Comparison the Radiologic Findings of Pulmonary Tuberculosis Among HIV-Seropositive With HIV-Seronegative Patients

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ABSTRACT

Background: Approximately 1.8 million of the world’s population is infected with both M.tuberculosis (TB) and HIV. HIV-seropositive patients with TB may have radiographically atypical presentations.

Objectives: This study aimed to determine whether there was any difference in radiological presentation of pulmonary TB between HIV-seropositive and HIV-seronegative patients.

Patients and Methods: Information on 204 patients who were admitted with a diagnosis of pulmonary TB to the infectious ward of Razi Hospital, Ahvaz, between 2004 and 2008 was obtained from their records. They were divided into HIV-seropositive and HIV-seronegative groups. All clinical signs and symptoms and radiological findings were extracted from each patient file and recorded in a questionnaire.

Results: Normal thoracic radiography, pleural effusion, milliary pattern, and hilar and mediastinal lymphadenopathy were more common in the HIV-seropositive group. Pulmonary infiltration and cavitary lesions in chest X-ray (CXR) were more frequent in the HIV-seronegative group. The prevalence of fibrosis in HIV-seronegative patients was higher than in HIV-seropositive subjects. Upper lobe pulmonary involvement in HIV-seropositive patients was less frequent than HIV-seronegative persons due to their immunodeficiency.

Conclusions: Radiological presentation of pulmonary TB differs between HIV-seropositive and HIV-seronegative patients due to progressive immunodeficiency from HIV infection.

Implication for health policy/practice/research/medical education: As pulmonary tuberculosis is an important opportunistic infection in patients with advanced HIV infection, delay in diagnosis and treatment may lead to severe morbidity and death. So clinicians should be aware about different and sometimes atypical radiographic manifestations of pulmonary tuberculosis in HIV infected patients. The importance of this study is to define such atypical.

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1. Background

It was widely believed that tuberculosis (TB) was controlled at least in developed countries, but in the 1980s, the incidence of this disease increased dramatically (1). The cause of this phenomenon was the epidemic HIV infection and the coexistence of these 2 diseases. In the United States, the incidence of TB declined due to its control of HIV (Human Immuno deficiency Virus) infection (1). The incidence of TB in developing countries increased due to the presence of TB in patients with HIV infection and endemicity of TB. More than 95% of cases of TB infection and concurrent HIV occur in developing countries (2). HIV-infected patients are predisposed not only to reactivation of remote infection but also to rapid progression of recently acquired infections (1).

Approximately 1.8 million of the world’s population is infected with both diseases, and 22% of deaths due to TB infection occur in TB-HIV coinfected patients (1). The
likelihood of progression of latent TB to active TB in HIV- 
seropositive patients is 5% to 15% per year or 30% during 
their lifetime versus 5% to 10% of HIV-seronegative people 
during their lifetime (2, 3). In a study by Alavi et al. (4), 
pulmonary TB was present in 45% of HIV-positive addicts. 
Chest X-ray (CXR) is central to the diagnosing tuberculo-
sis, determining the extent and character of disease, and 
evaluating the response to therapy (1).

Because the radiographic presentation of tuberculosis 
depends on the severity of immune system reactions 
and the number of bacilli in the lung, such characteris-
tics should differ between patients with HIV and TB (5). 
Therefore, HIV-seropositive patients may have radi-
ographically atypical presentations (6). This study aimed 
to determine whether there are differences in the radi-
ological presentation of pulmonary TB between HIV-sero-
positive and HIV-seronegative patients.

2. Patients and Methods

This descriptive epidemiological retrospective study 
was based on hospital information. The study popula-
tion included all patients with pulmonary TB who were 
hospitalized in the infectious ward of Razi Hospital, Ah-
vaz, Iran, from 2004 to 2008. The sampling method was 
non-random and targeted. After studying the records 
of patients, we divided them into HIV-seropositive and 
HIV-seronegative groups. The required information, 
including all clinical signs and symptoms and radiological 
findings, was extracted from each patient file and record-
ed in a questionnaire.

Inclusion criteria, per the WHO (World Health Organi-
ation) definition, were having at least 1 of the following 
criteria: clinical signs with repeat sputum smear-positive 
acid-fast bacilli, clinical signs with a positive sputum 
smear and sputum culture, clinical signs with a positive 
sputum smear in patients with a chest X-ray that was 
suggestive of pulmonary TB that was detected by a cli-
ician or radiologist. HIV diagnostic criteria were having 
2 positive ELISA tests and a positive western blot (7). Ex-
clusion criteria included files that were missing relevant 
information and HIV-seronegative persons who were im-
munocompromised for any reason.

2.1. Statistical Analysis

The data were analyzed with SPSS 13.0. Statistical com-
parison of variables was performed using chi-square test. 
P-values less than 0.05 were considered significant.

3. Results

In this study, 204 patients with pulmonary TB were 
evaluated; 170 cases were HIV- seropositive and 34 cases 
were HIV-seronegative. The mean (± SD) age in the HIV-se-
ropositive and HIV- seronegative groups was 31.85 ± 8.52 
and 44.33 ± 10.34 years, respectively (P = 0.001). All HIV-
seropositive patients were male, and the HIV-seronega-
tive group comprised 120 (70.6%) males and 50 (29.4%) 
females (P < 0.001).

Eleven (32.35%) HIV-seropositive patients and 20 (11.76%) 
HIV-seronegative patients had a normal CXR and no 
radiological pulmonary signs (P = 0.01). Also, 8 HIV-
seropositive patients (23.52%) had pulmonary infiltra-
tion and 3 (8.82%) had a cavity versus 99 (58.23%) and 58 
(34.11%) HIV-seronegative patients, respectively (P = 0.01, 
P = 0.008 respectively). Four (11.76%) HIV-seropositive pa-
tients had a milliary pattern and 11 (32.35%) had pleural 
effusion, compared with 10 (5.88%) and 14 (8.23%) HIV-se-onegative patients, respectively (P = 0.05 and P = 0.003, 
respectively). In the HIV-seronegative group, 15 (8.82%) 
had fibrosis and 20 patients (11.76 %) had lymphadenopa-
thy versus 2 (5.88%) and 9 (26.4 %) HIV-seropositive cases, 
respectively (P = 0.42, P = 0.23, respectively). The location 
of the pulmonary manifestation on the CXR in HIV-sero-
positive and HIV-seronegative groups is shown in Table 1.

4. Discussion

Tuberculosis is an important problem in HIV-infected 
persons and is the leading cause of death in these pa-
tients in developing countries. In this study, we com-
pared the radiographic findings of HIV-positive and 
HIV-negative patients with pulmonary tuberculosis. A 
normal chest radiograph was more common in the 
HIV-positive group. In contrast, pulmonary infiltration, 
cavity, and fibrosis were more frequent in HIV-negative 
patients, consistent with other studies, such as Kumar et 
(8), Parasad et al. (9), Haddadi et al. (10), Swaminathan 
et al. (11) Swaminathan et al (11), Henna et al. (12), and Sed-
hain et al. (13).

The higher frequency of normal chest radiographs in 
the HIV-positive group may be related to decreased cell-
mediated immunity in these patients. Poor cell-mediat-
ed immunity results in reduced granuloma formation, 
caseation, liquefaction, and eventually cavitation. In con-
trast, the greater occurrence of cavities, fibrosis, and pul-
monary infiltration in HIV-negative patients is related to 
the robust inflammatory response in this group. As Trip-
athy et al. (14) showed, cavity formation is observed in 
patients with higher CD4 counts, indicating that intact 
cell-mediated immunity is required for cavity formation.

In our study, milliary pattern, hilar and mediastinal 
lymphadenopathy, and pleural effusion were more com-
mon in the HIV-positive group, consistent with Haddadi 
et al. (10), Swaminathan et al (15), Swaminathan et al. 
(11), and lawn et al. (16). The more frequent occurrence 
of these radiographic findings may be explained by the 
failure of tissue containment of the disease in immu-
nosuppressed HIV-positive patients. This finding was in 
contrast to Parasad et al. (9), who did not observe a sig-
nificantly higher rate of milliary tuberculosis in HIV-pos-
itive patients. Pozinac et al. (17) also failed to note such 
a difference between HIV-positive and -negative groups, 
except for the higher occurrence of cavitation in HIV-
negative patients. These differences might be attributed to differences in patient selection and immune status. Another cause might be racial variations in the host response to mycobacterium tuberculosis.

In our study, we observed a higher occurrence of mid- and lower lobe involvement in the HIV-positive group, similar to other studies, indicating poor cellular immunity in HIV-infected patients. The strength of our study is that the data are from an infectious diseases ward in Ahvaz Razi Hospital, the only referral center for HIV and tuberculosis coinfected patients.

The radiological findings of pulmonary TB differ between HIV-seropositive and HIV-seronegative patients due to poor cellular immunity in HIV-infected patients. Normal chest radiograph, milliary pattern, hilar and mediastinal lymphadenopathy, pleural effusion, and mid- and lower lobe involvement are more common in HIV-positive persons. In contrast, pulmonary infiltration, cavity, and fibrosis are more frequent in HIV-negative patients.

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