**Original article:**

# Evaluation of Radiographic Findings in Patients of Pulmonary Tuberculosis at a Tertiary Care Hospital

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## ABSTRACT

**Background:** Among pulmonary tuberculosis patients, Chest radiograph (CXR) finds its place in sputum-negative patients not responding to a course of antibiotics. Hence, the present study was undertaken for assessing the radiographic findings in pulmonary tuberculosis patients.

**Materials & Methods:** A total of 120 patients with pulmonary tuberculosis were enrolled. Complete demographic details of all the patients were obtained. Pulmonary TB patients of less than 15 years of age, sputum smear negative patients and antitubercular treatment failure patients were excluded on the basis of history, clinical and physical examination. Chest X ray was done in all the patients and radiographic findings were recorded in separate Performa. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.

**Results:** Right apex and left apex of the lungs were involved in 60 percent and 54.17 percent of the patients. Right middle third and left middle third were involved in 49.17 and 34.17 percent of the patients. On radiographic analysis, heterogeneous consolidations were seen in 84.17 percent of the patients, while nodule pattern was seen in 65 percent of the patients. Pleural involvement occurred in 61.67 percent of the patients while excavations were seen in 35.83 percent of the patients. Fibrosis and homogenous consolidations were seen in 30.83 and 24.17 percent of the patients. Calcifications were seen in 9.17 percent of the patients.

**Conclusion:** Pulmonary tuberculosis manifests as spectrum of radiographic features. Thorough knowledge of these features is necessary for its identification in patients with non-specific clinical profile.

**Keywords:** Radiographic, Pulmonary, Tuberculosis.

## INTRODUCTION

Current guidelines for diagnosis of adult chest tuberculosis (TB) are based primarily on the demonstration of acid-fast bacilli (AFB) on sputum microscopy. Chest radiograph (CXR) finds its place in sputum-negative patients not responding to a course of antibiotics. Though computed tomography (CT) is frequently employed in the diagnosis and follow-up of TB, it does not find a place in the national and international guidelines.[1-3] Literature is lacking and no consensus exists on use of ultrasound (USG), CT, and magnetic resonance imaging (MRI) in such patients. With India having a large burden of TB, it is important to have established imaging criteria and recommendations.[4]

Radiology remains one of the most important diagnostic modalities of tuberculosis infection. Radiological

manifestations of pulmonary tuberculosis are dependent on several host factors, including underlying immune status. Impaired host immunity like HIV infection, diabetes mellitus etc., have been regarded as a predisposing factor in tuberculosis. Endobronchial spread of disease, cavitary lesions and lymphadenopathy can be easily detected by Computed Tomography (CT). Pleural effusion and bronchopleural fistula can also be detected in early stages.[5-7] Hence; the present study was undertaken for assessing the radiographic findings in pulmonary tuberculosis patients.

## MATERIALS & METHODS

The present study was conducted in the Department of Pulmonary Medicine, Subharti Medical College, Meerut, Uttar Pradesh (India) and it included assessment of radiographic findings in pulmonary tuberculosis patients. Written consent was obtained after explaining in detail the entire research protocol. A total of 120 patients with pulmonary tuberculosis were enrolled. Sputum smear examination for acid fast bacilli was done as per Revised National Tuberculosis Control Programme (RNTCP) guidelines.[6] Complete demographic details of all the patients were obtained. Pulmonary TB patients of less than 15 years of age, sputum smear negative patients and antitubercular treatment failure patients were excluded on the basis of history, clinical and physical examination. Chest X ray was done in all the patients and radiographic findings were recorded in separate Performa. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. Chi- square test was used for assessment of level of significance.

**Table 1: Demographic and clinical data**

| Parameter | | Number of patients | Percentage of patients |
|---|---|---|---|
| Age group (years) | Less than 25 | 23 | 19.17 |
| | 25 to 40 | 66 | 55 |
| | More than 40 | 31 | 25.83 |
| Gender | Males | 78 | 65 |
| | Females | 42 | 35 |
| Residence | Rural | 69 | 57.5 |
| | Urban | 51 | 42.5 |

**Table 2: Affected lung areas**

| Radiographic findings | Number of patients | Percentage |
|---|---|---|
| Right apex | 72 | 60 |
| Left apex | 65 | 54.17 |
| Right middle third | 59 | 49.17 |
| Left middle third | 41 | 34.17 |
| Right lower third | 38 | 31.67 |
| Left lower third | 30 | 25 |

**Table 3: Radiographic findings**

| Radiographic findings | Number of patients | Percentage |
|---|---|---|
| Heterogeneous consolidations | 101 | 84.17 |
| Nodules | 78 | 65.00 |
| Pleural involvement | 74 | 61.67 |
| Excavations | 43 | 35.83 |
| Fibrosis | 37 | 30.83 |
| Homogenous consolidations | 29 | 24.17 |
| Calcifications | 11 | 9.17 |
| Others | 5 | 4.17 |

## RESULTS

In the present study, assessment of a total of 120 pulmonary tuberculosis patients was done. Mean age of the pulmonary tuberculosis patients was 38.1 years. 55 percent of the patients belonged to the age group of 25 to 40 years. 65 percent of the patients were males while the remaining were females. 57.5 percent of the patients had rural residence while the remaining had urban residence. Right apex and left apex of the lungs were involved in 60 percent and 54.17 percent of the patients. Right middle third and left middle third were involved in 49.17 and 34.17 percent of the patients. Right lower third and left lower third involvement occurred in 31.67 and 25 percent of the patients.

In the present study, on radiographic analysis, heterogeneous consolidations were seen in 84.17 percent of the patients, while nodule pattern was seen in 65 percent of the patients. Pleural involvement occurred in 61.67 percent of the patients while excavations were seen in 35.83 percent of the patients. Fibrosis and homogenous consolidations were seen in 30.83 and 24.17 percent of the patients. Calcifications were seen in 9.17 percent of the patients.

## DISCUSSION

Tuberculosis is one of the three leading causes of death by infectious disease in adult individuals worldwide, which represents about two million deaths and involvement of approximately eight million people around the world per year. About 50% of the individuals who are not treated die because of the disease. The infection by the bacillus responsible for the tuberculosis - Mycobacterium tuberculosis - is the most common of the human infections and may be found in about one third of the world population.[8] Hence; the present study was undertaken for assessing the radiographic findings in pulmonary tuberculosis patients.

In the present study, mean age of the pulmonary tuberculosis patients was 38.1 years. Right apex and left apex of the lungs were involved in 60 percent and 54.17 percent of the patients. Right middle third and left middle third were involved in 49.17 and 34.17 percent of the patients. Right lower third and left lower third involvement occurred in 31.67 and 25 percent of the patients. Andreu J et al summarized the radiographic findings in pulmonary tuberculosis patients. Cavitation is the hallmark of postprimary tuberculosis and appears in around half of patients.

Late complications of tuberculosis comprise a heterogeneous group of processes including tuberculoma, bronchial stenosis bronchiectasis, broncholithiasis, aspergilloma, bronchoesophageal fistula and fibrosing mediastinitis. They concluded that radiology provides essential information for the management and follow-up of these patients and is extremely valuable for monitoring complications.[9] Kisembo HN et al described chest radiograph (CXR) findings in a population with a high prevalence of human immunodeficiency virus (HIV) and tuberculosis (TB) in order to identify radiological features associated with TB. Consecutive adult patients admitted to a national referral hospital with a cough of duration of 2 weeks or longer underwent diagnostic evaluation for TB and other pneumonias, including sputum examination and mycobacterial culture, bronchoscopy and CXR. Two radiologists blindly reviewed CXRs using a standardised interpretation form. Smear or culture-positive TB was diagnosed in 214 of 403 (53%) patients. Median CD4+ T-cell count was 50 cells mm–3 [interquartile range (IQR) 14–150]. TB patients were less likely than non-TB patients to have a normal CXR (12% vs 20%, p=0.04), and more likely than non-TB patients to have a diffuse pattern of opacities (75% vs 60%, p=0.003), reticulonodular opacities (45% vs 12%, p<0.001), nodules (14% vs 6%, p=0.008) or cavities (18% vs 7%, p=0.001). HIV-seronegative TB patients more often had consolidation (70% vs 42%, p=0.007) and cavities (48% vs 13%, p<0.001) than HIV-seropositive TB patients. TB patients with a CD4+ T-cell count of ≤50 cells mm–3 less often had consolidation (33% vs 54%, p=0.006) and more often had hilar lymphadenopathy (30% vs 16%, p=0.03) compared with patients with CD4 51–200 cells mm–3. Although different CXR patterns can be seen in TB and non-TB pneumonias there is considerable overlap in features, especially among HIV-seropositive and severely immunosuppressed patients.[10]

## CONCLUSION

From the above results, it can be concluded that pulmonary tuberculosis manifests as spectrum of radiographic features. Thorough knowledge of these features is necessary for its identification in patients with non-specific clinical profile.

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