

## ORIGINAL ARTICLE

# Chest X-Ray Findings in Sputum Positive Tuberculosis Patients

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## ABSTRACT

**Aim & Objective:** To see the spectrum of chest X-ray abnormalities in sputum positive T.B patients.

**Methodology:** In this descriptive cross sectional study a total of 120 patients aged 16-80 years of either sex, with sputum positive smear were taken from the Pulmonary Tuberculosis department of Gulab Devi Chest Hospital, whose chest X-rays were interpreted to see the suspicion of PTB and related spectrum of abnormalities on chest X-rays.

**Results:** Mean age of our patients was 40.7±16.8 years with male to female ratio of 1:1.4. Bilateral lung was involved in 62 (51.7%) patients and 58 (48.3%) patients have unilateral involvement of lung in chest X-rays. 68 (56.67%) patients had Infiltrative shadows. Cavitary lesions were present in 49 (40.83%) cases and only 3 (2.5%) patients had non-cavitary lesions on chest X-rays. Opacity or consolidation was seen in 41 (34.1%) cases while abnormalities in terms of pleural effusion or pneumothorax was seen in only 18 (15%) cases in CXR.

**Conclusion:** Common abnormalities on Chest X-ray in sputum positive TB patients include infiltrative shadows following opacity/consolidation and pneumothorax/pleural effusion. Early Chest X-ray leads to early diagnosis of PTB. Not even a single normal CXR was obtained so we conclude that the probability of detecting AFB on sputum smear is greatly influenced by suspected CXR abnormalities.

**Keywords:** Pulmonary Tuberculosis, Sputum Positive smear, Acid Fast Bacilli, Roentgenographic findings.

## INTRODUCTION

TB can be successfully treated if diagnosed in a timely fashion.<sup>1,2</sup> Currently, most cases of tuberculosis are diagnosed using one or more established approaches.<sup>3,4</sup> Clinical signs and symptoms of TB, as well as chest X-ray (CXR), are commonly used; these criteria are non-specific and their use may lead to both under and over-diagnosis.<sup>5</sup> CXR Postero-Anterior view is taken. The CXRs were scored as typical includes the presence of nodular, alveolar, or interstitial infiltrates predominantly affecting the zones above the clavicles or upper zones and atypical that includes any other pattern, and negative or normal CXR.<sup>6</sup> Primary TB produces a broad spectrum of radiographic abnormalities.<sup>7</sup> Although the physicians are more familiar with the radiological manifestations but failing to diagnose TB on the basis of CXR do occur.<sup>8,9</sup>

According to previous studies probability of detecting AFB on sputum is greatly influenced by the roentgenographic findings.<sup>10</sup> Because of the apparent widespread difficulty in recognizing the radiographic manifestations of PTB, it would be

beneficial to review the spectrum of CXR abnormalities in sputum positive TB patients.

## MATERIALS & METHODS

**Design & Setting:** This cross-sectional descriptive study was conducted in Gulab Devi chest hospital Lahore within the duration of 4 months.

**Sample selection:** Using purposive sampling 120 patients of sputum smear positive T.B irrespective of gender were taken as a sample. Patients with more than 15 years of age and those that were already diagnosed as pulmonary TB patients were excluded from the study.

**Data collection & management:** A questionnaire was made and used as data collecting tool. In addition to collecting basic demographic details chest X-ray findings like disease extension, zone involvement, lesions other related parameters were also noted down. Data were entered and managed using statistical software (SPSS).

**Data analysis:** Data were analyzed using SPSS v.16.0. Frequency distribution was used for

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quantitative data while qualitative data were presented in the forms of %age.

### RESULTS

The mean age of our patients was 40.7±16.8 years with minimum and maximum age as 16 and 80 years. Male to female ratio in our study was 1:1.4. Most of our patients were from rural background. Table-01 shows socio-demographic details of our patients.

Age in years (mean ± SD)	40.7±16.8
Range	80 -16 = 64
Gender n (%)	
Male	46 (46.6%)
Female	64 (53.3%)
Geographic distribution n (%)	
Rural	69 (57.5%)
Urban	51 (42.5%)

Table-02 shows chest X-rays findings in our patients. 62 (51.7%) patients have bilateral involvement of lung in CXR and 58 (48.3%) patients have unilateral involvement.

	Frequency N=120	Percentage
<u>Side Involved</u>		
Unilateral	58	(48.3%)
Bilateral	62	(51.7%)
<u>Disease Extension</u>		
Mild	33	27.5%
Moderate	47	39.2%
Advanced	40	33.3%
<u>Zone Involved</u>		
Upper	22	18.3%
Middle	24	20%
Lower	17	14.7%
<u>Lesion/Abnormality</u>		
Infiltrative shadow	68	56.6%
Cavitatory lesion	49	40.8%
Non cavitatory lesion	3	2.5%
Opacity/consolidation	41	34.1%
Pleural effusion/Pneumothorax	18	15%

With respect to disease extension 33 of our patients were having mild extension on CXR which means that only one or two zones were involved unilaterally, moderate disease extension (having more than two zones involved unilaterally and one zone involved bilaterally in CXR) were observed in 47 (39.2%) patients while 40 (33.3%) patients had advance disease extension on CXR i.e.

involvement of more than two zones bilaterally. 22 (18.3%) patients had involvement of upper zone in CXR, 24 (20%) patients had middle zone involvement whereas lower zone was involved in 17 (14.7%) patients. With respect to type of lesion infiltrative shadow was seen in 68 (56.67%) patients, cavitatory lesions were present in 49 (40.83%) cases and only 3 (2.5%) patients had non-cavitatory lesions on CXR. Opacity or consolidation was seen in 41 (34.1%) cases while abnormalities in terms of pleural effusion or pneumothorax was seen in only 18 (15%) cases in CXR.

### DISCUSSION

PTB produces a broad spectrum of radiographic abnormalities. The findings of our study are comparable to the study of Woodering et al<sup>8</sup> which showed that 50% of patients had consolidation, cavitations were present in 45% cases and 5% had infiltrative shadows along with this 18% patients had presence of pleural effusion. In our study opacity or consolidation was seen in 41 (34.1%) cases, cavitatory lesions were present in 49 (40.83%) cases, infiltrative shadows in 68 (56.67%) patients and 18 (15%) patients had pleural effusion.

A study was conducted in California to see the utility of CXR in detecting PTB showed that 90% patients whose chief complaints were unrelated to pulmonary tuberculosis, the CXR suggested PTB and among patients whose CXR showed cavitations or extensive infiltrative shadows, sputum smears showed AFB in 98% of cases<sup>10</sup>. Another study conducted in Brazil related to radiographic manifestations of PTB showed that CXR lesions associated with cavitations were present in almost 65% of the patients, highlighting the predominance of advanced stage PTB. Upper lobes were affected 56.9% patients, and 31.9% had more than one segment affected.<sup>11</sup> These results are in coalescence with our study which shows predominant involvement of more than one zone unilaterally on CXR. 22 (18.3%) patients had involvement of upper zone in CXR, 24 (20%) patients had middle zone involvement whereas lower zone was involved in 17 (14.7%) patients. Bilateral involvement was present in 21 (17.5%) patients.

Miller and MacGregor<sup>12</sup> described different stages of severity of illness i.e. mild, moderate and severe and suggested that there are some unusual characteristics of PTB which should be considered

while interpretation of CXR. 26% patients CXR was not suggestive of PTB which subsequently proved to be PTB whereas 74% had typical features of TB which suggests that the failure to suspect PTB on CXR lead to the delay in diagnosing PTB.

Our findings are quite similar to Cohen et al<sup>13</sup> in terms that patients who were smear positive didn't had a normal CXR as in our study not even a single normal CXR was observed. Chest radiographic configuration in predicting PTB shows analysis of CXR findings did show significant differences between TB and non-TB patients in the frequency of a typical CXR. Ultimately we can say that this test had good negative predictive value for TB, especially smear-positive TB.

## CONCLUSION

Common abnormalities on CXR in sputum positive TB includes infiltrative shadows involving more than one zone unilaterally on CXR. CXR is not a standard diagnostic tool or confirmatory investigation for diagnosing PTB but its importance in suspecting PTB is justified as in our study not even a single normal CXR was obtained in sputum positive smear patients. Early CXR leads to early diagnosis of PTB. So, we conclude that the probability of detecting AFB on sputum smear is greatly influenced by suspected CXR abnormalities.

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