

Assessment of X-Ray Findings of Pulmonary Tuberculosis Patients: An Observational Study at a Tertiary Care Hospital

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ABSTRACT

Background: Tuberculosis (TB) is a global health concern for both developing and developed countries and has recently become more complex due to persistence in aging populations and the rise of drug-resistant strains. Chest X-ray is useful but is not specific for diagnosing pulmonary TB. Hence; we planned the present study to evaluate the X-ray findings of pulmonary tuberculosis patients.

Materials & Methods: The present study included evaluation of X-ray findings in patients with pulmonary tuberculosis. A total of 80 patients with pulmonary tuberculosis were included in the present study. Complete demographic details of all the patients were collected and evaluated. Chest radiographs were taken in all the patients and interpretation was done. All the data were collected and evaluated by SPSS software.

Results: Normal chest radiographic findings were present in 10 patients, while infiltrate and condensation was observed in 30 and 25 patients respectively. Isolated cavitation was found to be present in 3 patients while bilateral lesions were 28 patients respectively.

Conclusion: Chest radiographic findings in pulmonary tuberculosis patients consist of a spectrum of pattern ranging from normal radiographic findings to cavitation.

Key words: Pulmonary Tuberculosis, Radiographic, X-Ray.

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INTRODUCTION

Tuberculosis (TB) is a global health concern for both developing and developed countries and has recently become more complex due to persistence in aging populations and the rise of drug-resistant strains. In clinical practice, rapid TB diagnosis can be difficult, and early pulmonary TB detection continues to be challenging for clinicians.¹⁻³ Prompt diagnosis of active pulmonary TB is a priority for TB control, both for treating the individual and for public health intervention to reduce further spread in the community. Radiological presentation of TB may be variable but in many cases is quite characteristic.⁴⁻⁶ Radiology also provides essential information for management and follow-up of these patients and is extremely valuable for monitoring complications. Chest X-ray is useful but is not specific for diagnosing pulmonary TB. Moreover, TB can present with symptoms and atypical radiologic findings that are indistinguishable from those of community-acquired pneumonia. As a result, it is not unusual for clinicians to prescribe a number of courses of antibiotics for pneumonia before the pulmonary TB is correctly diagnosed.^{7,8} Hence; we planned the present study to evaluate the X-ray findings of pulmonary tuberculosis patients.

MATERIALS & METHODS

We planned the present study in the department of Radiodiagnosis Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh (India) and included evaluation of X-ray findings in patients with pulmonary tuberculosis. Ethical clearance was obtained from institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. A total of 80 patients with pulmonary tuberculosis were included in the present study.

Inclusion Criteria

- Patients with confirmed diagnosis of pulmonary tuberculosis,
- Patients with smear positive for pulmonary tuberculosis,
- Patients with negative history of any systemic illness,
- Patients with negative history of any known drug allergy,
- Patients with negative history of any other pulmonary pathology

Complete demographic details of all the patients were collected and evaluated. As per guidelines given by WHO, we defined pulmonary tuberculosis positive smear as patients with a minimum of two positive smears of sputum for acid - fast bacillus or one

positive sputum smear associated either with one positive sputum culture or chest radiographic findings compatible with PTB. Chest radiographs were taken in all the patients and interpretation was done by experienced certified radiologist.

All the data were collected and evaluated by SPSS software. Chi-square test and univariate regression curve were used for evaluation of level of significance. P- value of less than 0.05 was taken as significant.

Table 1: Demographic details of the patients of the present study

Parameter	Value
Mean age (years)	48.2
Males	62
Females	18
Mean weight (Kg)	68.1

Table 2: Spectrum of chest radiographic findings observed among patients of present study

Parameter	Category	No. of patients
Chest radiographic finding	Normal	10
	Infiltrate	30
	Condensation	25
	Cavitation	5
	Pleural effusion	4
	Military	6
Isolated cavitation	Yes	3
	No	77
Bilateral lesions	Yes	28
	No	52

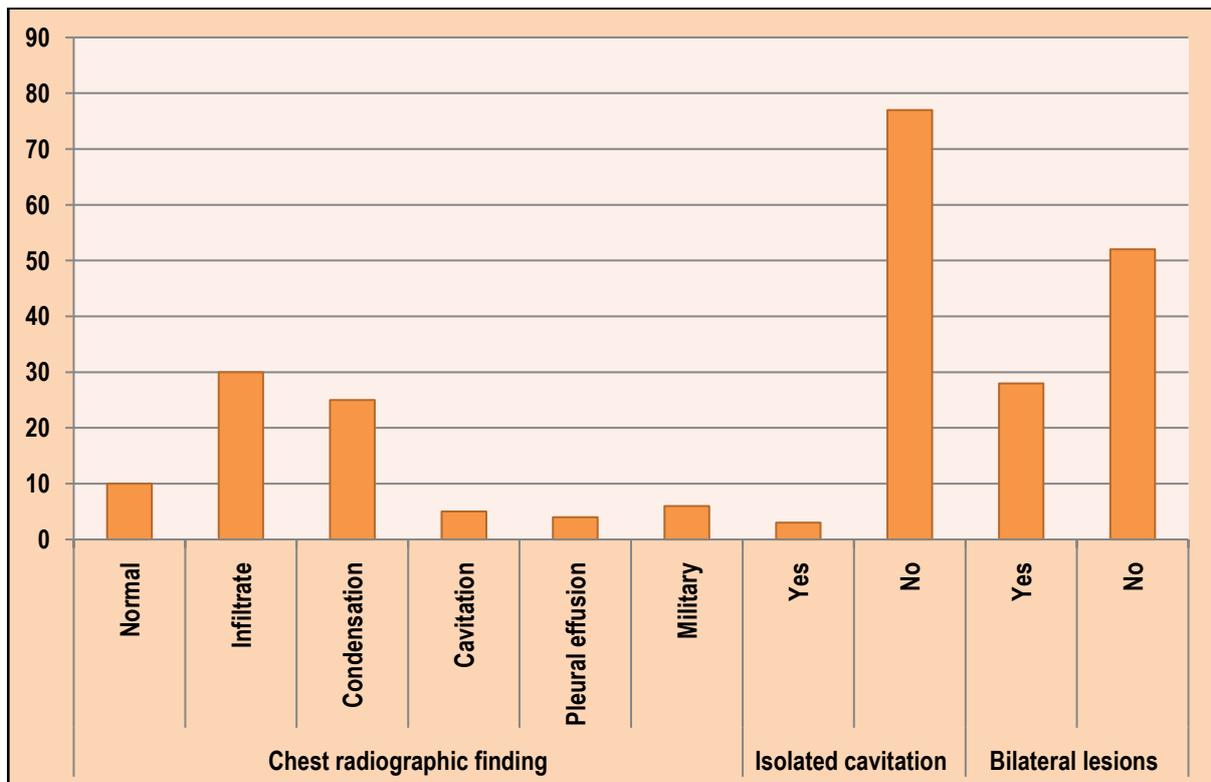


Figure 1: Spectrum of chest radiographic findings observed among patients of present study

RESULTS

A total of 80 patients with confirmed diagnosis of pulmonary tuberculosis were included in the present study. Out of 80, 62 patients were males while the remaining were females. Mean age of the patients of the present study was 48.2 years. Mean weight

of the patients of the present study was 68.1 Kg (Table 1). Normal chest radiographic findings were present in 10 patients, while infiltrate and condensation was observed in 30 and 25 patients respectively. Isolated cavitation was found to be present in 3 patients while bilateral lesions were 28 patients respectively.

DISCUSSION

In the present study, we observed that normal chest radiographic findings were observed in 10 patients. Infiltrate and condensation was observed in 30 and 25 patients respectively. Waitt CJ et al piloted a TB CXR Image Reference Set (TIRS) to improve non-expert performance in an operational setting in Malawi. Nineteen doctors and clinical officers read 60 CXR of patients with suspected PTB, at baseline and using TIRS. Two officers also used the CXR Reading and Recording System (CRRS). Correct treatment decisions were assessed against a "gold standard" of mycobacterial culture and expert performance. TIRS significantly increased overall non-expert sensitivity from 67.6 (SD 14.9) to 75.5 (SD 11.1, $P = 0.013$), approaching expert values of 84.2 (SD 5.2). Among doctors, correct decisions increased from 60.7 % (SD 7.9) to 67.1 % (SD 8.0, $P = 0.054$). Clinical officers increased in sensitivity from 68.0 % (SD 15) to 77.4 % (SD 10.7, $P = 0.056$), but decreased in specificity from 55.0 % (SD 23.9) to 40.8 % (SD 10.4, $P = 0.049$). Two officers made correct treatment decisions with TIRS in 62.7 %. CRRS training increased this to 67.8 %. Use of a CXR image reference set increased correct decisions by doctors to treat PTB. This tool may provide a low-cost intervention improving non-expert performance, translating into improved clinical care.⁹

Lachi T et al described the radiological findings of pulmonary tuberculosis in indigenous patients from the city of Dourados, MS, Brazil, according to age and sex. Chest radiographic images of 81 patients with pulmonary tuberculosis, acquired in the period from 2007 to 2010, were retrospectively analyzed by two radiologists in consensus for the presence or absence of changes. The findings in abnormal radiographs were classified according to the changes observed and they were correlated to age and sex. The data were submitted to statistical analysis. The individuals' ages ranged from 1 to 97 years (mean: 36 years). Heterogeneous consolidations, nodules, pleural involvement and cavities were the most frequent imaging findings. Most patients (55/81 or 67.9%) were male, and upper lung and right lung were the most affected regions. Fibrosis, heterogeneous consolidations and involvement of the left lung apex were significantly more frequent in males. Based on the hypothesis that indigenous patients represent a population without genetically determined resistance to tuberculosis, the study may enhance the knowledge about how the pulmonary form of this disease manifests in susceptible individuals.¹⁰

Cha J et al described the radiological findings of extensively drug-resistant (XDR) pulmonary tuberculosis (TB) and to compare the observed findings with findings of drug-sensitive (DS) and non-XDR multidrug-resistant (MDR) TB in non-AIDS patients. From September 1994 to December 2007, 53 MDR TB patients (M:F = 32:21; mean age, 38 years) and 15 XDR TB non-AIDS patients (M:F = 8:7; mean age, 36 years) were enrolled in the study. All of the MDR TB patients had received no treatment or less than one month of anti-TB treatment. In addition, all XDR TB patients received either no anti-TB treatment or only first-line anti-TB drugs. For the use of CT, significant differences (more frequent in MDR and XDR TB patients) were found for the frequency of multiple cavities, nodules and bronchial dilatation ($p = 0.001$ or $p < 0.001$). Patients with MDR TB and XDR TB were younger as compared to patients with DS TB ($p < 0.001$). Imaging findings were not different between patients with MDR TB and XDR TB. By observation of multiple cavities, nodules and bronchial dilatation

as depicted on CT in young patients with acid-fast bacilli (AFB) positive sputum, the presence of MDR TB or XDR TB rather than DS TB can be suggested.¹¹

CONCLUSION

From the above results, the authors concluded that chest radiographic findings in pulmonary tuberculosis patients consist of a spectrum of pattern ranging from normal radiographic findings to cavitation. Therefore a combination of radiographic and microbiological analysis of the patients should be done for assessing the diagnosis and prognosis of the disease.

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