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FEATURES OF PULMONARY TUBERCULOSIS WITH AND WITH OUT HIV CO-INFECTION :A RADIOLOGICAL COMPARATIVE STUDY

KEYWORDS: Pulmonary Tuberculosis, Radiological Features, HIV, CD4, ART.

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ABSTRACT *In most people with early stages of HIV infection, symptoms of tuberculosis are similar as in people without HIV infection. In areas where many people have HIV infection, tuberculosis programmes should continue to focus on identifying infectious sputum-smear- positive cases through microscopy. However, diagnosis of tuberculosis in individual patients using the standard diagnostic tools can be more difficult if they have advanced HIV infection. A wide Clinicoradiological spectrum of tuberculosis was seen among HIV patients, in consonance with their varying immune status. With the conventional sputum positivity and tuberculin test not providing an adequate diagnostic help, familiarity with the clinicoradiological spectrum of tuberculosis and coexisting opportunistic infections is absolutely necessary. This study makes an attempt to correlate the Chest X-ray and CD4 counts as it will help in better understanding this deadly duo of HIV and tuberculosis.*
This study is done to compare the Chest X ray features of HIV positive pulmonary tuberculosis patients with HIV negative pulmonary tuberculosis patients, to determine the percentage of patients with Atypical Chest X ray in HIV positive and negative groups and to determine the relationship between atypical Chest X rays and CD4 count.

INTRODUCTION

Worldwide the number of people infected with both HIV and tuberculosis is rising. The HIV virus damages the body natural defenses — the immune system — and accelerates the speed at which TB progresses from a harmless infection to a life threatening condition. TB has already become the most frequent opportunistic infection that kills HIV positive people.[1]

Community education is needed to increase awareness that tuberculosis is curable and most important, that people are no longer infectious after the first few weeks of treatment.[2]

In most people in the early stages of HIV infection, symptoms of tuberculosis are similar as in people without HIV infection. In areas where many people have HIV infection, tuberculosis programmes should continue to focus on identifying infectious sputum-smear-positive cases through microscopy. However, diagnosis of tuberculosis in individual patients using the standard diagnostic tools can be more difficult if they have advanced HIV infection because:

a) HIV positive people with pulmonary tuberculosis may have a higher frequency of negative sputum smears. Confirming the diagnosis may require sputum culture.[3]

b) The tuberculosis skin test often fails to work in people who are HIV positive because it relies on measuring the response of a person's immune system,[4] if the immune system has been compromised due to decreased CD4 cell count by HIV, it may not respond well enough to tuberculin test, even though the person is infected with tuberculosis. HIV positive people with tuberculosis, therefore have a higher frequency of false negative tuberculin skin test results.[5]

c) Cases of extra pulmonary tuberculosis seem to be more common in people who are co- infected.[6]

d) Chest radiography may be less helpful in assessing cavities in people with HIV because they have less cavitation[7] Cavities usually develop because the immune response to the tubercular bacilli leads to some destruction of lung tissue. In people with HIV, who do not have a fully functioning immune system, there is less tissue destruction and hence less lung cavitation.[8]

The radiological manifestations of tuberculosis in HIV infected patients may vary according to the degree of immuno suppression. A wide clinic-radiological spectrum of tuberculosis is seen among HIV patients, in consonance with their varying immune status. With the conventional sputum positivity and tuberculin test not providing an adequate diagnostic help, familiarity with the clinic-radiological spectrum of tuberculosis and coexisting opportunistic infections is absolutely necessary.[9] This study makes an attempt to correlate the Chest X-ray and CD4 counts as it will help in better understanding this deadly duo of HIV and tuberculosis.

MATERIAL AND METHODS

The cases analyzed in this study were patients who have were admitted in department of General Medicine, Government General Hospital, Vijayawada or attending ART(Anti retroviral Therapy) Centre for over a period of 1 year (2015 to 2016). After recording the presenting complaints, specific history of Diabetes mellitus, chronic kidney disease, immune- suppression therapy, and hematological malignancy is obtained. Patients with History of any of the above conditions are excluded. As these conditions can cause Chest X ray pictures similar to HIV infection in pulmonary tuberculosis patients. A complete physical examination is done. Patients with positive sputum AFB results whose HIV status is already checked or who are willing to check are included in the study.

After obtaining the HIV status all the patients under went Chest X-ray evaluation except those patients who had a recent Chest X ray after diagnosis of tuberculosis.

Inclusion Criteria:

1. Pulmonary tuberculosis proved by at least one positive sputum AFB result.
2. Presence of Chest X ray taken immediately after diagnosis of tuberculosis.
3. Known HIV status.
4. Known CD4 count if HIV positive
5. Consent

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Exclusion Criteria

Any condition which can cause immuno suppression
I. Diabetes mellitus
2. Chronic kidney disease
3. Immuno suppressive therapy
4. Hematological malignancy

Patients who satisfied both criteria were selected for this study.
The Chest X ray features are noted down for each patients. The features studied include pleural effusion, lung collapse, cavity, alveolar opacity in upper, middle and lower zones, interstitial shadowing, hilar lymphadenopathy, pleural thickening and normal Chest X ray finding. Those patients who were found to be HIV positive have undergone CD4 count estimation which is available at the ART centre in Government General Hospital, Vijayawada. The CD4 count was noted down. The Chest X ray features were divided into two groups according to presence of atypical features. So that all the Chest X rays were either having typical or atypical features.
Atypical Chest X ray features includes
1. Unilateral or bilateral lower zone infiltrates without affecting respective upper zone
2. Bilateral pleural effusion
3. Normal Chest X ray
4.Bilateral hilar or mediastinal lymphadenopathy
5. Interstitial shadowing
After getting all the data the following comparisons were made between the two groups.
1. Age distribution
2. Male and female ratio
3. Percentage of various Chest X ray features
4. Percentage of atypical features
5. Percentage of atypical features with relation to CD4 count

RESULTS

Total number of patients studied - 60
HIV positive patients - 26
HIV negative patients - 34

Table 1
Age Distribution

Age in Years	HIV Positive	HIV Negative
< 14 years	0	0
15- 29 years	6	6
30 – 44 years	13	12
45 – 59 years	7	11
>60 years	0	5
Total	26	34

Mean age of HIV positive patients - 37.54 + 10.21
Mean age of HIV negative patients - 42.26 + 12.87

Figure 1
Sex Distribution (Pulmonary TB Cases)

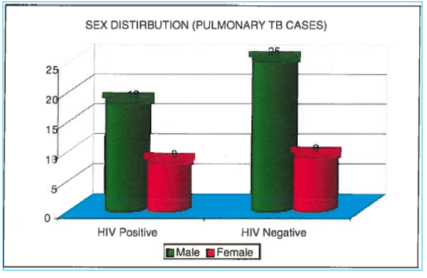


Table 2
Various Chest X-ray Features.

	Positive	%	Negative	%	P-value
Pleural Effusion	5	19.2	3	8.8	0.247
Collapse	0	0	0	0	
Cavity	3	11.5	13	38.23	0.016
Upper Zone	14	53.8	29	85.29	0.024
Mid Zone	0	0	3	8.8	0.13
Lower Zone	8	30.7	1	2.9	0.0023
Interstitial	1	3.8	0	0	0.256
Hilar Adenopathy	0	0	0	0	
Pleural Thickening	0	0	0	0	
Normal	7	26.9	4	11.76	0.137

HIV positive patients had significantly higher incidence of lower zone infiltrates and lower incidence of cavity and upper zone infiltrates.

Table 3
Atypical Chest X-rays.

	HIV Positive		HIV Negative	
	No of patients	%	No of patients	%
Present	16	61.5	5	14.8
Absent	10	38.5	29	85.2
Total	26		34	

P value - 0.0001 - very significant
HIV positive patients had significantly higher incidence of atypical features on Chest X ray than HIV negative patients.

Figure 2

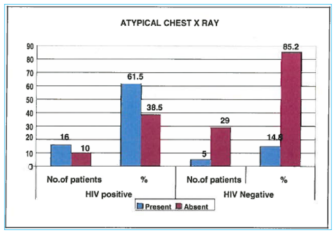
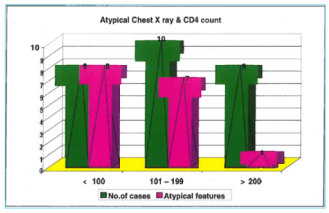


Table 4
Atypical Chest X ray & CD4 count

Cd4 Count	No of Cases	Atypical Features	Percentage
≤ 100	8	8	100%
101 - 199	10	7	70%
≥ 200	8	1	12.5%

Lower CD4 count patients had higher incidence of atypical features on chest X ray.

Figure 3



DISCUSSION

In this study, out of the total 60 patients, 26 were HIV positive and 34 were HIV negative.

The mean age of HIV positive patients was 37 yrs and HIV negative patients was 42 years. This may indicate that the HIV positive individuals contact tuberculosis infection early. Usually tuberculosis reactivation occurs as the age progresses and immunity declines. But

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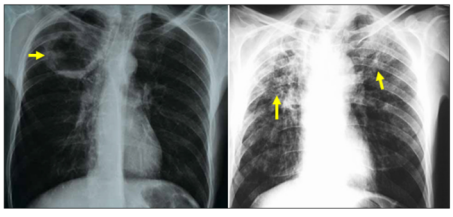
in HIV positive individual's immunity declines early and may cause disease at an earlier age. No patient was there in less than 14 years group. It is interesting to note that no HIV positive patient was there above the age of 60 years. This may be due to early death of HIV positive patients or due to the less risky behavior of older persons compared to young adults.

The sex distribution of HIV positive and negative patients was equal as the p value was found to be 0.631 which indicates there was no significant difference in the two groups.

In this study there were no patients with collapse, hilar adenopathy or pleural thickening in both groups. Pleural effusion was found in 19.2% HIV positive patients and 8.8% in HIV negative patients. The p value of 0.247 indicates that the difference is not significant. A study by Guilherme Freire Garcia et a1[10] indicated that pleural effusion was more common in HIV positive individual patients but there was no correlation between CD4 count and effusion. Cavity was seen in 11.5% patients in HIV positive and 38.23% of patients in HIV negative individuals with a p value of 0.0 16 which signifies the finding. As noted before many studies found out lower incidence of cavities in HIV positive individuals. There is a correlation between CD4 count and cavity as shown in the study by Guilherme Freire Garcia et al.[10] As cavity formation occurs when the caseous material is coughed out. The process requires a good immune function when compared to other findings. Caseous necrosis is the final product of the granulomatous reaction caused by, lymphoid cells, epithelioid cells and giant cells. As in HIV positive patients the cell mediated immunity is blunted more so in those having lower CD4 count, the finding of lower incidence of cavity can be explained. Pozniak AL et al[11] also showed lower incidence of cavity in HIV positive patients. Upper zone infiltrates was found in 53.8% of HIV positive patients and 85.29% of HIV negative patients with a p value of 0.024. It is a finding of classical pulmonary tuberculosis as the bacilli can survive better in more oxygenated apical and posterior segment of upper lobe. Another reason quoted for upper lobe infiltrates in pulmonary tuberculosis include the lower blood circulation and less immune activity. But in HIV positive patients as the cell mediated immunity is less the survival pressure of bacilli is less and the better blood supply of lower zones will not give a better immunity. The study by Guliherme Freire Garcia et al[10,12] showed that 64% of patients with CD4 count> 200 and none of the patients with CD4 count < 200 had upper zone infiltrates. This indicates that in pulmonary TB cases restriction of infiltrates to upper lobes is a function of cell mediated immunity. Middle zone infiltrate were seen in none of the patients in HIV positive group and 8.8% of the HIV negative patients showed middle lobe involvement. The p value of 0.13 indicates that finding is not significant. Lower zone infiltrates were seen in 30.7% of HIV positive patients and 2.9% in HIV negative patients with a p value of 0.0023 which showed very significant result, Diffuse infiltrations were found in many studies. In the study by Guilherme Freire Garcia et al[10,13] 9.1% of patients with CD4 count > 200 and 37% of patients with CD4 count < 200 had diffuse infiltrates involving lower zones. It may be due to the inability of the immune system in HIV positive patients to contain the infection to upper lobes.

Figure 4
RIGHT UPPER LOBE CAVITY
(HIV NEGATIVE)

Figure 5
DIFFUSE BILATERAL DISEASE
(HIV POSTIVE)



Normal Chest X ray was found in 26.9% of patients with HIV and 11.76% of patients without HIV. The finding was not significant as indicated by the p value of 0.137. This finding was found significant in many other studies. Aderaya et al[10,14]showed that 9.2% of patients had normal chest x ray and it was more common in HIV positive individuals with a p value of 0.05 Greamberg[13] et al in 1994 reported that Normal chest x rays are more common when CD4 count is less than 200 (21%) when compared to CD4 count > 200(5%). In 2008 Pepper T. Joseph[15] reported that normal chest x ray in HIV positive patients was more likely if associated with renal failure. (p-0.048). Atypical chest x rays were found in 21 patients. Out of that 16 patients (76%) were HIV positive and 5 patients (24%) were HIV negative. All the above studies quoted indicated higher incidence of atypical features in HIV positive individuals due to immuno suppression and decreased granuloma formation.

Among the HIV positive patients, atypical features are more common in patients with lower CD4 count. Patients with CD4 count less than 100 showed 100% presence of atypical features and patients with CD4 count between 100 and 200 showed 70% incidence of atypical features. Patients with CD4 count> 200 had only 12.5% incidence of Atypical features. These data confirm that the Atypical features are due to immuno suppression and the more the immune suppression the more the Atypical features in Chest X ray.

CONCLUSION:

There is a significant relationship between HIV co-infection and chest radiography in pulmonary tuberculosis. Atypical chest radiography is significantly higher in HIV co-infected patients with pulmonary tuberculosis. Atypical chest radiographic findings are more common in patients with lower CD4 counts. These findings emphasize the use of various investigations together with clinical features for the accurate diagnosis of pulmonary tuberculosis in patients with HIV co-infection.

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REFERENCES

1. Narain JP, Lo YR et al. Epidemiology of HIV-TB in Asia. The Indian Journal of Medical Research 2004; 120(4):277-2891.
2. Lienhardt C, Rowley J, Manneh K et al. Factors affecting time delay to treatment in a tuberculosis control programme in a sub-Saharan African country: experience of Gambia. international Journal of Tuberculosis and Lung Disease, Volume-5, Number-3, March 2001;5(3):233-9.
3. Patama Monkongdee et al. Yield of Acid-fast Smear and Mycobacterial Culture for Tuberculosis Diagnosis in People with Human ImmunodeficiencY Virus. American Journal of Respiratory and Critical Care Medicine. Vol. 180, No. 9(2009):903-908.
4. Fllner JJ. Tuberculosis, in: Goldman L, Schafer AT, eds. Goldman's Cecil Medicine. 24th ed. Philadelphia, PA: Elsevier Saunders; 2011 :chap 332.
5. Fitzgerald DW, Sterling TR, l-laas DW. Mycobacterium tuberculosis. In: Mandell GL, \ Bennett JE, Dolan R, eds.Mandell. Douglas, and Bennett's Principles and Practice of Infectious Diseases. 7th ed. Philadelphia, PA: Elsevier Churchill-Livingstone; 2009:chap 250.
6. Mehta JB et al. Epidemiology of Extrapulmonary Tuberculosis. Chest 1991 May;99(5):1134-8.
7. Huang L. HIV In site knowledge base chapter. University of California San Francisco. 2009. Jan
8. Huang L. Respiratory disease. In Dolin R, Masur H, Saag MS (Eds). AIDS Therapy, New York, Churchill Livingstone, 2nd edition, 2003;827-52.
9. Gold JA et al Significance of abnormal chest radiograph findings in patients with HIV-I infection without respiratory symptoms Chest. 2002 May; 121(5):1472-7.
10. Aderaya et al, Chest X ray in HIV positive tuberculosis in Ghana, African Journal of Respiratory medicine. Vol. (19): 222- 240.
11. Pozniak AL et al LucEtia Henn, Fabiano Nagel, Felipe Dal Pizzol, Mem Inst Oswaldo Cruz, Rio de Janeiro, Vol. 94(3): 377-38 1, May/Jun. 1999.
12. Christine Stavropoubos, MD, Allen Rothpearl, MD. Radiology 1994;193:115-119.
13. Stephen D. Greenberg, David Frager, Bernard Suster, Sidney Walker, Christine Stavropoulos1 and Allen Rothpearl. Active Pulmonary Tuberculosis in Patients with AIDS: Spectrum of Radiographic Findings (Including a Normal Appearance) Radiology 1994; 193: 115-1 19.
14. Ho, T T; Wong, K H; Lee, S S.Int J STD AIDS. 1999 Jun;10(6):409-l2.
15. Dr. Pepper T. Joseph 0. M. Leonenko et at, Chest X:Ray Peculiarities Of Pulmonary Tuberculosis In HIV infected Subjects And AIDS Patients, 7 edition, pg 456-487.