

## Screening of Pulmonary Tuberculosis in Newly Detected HIV Patients in a Tertiary Care Hospital

P. Anuradha<sup>1</sup>, P. Sammaiah<sup>1</sup>, Pratibha Lakshmi<sup>2</sup>, Kondle

Venkatesh<sup>3</sup>, K. Harsitha<sup>4</sup>

<sup>1</sup>Associate Professor, Department of General Medicine, Kakatiya Medical College/ Mahatma Gandhi Memorial Hospital, Warangal, Telangana, India

<sup>2</sup>Assistant Professor, Department of General Medicine, Osmania Medical College/ Hospital, Hyderabad, Telangana State

<sup>3</sup>M.D, Department of General Medicine, Osmania Medical College/ Hospital, Hyderabad, Telangana State

<sup>4</sup>Junior Resident, Osmania Medical College/ Hospital, Hyderabad, Telangana State

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Corresponding author: Dr Pratibha Lakshmi

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### Abstract

**Background:** AIDS disease was recognized in male and female injection drug users and blood transfusion recipients; among female sexual partners of men with AIDS; and among infants born to mothers with AIDS. In 1983, human immunodeficiency virus (HIV) was isolated from a patient with lymphadenopathy, and by 1984 it was demonstrated clearly to be the causative agent of AIDS.

**Aim of the study:** To screen for pulmonary tuberculosis in newly detected HIV cases.

**Material & Methods:** The present study was conducted in a Tertiary Care Hospital of Telangana State CBNAAT test was done for all newly HIV positive cases, who attended hospital/ ART centre on OPD basis from April 2019 to March 2020.

**Results:** 18 to 30 years age group constitutes majority (37.9%), Males constitutes majority (57.9%), majority of cases are TST negative (74.6%) and Sputum smear negative (83%)

**Conclusion:** CXR findings (61.6%) and symptoms (57.5%) have high sensitivity; most common presentation was infiltrates (34.6%) in both symptomatic and asymptomatic cases. Among the study population, smear negative TB were more (83%) and tuberculin skin test negative were more (74%) indicating low sensitivity

**Keywords:** AIDS, CXR, Immuno Deficiency, Smear Test, Pulmonary Tuberculosis

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### Introduction

AIDS, the Acquired immuno-deficiency syndrome (sometimes called “slim disease”) is a fatal illness caused by a retrovirus known as the Human immuno-deficiency

virus (HIV-1,2). Once infected, it is probable that a person will be infected for life. After the virus enters the body there is a period of rapid viral replication leading to an abundance of virus in the peripheral blood.

This response is accompanied by a marked drop in the number of circulating CD4<sup>+</sup> T cells. Ultimately, HIV causes AIDS by depleting CD4<sup>+</sup> T cells. The term AIDS refers only to the later stages of HIV infection. The primary causes of death from HIV/AIDS are opportunistic infections and cancer, both of which are frequently the result of the progressive failure of the immune system [1,2].

Tuberculosis co-infection is one of the leading causes of sickness and death in those with HIV/AIDS being present in a third of all HIV-infected people and causing 25% of HIV-related deaths [3] HIV is also one of the most important risk factors for tuberculosis [4]

This association of both the diseases makes the clinician difficult to diagnose and also to treat. Due to low immunity, many studies claim conventional methods of diagnostic tests are not of much use (tuberculin skin test, smear test chest x-ray etc).

### Aim of the Study

1. To screen for pulmonary tuberculosis in newly detected HIV cases.

2. To determine prevalence, clinical profile, socio demographic factors of HIV- TB co infection.

### Material and Methods

The present study was conducted in a Tertiary Care Hospital in the State of Telangana. CBNAAT test was done for all newly HIV positive cases, who attended hospital / ART centre on OPD basis from April 2019 to March 2020.

### Inclusion criteria

- Age above >12 years
- CBNAAT positive cases in newly detected HIV patients

### Exclusion criteria

- Age below 12 years
- Pregnant women

### Results

18 to 30 years age group constitutes majority (37.9%), followed by 31-40 years age group (32.1%), 41-50 years age group (13.8%), 50years above (12.5%), and 12-17 years age group (3.8%)

**Table 1: Age vs gender**

Age groups	Sex					
	Female		Male		Ts/tg	
	Number	%	Number	%	Number	%
12 to 17	4	1.70%	5	2.10%	0	0.00%
18 to 30	44	18.30%	45	18.80%	2	0.80%
31 to 40	33	13.80%	43	17.90%	1	0.40%
41 to 50	15	6.30%	18	7.50%	0	0.00%
50 ABOVE	2	0.80%	28	11.70%	0	0.00%
Total	98	40.80%	139	57.90%	3	1.30%

**Table 2: Tuberculin skin test**

Tests		Number	%
Tst status	Positive	61	25.40%
	Negative	179	74.60%
	Total	240	100.00%

**Table 3: Sputum smear**

Tests		Number	%
Sputum smear	Positive	41	17.10%
	Negative	199	82.90%
	Total	240	100.00%

**Table 4: Chest xray**

Chest x ray	Number	%
Cavitary	11	4.60%
Effusion	30	12.50%
Infiltrates	83	34.60%
Miliary	7	2.90%
Nodules	17	7.10%
Abnormal	148	61.66%
Normal	92	38.30%
Total	240	100.00%

**Table 5: Clinical presentation vs CD4 count**

CD4 count at the time of HIV	Clinical presentation			
	Symptomatic		Asymptomatic	
	Number	%	Number	%
<200	68	49.27%	20	19.60%
200-500	61	44.20%	65	63.72%
>500	9	6.52%	17	16.66%
Total	138	100.00%	102	100.00%
Chi-square-34.4, p value-.0001 significant				

**Table 6: Sensitivity of screening tests when compared to cbnaat**

Sensitivity when compared to cbnaat	True positive	False Negative	Sensitivity
Tst test	61	179	25.40%
Sputum	41	199	17.10%
Symptoms	138	102	57.50%
Chest x ray	148	92	61.60%

## Discussion

This study was done in a Tertiary care Hospital of Telangana State on Screening for Pulmonary Tuberculosis in newly detected HIV cases.

### Prevalence and Incidence

Present study was conducted during which there were 1450 newly detected HIV cases. Among them, cases were found to be

CBNAAT positive. Prevalence of pulmonary tuberculosis among newly detected was 17.93% in the present study.

This high prevalence shows the high burden of Tuberculosis as an opportunistic infection in newly detected HIV cases which warrants focus on each HIV case for the screening of tuberculosis.

It supports WHO guidelines of INH prophylaxis of each and every case for the prevention of the occurrence of opportunistic TB infection. Many similar studies done on this relevant topic, showed

different prevalence's / incidences. Prevalence was ranging from as low as 7.2% to 18.1%. Incidence was ranging 8.5% to 15.4%.

**Table 7**

Study	Prevalence
Dixit kumar <i>et al</i> [5]	9.5%
Daniel w gunda <i>et al</i> [6]	14%
Mohammedaman mama <i>et al</i> [7]	7.2%
Kartikeya tripathi <i>et al</i> [8]	18.1%
Kuan-yeh lee <i>et al</i> [9]	15.8%
S.swindells <i>et al</i> [10]	12%
M. E. Kimerling <i>et al</i> [11]	12%
Present study	17.93%
Study	Incidence
Monaliza cardozo rebougas <i>et al</i> [12]	8.5%
Manisha ghate <i>et al</i> [13]	15.4%

Kartikeya Tripathi *et al* showed prevalence of TB in HIV cases near 18%, which is correlating well with present study.

### Sociodemographic Factors

#### Age

Majority of present study population (HIV-TB) belongs to 18 to 30 years followed by 31 to 40 years age group which is most productive age group who earn living for the family. A similar study by Dixit Kumar *et al* showed similar results, where majority of HIV-TB study population belongs to 26 to 45 years which is coinciding with the present study. Another similar study by Eyongetah Tabenyang Mbu *et al* [14] showed group of HIV-TB study population mean age as 35 years.

One more study of S. Swindells *et al* showed the mean age group of HIV-TB study population as 33 years, which is similar to the present study.

#### Gender

In present study, Male gender constitutes majority (57.9%), followed by females

(40.8%). This may be because of their risk behavior.

Some studies, Dixit Kumar *et al*, Daniel W Gunda *et al* have showed Male predominance in the TB-HIV study population, which are similar to present study results.

Whereas, some other studies Eyongetah Tabenyang Mbu *et al*, S.Swindells *et al* showed opposite results with the present study results where females were more in the HIV-TB study population.

Purushottam A Giri *et al* [15] study had equivocal results where male female ratio was 1:1. This is not coinciding with present study population.

Different studies showed different results some of them were supporting and some not, which may be based on the place of study, study population and many other factors.

Most of the present study population belong to illiterate category (69.6%) and unemployed category (65%).

As this study was done in government

hospital where most of the study population belongs to rural areas, where low literacy rate is expected. When literacy rate is less it is obvious to expect low employment.

It is a matter of concern because, in illiterate people, awareness about HIV, TB and their symptoms is less. Because of lack of awareness, diagnosis will get delayed, and they may land up in advanced disease with opportunistic infections like TB.

### Past and family history

In the present study population, most of

them have no past history of TB (95.4%) and no family history (85.4%) of Tuberculosis.

A study done by Mohammedaman Mama *et al* showed past history of tuberculosis associated with higher occurrence of pulmonary TB in HIV study population, which is not supporting our study.

### Cd4 count

In the present study more than one third of the study population, were having CD4 count of less than 200.

**Table 8**

Study	Cd4 count <200
Dixit kumar <i>et al</i>	27%
Eyongetah tabenyang mbu <i>et al</i>	45%
Mohammedaman mama <i>et al</i>	21.6%
Daniel w gunda <i>et al</i>	32.9% / odds ratio 9.1
Present study	37%

Showing CD4 count comparison with previous studies.

Eyongetah Tabenyang Mbu *et al* study showed nearly half of the population were having less than 200 CD4 count which is nearly similar to the present study population.

Studies of Dixit Kumar *et al* Mohammedaman Mama *et al* showed 27%, 22% of the cases were having low CD4 count (<200) which is not correlating with present study.

Logistic regression analysis done by Daniel W Gunda *et al* showed 9.1 odds ratio of TB probability with <200 CD4 count (32.9%), supporting present study results.

Manisha Ghate *et al* study stated that probability of 0.1 (opportunistic infections which includes TB) 6 times higher in <200 CD4 count group. This is also similar to the present study.

### Clinical presentation

Around half of the study population (57.50%) were symptomatic, and weight loss was the most common presenting symptom, which is not specific to tuberculosis (can be seen in HIV itself). Cough was seen only in 17%, which is characteristic of TB.

Similar findings were seen in Eyongetah Tabenyang Mbu *et al* where cough as a presenting symptom was seen only in 20%, which is similar to present study. But the most common presenting symptom (25%) was fever, which is not similar to present study.

Only 2% of the cases were showing cough as the presenting symptom in the study of Mohammedaman Mama *et al*

### Sputum test & tst tsest

Among the study population, smear negative TB were more (83%) and tuberculin skin test negative were more (74%). This phenomenon is partially explained by immune suppression caused by HIV

infection.

WHO guideline states that <5mm also has to be considered as TST positive for TB, because, this test is based on immunological reaction, which is compromised/ suppressed in HIV positive cases.

Dixit Kumar *et al* Study showed 54% of sputum smear positive TB and 46% of sputum smear negative TB, which is not coinciding with the present study findings.

Eyongetah Tabenyang Mbu *et al* showed only 14% of smear positive TB cases, which is almost equal to the present study findings.

Abel Negussie *et al* [16] study had 72.5% of smear negative cases in their study population which is supporting the present study findings.

A study of Dr Haileyesus Getahun *et al* [17] said "The HIV epidemic has led to large increases in the frequency of smear-negative pulmonary tuberculosis, which has poor treatment outcomes and excessive early mortality compared with smearpositive disease".

### Chest x ray

Although majority of cases were having abnormal chest x ray, significant number of cases were having normal CXR; In abnormal chest x ray, most common

presentation was infiltrates (34.6%) in both symptomatic and asymptomatic cases.

### Clinical presentation vs cd4 count

Most of the symptomatic cases have/had CD4 count of <200(49.27%). In asymptomatic cases majority have/had CD4 count of 200-500(63.72%).

G.Chambie, A.Luetkemeyer *et al* [18] showed decreasing CD4 count was associated with more symptoms which is correlating with present study.

### Chest x ray findings vs cd4 count at the time of diagnosis

In study population, abnormal chest x ray findings were more in 200-500 (23.3%) CD4 count group; Normal chest x ray findings were more in <200(10.8%) CD4 count group

When CD4 count is on lower side, one should not rely on chest X ray to diagnose TB in HIV cases. G. Chambie, A. Luetkemeyer *et al* study showed lower CD4 count was significantly associated with normal CXR which is not correlating with present study.

### Sensitivity of screening tests

Chest X-ray findings (61.6%) and clinical symptoms (57.5%) had more sensitivity than sputum smear (17%) and TST (25.4%).

**Table 9**

Study	Test	Sensitivity
Eyongetah Tabenyang Mbu <i>et al</i>	Sputum smear	25%
S.Swindells <i>et al</i>	Sputum smear	26%
Abel Negussie <i>et al</i>	Sputum smear	17.6
	Chest x ray	72.5%
Present study	Chest x ray	61.6%
	Sputum smear	17%

The above shows screening tests comparison with previous studies

### Chest x ray

Present study reveals, no screening test have/had high sensitivity when compared to CBNAAT. Among all, chest X ray had higher sensitivity, which is supported by a

study of Abel Negussie *et al*, where sensitivity was found to be 72.5%.

### Sputum

Sputum smear sensitivity was very low (17%) which is supported again by Abel Negussie *et al* which has 17.6% sensitivity, which is similar to present study findings.

Studies done by Eyongetah Tabenyang Mbu *et al*, S.Swindells *et al* showed sputum sensitivity of 25%, 26% respectively, which is little higher than the present study findings.

### Conclusion

- Prevalence of pulmonary tuberculosis among newly detected HIV patients was 17.93%.
- Age-wise 18 to 40 years age group constitutes majority (37.9%),
- Slight predominance of males was present (57.9%).
- High risk behavior is present in 50% of study population
- Majority (52.50%) of the study population have/had CD4 count between 200 -500
- Weight loss (29.6%) was the most common presenting symptom among the symptomatic cases.
- CXR findings (61.6%) and symptoms (57.5%) have high sensitivity, most common presentation was infiltrates (34.6%) in both symptomatic and asymptomatic cases.
- When CD4 count is on lower side, one should not rely on CXR to diagnose TB in HIV cases.
- Among the study population, smear negative TB were more (83%) and tuberculin skin test negative were more (74%) indicating low sensitivity.

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