Original Article

Pulmonary TB

Radiographic Patterns in HIV Associated Pulmonary Tuberculosis

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ABSTRACT

Objective: To compare the radiologic patterns in HIV positive patients with pulmonary tuberculosis with non-HIV positive patients of pulmonary tuberculosis.

Study Design: Descriptive study

Place and Duration of Study: The study is a carried out in the Department of Medicine at Dow University Hospital from July, 2010 to July, 2011.

Materials and Methods: The admission records of 54 HIV-positive patients were analyzed. A total of 30 patients out of 54 presented with pulmonary symptoms, which were further evaluated by sputum smear for acid-fast bacilli and chest radiographs. These 30 patients were compared with 30 non-HIV, smear positive for acid-fast bacilli patients. **Results:** Out of 30 HIV seropositive patients, 29 were male and 1 was female with the mean age ± SD 33.9±95 years. Sputum staining for acid-fast bacilli was positive in 10 patients (33.3 %). Frequent radiographic patterns included normal 12(40%) and apical infiltrates 5(16.6%). Cavitatory lesion was observed in 1 patient. Dominant symptoms were weight loss 29(93.3%) and fever 24(80%). Out of the 30 non-HIV seropositive pulmonary tuberculosis patients, 20 were male and 10 were female of mean age ± SD 33.9±95 years. Sputum staining for acid-fast bacilli was positive in 30 patients (100%). Frequent radiographic patterns were apical cavitations 12(40%), apical infiltrates 5 (16.6%), bronchopneumonia 6(20%), interstitial infection3 (10%).Dominant symptoms were weight loss 29(93.3%) and fever 24(80%). **Conclusion:** Majority of HIV seropositive patients with pulmonary tuberculosis were male. Common radiographic patterns were normal radiographs and apical infiltrates. Atypical radiographic presentation is particularly related in advance stages of immunosuppresion. Cavitatory lesions and pleural effusion were rare findings.

Conclusion: Non HIV seropositive pulmonary tuberculosis patients were both male and female. Common radiographic patterns were apical cavitatory lesions, bronchopneumonia, interstitial infiltrations and pleural effusion. This radiographic presentation is particularly related to delayed hypersensitivity reaction.

Key Words: Radiographic Patterns, HIV, Pulmonary Tuberculosis

INTRODUCTION

From the first reported case of HIV in 1981, the global burden of HIV is now more than 40 million people with over 3.5 million people having AIDS defined illness.[1,2,3] Tuberculosis is one of the major health problems of Pakistan. In recent years, the burden of tuberculosis in Pakistan has further increased. Pakistan is categorized as the fifth country with the highest burden of tuberculosis worldwide. The incidence and prevalence of tuberculosis is 310/100,000 and 231/100,000 respectively.[4] The incidence of HIV-associated tuberculosis is rising throughout the world, especially in developing countries. Despite this low prevalence rate of HIV, Pakistan has embraced the circle of HIV/AIDS, transitioning from a low HIV prevalence to a concentrated HIV epidemic state.[5,6]

HIV infection provides a fruitful ground for M.tuberculosis to invade the lungs. New onset tuberculosis in the presence of HIV leads to a progressive disease, whereas the reactivation of latent tuberculosis in such individuals is also amplified particularly.[7] Tuberculosis is one of the most important infectious complications in HIV and the leading cause of death in these patients[8]. More than 50% of patients who are HIV positive, in developing countries, manifest the disease in the form of tuberculosis.[9] The synergistic effect of HIV infected individuals combined with TB unfortunately increases the disease mortality and morbidity.

Chest radiography is one of the foremost diagnostic tool for interpretation of respiratory symptoms in HIV infected patients. The spectrum of radiological findings in such patients is diverse unlike those observed in the classic post primary form of tuberculosis.[10] In a recent study it was concluded that chest radiography is sometimes the only tool used for diagnosis of pulmonary tuberculosis in those patients who are smear negative[11]. Studies have shown that an intact immune system forms the basis of the pattern of lung involvement observed on chest radiographs. Atypical presentations (such as pleural effusions, lower lobe

infiltrates, non-cavitatory lesions, hilar and mediastinal lymphadenopathy) are reported in advanced state of immunodeficiency. The absence of consolidation and cavitation may be an interesting clue used for defining the term "atypical" in HIV positive individuals.[12] Hence, in early stages of HIV infection, the findings of classic primary tuberculosis such as upper lobe involvement, cavitations and fibrosis are more common.[13] A normal chest x-ray is least likely to be found in a tuberculosis patient. Studies show that a normal chest x-ray is found in between 2-22% of individuals that are co-infected with HIV and pulmonary tuberculosis.[14] The findings of a normal chest x-ray should not serve as a limitation for further workup of tuberculosis.

There are various studies regarding the clinical features, diagnosis and consequences of HIV and tuberculosis in the developed world but these studies do not suffice as a general approach due to the various subtypes of the virus that are present in the Asian subcontinent, Pakistan in particular. The present study aims to highlight the radiological findings in HIV positive patients in Dow University of Health Sciences, Karachi comparing them to those who are HIV negative.

MATERIALS AND METHODS

It was an observational, retrospective and descriptive study, conducted in the Department of Medicine at Dow University Hospital, Dow University of Health Sciences. The study was conducted between July,2010 to July,2011, by reviewing the records of 54 HIV diagnosed in-patients for their symptoms, signs, laboratory investigations and chest radiographs. Data was entered in a prescribed performa and then evaluated .Out of 54 patients that we selected , 30 patients were chosen on the basis of correlation between their symptoms , signs, complete blood picture, erythrocyte sedimentation rate , CD4 count , sputum acid-fast bacilli staining for mycobacterium tuberculosis and pulmonary radiographic pattern. Similarly, 30 smear positive patients were selected as non-HIV pulmonary tuberculosis and their data was entered in a prescribed performa and evaluated.

Two consultants analyzed the radiographic patterns (Table 1) and symptoms (Table 2).

RESULTS

Out of 30 HIV patients, all of them were male except one female; of mean age ± SD of patients was 33.9 ± 9.5 years .Sputum staining for Acid fast Bacilli was positive in 10 (33.3%) patients. Dominant atypical Radiographic patterns was observed, in 12(40%) normal; 5(16.6%), atypical infiltrate; 3 (10%), consolidation;3 (10%),bronchopneumonia ; 3(10%) [Table 1] with dominant symptoms of weight loss; 28(93.3%), fever; 24 (80%), chronic cough; 21 (70%) [Table 2]

Out of 30 non HIV patients, 20 were male and 10 were female; of mean age ± SD of patients was 33.9 ± 9.5 years Dominant radiographic patterns observed cavitatory lesions in 13(43.3%) , bronchopneumonia 6(20%), reticulonodular shadows 3(3.3%) ,and pleural effusion 3(3.3%) [Table. 1] , with dominant symptoms of chronic cough 26(86.6%%) weight loss24(80%), and fever 21(70%).

Table No.1: Pulmonary Radiological Patterns In HIV Positive Patients & Non HIV Patients With Pulmonary Tuberculosis

Serial No	Radiographic Pattern In HIV Patients With Pulmonary Tuberculosis	Number of Patients	Percentage %	Number Of Non-HIV Patients With Pulmonary Tuberculosis	Percentage %
1	Normal	12	40%	0	0%
2	Cavitatory Lesions	5	16.6%	13	43.3%
3	Bronchopneumonia	3	10%	6	20%
4	Reticulonodular Shadows	2	6.6%	1	3.3%
5	Pleural Effusion	2	6.6%	3	10%
6	Interstitial Infiltrations	2	6.6%	3	10%
7	Collapse	1	3.3%	1	3.3%
8	Miliary Shadows	1	3.3%	0	0%
9	Lymphadenopathy	0	0%	1	3.3%
10	Pulmonary Shadows	2	6.6%	2	6.6%

DISCUSSION

Tuberculosis is the most important cause of morbidity and mortality worldwide, and Pakistan being the fifth most common country with Tuberculosis. In a study conducted in India prevalence of HIV infection in tuberculous patients was found to be 12.3%[15], of which 44% had pulmonary and 56% had extra pulmonary tuberculosis. And in another study also conducted in India showed prevalence of tuberculosis in HIV infected patients to be 17%[16]. This shows increasing trend of prevalence on TB-HIV co-infections in this region. Hence in this retrospective observational study

we studied common radiological pattern of pulmonary tuberculosis in HIV patients.

Tuberculosis frequently occurs in HIV infected patients and its clinical & radiological manifestations vary according to the degree of HIV induced immunosuppression. This descriptive study is carried out in department of medicine DUHS Karachi of 54 HIV diagnosed patients, to review the presentation of pulmonary tuberculosis and to compare with those who were non HIV diagnosed cases of pulmonary tuberculosis.

Table No.2: Clinical Features In HIV Positive Patients & Non-HIV Patients With Pulmonary Tuberculosis

Serial No.	Clinical Features	Number of HIV patients with Pulmonary Tuberculosis	Percentage %	Number of Non-HIV Patients with Pulmonary Tuberculosis	Percentage %
1	Weight Loss	28	93.3%	24	80%
2	Fever	24	80%	21	70%
3	Chronic Cough	21	70%	26	86.6%
4	Anorexia	17	56.6%	1	3.3%
5	Chest Pain	4	13.3%	7	23.3%
6	Haemoptysis	1	3.3%	1	3.3%
7	Night Sweets	1	3.3%	1	3.3%
8	Diarrhea	16	43.3%	7	23.3%

When evaluating the clinical features most common mode of presentation in patients with TB-HIV co-infection were weight loss (93%), fever (80%) and chronic cough (70%), while most common mode of presentation in non HIV- tuberculosis patients were chronic cough (86.6%), weight loss (80%) and fever (70%). This showed similar trends in clinical presentation of patients with non HIV and HIV infected tuberculosis patients.

In another cross sectional study conducted in India showed coughing as the most common clinical symptom (90%), followed by fever (78%) in patients with HIV-TB coinfection[1]. Similar trends were found in another study done in India where cough, fever and weight loss were found to be most common presenting symptoms with prevalence of 94%, 86% and 78% respectively[17].

In this study where common radiological features were evaluated, in HIV-Tuberculosis co infected patients mostly radiological studies were normal in 40%. Most common radiological finding were cavitatory lesions in 16.6%, bronchopneumonia (20%), pleural effusion (10%) and interstitial infiltrates (10%) respectively. In non HIV infected tuberculosis patients most common radiological finding was cavitatory lesion (43.3%), bronchopneumonia (20%), pleural effusion (10%) and interstitial infiltrates (10%) respectively. None of the non HIV infected tuberculosis patients had normal chest radiographs.

In a study conducted in South-America Brazil over a period of 3 years most common radiological finding was parenchymal consolidation seen in 14.3% patients followed by interstitial infiltrate, diffuse micro nodular (miliary) pattern in seen in 11.9% patients each[18]. Another similar study conducted in Brazil showed bilateral pulmonary infiltrates to be most common (51.8%) and pulmonary cavitation was the least common finding (5.4%)[19]. A study which compared incidence of pulmonary infiltrates in HIV infected and HIV non-infected tuberculous patients, pulmonary infiltrates were found to be more prevalent in HIV-tuberculosis co infected patients (47.6%) versus non HIV infected tuberculosis patients[20], whereas our study showed equal incidence of pulmonary infiltrates in both groups (10%). Another comparative study conducted in Uganda validated our results which showed consolidation and cavitations to be more prevalent in non HIV infected patients verses the co-infected patients 70% vs. 42% and 48% vs. 13% respectively.[21] Various studies have suggested the atypical features on chest radiograph are associated with HIV patient, but having said that, it may be linked with amount of the immunosuppression. In our study we have seen higher incidence of pleural effusion, interstitial infiltrates and bronchopneumonia in non-HIV tuberculosis patients. This finding may be due to HIV positive patients that included in our study may have better immunity[22,23]. An American comparative study done with CD-4 count concluded that tuberculosis & CD-4 count less than 200 cell frequently presents with chest radiograph as of post primary tuberculosis[24], this suggests that with more immunosuppression, there are greater atypical findings on chest radiograph. Though we have not tested our patients with CD-4 count in view of above study, atypical features of tuberculosis in HIV positive patients in chest radiograph may be due to less number of CD-4 count. Hence further multi centric larger studies are required in our country to establish the relation of atypical features of tuberculosis on chest radiograph with respect to CD-4 count.

CONCLUSION

Majority of HIV seropositive patients with pulmonary tuberculosis were male. Common radiographic patterns were normal radiographs and apical infiltrates. Atypical radiographic presentation is particularly related in advance stages of immunosuppression. Cavitatory lesions and pleural effusion were rare findings.

Non HIV seropositive pulmonary tuberculosis patients were both male and female. Common radiographic patterns were apical cavitatory lesions, bronchopneumonia, interstitial infiltrations and pleural effusion. This radiographic presentation is particularly related to delayed hypersensitivity reaction.

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