academicJournals

Vol. 5(3), pp. 29-32, September, 2013
DOI 10.5897/JIDI2013.0117
ISSN 2141-2375 ©2013 Academic Journals
http://www.academicjournals.org/JIDI

Journal of Infectious Diseases and Immunity

Full Length Research Paper

HIV co-infection among tuberculosis patients in Dabat, northwest Ethiopia

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Accepted 3 September, 2013

The aim of this study was to determine the prevalence of HIV co-infection among TB patients in Dabat district, northwest Ethiopia. Medical records of 1086 pulmonary and extrapulmonary tuberculosis patients registered from 2009 to 2012 at two health centers in the district were reviewed. HIV status was determined on 849 (78.2%) patients. The prevalence of HIV co-infection was 97 (11.4%). The majority, 61 (62.9%) and 90 (92.8%) of them were females and belonged to socio-economically productive age group, respectively. About half, 48 (49.5%) were smear-negative pulmonary tuberculosis patients. In conclusion, these findings call for an emergency reaction through strengthening the tuberculosis and HIV collaborative activities, decentralizing the diagnostic and treatment centers to reach the periphery, providing women and young-age targeted interventions, stepping up early diagnosis and treatment initiation, improving nutritional supplementation to boost immunity, and providing prophylaxis to prevent opportunistic infections. Performing culture tests for all HIV infected smear-negative pulmonary tuberculosis patients is also recommended.

Key words: TB/HIV co-infection, prevalence, Ethiopia.

INTRODUCTION

Tuberculosis (TB) and Human immunodeficiency virus (HIV) co-epidemics remain a major public health challenge, particularly in resource-limited settings. There were an estimated 1.1 million TB/HIV co-infected patients worldwide in 2011; 79% of these cases were in the African Region (World Health Organization (WHO), 2012). There has been a strong link between TB and HIV, as they are capable of disarming the host's immune responses. TB is the most common opportunistic disease which kills those infected with HIV (Modjarrad et al., 2010). Similarly, HIV co-infection which increases the risk of latent TB reactivation 20-fold, is the most powerful known risk factor known for progression of *Mycobacterium tuberculosis* infection to active disease (Getahun et al., 2010; Kwan and Ernst, 2011). The proportion of smear-negative pulmonary TB and extra-pulmonary TB is high among HIV co-infected TB patients (Maher et al., 2005; Harries et al., 2006).

The combined impact of HIV and TB co-epidemic has challenged the weak healthcare systems in resource-limited settings. To improve the diagnostic and intervention outcomes for TB/HIV co-infected patients, WHO developed a framework of strategic collaborative activities to be performed as parts of the health sector response to control co-epidemic (WHO, 2004). Ethiopia has started implementing the TB/HIV collaborative activities since 2002 (Ethiopian Federal Ministry of Health, 2007). However, only few studies state that HIV co-infection has been a major public health challenge among TB patients of the country (Deribew et al., 2009; Wondimeneh et al, 2012). Therefore, knowledge about HIV co-infection among TB patients might help to

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understand the spread of the dual infections and to monitor the performances of TB and HIV control activities (WHO 2012). In response to this, the present study was conducted to determine the prevalence of HIV co-infection among TB patients in Dabat district, northwest Ethiopia.

METHODOLOGY

Study area

This study was undertaken in Dabat district, northwest Ethiopia. The district had an estimated population of 46,165. Like the rest of the districts in the northern part of the country, the local community's livelihood largely depended on subsistence agriculture. Two health centers delivered directly observed chemotherapy (DOTS) service for TB patients in the community (Central Statistical Authority, 2007).

Study design and data collection

A retrospective analysis of the profile of all TB patients registered at the two health centers delivering DOTS service between 2009 and 2012 was conducted. The registration documents reviewed contained basic information, such as age, sex, address, and forms of TB.

Definition

The following standard clinical case definitions of the National Tuberculosis and Leprosy Control Program guideline adopted from WHO (Ethiopian Federal Ministry of Health, 2008) were used:

Smear-Positive Pulmonary TB (SPPTB)

One sputum smear examination positive for Acid Fast Bacilli (AFB) by direct microscopy and laboratory confirmation of HIV infection or strong clinical evidence of HIV infection.

Smear-Negative Pulmonary TB (SNPTB)

At least two sputum specimens negative for AFB and radiographical abnormalities consistent with active TB, and laboratory confirmation of HIV infection or strong clinical evidence of HIV infection and decision by a clinician to treat with a full course of anti-TB chemotherapy, or a patient with AFB smear-negative sputum which is culture-positive for M. *tuberculosis.*

Extra-Pulmonary TB (EPTB)

One specimen from an extra-pulmonary site culture-positive for M. *tuberculosis* or smear-positive for AFB, or histological or strong clinical evidence consistent with active EPTB and laboratory confirmation of HIV infection or strong clinical evidence of HIV infection and decision by a clinician to treat with a full course of anti-TB chemotherapy.

Any patient with both SPPTB and EPTB was classified as SPPTB. We considered individuals to be HIV-infected if they tested positive for HIV as tested using enzyme linked immunosorbent assay, immunofluorescence, Western blotting or rapid test.

Table 1. Socio-demographic and clinical characteristics of HIV infected TB patients (N=97) in Dabat district, 2009-2012.

Characteristics	Number	Percent
Sex		
Male	36	37.1
Female	61	62.9
Age (years)		
0-14	2	2.1
15-39	90	92.8
≥40	5	5.1
Residence		
Urban	52	53.6
Rural	45	46.4
Form of TB		
SPPTB	27	27.8
SNPTB	48	49.5
EPTB	22	22.7

Statistical analyses and Ethical considerations

Data were entered, cleaned and analyzed using the statistical package SPSS for windows, version 16. Inconsistencies in data entry were randomly checked by re-entering 10% raw data. Frequencies and percentages were used to describe HIV co-infection among TB patients. The study was approved by the Institutional Review Board of the University of Gondar.

RESULTS

Prevalence of HIV co-infection among TB patients

Among the 1086 medical reviews of TB patients, 849 (78.2%) were tested for HIV infection. Out of them, 97 (11.4%) were HIV co-infected. Of whom nearly two-thirds, 61 (62.9%), were females. The majority, 90 (92.8%), of the HIV infected TB patients belonged to the age group of 15–39 years. Fifty-two (53.6%) of the HIV infected TB patients were from urban areas. Out of the HIV infected TB patients, 48 (49.5%) had SNPTB, followed by 27 (27.8%) and 22 (22.7%) who had SPPTB and EPTB, respectively (Table 1). The prevalence of SNPTB was 18 (50.0%) among males, 30 (49.2%) among females, 2 (100.0%) among age group of 0-14 years, 43 (47.8%) among age group of 15-39 years, 3 (60.0%) among age group of 40 and above years, 23 (44.2%) among urban dwellers, and 25 (55.6%) among rural dwellers (Table 2).

Discussion

HIV co-infection among TB patients is well recognized as

Table 2. Description of form of TB among HIV infected TB patients by sex, age and residence in Dabat district, 2009-2012.

Characteristics	Form of TB SPPTB No. (%)	SNPTB No. (%)	EPTB No. (%)
Sex			
Male	11 (30.6)	18 (50.0)	7 (19.4)
Female	16 (26.2)	30 (49.2)	15 (24.6)
Age (years)			
0-14	0 (0.0)	2 (100.0)	0 (0.0)
15-39	27 (30.0)	43 (47.8)	20 (22.2)
≥40	0 (0.0)	3 (60.0)	2 (40.0)
Residence			
Urban	18 (34.6)	23 (44.2)	11 (21.2)
Rural	9 (20.0)	25 (55.6)	11 (24.4)

a major public health problem worldwide. In this study, the prevalence of HIV co-infection among TB patients was 11.4%. This finding is nearly similar to the 2012 WHO report (13.0%). However, this finding is by far lower than that of studies conducted in southern Ethiopia (18.0%), and Nigeria (44.2%) (Datiko et al., 2008; Pennap et al., 2010), and higher than that of recent studies conducted in northwest Ethiopia (7.5%), and the 2012 WHO report for Ethiopia (8.0%) (Wondimeneh et al., 2012). This high prevalence of HIV co-infection among TB patients in the study area signifies the urgent need for programmatic revision, strengthening the health system infrastructure, staff capacity building, increasing public awareness, decreasing social and perceived stigma associated with TB and HIV (Deribew et al., 2010) and innovating for patient-friendly and cultural sensitive intervention approaches.

Nearly two-thirds of the HIV co-infected TB patients were females in this study. Other studies support this finding (Wondimeneh et al., 2012; Nwabuko et al., 2012). This is probably related to the high incidence of HIV infection in females which predisposes them to TB as the former is known to activate dormant TB. Women, who have a higher susceptibility to HIV infection, are usually exposed to sexual activities earlier than men mainly for economic reasons. Furthermore, most African women being subservient subordinated to their husbands have little or no say in issues relating to sexual relationships. The study was done in an area where polygamy and early marriage thrives (Erulkar et al., 2009; Nwabuko et al., 2012). It is therefore possible for one male to be the source of infection to several females. Programs on delaying marriage and support women socially and economically are critical.

The higher prevalence of HIV co-infection among TB patients observed among younger age group in this study is consistent with the findings of other studies (Pennap et al., 2010; Kamenju et al., 2011). This age prevalence of HIV co-infection among TB patients probably reflects the age-specific prevalence of HIV in the community. This may be related to patients' being in a sexually active age group in which both TB and HIV prevail most (Tessema et al., 2009; Berhe et al., 2012). The other possible explanation for this may be their increased family, organizational, and societal responsibilities as people in this age group involve themselves in various extraneous daily activities in order to win the socio-economic hardship which increases the frequency of their contact with other patients in their society.

In this study, nearly half of the HIV infected TB patients had SNPTB. This is true according to several other studies (Deribew et al., 2009; Wondimeneh et al., 2012). This might be due to the variation in the concentration of AFB in the sputum and the rate of caseation necrosis. Studies have shown that HIV infected patients are twice as likely to have sputum smear-negative, and culture-positive pulmonary TB which results from their compromised immune response leading to less cavity formation (Elliott et al., 1993; Nunn et al., 1994). Therefore, performing culture tests for all HIV infected SNPTB patients may be the entry point.

Our study area was a densely populated agrarian community in northwest of Ethiopia. This area is typical of the rural population of Ethiopia, representing 85% of the total population, where the prevalence of HIV co-infection among TB patients is high because of the limited health service coverage, shortage of health workers, poor diagnostic facilities, and weak TB and HIV collaborative activities. Thus, we believe that our findings are applicable in similar settings.

However, the major limitation of this study is that we did not have access to the full range of socio-demographic

and clinical variables in the medical records during the review process. Another limitation is that we analyzed a small sample of HIV infected TB patients. We recommend further surveys involving large sample size of HIV infected TB patients to develop the full pledged knowledge.

Conclusion

The prevalence HIV co-infection among TB patients was high. This calls for emergency reaction through strengthening the TB and HIV collaborative activities, decentralizing the diagnostic and treatment centers to reach the periphery, providing women and young age targeted interventions, initiating early diagnosis and treatment, improving nutritional supplementation to boost immunity, and providing prophylaxis to prevent opportunistic infections. Performing culture tests for all HIV infected SNPTB patients is also recommended.

ACKNOWLEDGEMENTS

Authors would like to thank all the staff members of Dabat and Woken health centers for the proper documentation of patients' information and for their genuine assistance during data collection. Sebsibe Tadesse analyzed the data and wrote the manuscript while Takele Tadesse initiated the research and collected the data.

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