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Original article

Human immunodeficiency virus (HIV) infection in tuberculosis patients in Addis Ababa

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Abstact

BACKGROUND: In a country with a rapidly spreading HIV epidemic information regarding HIV and TB Co-infection are lacking.

OBJECTIVES: To determine the prevalence of HIV infection in a representative sample of sputum-positive tuberculosis patients.

METHODS: A cross-sectional survey whereby blood sample was collected from 236 consecutively coming smear positive pulmonary tuberculosis patients for HIV testing. This study, which involved all the health centres in Addis Ababa, was carried out during August 1, 1998 to the end of December 1998.

RESULTS: Of the 236 blood samples collected, 107(45.3%) were HIV positive. Among the HIV positives, 66 (61.7%) were male and 41(38.3%) females. The HIV-TB co-infection was highest in the age group 20-49 and the largest number of TB co-infection (75% of all such co-infection) was found in the 20-39 age group. There was no significant difference between the HIV positive and negative TB patients concerning to other socio-demographic factors or presenting symptoms.

CONCLUSION: The prevalence of co-infection appeared to have increased compared to previous studies, 6.6%, 20 & 25% and 44.4% in 1990, 1995, and 1996, respectively. This trend may have a serious impact on the control of tuberculosis. Co-ordinating strategies of the TB and HIV control programs is recommended

Introduction

In many parts of Africa and South East Asia, infection with human immunodeficiency virus (HIV) has further increased tuberculosis (TB) morbidity and mortality (1). There are about 17 million HIV infected people worldwide and about one third of these are also co-infected with M. tuberculosis. Among the estimated five to six million people who are dually infected with M. tuberculosis and HIV, 70% live in sub-Saharan Africa (3). In some HIV endemic countries of Africa, the prevalence of co- infection is as high as 60-70% (3,4). Unlike other diseases associated with HIV, TB can be spread to others in the community and primarily affects young adults. In Uganda in 1994, for example, over 70% of TB cases occurred in people 5-44 years of age (5).

HIV infection is a major public health problem in Ethiopia. Prior to 1985, HIV prevalence was very low in the country, but has increased rapidly in the years following. The adult HIV prevalence in the country was 0% in 1984, 1.0% in 1989, and 3.2% in 1993 (6). HIV infection

has now spread throughout the country and AIDS cases have been reported from every region of the country. By 1997, the adult prevalence had increased to 7.4% and about 2.4 million HIV infected adults live in Ethiopia today. In the urban areas, the HIV prevalence is much higher (21%) compared with the rural areas 4.5% (6).

In Ethiopia, the number of TB cases has also been rising rapidly (7). The number of reported new cases has increased from 55,000 to 100,000 in the last ten years. TB is among the leading causes of morbidity, hospital admission and the first cause of hospital deaths (7). This increase in the number of tuberculosis cases is in part thought to be due to the rapid spread of the HIV infection. Except for very few hospital-based studies conducted in different parts of the country, there is no adequate information on the prevalence of TB/HIV co-infection in the country. The aim of this study was to determine the prevalence of HIV infection in a representative sample of sputum positive tuberculosis patients in Addis Ababa.

Methods

This study was carried out from August 1, 1998 to the end of December 1998 in Addis Ababa, the capital city of Ethiopia. The population of the city was estimated at 2.4 million (8). There were 17 government health centres in the city and all of them participated in the study.

A cross-sectional survey was conducted in health institutions to determine the prevalence of HIV infection in sputum smear confirmed tuberculosis patients. A structured questionnaire was used to collect demographic, social, and medical information. Patients were asked for common pulmonary symptoms such as cough, chest pain, dyspnea, heamoptysis and they were also asked for non-specific symptoms, like fever, weakness, loss of appetite, and loss of weight. The questionnaire was pre-tested before use and trained nurses interviewed the patients as soon as they were diagnosed to have smear positive tuberculosis. Regular supervision of interviewers was conducted throughout the study period by the principal investigator.

All new smear positive pulmonary TB patients aged 14 years and above were eligible for participation in the study. Three sputum samples (two spots and one early morning) were taken from all suspected patients. Those patients with two positive results were registered as smear positive patients and a physician assessed those patients with no or one positive smear before registering them as smear negative tuberculosis cases. The exclusion criteria were: patients with previous history of anti-tuberculosis treatment, smear negative and extra-pulmonary tuberculosis cases. Blood sample was collected from the first 236 consecutive smear positive patients after informed consent.

A 10 ml blood sample was drawn from each smear positive patient by trained laboratory technicians. The sera were kept in a refrigerator until dispatched to the Ethiopian Health and Nutrition Research Institute (EHNRI), once a week, where the analysis was done. Tests of HIV antibodies were done by the double enzyme linked immuno-sorbent assay (ELISA) (9,10). Only reactive samples to the first ELISA were repeated.

The sample size was estimated by anticipating a 20% prevalence of co-infection, 95% confidence interval, and a precision of 5% (11). The calculated sample size was 215 patients. The patients' demographic and medical data and serum test results were entered and analysed using the Epi Info version 6(11) HIV positive and negative tuberculosis patients were compared

by socio-demographic variables and presenting symptoms. Odds ratio and 95% confidence interval and were calculated from crosstabulation. Multiple logistic regression was done adjusting for sex, age, marital status, religion, educational level, and occupation using SPSS version 10 computer program (12). Statistical significance was designated at $p< 0.05$.

The National Ethical Clearance Committee of the Ethiopian Science and Technology Commission approved the study protocol. Verbal informed consent was obtained from each patient before participation in the study. All patients were given code numbers to maintain confidentiality about their identity.

Confidentiality of all records, data forms, and computer files were maintained.

Results

Two hundred thirty six patients (132 male and 104 female) with a mean age of 29.8 years (range 14-70 years) were recruited for the study. Fifty (21.2%) of the patients were civil servants, 43 (18.2%) students, 36 (15.2%) unemployed, 27 (11.4 %) housewives, and 80 (34%) belonged to different occupational groups (Table 1).

Among the 236 AFB confirmed tuberculosis patients, 107 (45.3%) were HIV positive (Table 2). The HIV- TB co-infection rate varied greatly between different parts of Addis Ababa with lowest HIV prevalence (25.0%) and the highest HIV prevalence (80%)(due to small sample and ethical reasons the areas are not specified).

As indicated in Table 2, there was a significant association between age and HIV infection. The age group of 20-49 was more affected, the risk being higher in the age groups 20-29 and 30-39, OR (95% CI): 4.8(1.4,16.3) and 5.5(1.47,20.4), respectively. Though the crude analysis showed a significant difference in HIV status between the married and singles and between students and civil servants groups, this significance was not maintained in the multiple logistic regression analysis. No significant difference was observed in the presenting symptoms between the HIV positive and negative tuberculosis patients.

Discussion

The prevalence of HIV in smear positive TB patients in Addis Ababa is 45.3 % with the highest co-infection rate in the 20-39 age group. No difference in HIV status was observed between the sexes or among the different occupational, religious, and educational groups. As the survey included all the health centres in the city, it is believed that the sample is representative of smear positive pulmonary tuberculosis patients in Addis Ababa.

The sero prevalence of 45.3% among smear positive TB patients is higher than what has recently been published from southern Ethiopia (13). It is consistent with other studies conducted in sub-Saharan Africa, which have shown a high prevalence rate of 20-60% (14-17). However, this rate is much higher than previously reported from Addis Ababa in 1990 (18), from Harrar in 1995 (19) and Yirga Alem Hospital in southern Ethiopia in 1997 (20). These differences could be attributed to the difference in the study population, the study sample or to the rapid dissemination of the HIV infection over time. The available information so far and the current finding suggest that HIV-TB co-infection has markedly increased through the years

from 6.6% in 1990, to 20% and 25.7% in 1995, 44.4% in 1996 and 45.3% in this study and with higher co-infection rates among urban populations (13,18-20).

The observed high HIV positivity rate in the younger age group is consistent with the findings from other African and Asian countries (14,15,16, 21). This age prevalence of HIV in TB patients probably reflects the age-specific prevalence of HIV in the community. Unlike in some other studies (17, 21), study has we have not found difference in prevalence between the two sexes. Contrary to many other studies, no significant differences have been observed in the presenting symptoms of the HIV positive and negatives tuberculosis patients. In both the studies from Yirga Alem and Shashemene, the clinical features of HIV positive tuberculosis patients differed from the HIV negative TB patients (13,20). The similarity between the HIV positives and negatives among our patients might be due to the chronic nature of both diseases leading to protracted ill-health and wasting and the fact that we only interviewed the patients and did not examine them clinically may also explain the findings.

HIV is a major cause of the large increases in incidence of TB seen in many sub- Saharan countries (22). In Ethiopia, the available data suggest that HIV- TB co-infection has markedly increased during the decade of the 1990s and that HIV is now contributing very much to the tuberculosis load in the country. The challenge appears serious, the tuberculosis cases may in the coming years be disproportionately higher than the resources potentially available for its control. Therefore, strengthening the HIV/AIDS control programme should be the main priority. New and co-ordinated ways to control both diseases are also urgently needed.

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Tables

Table 1: **Socio-demographic characteristics of the study population and HIV sero prevalence rate**

Variable	No. Total (%)	HIV infection No. (%)
Sex		
Male	132 (55.9)	66 (61.7)
Female	104 (44.1)	41 (38.3)
Age		
14-19	36 (15.2)	5 (13.9)
20-29	90 (38.1)	41 (45.5)
30-39	67 (28.4)	39 (58.2)

	40-49	32 (13.6)	17 (53.1)
	>=50	11 (4.6)	5(45.5)
Marital status			
	Married	90 (38.1)	50 (55.5)
	Single	146 (61.9)	57 (39.0)
	Religion		
	Christian	213 (90.3)	95 (44.6)
	Moslem	23 (9.7)	12 (52.2)
Occupation			
	Civil servants	50 (21.2)	28 (56.0)
	Hosewives	27 (11.4)	14 (51.8)
	Daily labourers	25 (10.6)	15 (60.0)
	No job	36 (15.2)	15 (41.6)
	Students	43 (18.2)	7 (16.3)
	Occupation		
	Merchants	19 (8.1)	9 (47.4)
	Others	36 (15.3)	19 (52.8)
Educational Status			
	No education	23 (9.7)	12 (52.2)
	Read and write	21 (8.9)	11 (52.3)
	1-6 grade	45 (19.1)	22 (48.9)
	7-12 grade	13 (57.2)	55 (40.7)
	Above 12	12 (5.17)	7 (58.3)

Table 2: **HIV sero-prevalence rate of 236 smear positive tuberculosis patients, by socio demographic factors, Addis Ababa, 1999.**

Variable		HIV test result		Crude	Adjusted OR
		Positive	Negative	OR (95% CI)	(95% CI)
Sex					
	Male	66	66	1.00	
	Female	41	63	0.65(0.37,1.13)	0.74(0.38,1.45)
Age					
	14-19	5	31	1.00	
	20-29	41	48	5.30(1.75,17.16)	4.8(1.4,16.3)

	30-39	39	28	8.91(2.83,29.93)	5.5(1.47,20.4)
	40-49	17	15	7.25(1.99,27.99)	4.11(0.96,17.6)
	50 years	5	7	4.43(0.81,25.50)	2.8(0.47,17.03)
Marital status					
	Married	50	40	1.00	
	Single*	57	89	0.51(0.29,0.90)	0.91(0.48,1.70)
Religion					
	Christians	95	118	1.00	
	Moslem	12	11	1.36(0.53,3.47)	1.32(0.48,3.6)
Educational level					
	No education	12	11	1.00	
	Read and Write	11	10	1.01(0.26,3.89)	0.83(0.22,3.17)
	1-6 grade	22	23	0.88(0.28,2.68)	0.82(0.26,2.59)
	7-12 grade	55	80	0.63(0.24,1.66)	0.72(0.24,2.16)
	Above 12 grade	7	5	1.28(0.25,6.61)	0.38(0.16,1.48)
Occupation					
	Civil servants	28	22	1.00	
	House wives	14	13	0.85(0.30,2.40)	1.04(0.33,3.28)
	Dauly labourers	15	10	1.18(0.40,3.50)	1.13(0.38,3.41)
	No job	15	21	0.56(0.21,1.46)	0.71(0.26,1.96)
	Students	7	36	0.15(0.05,0.45)	0.36(0.27,1.19)
	Merchants	9	10	0.71(0.22,2.31)	0.70(0.22,2.21)
	Others	19	17	0.88(0.34,2.27)	0.87(0.34,1.80)

* Includes: never married, widowed, separated and divorced

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