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ORIGINAL RESEARCH

Assessment of pattern of HRCT findings in active and inactive pulmonary tuberculosis

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ABSTRACT

Background: TB is one of the top ten causes of death globally, as well as the leading cause of death from a single infectious agent. The present study was conducted to assess pattern of HRCT findings in active and inactive pulmonary tuberculosis.

Materials & Methods: 60 patients suspected with tuberculosis, new patients and AFB positive (on sputum or endobronchial washings smear or culture) of both genders were included. All were subjected to inspiratory HRCT scans done with Siemens CT scanner with 1.5 mm thickness sections at 5 mm intervals from lung apices to below the costophrenic angles using parameters 130 mAs, 130 kVp. All scans were performed in supine position.

Results: Out of 60 patients, males were 35 and females were 25. Common symptoms were fever in 42, cough in 35, hemoptysis in 22, night sweats in 15 and weight loss in 12 cases. The difference was significant (P< 0.05). HRCT revealed cavity in 32 and 11, consolidation in 12 and 17, tree- in bud in 25 and 11, ill defined nodules in 11 and 21, ground glass opacity in 8 and 30, atelectasis in 14 and 11, traction bronchiectasis in 12 and 23, peribronchial thickening in 11 and 45 and calcified granuloma in 42 and 23 in active and inactive tuberculosis cases respectively. The difference was significant (P< 0.05).

Conclusion: HRCT revealed active illness findings such as ill-defined nodules, consolidation, tree-in-bud look, and cavitation. Inactive disease is indicated by traction bronchiectasis, atelectasis, calcified granulomas, and peribronchial thickening.

Key words: tuberculosis, bronchiectasis, HRCT

Introduction

TB is one of the top ten causes of death globally, as well as the leading cause of death from a single infectious agent (second only to HIV/AIDS). Millions of people develop TB each year. Pulmonary tuberculosis (TB) is a significant public health issue that has reappeared in the West in the aftermath of the AIDS pandemic.[1] In 2019, an estimated 1.2 million HIV-negative people and 2,08,000 HIV-positive people died as a result of tuberculosis. According to the most current estimates, 10.0 million people got TB globally in 2019: 5.6 million men, 3.2 million women, and 1.2 million children. The natural course of tuberculosis (TB) disease is the result of highly dynamic changes at the human- and mycobacterial-level. Quantitative and qualitative variations of metabolites produced by host and pathogen could provide important information on the disease and its prognosis.[2]

In a country like ours, pulmonary tuberculosis is widespread amongst the old people and poor socioeconomic class.[3] TB can present clinically and radiologically like many other diseases as pneumonia, malignancy and interstitial lung diseases, the yield of sputum smear is still low and needs few

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days to get the results. HRCT is more sensitive than chest x-ray in the detection of minimal exudative lesions, subtle or occult parenchymal disease and in assessing disease activity in pulmonary TB.[4] In post-primary pulmonary TB, CXR frequently shows upper lung field infiltration with or without cavitation, and it is difficult to accurately assess disease activity.[5] The present study was conducted to assess pattern of HRCT findings in active and inactive pulmonary tuberculosis.

Materials & Methods

The present study comprised of 60 patients suspected with tuberculosis, new patients and AFB positive (on sputum or endobronchial washings smear or culture) of both genders. All patients gave their written consent for the participation in the study.

Data such as name, age, gender etc. was recorded. A careful examination was carried out in all patients. All were subjected to inspiratory HRCT scans done with Siemens CT scanner with 1.5 mm thickness sections at 5 mm intervals from lung apices to below the costophrenic angles using parameters 130 mAs, 130 kVp. All scans were performed in supine position. The mediastinum, hila, and pleura was evaluated with a window level/width of 40-50/350-450 HU. Results were tabulated and assessed statistically. P value less than 0.05 was considered significant.

Results

Table I Distribution of patients

Total- 60		
Gender	**Male**	**Female**
Number	35	25

Table I shows that out of 60 patients, males were 35 and females were 25.

Table II Assessment of clinical profile

Symptoms	Number	P value
Fever	42	0.05
Cough	35	
Hemoptysis	22	
Nigh sweat	15	
Weight loss	12	

Table II shows that common symptoms were fever in 42, cough in 35, hemoptysis in 22, night sweats in 15 and weight loss in 12 cases. The difference was significant (P< 0.05).

Table III Assessment of various lesions in active and inactive tuberculosis

Parameters	Active	Inactive Tuberculosis	P value
Cavity	32	11	0.05
Consolidation	12	17	0.12
Tree- in bud	25	11	0.04
Ill defined nodules	11	21	0.05
Ground glass opacity	8	30	0.01
Atelectasis	14	11	0.17
Traction bronchiectasis	12	23	0.04
Peribronchial thickening	11	45	0.01
Calcified granuloma	42	23	0.01

Table III, graph I shows that HRCT revealed cavity in 32 and 11, consolidation in 12 and 17, tree- in bud in 25 and 11, ill defined nodules in 11 and 21, ground glass opacity in 8 and 30, atelectasis in 14 and 11,

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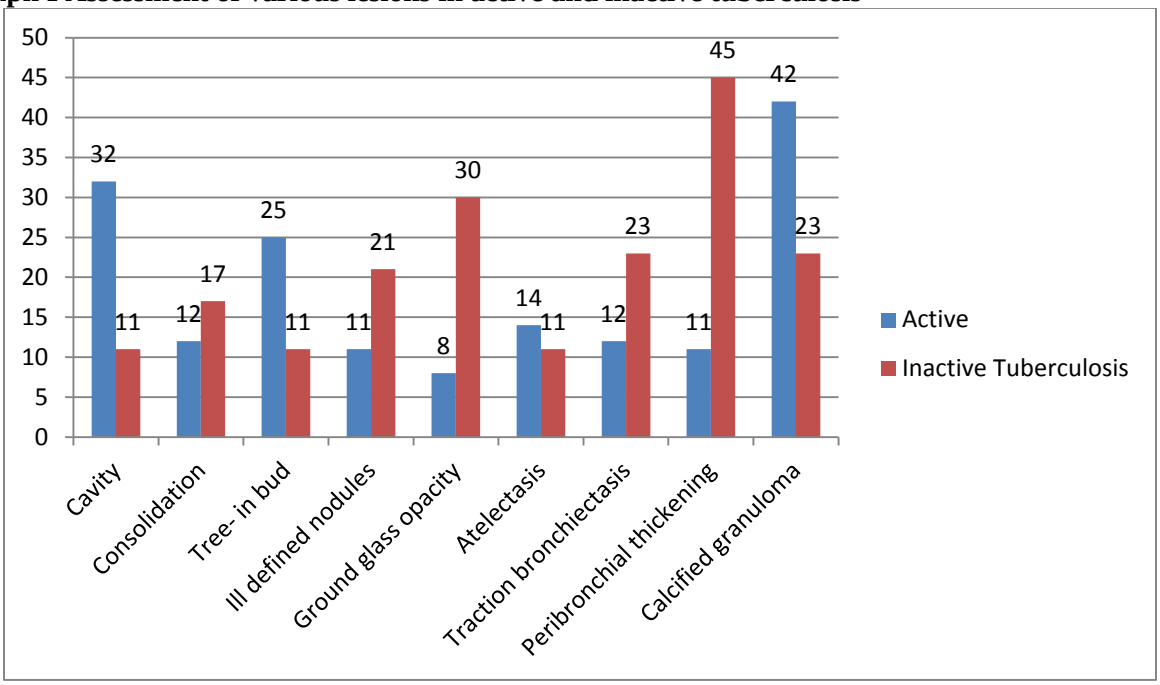
traction bronchiectasis in 12 and 23, peribronchial thickening in 11 and 45 and calcified granuloma in 42 and 23 in active and inactive tuberculosis cases respectively. The difference was significant (P< 0.05).

Graph I Assessment of various lesions in active and inactive tuberculosis



Discussion

Recent studies indicate that computed tomography is more sensitive than plain chest film in the detection of lung parenchymal lesions and that it plays an important role in evaluating the activity of pulmonary TB.[6,7] While some reports stressed the superiority of high resolution computed tomography (HRCT) in assessing the activity of pulmonary TB, the clinical value of HRCT in assessing the activity of pulmonary TB has not been statistically reported. Important CT findings of active pulmonary tuberculosis are centrilobular nodules and branching linear structures (tree- in-bud appearance), lobular consolidation, cavitation, and bronchial wall thickening.[8] The CT findings of inactive pulmonary tuberculosis include calcified nodules or consolidation, irregular linear opacity, parenchymal bands, and pericicatricial emphysema.8 Because of limitations in the yield of chest X-ray in diagnosis of pulmonary TB (PTB) computed tomography (CT) scans provide more accurate information about the extent and distribution of PTB with cavities and satellite lesions that are not seen on chest x ray.9 Moreover, CT can contribute to distinguish active from old infection.[9,10] The present study was conducted to assess pattern of HRCT findings in active and inactive pulmonary tuberculosis.

We found that out of 60 patients, males were 35 and females were 25. Drusty et al[11] aimed to determine the pattern of HRCT findings in active and inactive Pulmonary Tuberculosis and the value of HRCT in predicting disease activity in pulmonary tuberculosis. 27 patients were males and 23 were females. Average age at presentation was found to be about 44 years. Tree-in-bud appearance, ill-defined nodules, consolidation were found to have a high predictive value in diagnosing disease activity. Mediastinal adenopathy, pleural effusion and Ground Glass Opacity were statistically insignificant

We observed that common symptoms were fever in 42, cough in 35, hemoptysis in 22, night sweats in 15 and weight loss in 12 cases. Hafeezuddin et al[12] included 50 patients suspicious of pulmonary tuberculosis who underwent HRCT Thorax. Patients suspected with tuberculosis, new patients (on treatment) and AFB positive included in study. Most patients were in 40 – 60 year age group with Males comprising 54%, Females 46%. The common complaints patients presented were cough, fever, night sweats. Ill-defined nodules, consolidation, tree-in-bud look, and cavitation were the most frequent HRCT findings in Active

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disease. Traction bronchiectasis, atelectasis, calcified granulomas, and peribronchial thickening were the most prevalent symptoms of Inactive disease.

We found that HRCT revealed cavity in 32 and 11, consolidation in 12 and 17, tree- in bud in 25 and 11, ill defined nodules in 11 and 21, ground glass opacity in 8 and 30, atelectasis in 14 and 11, traction bronchiectasis in 12 and 23, peribronchial thickening in 11 and 45 and calcified granuloma in 42 and 23 in active and inactive tuberculosis cases respectively. Rahim A et al[13] studied the positive acid fast bacilli in sputum and bronchial washing smears or cultures, as well as alterations on serial radiographs collected during therapy, to diagnose active pulmonary TB. HRCT scans indicated centrilobular lesions (n=29), "tree-in-bud" appearance (n = 23), and macronodules 5-8 mm in diameter (n = 22) in cases of active pulmonary TB. In patients with latent TB, HRCT scans revealed fibrotic lesions (n = 34), bronchovascular structural distortion (n = 32), emphysema (n = 28), and bronchiectasis (n = 24). The most common CT characteristics of disease activity were centrilobular concentrations in and around the small airways, as well as "tree-in-bud" appearances. HRCT scanning revealed early bronchogenic spread and clearly distinguished old fibrotic lesions from fresh active lesions. Although infiltration was the most common HRCT result, the majority of active pulmonary TB patients had "centrilobular nodule" and "tree-in-bud" appearances.

The shortcoming of the study is small sample size.

Conclusion

Authors found that HRCT revealed active illness findings such as ill-defined nodules, consolidation, tree-in-bud look, and cavitation. Inactive disease is indicated by traction bronchiectasis, atelectasis, calcified granulomas, and peribronchial thickening.

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