

RADIOLOGICAL PRESENTATION OF POST PRIMARY TUBERCULOSIS IN ADULT SPUTUM SMEAR POSITIVE PATIENTS

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ABSTRACT

Background: Pulmonary Tuberculosis (TB) is traditionally classified into primary & post primary tuberculosis; both have distinct characteristics on radiology. A detailed knowledge of different radiological patterns is helpful in diagnosis of TB. **Objective:** To determine the frequency of various radiological presentation of post primary tuberculosis in adult sputum smear positive patients. **Methodology:** This cross sectional study was carried out at Department of Pulmonology, Sheikh Zayed Medical College / Hospital, Rahim Yar Khan on adult sputum smear positive pulmonary TB patients. A total of 250 new cases of pulmonary TB with no previous history of Anti-Tuberculosis treatment were included in this study. Socio demographic data and findings of X – ray Chest from each sputum smear positive patient were collected and recorded on a predesigned performa. The data was entered and analyzed by using SPSS version 17. **Result:** Out of 250 patients, 146 were male and 104 were female with mean age of 35.76 ± 16.25 years. Left lung was most affected in 40.4% cases, right lung in 35.6%, while 24% has bilateral involvement. Duration of illness prior to diagnosis was 3 ± 1.66 months. Among the radiological presentation, cavitation was seen in 49.2% cases, alveolar consolidation in 42.4%, nodular pattern in 3.2%, reticulonodular pattern in 3.2% and reticular pattern in 2% cases. There was significant association of alveolar consolidation with male gender (0.03) while reticulonodular pattern was significantly seen in female gender (0.007). Majority of the patients were young; 42.8% were below the age of 30 years and 82% patients were below the age of 50 years and there was a delay of > 03 months in the diagnosis. **Conclusion:** According to this study, cavitations and alveolar consolidation were the commonest radiological presentations of post primary TB. Majority of patients were young and there was a considerable delay in diagnosis.

Keywords: Tuberculosis, Radiological presentations, Sputum smear.

INTRODUCTION

Tuberculosis (TB) is one of the most important communicable diseases worldwide. Global Tuberculosis report 2015 by World Health Organization reveals that 9.6 million people got tuberculosis and 1.5 million people died of the disease during 2014. Pakistan is ranked 4th in top 22 high TB burden countries. According to World Health Organization estimates for burden of tuberculosis, Pakistan has a prevalence rate of 341 per 100,000 population, an incidence rate of 270 per 100,000 population and mortality rate of 28 per 100,000 population.¹

Pulmonary Tuberculosis is traditionally classified into primary & post primary tuberculosis, both have characteristic features on radiology. Primary

tuberculosis usually presents as an inflammatory patch or consolidation in lung fields & hilar lymphadenopathy. It commonly affects children or previously uninfected adults. Post primary tuberculosis usually presents with nodular or patchy infiltration with or without cavitation involving the posterior segment of upper lobe.² In some cases, the apical segment of the lower lobe is first to be involved. This presentation is considered as typical or usual pattern.³

Various groups of patients of pulmonary TB show different radiological involvement including alveolar consolidation, nodular or interstitial infiltrates, miliary shadowing, diffuse pulmonary shadowing, pleural effusion, atelectasis, pneumothorax.⁴ Isolated lower lung field involvement, hilar lymphadenopathy, tuberculomas

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& some other unusual patterns may be seen on chest X-ray in tuberculosis. Such presentations may be misdiagnosed as pneumonia, lung abscess or carcinoma. These presentations, usually referred as atypical, are commonly seen in elderly, diabetics and persons with HIV infection or other immunocompromised conditions.⁵

Diagnosis of pulmonary TB depends upon the combination of clinical presentation, sputum bacteriology and radiologic abnormalities. As far as bacteriological examination is concerned, sensitivity of sputum smear for AFB Acid Fast Bacillus (AFB) is quite low (45 – 65%), and sputum culture for AFB takes six weeks. Even WHO sponsored Directly Observed Therapy Short Course (DOTs) programs target more than 70% of pulmonary TB cases be diagnosed by AFB smear. Mycobacterial cultures are not routinely recommended in developing countries.

For the large number of bacteriologically unproven cases, one have to either opt for more invasive and costly procedures like bronchoscopy, PCR based diagnostic tests or to treat these cases as sputum smear negative pulmonary TB, on the basis of suggestive X-ray chest. In these circumstances, role of radiology becomes more important, especially in developing countries. This study was conducted to determine the frequency of radiological presentation of post primary tuberculosis in adult sputum smear positive patients.

METHODOLOGY

This cross sectional study was carried out at Department of Pulmonology, Sheikh Zayed Medical College / Hospital, Rahim Yar Khan, Pakistan. A total of 250 sputum smear positive TB patients of either sex, aged 18 years and above with no previous history of ATT were included in this study. Socio demographics including age, sex, duration of illness and X-ray chest finding like cavitations, consolidation and nodules, were recorded on a predesigned performa. Chest X-ray was obtained from each patient and reported by a consultant radiologist. Data was entered for analysis in SPSS version 17. Post stratification applying chi-square test was applied. $P \leq 0.05$ was taken as significant.

RESULTS

Age distribution of 250 participants in this study is

presented in figure I. There were 146 (58.4%) male and 104 (41.6%) female. Regarding distribution of lung lesion, 190 (76%) has unilateral and 60 (24%) has bilateral involvement. Cavitation 123 (49.2%) was the commonest radiological presentation among post primary TB followed by Alveolar Consolidation 106 (42.4%). (Table I)

Table I: Frequency of radiological presentation of post primary TB in adult sputum smear positive patients n=250

Various radiological presentation	Frequency	Percentage
Cavitation	123	49.2%
Alveolar Consolidation	106	42.4%
Reticulonodular Infiltration	08	3.2%
Nodular Pattern	08	3.2%
Reticular Pattern	05	2.0%

Multiple presentations also count

Table II: Frequency of radiological presentation of post primary TB with respect to gender, age groups and duration of illness (n=250)

Radiological Presentation	Gender		Total No (%)	P. Value
	Male No (%)	Female No (%)		
Cavitations	67 (45.9%)	56 (53.8%)	123 (49.2%)	0.22
Alveolar Consolidation	70 (47.9%)	36 (42.4%)	106(42.4%)	0.03
Reticular Pattern	03 (2.1%)	02 (1.9%)	05 (2.0%)	0.94
Nodular Pattern	05 (3.4%)	03 (2.9%)	08 (3.2%)	0.81
Reticulonodular Infiltration	01 (0.7%)	07 (6.7%)	08 (3.2%)	0.007
Various Radiological Presentation	Age Groups (Years)		Total	P. Value
	≤ 50 Years (n=205)	>50 Years (n=45)		
Cavitations	101 (49.3%)	22 (48.9%)	123 (49.2%)	0.75
Alveolar Consolidation	89 (43.4%)	17 (37.8%)	106(42.4%)	0.48
Reticular Pattern	03 (1.5%)	02 (4.4%)	02 (2.0%)	0.19
Nodular Pattern	06 (2.9%)	02 (4.4%)	08 (3.2%)	0.60
Reticule nodular Infiltration	06 (2.9%)	02 (4.4%)	08 (3.2%)	0.60
Various Radiological Presentation	Duration of Illness Group		Total	P Value
	13 months n=172	>3 months n=78		
Cavitations	81 (47.1%)	42 (53.8%)	49.2(49.2%)	0.40
Alveolar Consolidation	76 (44.2%)	30 (38.5%)	106(42.4%)	0.39
Reticular Pattern	04 (2.3%)	01 (1.3%)	05 (2.0%)	0.58
Nodular Pattern	07 (4.1%)	01 (1.3%)	08 (3.2%)	0.21
Reticule nodular Infiltration	04 (2.3%)	04 (5.1%)	08 (3.2%)	0.24

Among gender, there was significant association of alveolar consolidation with male gender (0.03), while reticulonodular pattern was significantly seen

in female gender (0.007). (Table II) Rate of radiological presentation was not significantly different between the age groups. No statistically significant difference was observed (Table II).

DISCUSSION

In this study cavitation and alveolar consolidation were the commonest radiological presentation of post primary TB that was observed in 49.2% and 42.4% cases respectively followed by reticular pattern 2%, nodular pattern 3.2% and reticulonodular infiltration 3.2%. Sant'Anna et al, in a Brazilian study, observed the most common radiographic lesions in post primary tuberculosis were cavitations (53.3%), which is close to our finding. However, the frequency of alveolar consolidation (27%) was much lower in their study compared with 42.4% of current study.² Frequency of cavity in post primary TB had been seen in 20 – 45% of cases in some other studies. In the vast majority (85%) of cases they develop in the posterior segments of the upper lobes.⁶

There is no evidence that tuberculosis preferentially affects one sex rather than the other. However in this study, higher proportion (58.4%) of male patients were found as compared to female (41.6%). Male predominance has been found in other studies as well.

Higher male incidence might be due to the reason that males are more exposed to infections because of their living in congested places for earning, social exposures, higher chances of addiction and living in imprisonment. There was significantly higher rate of alveolar consolidation seen with male gender (0.03). This can be explained by the reasons that males usually report more in number, secondly, due to social factor of single earning person in our community, they also seek early medical attention and are diagnosed in early phase as compared to females. Moreover there was significant association of reticulonodular shadowing among the females (0.007). This study has revealed that PTB is still common in younger age group in our area. About half of patients were aged 18 – 30 years and 82% of patients were below the age of 50 years as compared with developed countries where, TB is becoming more prevalent in older people.⁷

There is a grave economical implication of this finding as this age group (18 – 50 years) is economically most productive. Therefore, tuberculosis adversely affects the economic

condition of individuals and families making poor nations even poorer. Various studies have shown that elderly people develop mediastinal lymph node enlargement, lower lobe lesions, and pleural effusions, which are considered characteristics of primary TB infection, instead of typical post primary type of lesion like upper lobe lesions, cavitation, and fibrosis.^{8,9} However in this study there was no significant difference of frequency of various radiological presentations in patients less than 50 years and those above 50 years.

The mean duration of illness before patients were diagnosed and started on treatment was 3 ± 1.66 months. Considering the guidelines of TB Control Authorities that anyone with symptoms suggestive of TB for more than two weeks duration, should be investigated for TB.¹⁰

This more than three months delay in diagnosis is unacceptable. Such delays in picking up smear positive infectious cases result in spread of TB in communities. Further studies are needed to find out causes of such delay so that measures can be taken to reduce time to diagnosis.

There is another important finding to note that cavitation was most frequent presentation in those having duration of illness more than three months and alveolar consolidation most common in those with less than three month duration indicating prolong illness favours cavity formation. As we know, cavitory TB is more infectious, more likely to give rise to complications (like massive hemoptysis, pneumothorax and residual fibrosis) and more likely to give rise to drug resistance.

Therefore, delayed diagnosis is likely to lead to poor outcome and result in failure of TB control measures. Another evidence which supports the above mentioned fact is that almost one quarter of patients at the time of diagnosis had involvement of both lungs. This bilateral involvement again possibly had been resulted from delay in the diagnosis, a situation, which can be avoided by ensuring early diagnosis and management.

This study has limitations; Firstly, in absence of a notification system of tuberculosis and proper treatment record, it is difficult to assure that patient had no previous history of anti TB therapy. Patients might not know exact nature of treatment or sometimes may intentionally hide the facts. Secondly, we did not evaluate the effect of BCG vaccination on the host immune response and radiological manifestation of TB infection. Our national policy for preventing tuberculosis

recommends BCG vaccination in the neonatal period. BCG vaccination may affect host immune response and radiological manifestations of TB infection. Finally, only limited radiological manifestations were noted in this study. Tuberculosis can present as pleural effusion, mediastinal hilar lymphadenopathy, pneumothorax, pyopneumothorax and aspergilloma etc, so more extensive studies involving larger number of patients can be planned to find the frequency of all the radiological manifestation of TB.

CONCLUSION

Cavitation was the commonest radiological presentations of post primary TB. It is very important finding as the presence of cavities correlates with higher organism load, poor treatment outcome, risk of acquiring drug resistance, and risk of spreading infection in the community. Alveolar Consolidation was the 2nd most common finding on Chest X – ray. TB affects economically most productive age group in this area. Considerable delay of more than three months has been noticed prior to diagnosis and start of treatment. Further studies are needed to find out causes of this delay so that measures could be taken to avoid.

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