Prevalence of HIV infection among tuberculosis patients in Eastern India

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KEYWORDS
Prevalence; HIV; Pulmonary tuberculosis; Extrapulmonary tuberculosis; Co-infection

Summary
Background: India has a high tuberculosis (TB) burden. A significant percentage of TB patients are human immunodeficiency virus (HIV) positive. As the HIV epidemic is fueling the global TB epidemic, the prevalence of the virus in TB patients is a sensitive indicator of the spread of HIV into the general population in many regions. The aim of this study was to determine the prevalence of HIV–TB co-infection among a less studied population of Eastern India.

Materials and methods: A cross-sectional record analysis study covering the period from 2000 to 2011 was conducted at Central Hospital of South Eastern Railway, Garden Reach, Kolkata, India. All tuberculosis patients consenting for HIV testing were included in the study after obtaining ethical clearance from the institution. The TB diagnosis was performed using clinical examination, sputum acid-fast bacillus (AFB) smear and chest radiography. HIV-positive cases were screened using an initial HIV tridot test, followed by repetitive tests using a Micro ELISA HIV Kit for HIV 1 and HIV 2 antigen.

Results: Overall, 50 (12.3%) of the consenting 406 TB patients were HIV positive. Of these 406 patients, 44% had pulmonary TB, and 56% had extrapulmonary TB (EPTB). Coughing was the most common symptom (90%), followed by fever (78%). Pleural effusion (60.7%) was the most common form observed in the EPTB cases.

Conclusions: The prevalence of HIV–TB co-infection was 12.3%. Consequently, all TB patients should be assessed for HIV risk factors and counseled to undergo HIV testing. Conversely, all HIV-positive cases should be screened for TB.

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Abbreviations: HIV, human immunodeficiency virus; TB, tuberculosis; PTB, pulmonary tuberculosis; EPTB, extrapulmonary tuberculosis.

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Introduction

Southeast Asia is known to have the highest worldwide tuberculosis (TB) burden, contributing 35% to the global TB incidence. Of the 11 countries in Southeast Asia, 5 (Bangladesh, India, Indonesia, Myanmar and Thailand) are among the 22 countries with the highest TB burden [1]. According to a 2010 World Health Organization (WHO) global TB report, the annual incidence of TB was 9.4 million cases, of which 2 million cases were from India. India is 17th among the 22 countries with the highest TB incidence rates. According to a 2004 WHO report, TB ranked the 7th leading cause of death worldwide, accounting for 2.5% of all deaths. Furthermore, of the 9.4 million diagnosed cases of TB in 2009, an estimated 1.1 million (12%) were human immunodeficiency virus (HIV) positive, with 78% in Africa and 13% in Southeast Asia [2]. The global list of 41 countries with the highest HIV—TB burden includes India, Indonesia, Myanmar and Thailand in Asia and the Pacific region [1].

People with HIV and TB infection are much more likely to develop active TB. Each case of TB—HIV co-infection and/or drug-resistant tuberculosis severely aggravates the global TB situation. TB is a leading cause of death in HIV-infected persons, and HIV infection is the most potent risk factor for developing active TB disease from a latent TB infection [2].

Worldwide, if we consider the prevalence of HIV—TB co-infection, there is an approximately 41.2% prevalence in Sub-Saharan Africa [3], whereas the prevalence was 44% in Kenya [4]. However, China has a relatively low prevalence (0.5%) of co-infection [5]. In addition, 9% of TB patients were HIV positive in the United States in 2005 [6], and Vietnam had an 8.2% prevalence of co-infection in 2010 [7]. Among European countries, France, Iceland and Portugal have reported co-infection prevalences of approximately 11–15%, but central European countries have reported a lower prevalence (0–1%) [8].

In India, information on co-infection remains sparse. Reports from the cities/states of Delhi [9], Tamil Nadu [10,11], Maharashtra (Mumbai [12], Pune [13]), Jammu and Kashmir [14], Madhya Pradesh (Indore) [15], Uttar Pradesh (Aligarh) [16], Lucknow [17], Karnataka (Mangalore) [18] and Pondicherry [19] are available and indicate prevalences ranging from <1% to approximately 30%.

Learning the prevalence of HIV-positive infection in active TB patients is imperative, as it is increasingly being recognized that such information would encourage planning and may also be necessary for determining the appropriate treatment regime. The importance of HIV surveillance in TB patients is increasingly being realized as the HIV epidemic continues to fuel the global TB epidemic. In many regions, the HIV prevalence in TB patients is a sensitive indicator of the spread of HIV into the general population. Information about the HIV prevalence in TB patients is essential for responding with an increasing commitment to providing comprehensive HIV/AIDS care and support, including anti-retroviral therapy (ART), to HIV-positive TB patients. Presently, although TB cases are increasingly being detected in most regions, the majority of HIV cases are not. Current knowledge of the interaction between the two epidemics in a given area is restricted to individuals who are able to access good health services [1]. Therefore, this study was planned to determine the prevalence of HIV—TB co-infection in patients among a less studied population of Eastern India and investigate the distribution of HIV-positive cases among pulmonary TB and extrapulmonary TB (EPTB) patients. In addition, the study also describes various clinical presentations among these co-infected cases, along with a comparative analysis of several earlier studies.

Materials and methods

This cross-sectional record analysis study was conducted at Central Hospital of South Eastern Railway, Garden Reach, Kolkata, India from January 2000 to January 2012. All tuberculosis patients who gave consent for HIV testing (after pre-test counseling) in the in-patient and out-patient wards of the Department of Medicine were included in the study. All personal information, such as age, gender, socioeconomic background, education level, profession, sexual preferences and promiscuity, history of past surgery or blood transfusion were collected. The diagnosis of tuberculosis was performed using clinical examination and acid-fast bacillus (AFB) sputum smear, chest radiography, body fluid analysis or tissue biopsy/ FNAC in the case of EPTB. The HIV-positive cases were screened using an initial HIV triot spot test, followed by repetitive diagnostic tests using a MICRO ELISA HIV kit (HIV-1 and HIV-2 Ag). The following exclusion criteria were applied: refusal to consent to HIV screening, patients admitted to or treated by other specialties and those outside the age group of 18-60 years. Of 947 TB cases, 406 cases consented to HIV testing and were included in this study.
Results

Of the 406 TB patients included in this study, 267 were males and 139 were females. Fifty (12.3%) of these patients were HIV positive, including 42 (10.3%) males and 8 (2%) females; 22 of the HIV-positive cases had pulmonary TB, whereas 28 cases had EPTB (Table 1). The most commonly affected age group was 31–45 years.

Of the 42 HIV–TB co-infected males, 30 (71.43%) were field workers, and 12 (28.57%) were office workers; all 8 affected females were housewives. Forty-three cases (86% of the 50 HIV–TB co-infected cases) had histories of heterosexual relationships with more than 1 partner; 2 (4%) patients were intravenous drug users and 5 (10%) patients had past histories of blood transfusion/surgery.

In terms of the number of HIV–TB co-infected cases per year, the maximum number of 5 cases/year occurred in 2003, 2005, 2010 and 2011, whereas the lowest number of cases was observed in 2000, with 1 case of HIV–TB co-infection.

Of the 50 HIV-positive cases, 45 (90%) patients presented with cough; 39 (78%) presented with fever; 38 (76%) presented with loss of appetite; 38 (76%) presented with weight loss; 22 (44%) presented with dyspnea; 7 (14%) presented with hemoptysis and 5 (10%) presented with chest pain (Table 2).

Similarly, among the 50 HIV–TB co-infected cases, 22 (44%) patients suffered from pulmonary TB, and the 28 (56%) remaining patients suffered from EPTB. Sixteen (72.7%) of the 22 PTB cases displayed AFB positivity. The X-ray findings showed the following pulmonary lesion distribution: upper zone lesions in 14 (63.6%) cases, upper and mid zone lesions in 2 (9%) cases, a lower zone lesion in 1 (4.5%) case, miliary mottling in 2 (9%) cases and cavitary lesions in 3 (13.6%) cases (Fig. 1).

Of the 28 EPTB cases, 17 (60.7%) patients presented with pleural effusion; 7 (25%) presented with lymphadenopathy (mediastinal, cervical and abdominal); 1 (3.6%) presented with CNS TB; 2 (7.1%) presented with pericardial effusion and 1 (3.6%) presented with bone TB (Table 3).

Discussion

Surveys in Africa, Asia and the Pacific have indicated that the HIV prevalence among TB patients is much higher than that observed in the general population [20]. Sub-Saharan Africa has a prevalence of HIV–TB co-infection of approximately 41.2% [3], whereas the prevalence in Kenya has decreased from 52% in 2006 to 44% in 2009 [4]. The prevalence of HIV among tuberculosis patients in the United States was 9% in 2005 [6]. The recorded data for 23 European countries over several years indicate that the HIV prevalence among the TB patients in England increased from 5% in 2000 to 8% in 2005. In contrast to the higher co-infection rate in France, Iceland and Portugal (11–15%), in 2008, the

<table>
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<tr>
<th>Table 1</th>
<th>HIV co-infection among TB patients.</th>
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<tr>
<td>Type of TB</td>
<td>HIV positive</td>
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<tr>
<td>PTB</td>
<td>22</td>
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<tr>
<td>EPTB</td>
<td>28</td>
</tr>
<tr>
<td>Total HIV Tested</td>
<td>50</td>
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* PTB = pulmonary tuberculosis.
* EPTB = extrapulmonary tuberculosis.

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<th>Table 2</th>
<th>Clinical presentation of the co-infected patients.</th>
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<td>Symptoms</td>
<td>Percentage (%)</td>
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<tr>
<td>Cough</td>
<td>90</td>
</tr>
<tr>
<td>Fever</td>
<td>78</td>
</tr>
<tr>
<td>Loss of appetite</td>
<td>76</td>
</tr>
<tr>
<td>Weight loss</td>
<td>76</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>44</td>
</tr>
<tr>
<td>Hemoptysis</td>
<td>14</td>
</tr>
<tr>
<td>Chest pain</td>
<td>10</td>
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<th>Table 3</th>
<th>Presentations of EPTB.</th>
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<tr>
<td>Extrapulmonary presentation of TB</td>
<td>Percentage (%)</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>60.7</td>
</tr>
<tr>
<td>Lymphadenopathy</td>
<td>25.0</td>
</tr>
<tr>
<td>Pericardial effusion</td>
<td>7.1</td>
</tr>
<tr>
<td>CNS TB</td>
<td>3.6</td>
</tr>
<tr>
<td>Bone TB</td>
<td>3.6</td>
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</table>
Central European countries reported a low prevalence (0–1%) [8]. A similarly low prevalence (0.5%) was observed in China in 2010 [5]. The prevalence of co-infection was 8.2% in Vietnam in 2010 [7], but the prevalence was 40% in Northern Thailand in 1996 [21].

In India, the prevalence of HIV among TB patients was generally high in some areas, such as Mumbai (30%), Pune (28.75%) and Mangalore (21%), compared with areas with a low prevalence, such as New Delhi (0.68%), Jammu and Kashmir (1.6%), Aligarh (2.8%), Indore (4%) and Tamil Nadu (4.7%). The present study indicates a prevalence of 12.3%, which more or less reflects the prevalence in the states of Odisha, Jharkhand and some areas of West Bengal, as the study was conducted in a referral hospital in South Eastern Railway, India.

There was a trend of increasing HIV prevalence in TB patients in Aligarh (from 0.8% to 2.8%) from 1996 to 2001 [16]. A similar result was observed in Goa, indicating a rising trend in HIV prevalence from 2.01% in 1995 to 10.91% in 2000 [22]. The present study indicates that there has been a somewhat imperceptible change in the prevalence of HIV–TB co-infection. This change in co-infection prevalence might be the result of improvements in public awareness and better treatment regimes.

Except for a few countries in Africa (Sub-Saharan Africa), the prevalence of co-infection has been reported to be higher among males than females [3]. In almost all other countries, there is little difference in the gender ratio. Many studies that have been conducted in different parts of India have indicated significantly higher numbers of male subjects with HIV–TB co-infection than affected females. The findings of the present study align with that pattern. Moreover, the most affected age group in this study comprised patients aged 30–45 years. Almost all males and females were from a low socio-economic background.

Of the 50 HIV–TB co-infected cases, 43 (86%) patients had histories of heterosexual relationships with more than 1 partner; 2 (4%) patients were intravenous drug users and 5 (10%) patients had past histories of blood transfusion/surgery. In the Indian scenario, the most common route of HIV infection has been through heterosexual transmission followed by a history of blood transfusion or sharing of needles [15,16,23]. Homosexual transmission has been rare but has been observed in a few places, such as Gujarat [23]. European countries have different transmission modes [8]. In the United States, the most common route has been reported to be intravenous drug use [6].

In this study, the most commonly presented symptom was cough (90%), followed by fever (78%), weight loss (76%) and loss of appetite (76%). These findings are supported by other studies [23]. Fever (70.4%) was the most common symptom, followed by weight loss (65.2%) and cough (42%) in another study [24].

HIV prevalence has been observed to present more prominently in patients with pulmonary TB in many studies [9,16,18]. However, other researchers [23,24] have observed that HIV prevalence is more prominent in EPTB patients. However, in the present study, EPTB was observed to be the more prominent form of presentation, which may most likely be attributed to the immune-compromised state associated with HIV–TB co-infection. As HIV-related immune-suppression increases, the clinical pattern of TB changes, with an increasing number of EPTB cases. In our study, the most common form of EPTB was pleural effusion (60.7%), followed by lymphadenopathy (25%) (mediastinal, cervical and abdominal) and pericardial effusion (7.1%). Other studies have reported the lymphatic system to be more common than pleural involvement [23]. The AFB-positive cases displayed a higher HIV prevalence (72.7%) in the present study, whereas in other studies, AFB-negative cases have displayed a greater HIV prevalence.

The tertiary referral Railways hospital in which the study was conducted has a catchment area that includes a portion of West Bengal, Odisha and Jharkhand. Therefore, the study population may not exactly represent the general population, which is one limitation of this study. HIV surveillance in all TB centers in these areas would perhaps better reflect the general population.

After the present work was communicated, a very recent report [25] appeared highlighting the mass economic migration in India and its likely effect on HIV propagation.

In summary, the prevalence of HIV–TB co-infection was 12.3%, and co-infection was more common in the sexually active age group. Heterosexual transfer is the most common mode of transmission, and the most common presenting symptom appears to be cough. EPTB is more common in HIV-positive cases with predominantly pleural effusion. Thus, all TB patients should be questioned about their risk factors for HIV infection and counseled to undergo HIV testing. Conversely, all HIV-positive cases should be screened for TB because the latter may cause a more rapid progression to AIDS unless appropriately treated in time.

**Conflict of interest**

None declared.
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References