

# Human Immunodeficiency Virus Infection Among Tuberculosis Patients in Mumbai

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## ABSTRACT

**Background:** Human Immunodeficiency Virus (HIV) is the most powerful risk factor for the progression of *Mycobacterium tuberculosis* infection to Tuberculosis (TB) disease. TB accelerates the progression of HIV infection to AIDS and shortens the survival of such patients.

**Aim:** To determine the seroprevalence of HIV infection among TB confirmed patients in a tertiary care center in Mumbai in view of the significance of HIV in TB. Its association with gender and age was also determined.

**Materials and Methods:** Blood samples were collected by venipuncture from 432 TB patients and their HIV status was determined. HIV antibody detection was carried out as per Strategy III, National AIDS Control Organisation (NACO) guidelines. Statistical analysis was carried out by applying the Chi-square test.

**Results and Conclusion:** Of the 432 patients screened, 9% (39) were HIV positive. The prevalence of co-infection was higher among females (9.4%) than the male (8.7%) patients and highest amongst those aged 21to40 years (13.7%). Co-infection was found to be statistically highly associated with age ( $p < 0.05$ ). This high prevalence calls for routine screening of TB patients for HIV infection.

**Keywords:** Human immunodeficiency virus, seroprevalence, Tuberculosis

## INTRODUCTION

The emergence of Human Immunodeficiency Virus (HIV) has paved way for the resurgence of *Mycobacterium tuberculosis* infection. While HIV is the most powerful risk factor for the progression of *M. tuberculosis* infection to Tuberculosis (TB) disease, TB accelerates the progression of HIV infection to Acquired Immunodeficiency Syndrome (AIDS) and shortens the survival of such patients.<sup>[1,2]</sup> The two are intricately linked to malnutrition, unemployment, poverty, drug abuse, and alcoholism and have also been referred to as the “Cursed Duet.”<sup>[3]</sup> HIV is known to increase the risk of reactivation in people with latent TB and also increases the risk of subsequent

episodes of TB from exogenous reinfection.<sup>[3,4]</sup> It has also corroborated by noting that HIV patients are highly vulnerable to TB because of their weakened immune systems and the latter is now their number one killer.<sup>[5]</sup> Surveillance of HIV among TB patients has been recognized to be important as the HIV epidemic continues to fuel TB epidemics. In many countries, HIV prevalence among TB patients is a sensitive indicator of the spread of HIV into the general population.<sup>[6]</sup>

TB and HIV epidemics are heavily intertwined, each increasing the morbidity and mortality of the other. In India, there are over 3 million annual prevalent active TB cases and over 5 million HIV-positive individuals. Although the countrywide prevalence remains less than 1% (0.91%),<sup>[7]</sup> a vast majority of HIV-positive patients do not know their status. Less than 5% of the approximately 7,70,000 patients in need of antiretroviral therapy currently have access to it.<sup>[8]</sup> Strategies to detect and treat HIV are thus of a pressing concern. Given that TB is the most common

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opportunistic infection in HIV infected individuals in India, detecting HIV among TB patients presenting to the health sector represents an important public health opportunity. Programmatic planning requires the availability of up-to-date data on HIV seroprevalence among different populations of TB patients.

In the view of the aforementioned, a retrospective analysis was carried out to estimate the prevalence of HIV infection among TB patients visiting a tertiary care center in Mumbai.

## MATERIALS AND METHODS

A retrospective analysis of TB patients referred for HIV testing over a period of 1 year was carried out in the Department of Microbiology at the B.Y.L. Nair Charitable Hospital, Mumbai. This institute is a tertiary care referral hospital. Only those TB patients whose HIV status was not known at the time of TB diagnosis were included in the analysis to draw the true prevalence of HIV infection among TB patients. TB diagnosis was done on the basis of smear microscopy, chest radiography, and clinical signs/symptoms as per the Revised National Tuberculosis Control Programme (RNTCP).

TB patients registered at the DOTS center of this hospital are routinely advised to undergo HIV screening after pretest counseling and informed consent. Our laboratory caters laboratory services to all such patients, and tests are carried out as per the guidelines laid down by the National AIDS Control Organization (NACO), India.<sup>[9]</sup> The results were collected from all TB patients tested in this laboratory and no selection bias was observed. The findings were analyzed over a period of 1 year from August 2009 to July 2010. All the tests were done after a written informed consent was obtained from the patients and in accordance with the institutional ethical guidelines.

Venous blood sample (5 ml) was collected in a plain container from all the patients who consented for testing. Blood was allowed to clot for 30 mins at room temperature (25–30°C) and serum was separated after centrifugation at low speed. The serum samples were then stored at 4°C and were tested within 48 hours.

HIV antibodies were tested by the three ELISA/Rapid/Supplemental tests protocol as per the guidelines laid down by NACO (Testing strategy III) and positive test result was disclosed to the patients by post test. Antibodies to HIV (1 and 2) were tested initially using COMBAIDS test (Span Diagnostics Ltd, Surat, India). Samples found

reactive by COMBAIDS were tested by RETROSCREEN test (Qualpro Diagnostics, Goa, India) and RETROQUIC test (Qualpro Diagnostics, Goa, India).

## RESULTS

The study population comprised of 420 confirmed TB patients who were screened for presence of HIV antibodies. Of these, 191 (44.2%) were females and 241 (55.8%) were males. There were more patients in the 21–40 years age group (47.5%) than in any other age group. Patients between 1 and 20 years of age were the least (1.6%).

The overall prevalence of co-infection of *M. tuberculosis* and HIV in this population was 9%. In relation to gender, it was 9.4% and 8.7% among females and males, respectively [Table 1].

The prevalence of co-infection also varied with age of the patients. It was highest among TB patients aged 21–40 years (13.7%) followed by those aged 41–60 years (9.6%), more than 60 years (4.8%), and least among those aged 1–20 years (1.6%) [Table 2]. There was a statistically significant association between age and HIV infection among TB patients in this study ( $p < 0.05$ ).

## DISCUSSION

This study demonstrated that the HIV seroprevalence among TB patients presenting to the tertiary care hospital in Mumbai in 2009–2010 was 9%, as compared to previous reports from Delhi of 0.4% in 1995–1999,<sup>[10]</sup> 9.4% in 2000–2002,<sup>[11]</sup> and 8.3% in 2003–2005.<sup>[12]</sup> Ramachandran *et al* have reported a seroprevalence of 4.7% in Tamil

**Table 1: Prevalence of HIV infection among tuberculosis patients in relation to gender**

Gender	Number screened	Number positive	Percentage
Male	241	21	8.7
Female	191	18	9.4
Total	432	39	9

**Table 2: Prevalence of HIV infection among tuberculosis patients in relation to age**

Age (years)	Number screened	Number positive	Percentage
1–20	123	2	1.6
21–40	205	28	13.7
41–60	83	8	9.6
>60	21	1	4.8
Total	432	39	9

Nadu in 1997–1998.<sup>[13]</sup> The trend observed over the years highlights the importance of continuous surveillance and in-time appropriate preventive measures.

The HIV seroprevalence of 9% among TB patients in our study is a cause for alarm, especially in view of the fact that HIV seroprevalence among TB patients is a good indicator of the spread of HIV infection in the general population. This high prevalence might not be unconnected with the relatively high HIV prevalence in the area,<sup>[14]</sup> which is important in latent TB reactivation<sup>[3]</sup> leading to a preponderance of HIV/TB co-infection.

We found that HIV seroprevalence rates among TB patients were more in females (9.4%) as compared to males (8.7%). This is probably related to the higher incidence of HIV infection in females, which predisposed them to TB as HIV is known to activate dormant TB. Women also have a higher susceptibility to HIV infection and are usually exposed to sexual activities earlier than men mainly due to economic circumstances. Furthermore, most Indian women are so subordinated to their husbands that they have little or no say in issues related to sexual relationships.

HIV seroprevalence rates were highest in the age group of 21–40 years (13.7%). Our data suggests that it is better to target TB patients aged between 21 and 40 years for HIV screening, as 47.5% of the cases were found in this age group. The preponderance of HIV/TB co-infection among patients aged 21–40 years observed in this study ( $p < 0.05$ ) is similar to some other reports.<sup>[1]</sup> This is a sexually active group in which both TB and HIV prevail the most.<sup>[14]</sup> Thus the significantly high prevalence of co-infection.

## CONCLUSION

Knowledge of HIV status in a TB patient is critical from both patient and public health perspectives. In those patients who test seropositive for HIV, better care can be provided in the form of effective combined antitubercular (ATT) therapy and antiretroviral treatment. If a HIV-positive TB patient on ATT worsens or fails to improve with therapy, the possibility of other co-existing opportunistic infections or immune reconstitution syndrome should be considered. Knowledge of a person's HIV serostatus also provides the opportunity to administer prophylaxis for opportunistic infections and thereby reduces morbidity and mortality.

The spouse and relatives of HIV-seropositive patients may also be counseled on HIV infection and its modes of transmission and prognosis, preventing the spread of infection. Spouses may be educated on safe sex practices and may be offered testing themselves.

In conclusion, there is a pressing need for the Revised National Tuberculosis Control Programme (RNTCP) and NACO to collaborate on the feasibility of making HIV counseling and testing routinely available to all DOTS and other TB patients throughout India.

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