



## Prevalence of HIV-TB co-infections in a Tertiary care centre in Delhi: One year hospital-based study

\*<sup>1</sup> Dr. Kirti Nirmal, <sup>2</sup> Dr. Rohit Chawla, <sup>3</sup> Dr. CP Baveja

<sup>1</sup> Senior Resident, Department of Microbiology, Maulana Azad Medical College & LNJP Hospital, Bahadur Sha Zaffar Marg, New Delhi, India

<sup>2</sup> Assistant Professor, Department of Microbiology, Maulana Azad Medical College & LNJP hospital, Bahadur Sha Zaffar Marg, New Delhi, India

<sup>3</sup> Director Professor & Head of Department, Department of Microbiology, Maulana Azad Medical College & LNJP hospital, Bahadur Sha Zaffar Marg, New Delhi, India

### Abstract

**Background:** HIV-TB co-infection is a major public health problem, which poses unprecedented challenges on the public health system in India. India bears the burden of 2.5 million people infected with HIV, of these, 40% suffer co-infection with TB. Approximately one in four deaths among PLWHA is due to TB.

**Aim:** The present study documented the prevalence, socio-demographic profile and risk factors associated with HIV-TB co-infection.

**Settings and Design:** A retrospective review of records of clients visiting the ICTC of a tertiary hospital in Delhi, between January and December 2016, was conducted.

**Statistical Method:** Data collection and analysis was done using SPSS software.

**Materials and Methods:** The patients diagnosed with HIV infection at the ICTC were referred to the linked TB center to rule out TB. While, patients diagnosed with TB at the linked TB center were referred to the ICTC for HIV testing. The HIV testing was performed as per NACO guidelines, while TB (pulmonary/ extra-pulmonary) was diagnosed as per RNTCP guidelines. The demographic, clinical and risk factors associated with HIV-TB co-infection were analyzed.

**Result:** During present study period, 22,063 clients were tested for HIV infection at ICTC, out of these, 423 patients found to be HIV positive. HIV-TB co-infection was diagnosed in 11 (2.60%) patients (M:F =4.5:1). Most of the co-infected patients were in the sexually active age group (n=11, 81%). 10 (90%) cases of HIV-TB co-infection had pulmonary TB, while only one had extra-pulmonary TB.

**Conclusion:** The prevalence of HIV-TB co-infection in this study was 2.6%, which is less than the prevalence reported by other Indian studies. Creating grass root level awareness coupled with aggressive case finding is the need of the hour for improving the rate of dual infections.

**Keywords:** HIV-TB co-infection, ICTC, dual infection

### Introduction

Although, Human Immunodeficiency Virus (HIV) infection and tuberculosis (TB) can individually be the major causes for alarm as stand-alone public health threats, the combination of the two has recognized to have a far greater possessions on the epidemiologic progression and consequently, on the impact it has on the global health scene [1]. TB and HIV have been declared as global emergencies demanding worldwide attention [2]. Co-infection of HIV & TB, is not only a medical malady, but a social and an economic disaster and is aptly described as the a "cursed duet [3]." The burden of TB & HIV poses unprecedented contests on the public health system in India [4]. Globally, nearly 2 billion people are infected with TB & about 33.2 million are estimated to be people living with HIV infection (PLWHA), while 14.8% of patients with TB are co-infected with HIV [5]. India bears the burden of 2.5 million people infected with HIV and of these 40% suffer co-infection with TB [6]. Approximately one in four deaths among PLWHA are due to TB [7, 8]. The higher mortality is due to the

progression of HIV/AIDS rather than TB probably due to the fact that *Mycobacterium tuberculosis* increases viral replication [9]. It has been documented that co-infection with HIV and *M. tuberculosis* has a bidirectional and synergistic effect on each other, and in later stage of HIV infection, TB may present as extra-pulmonary diseases (EPTB) [10].

Also, the socioeconomic factors of poverty, ignorance and stigma are mutual to both the diseases [8]. Thus, the TB and HIV/AIDS control programme share mutual concerns. Learning the prevalence of HIV- positive infection in active TB patients and vice- versa is imperative, as it is progressively being predictable that such information would stimulate for planning and may also be necessary for determining the applicable treatment regime. This study deals the prevalence, socio-demographic profile and risk factors related to TB-HIV co-infection in India. With the emergence of TB as mortal counterpart in the epidemiology of HIV, there is an urgent need to understand probable underlying correlation of TB-HIV co-infections.

**Materials and Methods**

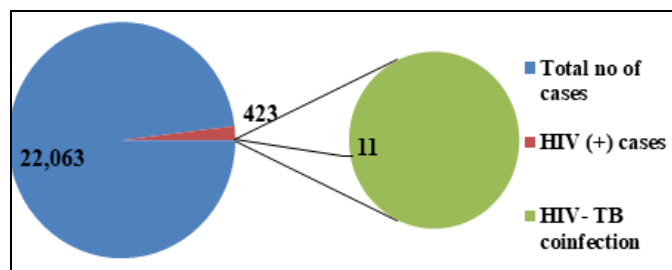
A retrospective study of clients who attended ICTC, tertiary hospital, New Delhi from January 2016 to December 2016 was conducted. All the clients attending the ICTC were counseled and informed consent was taken. The data pertaining to the clients including name, age, sex, occupation, education, and marital status, risk factor like sexual preferences and promiscuity, history of past surgery or blood transfusion were documented in the register by ICTC counselors. Those clients who refused to give consent were excluded from the study.

All clients at ICTC were given unique PID number and he/she was directed for sample collection (3-5 ml of blood) and serum separated for serology of HIV, whole blood (2-3 ml in plain vial) for CD4 count & sputum in appropriate container for pulmonary (PTB) & other body fluid for extra-pulmonary tuberculosis (EPTB). All patients were screened for PTB and EPTB with using clinical examination, physical, acid-fast bacillus (AFB) smear in sputum examinations, chest radiography, ultrasound and CT scan of the suggestive body organ, body fluid analysis or tissue biopsy/FNAC in case of EPTB. All symptomatic suspected patients were screened for acid fast bacilli (AFB) by direct microscopy through Ziehl Nelsen (ZN stain) for diagnosis of PTB and EPTB. HIV test was done in the HIV Laboratory, as per National AIDS Control Organization (NACO) guidelines [12].

CD4 count cells/ $\mu$ L were assessed for all patients by Fluorescent activated cell sorting system (FACS) count, Becton Dickinson according to kit instruction. Following data collection, analysis was done using SPSS software version 20. Tests of significance for differences between proportions were carried out.

**Result**

During present study period, 22,063 clients were tested for HIV infection at ICTC, out of these, 423 (1.9%) patients found to be HIV positive. HIV-TB co-infection was diagnosed in 11 (2.60%) patients (M: F =4.5:1). (Fig 1) Most (n=11, 81%) of the co-infected patients were in the sexually active age group (25-45yrs). (Table 1)



**Fig 1:** Frequency of HIV-TB Co-infection.

**Table 1:** Age and sex profile of patients

	Male(n=9)	Female (n=2)	Total (n=11)
<10 yrs.	0	0	0
11-20 yrs.	0	0	0
21-30 yrs.	4	0	4
31-40 yrs.	4	2	6
41-50 yrs.	1	0	1
>50 yrs.	0	0	0

Majority (81%) patients had primary level of education, while rest was illiterate. More than half of patients were working as a laborers (54%, n=11) and having low income-earning capacity (72%, n=11). Married individual were seen to be higher rates of infection (Married: Unmarried = 4:1), this is statistically not significant ( $p=0.061$ , chi-square test). Number of isolated cases was more in September month. (Fig: 2)

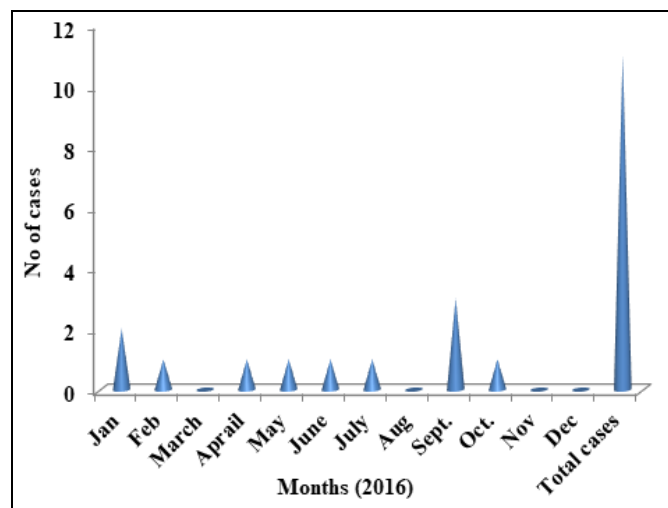
In addition heterosexual (72%, n=11) route of transmission had predominantly found in TB-HIV co-infection cases among both gender. One case was transmitted through blood transfusion route also.

Out of 11 cases, 10 (90%) had pulmonary TB, while one had EPTB which is abdominal type of tuberculosis. Significant association was demonstrated between the types of TB ( $p=0.032$ , chi-square test) (Fig: 3).

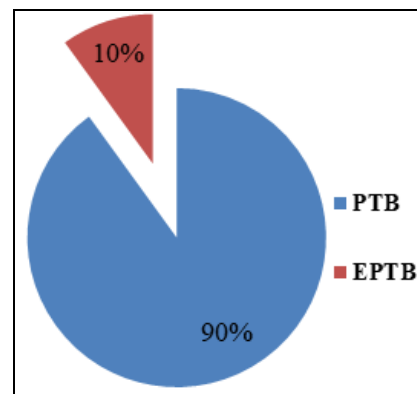
In present study 72.7 % (n=11) cases had diagnosed as sputum smear positivity for acid-fast bacilli (AFB) so considered sputum positive pulmonary TB, while only two cases (18.1%, n=11) had sputum negative for AFB, while chest x-ray suggestive of PTB characteristic so they come under category of sputum negative pulmonary TB (Fig 4).

Most of TB-HIV co-infection cases had low CD4 count lies between ranges of 101-150 cells/ $\mu$ L.

In our study there was two cases had referred to ICTC from RNTCP Centre, while nine cases referred from ICTC to ART clinic for further evaluation and treatment.



**Fig 2:** Prevalence of HIV-TB co-infections in the year 2016.



**Fig 3:** Distribution of cases of PTB & EPTB.

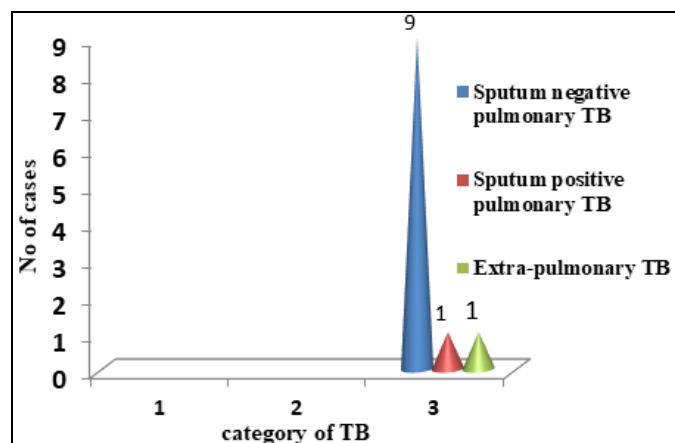


Fig 4: Categories wise distribution of TB cases

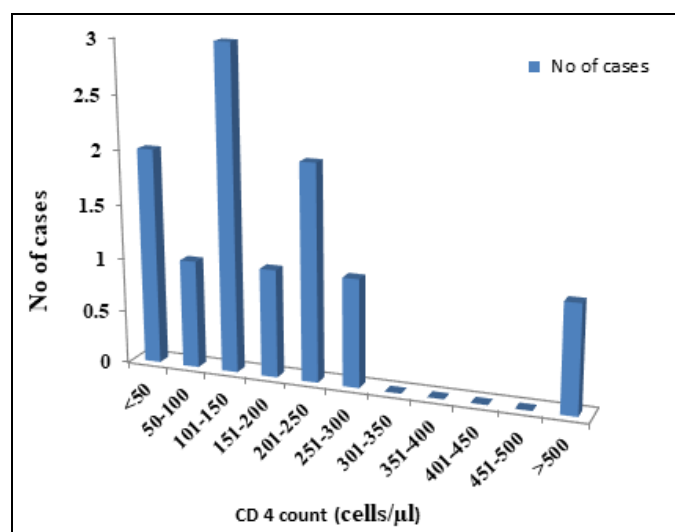


Fig 5: Correlation between positive cases of HIV-TB with CD 4 count (cells/μL)

## Discussion

This study revealed the prevalence of individuals with dual infection of HIV-TB. A total of 22,063 patients reported in the ICTC, New Delhi between January to December 2016. Of them 423 cases were HIV sero-positive, out of this, 11 cases were reported HIV-TB co-infection, which indicates 2.6% prevalence in this sample. The prevalence rates have varied from as low as 0.4% [14] to as high as 20.1% [15]. This was extremely declined in number as compared to various study were documented in different part of India, which had wide variation ranging from 9.4% in New Delhi [16], 12 % in Kolkata [17] and 30% in Mumbai [18]. The dual HIV and TB epidemic poses a great therapeutic challenge for the clinicians. Early diagnosis of these individual infection and screening for detection of the co-infection is a crucial step in arresting the progress of these deadly dual infections by initiation of appropriate treatment. In a resource-limited setting like India, this could have far reaching consequences. It could be due to the linkages between the RNTCP & the ICTC are still in the nascent stage & optimal co-ordination between the programmers is necessary to curb the dual epidemics. From this study, the profile emerged of higher prevalence of co-infection among males (M:F=4.5:1) than females [17]. 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 number of male subjects with HIV-TB co-infection than affected females. The finding of the present study aligns with that pattern. Moreover, the most affected age group in this study comprised patients aged 30-45 years as compared to other documented studies [19, 20]. This age prevalence of TB co-infection among HIV patients probably reflects the age-specific prevalence of HIV in the community. This may be reflected to patients being in a sexually active age group in which both HIV and TB prevail. The other possible explanation for this may be their increased family, organizational and societal responsibilities as people in this age group involves 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. This can have a serious negative effect on socioeconomic status of a country being the reproductive and economically productive age group.

Almost all males and females were from a low socioeconomic background with little or no education, working as laborers, as comparable to studies conducted in varies parts of India.<sup>21,22</sup> Of the 11 HIV-TB co-infected cases, 8 (72%) patients had histories of heterosexual relationships with more than 1 partner; two patients (18%) had history of blood transfusion. In the Indian scenario, the most common route of HIV infection has been through heterosexual transmission followed by a history of blood transfusion [23]. interestingly, married (72%) individuals were seen to have a higher rate of infection in comparison with bachelor. This finding were coincides with the other studies conducted from Northern (74.5%) [17] and Southern parts (84%) [24, 25] of India.

In the present study, HIV prevalence has been observed to more prominently in patients with pulmonary TB about 90%. This is in line with many previous reports from India [26, 27, 28]. The report from Kenya stated 87% co-infected patients with pulmonary TB [29]. However, other researchers have observed that HIV prevalence is more prominent in EPTB patients [19, 30].

Our study showed TB-HIV co-infection were more common with reduced CD4 counts (101-150 cells/μL) which could hasten the progression to AIDS as correlated with the other studies [30, 31]. Several other research studies have pointed to the fact that CD4 counts are lower among co-infected patients as compared to HIV infected alone and severe immune suppression is seen in those with CD4 count below 200 cells/μL [31, 32].

## Conclusion

Co-infection with HIV & TB is not only a medical malady, but a social and an economic disaster and is aptly described as deadly duo. It is imperative that physicians treating HIV-infected patients should aggressively diagnose TB in order to reduce the associated co-morbidity. Ongoing efforts to integrate TB-HIV collaborative activities will strengthen the program further and will accelerate the march towards TB and HIV control both nationally and globally. However, the linkages between the RNTCP and the ICTC are still in the nascent stage and optimal co-ordination between the two

programmed is necessary to curb the dual epidemics. Hence, screening of all TB patients for HIV and vice-versa will help in early detection and initiation of appropriate treatment at an early stage thus, reducing the mortality rate.

## References

1. Seth P. The Situation of HIV/M. tuberculosis Co-Infection in India the Open Infectious Diseases Journal. 2011; 5(Suppl 1-M5):51-59.
2. WHO. World Health Organization: TBHIV 2011 Factsheet Source. Last accessed on August 14, 2013. Available from: <http://www.who.int/en/>, 2012.
3. Jaiswal RK, Srivastav S, Mahajan H. Socio demographic profile of TBHIV coinfecting patients in Bundelkhand Region, Uttar Pradesh Natl J Med Res. 2012; 2:149-51.
4. Sharma SK, Mohan A. Co-infection of human immunodeficiency virus HIV and tuberculosis: Indian perspective. Indian J Tuberc, 2004; 51:5-16.
5. WHO. World Health Organization: TB-HIV 2011 Factsheet Source. [Last accessed on August 14, 2013]. Available from: <http://www.who.int/en/>, 2012.
6. Marfatia YS, Sharma A, Modi M. Overview of HIV/AIDS in India. Indian J Sex Transm Dis. 2007; 28:1-5.
7. UNAIDS. UNAIDS Annual Report. 2009. [Last accessed on August 14, 2013]. Available from: <http://www.unaids.org/en>, 2012.
8. Preetish SV, Singh S. TB-HIV coinfection in India. NTI Bulletin, 2003; 39/3&4:11-18.
9. Geneva Switzerland: Global tuberculosis control: Epidemiology, strategy, financing; 2009. World Health Organization World Health Organization; p. 411. WHO/HTM/TB/2009.
10. Gao L, Zhou F, Li X, Jin Q. HIV/TB coinfection in Mainland China: A metaanalysis. PLoS One 2010; 5:e10736.
11. Sharma SK, Mohan A, Kadiravan T. HIV/TB coinfection: Epidemiology, diagnosis and management. Indian J Med Res. 2005; 121:550-67.
12. NACO Guidelines, 2007.
13. TB India. RNTCP Status Report Central TB Division, Directorate General of Health Services, Ministry of Health and Family Welfare, NirmanBhawan, New Delhi-2010.
14. Sharma SK, Saha PK, Yogita Dixit *et al.* HIV seropositivity among adult Tuberculosis patients in Delhi. Indian J chest Dis Allied Sci. 200; 42:157-160.
15. Paranjape RS, Tripathy SP, Menon PA, Mehenfale SM, Khatavkar P, Joshi Dr, *et al.* Increasing Trend of HIV sero prevalence among pulmonary TB patients in Pune, India. Indian J Med. Res, 1997; 106:207-11.
16. Kamath R, harma vs, Pattanshetty S. HIV/TB coinfection: Clinico epidemiological determinants at an antiretroviral therapy center in Southern India. Lung India. 2013; 30(4):302-306.
17. Manjareeka M, Nanda S. Prevalence of HIV infection among tuberculosis patients in Eastern India; Journal of Infection and Public Health, 2013; 6:358-362.
18. Narain JP, Lo YR. Epidemiology of HIV-TB in Asia. Indian J Med Res. 2004; 120:277-89.
19. Patel AK, Thakrar SJ, Ghanchi FD. Clinical and laboratory profile of patients with TB/HIV coinfection: A case series of 50 patients. Lung India. PMC free article PubMed, 2011; 28:93-6.
20. Agarwal U, Kumar A, Behera D. Profile of HIV associated tuberculosis at a tertiary institute in setting of free antiretroviral therapy. J Assoc Physicians India. 2009; 57:685-90.
21. Gupta P, Rawat J, Sindhwani Getal HIV seroprevalence and tuberculosis in Uttarakhand. Indian J Tuberc. 2006; 53:96-100.
22. Ghiya R, Naik E, Beata C, *et al.* Clinicoepidemiological profile of HIV/TB coinfecting patients in Vadodara, Gujarat. Indian J Sex Transm Dis. 2009; 30:10-5.
23. Patel AK, Thakrar SJ, Ghanchi FD. Clinical and laboratory profile of patients with TB/HIV co-infection: a case series of 50 patients. Lung India. 2011; 28(2):93-6.
24. Shastri S, Naik B. Anita Shet3TB treatment outcomes among TBHIV coinfections in Karnataka, India: how do these compare with non HIV tuberculosis outcomes in the province? <https://bmcpublichealth>. BMC Public Health, 2013; 13:838.
25. Roshana A, Gopal R, Saleem M. Prevalence of pulmonary tuberculosis and HIV co- infection – a hospital based study at Puducherry. Indian J Microbiol Res. 2015; 2(2):126.
26. Jain SK, Aggarwal JK, Rajpal S, Baveja U. Prevalence of HIV infection among tuberculosis patients in Delhi - A sentinel surveillance study. Indian Journal of Tuberculosis, 2000; 47:21-6.
27. Ahmad Z, Bhargava R, Pandey DK, Sharma K. HIV infection seroprevalence in tuberculosis patients. Indian Journal of Tuberculosis, 2003; 50:151-4.
28. Susheel B, Pai. HIV and tuberculosis. Indian Journal of Tuberculosis, 2006; 53:43-6.
29. TaylerSmith K, Zachariah R, Manzi *et al.* Antiretroviral treatment uptake and attrition among HIV positive patients with tuberculosis in Kibera, Kenya. Trop Med Int Health, 2011.
30. Sharma SK, Kadiravan T, Banga A, Goyal T, Bhatia I, Saha PK. Spectrum of clinical disease in a series of 135hospitalised HIV-infected patients from North India. BMC Infectious Diseases, 2004; 4:52.
31. Iredia CH, Oguntibeju OO, Lewis HA, Mokwena K. Trends and characteristics of patients admitted with musculoskeletal tuberculosis to a referral hospital from 2003 to 2008. Afr J Microbiol Res. 2011; 5:532-40.
32. Vajpayee M, Kanswal S, Seth P, Wig N, Pandey RM. Tuberculosis infections in HIV in fection Indian Patients. AIDS Patient Care STDS. 2004; 18:209-13.