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A Clinico-Radiological Study of Pulmonary Tuberculosis in Patients with and Without HIV Infection

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ABSTRACT

Introduction: Tuberculosis is a chronic infectious disease caused by mycobacterium tuberculosis. The disease primarily affects lungs and causes pulmonary tuberculosis. Tuberculosis remains a worldwide public health problem despite the fact that the causative organism was discovered more than 100 years ago. The pandemic of HIV infection has had a profound impact on the global TB problem. Due to its ability to destroy the immune system, HIV has emerged as the most significant risk factor for progression of dormant TB infection to clinical disease.As per the WHO report 2018 (2), in 2017, there were an estimated 10 million new TB cases globally. People living with HIV [PLHIV] accounted for 10% of all new TB cases. In 2017, there were an estimated 1.3 million TB deaths; an additional 0.3 million deaths resulted from TB disease in PLHIV.

Objectives of the study: to study the clinico-radiological features of pulmonary tuberculosis in patients with and without HIV and to study the distribution of atypical chest x ray features among HIV positive and HIV negative patients.

Materials and methods: The cases analysed in this study were patients who have Come to the department of pulmonary medicine, MNR medical college and hospital, sangareddy, over a period of 18 months. After recording the presenting complaints, specific history of Diabetes mellitus, chronic kidney disease, immune suppression therapy, and haematological malignancy is obtained. A complete physical examination is done. Patients with positive sputum AFB/CBNAAT results whose HIV status is already checked or who are willing to check are included in the study.The clinical presentation and chest x ray features of the patients is noted. The chest x ray features 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. The chest x ray features are categorised into two groups according to their typical or atypical presentation.Atypical chest x ray features include: Unilateral or bilateral lower zone infiltrates without affecting respective upper zone, Bilateral pleural effusion, Bilateral hilar or mediastinal lymphadenopathy and interstitial shadowing.

Results and Conclusion: In the present study the most common symptom among the HIV positive patients was subjective weight loss (80%) followed by cough and subjective fever (75% each). Among HIV negative patients 95% of them had cough and sputum production followed by weight loss and fever (70%,65% respectively). In the present study the most common clinical sign seen among both the groups of HIV positive and HIV negative patients is an abnormal chest examination (72.5 % and 80% respectively) followed by the clinical sign of temperature > 37.5oC which was seen in 37.5% and 32.5% patients respectively. Among the other clinical signs, abnormal lymph node examination was more commonly seen among HIV positive patients, oral thrush was seen in just 2 of 40 patients with HIV positive status. In the present study chest x ray findings showed mid and lower zones were commonly involved among the HIV positive patients and upper zone was commonly involved in HIV negative patients. Among the x ray features in particular, miliary pattern was exclusively seen in HIV positive patients. X ray features like pulmonary infiltrate only and pulmonary infiltrate plus cavity were more commonly seen in HIV negative patients. There is a significant relationship between HIV co-infection and clinicaland radiological presentation in pulmonary tuberculosis.Atypical clinical presentation is significantly higher in HIV co-infectedpatients with pulmonary tuberculosis. Atypical chest radiography is significantly higher in HIV co-infectedpatients with pulmonary tuberculosis. These findings emphasize the use of various investigations together withclinical features for the accurate diagnosis of pulmonary tuberculosis inpatients with HIV co-infection.

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Key-words: human immunodeficiency virus, pulmonary tuberculosis, atypical chest x-ray findings and pleural effusion.

I. INTRODUCTION

Tuberculosis is a chronic infectious disease caused by mycobacterium tuberculosis. The disease primarily affects lungs and causes pulmonary tuberculosis. Tuberculosis remains a worldwide public health problem despite the fact that the causative organism was discovered more than 100 years ago. The pandemic of HIV infection has had a profound impact on the global TB problem. Due to its ability to destroy the immune system, HIV has emerged as the most significant risk factor for progression of dormant TB infection to clinical disease.[1] As per the WHO report 2018 (2), in 2017, there were an estimated 10 million new TB cases globally. People living with HIV [PLHIV] accounted for 10% of all new TB cases. In 2017, there were an estimated 1.3 million TB deaths; an additional 0.3 million deaths resulted from TB disease in PLHIV.[2]

HIV and tuberculosis interact in several ways

1. Reactivation of latent infection: People who are infected with both tuberculosis and HIV are 25-30 times more likely to develop tuberculosis. This is because HIV stops the immune system working effectively and tuberculosis bacilli are able to multiply rapidly. In developing countries HIV associated tubercular disease is very common.
2. Primary infection: New tubercular infection in people with HIV can progress to active disease very quickly. Among active tubercular disease in two thirds of people with HIV coinfection, tuberculosis is due to recent infection rather than reactivation of latent infection. People with HIV are at risk of being newly infected, if they are exposed to tuberculosis due to their weakened immune system.
3. Recurring Infection: People with HIV who have been cured of tuberculosis infection are at higher risk of developing tuberculosis again. However, it is not clear whether this is because of reinfection or relapse.
4. In the community: There are more new cases of active tuberculosis because more people infected with tuberculosis develop active disease, and those newly infected become ill faster. This means that there are more people in the community who are infectious to others. Larger number of people with active disease mean more people will die from tuberculosis unless they are treated. The association of tuberculosis with HIV means that people suffer additional discrimination. 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. In majority of people during the early stages of HIV infection, symptoms of tuberculosis are similar as in people without HIV infection.

II. AIM AND OBJECTIVES

1. To study the clinico-radiological features of pulmonary tuberculosis in patients with and without HIV.
2. To study the distribution of atypical chest x ray features among HIV positive and HIV negative patients.

III. MATERIALS AND METHODS

The cases analysed in this study were patients who have Come to the department of pulmonary medicine, MNR medical college and hospital, sangareddy, over a period of 18 months. After recording the presenting complaints, specific history of Diabetes mellitus, chronic kidney disease, immune suppression therapy, and haematological malignancy is obtained. A complete physical examination is done. Patients with positive sputum AFB/CBNAAT results whose HIV status is already checked or who are willing to check are included in the study.

Inclusion criteria: We included the patients in the age group 18 to 60 years with pulmonary tuberculosis by at least one positive sputum AFB/CBNAAT results whose chest x-ray was available with known HIV status and their CD4 counts.

Exclusion criteria: we excluded the patients with Diabetes mellitus, Chronic kidney disease. and patients on Immune suppression therapy.

Data collection: The clinical presentation and chest x ray features of the patients is noted. The chest x ray features 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. CD4 count of the HIV positive patients with TB is noted. The chest x ray features are categorised into two groups according to their typical or atypical presentation.

Atypical chest x ray features include: Unilateral or bilateral lower zone infiltrates without affecting respective upper zone, Bilateral pleural effusion, Bilateral hilar or mediastinal lymphadenopathy and interstitial shadowing.

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IV. RESULTS

Table 1: Shows the Age-wise and gender-wise distribution of study subjects

	HIV positive (no=40)		HIV negative (no = 40)	
	Number	**%**	**Number**	**%**
18-30	14	35	4	10
31-40	21	52.5	5	12.5
41-50	5	12.5	16	40
51-60	0	00	10	25
>60	0	00	5	12.5
Mean	33.7±7.12		47.8±11.7	
Males	32	80	24	60
Females	8	20	16	100

Table 2: Shows the clinic-radiological features of pulmonary tuberculosis in the subjects

	HIV positive (no=40)		HIV negative (no = 40)	
	Number	**%**	**Number**	**%**
Cough (>2 weeks)	30	75	38	95
Subjective fever	30	75	26	65
Weight loss	32	80	28	70
Malaise	7	17.5	5	12.5
Haemoptysis	3	7.5	10	25
Loss of appetite	26	65	19	47.5
Diarrhoea	3	7.5	1	2.5
Sputum production	24	60	38	95
Temp (>37.5)	15	37.5	13	32.5
Abnormal chest examination	29	72.5	32	80
Abnormal lymph node	12	30	5	12.5
Oral trush	2	05	0	00
Normal x-ray	6	15	0	00
Pulmonary infiltrate only	2	5	8	20
Pulmonary infiltrate and cavity	15	37.5	28	70
Pulmonary infiltrate & mediastinal lymphadenopathy	8	20	3	7.5
Pleural effusion	11	27.5	8	20
Miliary pattern	5	12.5	0	00
Upper zone predominance	12	30	35	87.5
Mid and lower zone predominance	22	55	5	12.5

V. DISCUSSION

Tuberculosis is most common opportunistic infection in HIV / AIDS patients. The human immunodeficiency virus pandemic has altered the epidemiology of tuberculosis (TB) worldwide. The suppression of the immune response by HIV makes these patients to present with atypical clinical and radiological features. The clinical presentation of TB among the HIV infected is dependent on the degree of immune suppression. Patients with relatively preserved immune function (with CD4+T cell counts above 200/mm3) are more likely to have typical symptoms, upper lobe disease and sputum smear positive for acid-fast bacilli (AFB). Patients who are severely immunosuppressed are more likely to have atypical clinical and radiographic features. HIV-TB co infection increases the morbidity and mortality, so early diagnosis is very necessary to prevent the morbidity and mortality. This study presents the spectrum of clinico-radiological features of tuberculosis among HIV seropositive and seronegative patients.

In this study, a total of 80 patients were included, of which 40 were HIV positive with pulmonary tuberculosis and 40 were HIV negative with pulmonary tuberculosis.The mean age of patients with HIV is 33.7±7.12 and the mean age of

patients without HIV is 47.8±11.7. Maximum number of patients with HIV are in the age group between 31 - 40 years while that of patients in HIV negative group are between 41-50 years. In HIV positive individual's, immunity declines early and may cause disease at an earlier age. In the present study, both in HIV positive and negative group of patients, male preponderance was seen. 80% of subjects in HIV positive group and 60% of subjects in HIV negative group were males. Male: Female ratio in HIV positive and negative patients is 4:1 and 3:2 respectively.

In the present study the most common symptom among the HIV positive patients was subjective weight loss (80%) followed by cough and subjective fever (75% each). Among HIV negative patients 95% of them had cough and sputum production followed by weight loss and fever (70%,65% respectively). In the present study the most common clinical sign seen among both the groups of HIV positive and HIV negative patients is an abnormal chest examination (72.5 % and 80% respectively) followed by the clinical sign of temperature > 37.5oC which was seen in 37.5% and 32.5% patients respectively. Among the other clinical signs, abnormal lymph node examination was more commonly seen among HIV positive patients although p value of 0.056 was just falling short of level of significance. Oral thrush was seen in just 2 of 40 patients with HIV positive status. In the present study comparing the chest x ray features among the HIV positive and HIV negative patients it has been seen that mid and lower zones were commonly involved among the HIV positive patients and upper zone was commonly involved in HIV negative patients with significant p value of <0.001. Among the x ray features in particular, miliary pattern was exclusively seen in HIV positive patients with a significant p value of 0.02. X ray features like pulmonary infiltrate only and pulmonary infiltrate plus cavity were more commonly seen in HIV negative patients with a significant p value of 0.04 and 0.004 respectively. The findings of clinical symptoms among the two groups in the present study are in accordance with various national and international studies. In a study by Garcia et al (25) who studied clinical and radiological features of HIV related pulmonary tuberculosis, it was found that patients with HIV, diagnosed with pulmonary tuberculosis had cough less than 3 weeks duration.[3]Banda HT et al[4] who studied the prevalence of pulmonary tuberculosis in TB suspects with short duration cough found that 35% of HIV positive patients had pulmonary tuberculosis, the results of our study are in concordance with similar studies conducted in the past.[5-10]

VI. CONCLUSION

There is a significant relationship between HIV co-infection and clinicaland radiological presentation in pulmonary tuberculosis.Atypical clinical presentation is significantly higher in HIV co-infectedpatients with pulmonary tuberculosis.Atypical chest radiography is significantly higher in HIV co-infectedpatients with pulmonary tuberculosis. These findings emphasize the use of various investigations together withclinical features for the accurate diagnosis of pulmonary tuberculosis inpatients with HIV co-infection.

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