HIV negative TB cases while 245 (82.2%).

HIV/TB co-infection and associated Factors

In order to determine factors associated with TB-HIV Co-infection logistic regression analysis was used. On Bivariate analysis Variables having statistically significantly association between TB-HIV Co-infection, and p-value ($P \leq 0.2$) were Residence, Age, Weight, PTB category (Types), TB Category of patient (outcomes), TB category. However, in multivariable analysis Urban Residence [AOR (95% CI)= 2.061(0.942,4.510), Age category 18-30years [AOR (95% CI)= 0.458(0.227,0.925)], and PTB SNPTB category (Types), ((AOR=2.896 [(95% CI:1.069,7.850)], PTB Smear Unknown (AOR=

12.225 [95% CI: 1.896,19.903], EPTB (AOR=11.225 [95% CI:1.138,17.695]) were remained

significantly associated with the outcome variable with at 95% CI and P-value of ≤ 0.05 (Sees Table- 3).

DISCUSSION

HIV co-infection among TB patients is well recognized as a major public health problem worldwide and this study was carried out to determine the prevalence and associated risk factors of HIV and TB co-infection among patients in north eastern Ethiopia from 2015-2020. The overall prevalence of HIV co-infection among TB patient was (17.8%) (95% CI: 13.3-21.8).

This finding was in line with a study conducted in Dabat, northwest Ethiopia the prevalence of TB/HIV co-infection was 11.4%. A study was done in Hawassa, among TB patients 18% were HIV positive

(12). In Ethiopia studies done in different period and area, a study conducted Wollega indicated that the overall prevalence of tuberculosis and human immunodeficiency virus co-infection was 17.9% and the trend was shown steady increasing (14). Prevalence of TB/HIV Co-Infection in Countries Except China: A Systematic Review and Meta-Analysis, Estimates of TB/HIV co-infection prevalence ranged from 2.93% to 72.34%; and 17.21% (95% CI 9.97–24.46) in Asian countries, 20.11% (95% CI 13.82– 26.39) in European countries, and 14.84% (95% CI 10.44–19.24) in the USA Prevalence (4). In Nigeria Study conducted Prevalence of TB/HIV co-infection was 21.6% (17). A meta-analysis study was done to summarize the 17.21% in Asian countries (18), 20.11% in European countries, and 14.84% in the USA (19). The similarity of this study with the above could be the study design and socio-cultural resemblance among society of TB patients,

This result was higher as compared with other studies such as, Study done in Gondar University Referral Hospital, Northwest Ethiopia, Successful TB treatment outcome among TB/HIV co-infected patients in Gondar University Hospital was 77.3% [95% CI 72.6–81.9] (20). Another retrospective review of patient medical records from Debre Markos Referral Hospital, the prevalence of TB-HIV co-infection was 44%. The trend of co-infection was decreased from 2008/9 179 (49.2%) to 2012/13 29 (44.6%) (8). A retrospective data review of TB patients was done at Fenote Selam Hospital to determine the level of TB-HIV co-infection, 22.1% were co-infected with HIV (9). In a study conducted in Dabat, northwest Ethiopia the prevalence of TB/HIV co-infection were Data collected from three health centers namely; Kobo, Robit and Gobiye, in TB patients 24.3% were co-infected with TB and HIV (10). Study done in Southwest Ethiopia, the prevalence of DP among TB/HIV co-infected patients was 59.9% (21). Prevalence of TB/HIV Co-Infection in

Countries Except China: A Systematic Review and Meta-Analysis, Estimates of TB/HIV co-infection prevalence ranged from 2.93% to 72.34%; the random effects pooled prevalence of TB/HIV co-infection was 23.51% (95% CI 20.91–26.11). Prevalence of TB/HIV co-infection was 31.25% (95% CI 19.30–43.17) in African countries, 25.06% (95% CI 19.28–30.84) in Latin America countries (4). study done in Nigeria, 29.2% was HIV seropositive (22). A meta-analysis study was done to summarize the prevalence of TB and HIV co-infection worldwide in a year 2013 was 23.51% (2). Prevalence of TB/HIV co-infection was 31.25% in African countries (18), 25.06% in Latin America countries (19). This discrepancy might be due to socio-demographic or time variation, a difference in individual disease burden, preference of patients towards quality of care and also this may be due to increased awareness of HIV infected patients about ART drugs to prevent opportunistic infections so that their immunity may cope from having active TB from latent infection. Other reason may be due to expanded health facilities across the country, the increased awareness of the community through health education according to current strategic plan of the federal ministry of health of Ethiopia.

In this study in multivariable analysis Urban Residence [AOR (95% CI)= 2.061(0.942,4.510), Age category 18-30years [AOR (95% CI)= 0.458(0.227,0.925)], and PTB SNPTB category (Types), ((AOR=2.896 [(95% CI:1.069,7.850)], PTB Smear Unknown (AOR= 12.225 [95% CI: 1.896,19.903], EPTB (AOR=11.225 [95% CI:1.138,17.695]) were remained significantly associated with the outcome variable with at 95% CI and P-value of ≤ 0.05 .

This study showed that Age category 18-30years [AOR (95% CI)= 0.458(0.227,0.925)] were remained significantly associated with the outcome variable with at 95% CI and P-value of < 0.05 , This finding was supported by the study done Nigeria in Age 25 - 39 ([AOR (95% CI)= 2.1 (0.9 – 4.6)] (17). Data collected from three health centers namely; Kobo, Robit and Gobiye, in TB patients, The odds of having TB/HIV co-infection were 3.4 times higher among in the age group of 25–45 years compared to older (≥ 45 years) age TB patients (10). A retrospective data review of TB patients at Fenote Selam Hospital to determine the level of TB-HIV co-infection revealed that study participants in age groups of 15-24 and 25-34 years old were independently associated with outcome variables (9). retrospective review of patient medical records from Debre-Markos Referral Hospital the highest rate of co-infection was observed, Age (years), 18-30 ([AOR (95% CI)= 2.52 (1.25-3.14)], ≥ 31 , ([AOR (95% CI)= 1.34 (1.1-2.05)], compared with age < 18 (8).

This study showed that, Urban Residence [AOR (95% CI)= 2.061(0.942,4.510), This finding was supported by study done in Hawassa, among TB patients, the rate of HIV infection was higher in TB patients from urban 25% than rural areas 16% (12). Another retrospective review of patient medical records from Debre-Markos Referral Hospital the highest rate of co-infection was observed, Residence, Urban, ([AOR (95% CI)= 0.71 (0.63-1.28)], compared with Rural (8).

This study showed that PTB SNPTB category (Types), ((AOR=2.896 [(95% CI: 1.069, 7.850)], PTB Smear Unknown (AOR= 12.225 [95% CI: 1.896, 19.903], EPTB (AOR=11.225 [95% CI: 1.138, 17.695]) were remained significantly associated with the outcome variable with at 95% CI and P-value of < 0.05 . This finding was supported by study done in NIGERIA The odds of having TB/HIV co-infection was 3.3 higher among EPTB cases (AOR 3.3; 95% CI 1.2 – 9.5; $p = 0.026$) and 2.1 times higher among retreated patients (AOR 2.1; 95% CI 1.1 – 3.9; $p = 0.017$) than pulmonary TB and new patients respectively (17). In a cross-sectional study done in Gamo Goffa Zone, the rate of HIV-TB co-infection among sputum SPPTB patients was 6.8% with 95% confidence interval of 3.3 to 10.3% (13). In a study conducted in Dabat, northwest Ethiopia, About half, 49.5% were smear-negative pulmonary tuberculosis patients (11). Data collected from three health centers namely; Kobo, Robit and Gobiye, in TB patients, the odds of having TB/HIV co-infection were 2.8 and 1.7 times higher among smear positive and smear negative patients with pulmonary TB respectively than patients with extra pulmonary TB (10). retrospective review of patient medical records from DebreMarkos Referral Hospital the highest rate of co-infection was observed, Type of TB, Smear negative PTB, ([AOR (95% CI)= 0.74 (0.35-1.77)], Extra PTB, ([AOR (95% CI)= 2.44 (1.01-6.14)], compared with, Smear positive PTB, independently associated with TB -HIV co-infection (8). This might be due to multiple factors, If PTB+/HIV co-infected

people adhered well on ART and CPT, they would have high level of innate and cell mediated immunity. Thus, these people would have high probability for being smear positive

LIMITATIONS

Non-registered variables on the patient chart which may have an influence on a risk of TB like income, housing condition, caregiver, and family size were not investigated. Those charts in difficulty of getting an HIV diagnosis date, date of ART started, TB diagnosis and studied variables

Conclusion

The overall prevalence of HIV among TB patient was 17.8 % of Debre Tabor Comprehensive Specialized Hospital. Generally this study shows relatively higher TB-HIV co-infection than a number of other studies held in different part of the country even though there was decreasing rate of TB-HIV co-infection in the study area from 44% to 17.8% in the last 4year. TB-HIV co-infection was significantly associated with type of TB, age; residence and weight.

Recommendations

The author of this study suggested that the regional health bureau, zonal health department, and higher officials to emphasis the current collaborative TB/HIV prevention strategy for the sustainability in the decrement in the prevalence of the co-infection, to have health education about transmission of PTB and find the way how to intervene. In addition, the data registration system of patients should be improved to include patients' marital status, occupation, income, personal lifestyle like any addictions, co-morbid illnesses. It is also recommended to researchers to conduct a prospective study to have full information of the patient for further explanations for this higher prevalence of TB/HIV co-infection compared to most of the research findings in other study areas of the country.

▼ To decision makers:

It is recommended that decision makers ought to strengthen diagnostic approach and preventive strategies to reduce TB/HIV co infection.

▼ To Debre Tabor comprehensive Specialized Hospital:

It will better emphasis the current collaborative TB/HIV prevention strategy for the sustainability in the decrement in the prevalence of the co-infection, to have health education about transmission of PTB and find the way how to intervene. In addition, the data registration system of patients should be improved to include patients' marital status, occupation, income, personal lifestyle like any addictions, co-morbid illnesses.

▼ To researcher:

To recommended to researchers to conduct a prospective study to have full information of the patient for further explanations for this higher prevalence of TB/HIV co-infection compared to most of the research findings in other study areas of the country.

Abbreviation:

AOR: Adjusted Odds Ratio, ART: Anti-Retroviral Therapy, ATT: Anti-Tuberculosis Treatment, BCG: Bacille Calmette Guerin, DOT: Directly Observed Treatment, DOTs: Directly Observed Treatment Short-Course, DST: Drug Susceptibility Test, DR-TB: Drug Resistant Tuberculosis, EPTB: Extra-Pulmonary Tuberculosis, FMOH: Federal Ministry of Health, INH: Isoniazid Preventive therapy, HIV: Human Immune Virus, HSTP: Health Sector Transformation Plan, LTBI: Latent Tuberculosis infection, MDR-TB: Multi-Drug Resistant Tuberculosis, MOH: Ministry of Health, M.TB: Mycobacterium Tuberculosis, PTB: Pulmonary Tuberculosis, SNPTB: Smear Negative Pulmonary Tuberculosis, SPPTB:

Smear Positive Pulmonary tuberculosis, SPSS: Statistical Package for Social Sciences, TB: Tuberculosis, TS: Treatment Success, TSR: Treatment Success Rate, TST: Tuberculin Skin Test, WHO: World Health Organization, XDR-TB: Extensively Drug Resistant Tuberculosis

Declarations

Ethical approval and consent to participate: Ethical clearance was obtained from Ethical Review Committee of College of Health Science, Debre Tabor University. Letter of permission was given to Debre Tabor Zonal health office, and Debre Tabor Comprehensive Specialized hospital. The patient data were accessed up on the approval of medical director of Debre Tabor Comprehensive Specialized Hospital, North central Ethiopia. To ensure confidentiality, patient identifiers were not recorded in the data collection check list, and data were used only for the intended study.

Consent to publication: Not applicable

Availability of data and materials: Data will be available upon request from the corresponding author.

Competing interests: The authors declare that they have no competing interests.

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