

# Correlation of Pulmonary Tuberculosis in HIV Positive Patients and its Association with CD<sub>4</sub> Count

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**ABSTRACT-BACKGROUND-** HIV/AIDS pandemic is responsible for the resurgence of Tuberculosis worldwide, resulting in increased morbidity and mortality. Co-infection with HIV infection leads to difficulty in both the diagnosis and treatment of Tuberculosis, increased risk of death, treatment failure and relapse.

**OBJECTIVE-** The present study highlights the correlation of Pulmonary Tuberculosis in HIV positive cases and its association with CD<sub>4</sub> count.

**METHODS-** A total of 72 known case of HIV were screened for tuberculosis infection by clinical examination, radiology & ZN staining.

**RESULTS AND CONCLUSION-** From our study 60 (83.33%) were diagnosed as tuberculosis and 12 (16.67%) were negative. More common HIV infection in case of male 48 (66.67%). Out of 60 tuberculosis infection 53 (88.33%) were diagnosed as Pulmonary Tuberculosis and 7 (11.67%) were diagnosed as Extrapulmonary Tuberculosis. The result of study emphasizes that co-infection of tuberculosis in HIV/AIDS patient is a concern. There is direct correlation between CD<sub>4</sub> counts depletion and Pulmonary Tuberculosis in HIV/AIDS patients.

**Key-words-** Pulmonary Tuberculosis, HIV, AIDS, CD<sub>4</sub> count

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## INTRODUCTION

AIDS, the Acquired Immunodeficiency Syndrome, is the disease known to be scourge for our century has had an impact like no other disease. Human Immunodeficiency Virus (HIV) affects the human Helper T lymphocytes and macrophages, which are important in maintaining cell mediated immunity (CMI). The CMI is essential in protecting persons from many diseases including tuberculosis. HIV is the most important known risk factor that promotes progression to active tuberculosis in people with Mycobacterium tuberculosis infection. <sup>[1]</sup>

Tuberculosis (TB) and HIV have been closely linked since the emergence of AIDS and both diseases is a major public health challenge. It is estimated that 60-70% of HIV positive persons will develop tuberculosis in their lifetime. <sup>[2]</sup> Approximately, 50% of adult Indian population is infected with Mycobacterium tuberculosis, and the spread of HIV infection could lead to a potentially explosive increase in the number of cases of tuberculosis. <sup>[2]</sup> About 1.8 million new cases of tuberculosis are occurring annually in India, whereas the pool of HIV infected individual is quite large (2.5 million). Therefore, there is always a propensity for deadly synergic interactions between HIV and tuberculosis. <sup>[3]</sup> Exogenous re-infection can also occur as HIV infected individuals fail to contain new infections. The world health organization (WHO) reported in 2007 that the African region accounted for most HIV positive tuberculosis cases (79%), followed by Southeast Asia region (mainly India), which had 11% of total cases. Although the prevalence of HIV infection among patients with tuberculosis ranges from 50% to 80% in many settings in sub Saharan Africa, in other part of the world it varies from 2% to 15% <sup>[4]</sup>.

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The pattern of clinical presentation of TB depends on the host immune status which is reflected in the microbiological, radiological and histological characteristics of TB. The CD<sub>4</sub> T-cell count is one of the best indicators of the immediate state of immunologic competence of the patient with HIV infection. The appearance of many opportunistic infections correlates with the CD<sub>4</sub> count. TB generally develops at CD<sub>4</sub> counts of 200-500 cells/mm<sup>3</sup>. Thus determinations of CD<sub>4</sub> cell counts provide a powerful tool for determining prognosis and monitoring response to HAART. [5]

**MATERIALS AND METHODS**

The prospective hospital based study was conducted in the department of Microbiology, Katihar Medical College & Hospital, Katihar, Bihar, India from June 2015 to May 2016 in association with the ART clinic, Medicine, Integrated Counseling & Testing Centre and TB & Chest ward of our hospital.

We examined 72 known HIV infected patients between the age group of 25-40 years either hospitalized or coming to ART clinic, clinically suspected to having Tuberculosis were included in the study.

Patients were subjected to through clinical examination, X-ray chest, sputum examination for AFB and necessary relevant investigation for EPTB.

Two sputum samples were obtained from each patient as per RNTCP guidelines. [6] Smear were prepared and stained by Ziehl Nielsen stain.

About 3 ml of blood was collected from each patient using aseptic precautions. CD<sub>4</sub> counting of blood samples was done by Flow Cytometer as per manufacturer’s instructions (FACs Calibur, Becton-Dickinson, Immunocytometry system). The findings of chest x-ray were noted of each patient. Correlation of CD<sub>4</sub> cell counts was done with the pulmonary tuberculosis in HIV positive patients. ART was started for eligible patients and was guided by baseline and 6 monthly CD<sub>4</sub> counts in accordance with the national ART guidelines. [7]

**RESULTS**

Out of total of 72 known case of HIV is taken and examined for tuberculosis infection by clinical examination, radiology and ZN staining during the study period. Only 60 (83.33%) patients were diagnosed as tuberculosis and 12 (16.67%) were negative (Table 1).

**Table 1:** Showing incidence of Tuberculosis infection among known HIV cases

	<b>Known case under study (n=72)</b>
Tuberculosis infection	60 (83.33%)
Non-tuberculosis infection	12 (16.67%)

Out 72 HIV cases 48 (66.67%) patients are male and 24 (33.33%) were females (Table 2). From this table it is clear that males are more affected than females.

**Table 2:** Showing sex wise distribution among the cases infected with HIV

<b>Sex</b>	<b>Known under study (n= 72)</b>
Male	48 (66.67%)
Female	24 (33.33%)

Table 3 shows that among 60 Tuberculosis cases 53 (88.33%) were diagnosed as Pulmonary Tuberculosis and 7 (11.67%) were diagnosed as Extra pulmonary Tuberculosis.

**Table 3:** Showing incidence of Pulmonary and Extra Pulmonary Tuberculosis

	<b>Total no of Tuberculosis cases (n=60)</b>
Pulmonary Tuberculosis	53 (88.33%)
Extra Pumonary Tuberculosis	07 (11.67%)

Out of 53 Pulmonary Tuberculosis cases 32 (60.38%) had CD<sub>4</sub> counts of less than 200, in 6 (11.32%) between 200 & 349, in 13 (24.53%) between 350 & 500 and in only 2 (3.77%) cases the CD<sub>4</sub> counts were more than 500 cells/μl. the association of CD<sub>4</sub> counts with occurrence of Pulmonary Tuberculosis is shown in (Table 4).

**Table 4:** Showing association of CD<sub>4</sub> counts with the occurrence of Pulmonary Tuberculosis

<b>Counts: Cells/μl</b>	<b>HIV with Pulmonary Tuberculosis (n=53)</b>
<200	32 (60.38%)
200 – 349	06 (11.32%)
300 – 500	13 (24.53%)
>500	02 (3.77%)
<b>Total</b>	<b>53 (73.61%)</b>

**DISCUSSION**

AIDS is a pandemic of 21<sup>st</sup> century and pulmonary tuberculosis is the most common opportunistic infection (AIDSCAP). [8] It is important to identify pulmonary tuberculosis at an earliest so that it can be managed appropriately and at the right time. The prevalence of pulmonary tuberculosis among the HIV positive persons, in the present study is 53 (88.33%). The prevalence of co-infection with HIV varies widely across regions [9-14] within India and outside India mainly due to the variation in the distribution of risk factors, geographic location, awareness levels etc. of the study population.

In the present study, among known HIV cases 60 (83.33%) were infected with tuberculosis. Thus AIDS patients had a significant association with the risk of developing tuberculosis. Moreover, tuberculosis is still a disease of the poor & low socio-economic background particularly among the developing countries.

Males are more affected with HIV infection in comparison

with female patients which is shown in Table 2. In our study among 60 tuberculosis cases 53 (88.33%) were diagnosed as pulmonary tuberculosis and 7 (11.67%) were diagnosed as extra-pulmonary tuberculosis. Tuberculosis can occur at an early stage of HIV infection with pulmonary features and also in late stages with more extra pulmonary presentations. [15]

The appearance of many opportunistic infections (OI's) correlates with the CD<sub>4</sub> cell count. In pulmonary tuberculosis patients to the depletion of CD<sub>4</sub> counts bear a direct correlation with acquisition of disease. Tuberculosis has a direct association with cell mediated immunity (CMI). The CD<sub>4</sub> counts are an important indicator of CMI status of an individual. The data in the present study indicates that the patients with CD<sub>4</sub> count of less than 350/μl are at substantially higher risk of acquiring pulmonary tuberculosis. Similar correlation was reported by other Indian and foreign studies. [16-18] Since HIV/AIDS leads to immune-suppression, it is strongest of all known risk factors for development of tuberculosis. Thus, the patients who have CD<sub>4</sub> count <350cells/μl has significantly more chances of acquiring tuberculosis.

## CONCLUSIONS

Thus the results of the present study emphasizes that co-infection of Tuberculosis has been a major concern in HIV/AIDS patients. Tuberculosis remains an important public health problem and has been exacerbated by the HIV epidemic, resulting in increased morbidity and mortality worldwide. HIV/AIDS leads to immune suppression and is a strongest of all known risk factors for the development of Tuberculosis and there is need for constant monitoring of HIV positive patients for acquisition of Tuberculosis, assessment the type of prevalent mycobacteria in the region and information on the resistance pattern obtained in the prevalent strains. Therefore, adequate knowledge is absolutely necessary for optimum management and to reduce mortality and morbidity.

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