

Study of prevalence of pulmonary tuberculosis and HIV coinfection at a tertiary care hospital

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Abstract

Background: While HIV and TB can individually be the major causes for public health threats, the combination of the two has proven to have a far greater impact on the epidemiologic progression and consequently on the global health scene. Present study was aimed to study the prevalence of pulmonary tuberculosis and HIV coinfection at a tertiary care hospital. **Material and Methods:** Present study was cross-sectional, observational study, patients with TB registered for DOTS treatment under RNTCP, who have completed two months of DOTS therapy underwent HIV testing after proper counselling and reporting was done as per NACO guidelines only. **Results:** In present study, among 1354 patients were taking AKT from DOTS cum Designated Microscopy Centers, we observed 3.1 % prevalence of HIV seropositivity among total study population (n=42). Mean age of patients was 51.34 ± 11.92 years, majority were from 40-49 year sage group (35.71 %) followed by 60-69 years age group (23.81 %). Male to female ratio was 2.9:1. In HIV seropositive patients, 85.71 % patients had Pulmonary tuberculosis while extra pulmonary tuberculosis was noted in 14.29 % patients. Lymphadenopathy (7.14 %) was most common presentations of extra-pulmonary tuberculosis in study patients. Cough (90.48 %), Weight loss (78.57 %), Fever (76.19 %) & loss of appetite (64.29%) were common symptoms noted in study population. CD4 count among HIV/TB co-infected individuals was < 200, 200-349, 350-500 & >500 in 15 (35.71 %), 11 (26.19 %), 7 (16.67 %) & 9 (21.43 %) patients respectively. **Conclusion:** HIV promotes the progression of infection with Mycobacterium tuberculosis to active TB, both in people with recently acquired infections and those with latent infections.

Keywords: HIV, Mycobacterium tuberculosis, Antiretroviral treatment (ART) cente, Directly Observed Treatment, Short Course (DOTS) centre.

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Introduction

While HIV and TB can individually be the major causes for public health threats, the combination of the two has proven to have a far greater impact on the epidemiologic progression and consequently on the global health scene. The dual infection has been termed "the cursed duet."¹ HIV infection has contributed to a significant increase in the worldwide incidence of TB. The risk of developing TB is estimated to be between 16-27 times greater in people living with HIV than among those without HIV infection.^{2,3}

HIV – TB co infection is on the rise more so in the developing countries like India. HIV infection causes a gradual depletion of cell mediated immunity and thus offers an opportunity

for activation of the latent TB infection. HIV infection is found more frequently in patients with TB in comparison to non-tuberculosis chest diseases.

HIV surveillance among tuberculosis patients allows assessment of the impact of the HIV epidemic on the tuberculosis situation and facilitates planning of collaborative activities between HIV/AIDS and tuberculosis programmes. Furthermore, surveillance provides information necessary to monitor the effectiveness of joint strategies aimed at reducing the impact of HIV among tuberculosis patients.⁴ Present study was aimed to study the prevalence of pulmonary tuberculosis and HIV coinfection at a tertiary care hospital.

Material And Methods

Present study was cross-sectional, observational study, conducted in Department of Microbiology with help from Department of chest & TB, Dr Ulhas Patil Medical College & Hospital, Jalgaon, India. Study duration was of 6 months (January 2022 to December 2022). Study approval was obtained from institutional ethical committee.

Inclusion criteria

- Patients with TB registered for DOTS treatment under RNTCP, who have completed two months of DOTS therapy. willing to participate in present study

Exclusion criteria

- Patients not completed 2 months DOTS therapy
- Patients already diagnosed with HIV
- children < 2 years.
- Not willing to participate

Study was explained to patients in local language & written consent was taken for participation & study. Confidentiality was ensured and the collected data was used for research purpose only. HIV testing was done after proper counselling and reporting was done as per NACO guidelines only. Confirmed reports were considered in study.

Socio-demographic details (age, sex, religion, marital status), clinical features (symptoms/signs), detailed physical examination was done. Necessary laboratory (CBC, CD4, LFT, RFT) & imaging (CXR, whenever needed CT-thorax) were done. Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

Data was collected in Microsoft excel sheet & statistical analysis was done using descriptive statistics.

Results

In present study, among 1354 patients were taking AKT from DOTS cum Designated Microscopy Centers, we observed 3.1 % prevalence of HIV seropositivity among total study population (n=42). Mean age of patients was 51.34 ± 11.92 years, majority were from 40-49 year sage group (35.71 %) followed by 60-69 years age group (23.81 %). Male to female ratio was 2.9:1.

Table 1: General characteristics

	No. of patients	Percentage
Age groups (in years)		
≤ 3	1	2.38
30-39	4	9.52
40-49	15	35.71
50-59	9	21.43
60-69	10	23.81

≥ 70	3	7.14
Mean age (mean ± SD)	51.34 ± 11.92	
Gender		
Male	31	73.81
Female	11	26.19

In HIV seropositive patients, 85.71 % patients had Pulmonary tuberculosis while extra pulmonary tuberculosis was noted in 14.29 % patients. Lymphadenopathy (7.14 %) was most common presentations of extra-pulmonary tuberculosis in study patients.

Table 2: Distribution of tuberculosis

Tuberculosis	No. of patients (n=42)	Percentage (%)
Pulmonary tuberculosis	36	85.71
Extra pulmonary tuberculosis	6	14.29
• Lymphadenopathy	3	7.14
• Pericardial effusion	1	2.38
• CNS TB	1	2.38
• Bone TB	1	2.38

Cough (90.48 %), Weight loss (78.57 %), Fever (76.19 %) & loss of appetite (64.29%) were common symptoms noted in study population.

Table 3: Clinical presentation.

Symptoms	No. of patients (n=58)	Percentage (%)
Cough	38	90.48
Weight loss	33	78.57
Fever	32	76.19
Loss of appetite	27	64.29
Dyspnea	9	21.43
Hemoptysis	6	14.29

CD4 count among HIV/TB co-infected individuals was < 200, 200-349, 350-500 & >500 in 15 (35.71 %), 11 (26.19 %), 7 (16.67 %) & 9 (21.43 %) patients respectively.

Table 4: Distribution of CD4 count among HIV/TB co-infected individuals

CD4 count (CELLS/MM3)	No. of patients (n=58)	Percentage (%)
<200	15	35.71
200-349	11	26.19
350-500	7	16.67
>500	9	21.43

Discussion

TB is one of the most common infections in HIV-infected people, especially in high TB prevalence areas. Moreover, the risk of MDR-TB transmission may be increased if effective and uninterrupted TB treatment is not ensured.² HIV – TB co infection is on the rise more so in the developing countries like India. TB accounts for about a third of deaths among patients with AIDS.⁵

The introduction of highly active antiretroviral therapy (HAART) has led to a significant reduction in AIDS-related morbidity and mortality. Since the introduction of ART, a

significant decline in OIs and AIDS progression has been observed.⁶ The progressive destruction of immune system by chronic HIV infection leads to progressive fall in the level of CD4 cells (<200/ μ l to <50/ μ l), responsible for the occurrence of infections by a variety of opportunistic microorganisms

In study by Saleem M et al.,⁷ total of 340 cases were diagnosed as sputum positive pulmonary tuberculosis among which 7 cases (2.6 %) were seropositive for HIV antibodies. In study by Nella H⁸, 107 HIV patients were found to be positive for TB by CBNAAT. Rifampicin resistance was detected in 10 patients (9.34%). 54(50.4%) were under pre-antiretroviral therapy and 46(42.9%) were under antiretroviral therapy and others were 7(6.5%). 45(42.05%) patients with HIV/TB co-infection showed CD4 count <200 cells/mm³, 32(29.9%) showed 200-349 cells/mm³, and 6(5.6%) showed 350-500 cells/mm³ and remaining showed >500 cells/mm³. Demographical characters were also considered. P value <0.05 was considered to be significant. The major determinants of HIV/TB co-infection were identified to be low CD4 counts, ART and WHO clinical stages.

In study by Jindal S et al.,⁹ majority of patients (75 %) were male and 81% of patients were in reproductive age group. CD4 count varied from 22 to 619. Majority of patients had Pulmonary TB (PTB) (63%), isolated Extrapulmonary TB (EPTB) was found in 21%, Disseminated TB (DTB) was common (43%). Majority (44%) had CD4 between 200-400. Sputum AFB negativity was greater than positivity (51.72 % versus 48.27 %) among PTB cases. With CD4 >200, positivity was higher and with CD4 <200, negativity was higher.

In study by Sabhapandit D et al.,¹⁰ total of 6786 clients attending ICTC and 2651 patients attending DMC of which 86 (1.26%) were positive for HIV, 253(9.54%) were positive for pulmonary TB, and 12(0.13%) had HIV-TB coinfection respectively. Prevalence of coinfection was more common among males sexually active age group. Substance abuse, illiteracy and truck drivers by occupation were found to be risk factors for coinfection in comparison to other similar studies.

Wankhade AB et al.,¹¹ studied mycobacterium tuberculosis from clinical samples of AIDS patients & noted that 65% patients were TB symptomatic with cough, fever, breathlessness and loss of weight being significant clinical features. Chest X-rays finding were infiltration and air space consolidation. Cavity was found in only 3% cases. 9 mycobacterium tuberculosis isolates were isolated. Mycobacteria were isolated from various samples viz. sputum (8 M. tuberculosis), blood (1 M. tuberculosis).

The prevalence of pulmonary TB and TB – HIV co infection is variable and periodic estimates of the same help in assessing the disease burden in that part of the country and in effective implementation of the control strategies. Treatment of HIV-TB co-infection is complex and associated with high pill burden, overlapping drug toxicities, risk of immune reconstitution inflammatory syndrome (IRIS) and challenges related to adherence. From a programmatic point of view, screening of all HIV-infected persons for tuberculosis and vice-versa will help identify co-infected patients who require treatment for both infections. This requires good coordination and communication between the TB and AIDS control programs, in India.¹²

Improved hygienic practices, regular examination and appropriate medications can reduce the morbidity and mortality caused by opportunistic infections in HIV seropositive patients. Providing prevention and treatment of opportunistic infections not only helps HIV positive people to live longer, healthier lives, but can also help prevent tuberculosis and other transmissible opportunistic infections from spreading to others.

Conclusion

HIV promotes the progression of infection with Mycobacterium tuberculosis to active TB, both in people with recently acquired infections and those with latent infections. Appropriate

management of patients with HIV-TB requires not only treating the TB and HIV alone but a strengthened mechanism of cross reference between the Antiretroviral treatment (ART) center and Directly Observed Treatment, Short Course (DOTS) centre.

References

1. Jaiswal RK, Srivastav S, Mahajan H. Socio demographic profile of TB-HIV coinfecting patients in Bundelkhand Region, Uttar-Pradesh. *Natl J Med Res.*2012;2:149-51.
2. Sanjay B. Tripathi, Vishakha Kapadia. Treatment outcome of Tuberculosis in HIV seropositive patients : An Experience of Southeast region of Ahmedabad. *National Journal of Community Medicine*,2015; 6(4): 462-465.
3. Lisa Goozé, Charles L. Daley and Annie Luetkemeyer. HIV In Site Knowledge Base Original Chapter: University of California San Francisco ; January 2013
4. Neeraj Raizada, Lakbir Singh Chauhan, Ajay Khera, Jotna Sokhey, D. Fraser Wares, Suvanand Sahu, Rahul Thakur, Puneet Kumar Dewan. HIV Seroprevalence among Tuberculosis Patients in India, 2006–2007.
5. Joint United Nations programme on HIV/AIDS and WHO 2002. AIDS epidemic update December 2002. UN AIDS 102. 58 E Geneva; UNAIDS;2002.
6. Seyler C, Messou E, Gabillard D, Inwoley A, Alioum A, Anglaret X. Morbidity before and after HAART initiation in Sub-Saharan African HIV-infected adults: a recurrent event analysis. *AIDS Res Hum Retroviruses.* 2007;23:1338–47.
7. Saleem M., Roshan A., Gopal A. Prevalence of pulmonary tuberculosis and HIV co-infection – a hospital based study at Puducherry. *Indian J Microbiol Res* 2015;2(2):128-129.
8. Nella Harshini and Anuradha, B. 2017. A Study on HIV/TB Co-infection in and around Khammam, Telangana. *Int.J.Curr.Microbiol.App.Sci.* 6(11): 3698-3705.
9. Jindal S, Damor PH, Patel R. A Study of Tuberculosis and HIV Coinfection and Its Corelation with CD4 Count . *Natl J Community Medicine* 2018; 9(2):110-113.
10. Sabhapandit D, Hazarika P, Phukan AC et al. A study on HIV-TB coinfection among patients attending a Tertiary Care Centre in North East India. *Int J Health Sci Res.* 2017; 7(6):94-101.
11. Wankhade A.B, Narang R, Narang P, Isolation and Identification of Mycobacterium tuberculosis from AIDS Patients Attending a Rural Hospital in Central India, *Asian Journal of Biomedical and Pharmaceutical Sciences* 1 (1) 2011, 8-12.
12. Swaminathan S and Narendran G 2008 HIV and tuberculosis in India; *J. Biosci.* 33 527–537.