Original Research Article

Determine the Pattern of HRCT Findings in Active and Inactive Pulmonary Tuberculosis

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Abstract

Background: Tuberculosis (TB) is a common and frequently fatal infectious disease caused by Mycobacterium strains. The delay in diagnosis leads to a delay in isolation of the patient, which increases the risk of infection spreading and the severity of the disease, and this delay in diagnosis is caused by a variety of factors, so we aim to determine the pattern of HRCT findings in active and inactive pulmonary tuberculosis.**Material and Methods**- This was the prospective descriptive clinical study carried out on 50 patients suspicious of Pulmonary Tuberculosis who underwent HRCT Thorax. Patients suspected with tuberculosis, new patients (on treatment) and AFB positive included in study.**Results**- Most patients were in 40 – 60 year age group with Males comprising 54%, Females 46%. The common complaints patients presented were Cough, Fever, Nightsweats. Ill-defined nodules, consolidation, tree-in-bud look, and cavitation were the most frequent HRCT findings in Active disease. Traction bronchiectasis, atelectasis, calcified granulomas, and peribronchial thickening were the most prevalent symptoms of Inactive disease.**Conclusion** – HRCT chest results can assist distinguish higher-risk individuals from those with active pulmonary tuberculosis but negative sputum smears. HRCT is a helpful diagnostic and treatment tool because it can distinguish between active and inactive disease.

Keywords - Active Pulmonary Tuberculosis, sputum smears, High-resolution computed tomography (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. There were cases in all countries and age groups, but 90% were adults (aged 15 or older), 9% were HIV-positive people (72 percent in Africa), and two-thirds were in eight countries: India, Indonesia, China, the Philippines, Pakistan, Nigeria, Bangladesh, and South Africa, with India accounting for one-third of all cases (27 percent).

In a nation like India, pulmonary TB is common among the elderly and those from lower socioeconomic backgrounds [1]. Drug-resistant tuberculosis remain a public health emergency. According to the best estimates, 2,06,030 persons globally developed tuberculosis resistant to rifampicin (RR-TB), the most effective first-line treatment, in 2019, with 82 percent of these having multidrug-resistant TB (MDR-TB).Delays in diagnosis result in delays in isolating the patient, increasing the danger of infection spreading and the severity of the disease deteriorating [2,3]. There are several reasons for this delay in diagnosis: TB can manifest clinically and radiologically as pneumonia, malignancy, and interstitial lung diseases; nevertheless, the yield of sputum smear is still low, and results take several days to come [1,2].

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Microbiological detection of Acid Fast Bacillus (AFB) is the gold standard for diagnosing active TB in patients with active pulmonary illness; the sensitivity of a sputum smear for AFB is 46-74 percent, and the sensitivity of a sputum culture is 2-95 percent.4 Even contemporary radiometric cultures, which take around 2 weeks to generate results and are not available in every hospital, require about 2 weeks to produce results. Mycobacterium tuberculosis culture, the gold standard in tuberculosis diagnosis, can take up to 6 weeks to yield definitive findings[2,3] Positive sputum cultures for Mycobacterium tuberculosis can only identify active pulmonary TB, even in patients with unaltered serial radiographic tuberculous scars [1].

The chest radiograph has long been used to detect tuberculosis, and it is currently used in combination with the tuberculin skin test. In postprimary or reactivated pulmonary tuberculosis, acute necrotizing pneumonia in the subapical lung is followed by transbronchial spread. In post-primary pulmonary TB, CXR generally shows upper lung field infiltration with or without cavitation, making it difficult to accurately define disease activity. Because chest X-ray has a limited yield in the diagnosis of pulmonary tuberculosis (PTB), computed tomography (CT) scans provide more accurate information about the size and location of PTB by identifying cavities and satellite lesions that chest X-ray does not detect.

Patients with smear-negative tuberculosis, on the other hand, have clinical and radiological indications that differ from those with smear-positive tuberculosis due to a reduced mycobacterium burden. Individuals with smear-negative disease are less likely to show the typical radiographic image of reactivation TB seen in smear-positive individuals, such as apical or upper lobe infiltrates or cavities.

Children are at a high risk of contracting the illness. Diagnosis and treatment of tuberculosis in children can help avoid the progressive forms (tuberculous meningitis and miliary TB) as well as active TB in adults. Because there are no particular clinical signs or pauci-bacilli in children, diagnosing tuberculosis is challenging.

HRCT has been shown to be more sensitive than chest radiography in identifying small exudative lesions, moderate or hidden parenchymal illness, and assessing disease activity in pulmonary tuberculosis. Even after anti-tuberculosis treatment, HRCT is more sensitive in detecting miliary nodules, correlating underlying pathomorphological processes, mechanism of disease propagation, and sequential morphological alterations. Cavities, the radiological characteristic of reactivated tuberculosis, can be seen on radiographs in 40% to 45% of post-primary TB patients. Patients with MDR TB are more prone to develop a large number of cavities. Although the majority of cavities heal as linear or fibrotic lesions, some cavities remain following antituberculous treatment. When cavities persist following anti-tuberculous medication, it might be difficult to identify lung TB activity on imaging tests. By giving information on the quantity and distribution of PTB, HRCT can help distinguish between active and inactive disease.

Material and Methods

A prospective study was conducted at Department of Radiology, MGM Hospital/ Kakatiya Medical College, Warangal from September 2019 to March 2021. The patients after informed consent were subjected to HRCT Thorax.

Inclusion criteria:

Patients suspected with tuberculosis, new patients (on treatment) and AFB positive (on sputum or endobronchial washings smear or culture).

Exclusion criteria:

Pregnant patients (1st and 2nd trimester), Patients with known malignancy, immunocompromised, unable to hold breath (interpretation of the lesions made difficult by motion artifact) and H/o allergic reaction to either ionic or non-ionic contrast.

Inspiratory HRCT scans done with Siemens Somatom Scope (16 slice) CT scanner at full inspiration with 1.5 mm thickness sections at 5mm intervals from lung apices to below the costophrenic angles with 130mAs, 120 - 140 kVp. All scans done in supine position.

All pictures were rebuilt without targeting using a high-resolution bone algorithm. We'll utilize window settings that are acceptable for assessing the bronchi and lung parenchyma (level – 700 to 900: width 1000 to 1500). The mediastinum, hila, and pleura should be evaluated with a window level/width of 40-50/350-450 HU. Intravenous contrast medium was not regularly used; instead, it was used to evaluate the mediastinum in patients with ambiguous mediastinal pathology.

Results

Results of Prospective descriptive study of 50 patients who underwent HRCT Thorax are shown in Tabular and Graphical forms.

Table 1: Distribution of patients in present study

Age Group	Number of cases	Percentage
<10	1	2
20-30	5	10
30-40	6	12
40-50	17	34
50-60	14	28
>60	7	14
Total	50	100
Gender		
Male	27	54
Female	23	46

Most patients were in 40 – 60-year age group with Males comprising 54 %, Females 46%.

Table 2: The clinical signs and symptoms of active pulmonary tuberculosis

Symptoms & Signs	Percentage
Cough	86%
Fever	55%
Hemoptysis	29%
Sputum	62%
Night Sweats	34%
Weightloss.	55%

The common complaints patients presented were Cough, Fever, Nightsweats.

Table 3: Distribution of the various lesions in Active and inactive Tuberculosis

Active Tuberculosis	
Ill-defined nodules	15 (71.42%)
Consolidation	14 (66.6%)
Tree-in-bud	16 (76.19%)
Cavity	9 (42.85%)
Ground glass opacity	4 (19.04%)
Traction bronchiectasis	4 (19.04%)
Atelectasis	2 (9.52%)
Calcified granuloma	0 (0%)
Peribronchial thickening	11 (47.61%)
Inactive Tuberculosis	
Ill-defined nodules	2 (6.89%)
Consolidation	3 (10.34%)
Tree-in-bud	1 (3.45%)
Cavity	2 (6.89%)
Ground glass opacity	1 (3.45%)
Traction bronchiectasis	18 (62.06%)
Atelectasis	15 (51.72%)
Calcified granuloma	6 (20.69%)
Peribronchial thickening	9 (31.03%)

Ill-defined nodules, consolidation, tree-in-bud look, and cavitation were the most frequent HRCT findings in Active disease.
Traction bronchiectasis, atelectasis, calcified granulomas, and peribronchial thickening were the most prevalent symptoms of Inactive disease.

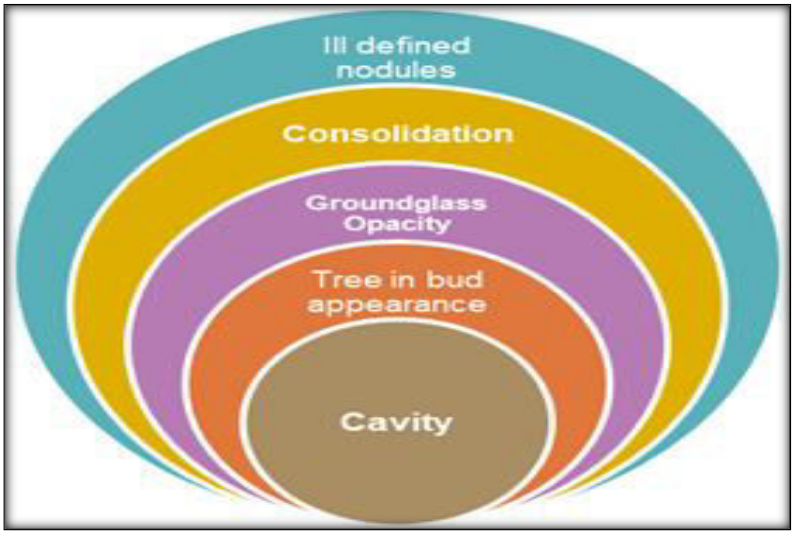

Fig 1: HRCT patterns of active tuberculosis

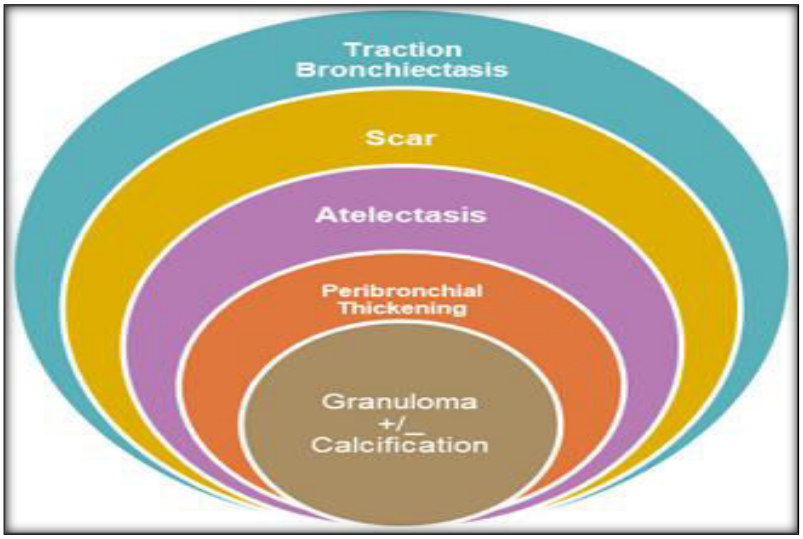

Fig 2: HRCT patterns of inactive tuberculosis

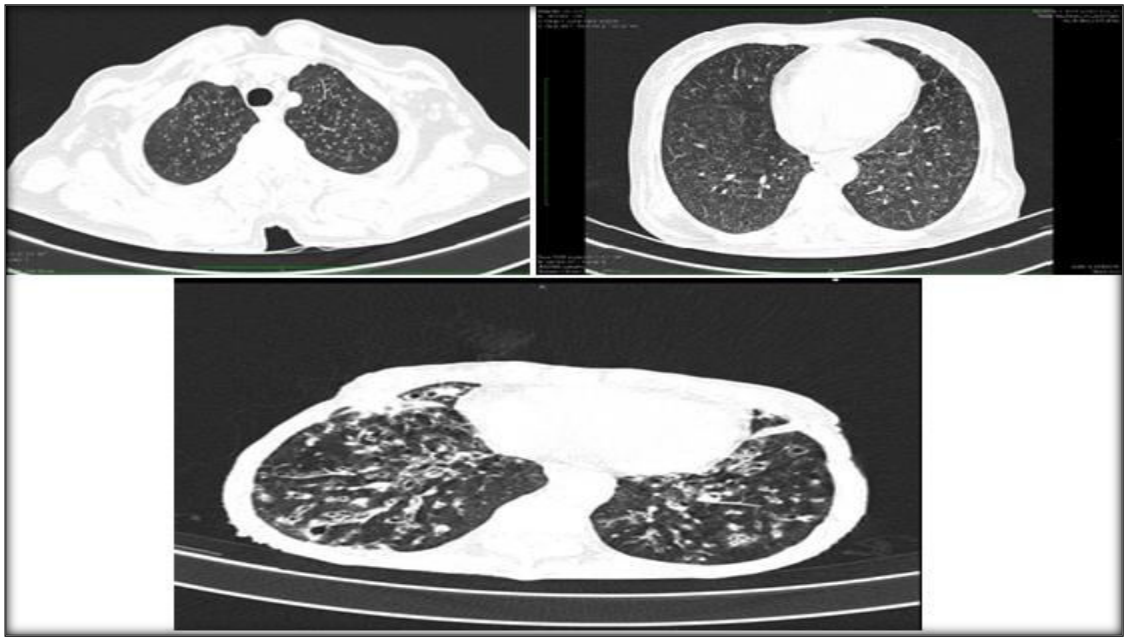

Figure 3: Photographs in study. A. Axial HRCT Image Lung Window, B. HRCT Images showing Miliary mottling in bilateral lung field, A 65 Year old female Complaining of Cough, Evening rise of Temperature since 2 months. Her HRCT Images HRCT Images showing Cavity with adjacent Parenchymal bands in the Right Upper lobe, nodules in the left Upper lobe. Changes of consolidation in Right Middle lobe; Cystic bronchiectasis with peribronchial thickening in bilateral middle & lower lobes.

Discussion

Primary tuberculosis is most prevalent in children, although it is becoming more common in adults. In this study, post-primary TB was found in adults, with the majority of patients being between the ages of 40- 60 Year. In DK Majmudar 2017 et al [1] study the average age at presentation was 44 years old. In Shivraj M ingole 2017 et al [5] study the majority of the Patients were in the age group of 40-50 i.e. 32.35%, followed by 50-60 -27.65%, >60 13.53%, 30-40 -12.35%, 20-30 - 10.59%, and <10- 3.53% respectively. In Santosh Raj 2017 et al [6] study most of the patients were in the age group 51-60 In Hussain I 2018 et al [7] study the mean age of the patients was 44.5 ± 27.32 years. In Soujanya D Bolla 2014 et al [8] study, average age was 44.15±22.6 Years. In Rahim A, 2009 et al [9] study average age was 47.15±22.6 years. In the Rizwan HM, 2017 et al [10] research, half of the patients were between the ages of 18 and 30, and 82 percent were under the age of 50, contrasting to industrialized nations where TB is growing increasingly frequent among the elderly. In Naseem A 2009 et al [11] study mean age was 40.18 ± 14.55 years

In Raniga 2006 et al [12] study average age at presentation was found to be about 38 yrs

(Range 14–65 Years). Shaarrawy 2013 et al [13] studies representing Post primary Tuberculosis more common in adult population.

In DK Majmudar 2017 et al [1] study comprised of 27 patients were males and 23 were females. In Shivraj M ingole 2017 et al [5] study the majority of the Patients were Males i.e. 52.71% and Females were 47.29%. In Santosh Raj 2017 et al [8] study Out of the 100 patients included in the study, 65 were males & 35 females. In Hussain I 2018 et al.7 study 47 (67.1%) male and 23 (32.8%) female In Soujanya D Bolla 2014 et al study, 38 females and 62 males. In Rahim A, 2009 et al [9] study 38 females and 62 males. In Rizwan HM, 2017 et al [10] study higher proportion (58.4%) of male patients were found as compared to female

(41.6%). In Naseem A 2009 et al [11] study Forty four (88%) cases were males. In Raniga 2006 et al study 22 males and 3 females. In H. Shaarrawy2013 et al study 70% are males. Thus the study thus correlates with DK Majmudar 2017, Shivraj M ingole 2017, Santosh Raj 2017, Hussain I 2018, SoujanyaBolla 2014, Rahim A 2009, KaramMB.2005, Naseem A 2009, Rizwan HM 2017, Raniga 2006, et al [5-12] studies representing male predominance more likely due to transmission at working places.

In Hussain I 2018 et al. study the clinical signs and symptoms of active pulmonary TB were

82% cough, 57% fever, 29% hemoptysis, 64% sputum, 39% night sweats, and 61% weight loss. In Soujanya D Bolla 2014 et al [8] study, the clinical signs and symptoms of active pulmonary tuberculosis comprised of 84% cough, 53% fever, 33% hemoptysis, 63% sputum, 36% night sweats, and 55% weightloss. In Rahim A, 2009 et al. study the clinical signs and symptoms of active pulmonary tuberculosis; comprising, 82.3% cough, 50% fever, 38.2% hemoptysis, 64% sputum, 31% night sweats, and 50% weight loss.

In H. Shaarrawy 2013 et al [13] study constitutional symptoms such as fever, weight loss, and night sweating were present in 95% of patients, whereas specific chest symptoms such as cough, expectoration, chest discomfort, dyspnea, and hemoptysis were present in 90%. Thus the study thus correlates with Hussain I 2018, Soujanya Bolla 2014, Rahim A 2009, H. Shaarrawy 2013 et al. studies [7-9,13].

In the current study, 21/ 50 patients (42%) had positive sputum for tuberculosis, while 29/ 50 patients (58%) had negative sputum. In DK Majmudar 2017 et al [l] study 22/ 50 patients (44%) had their sputum positive for TB, while patients 28/ 50 (56%) had their sputum negative. In Shivraj M ingole 2017 et al [5] study 374/850 patients (44%) had their sputum positive for TB, while 476/ 850 patients (56%) had their sputum negative. In Santosh Raj 2017 et al. study Out of the 100 patients sputum AFB was positive in 30 (30%) patients and negative in 70 (70%) patients with 95% confidence limit of 21-40%. In Hussain I 2018 et al [7] study 29 patients (41.4%) had their sputum positive for TB, while 41 patients (58.5%) had their sputum negative. In Soujanya D Bolla 2014 et al [8]. study 44 patients (44%) had their sputum positive for TB, while 56 patients (56%) had their sputum negative. In Rahim A, 2009 et al [9] study sixty patients had negative sputum smear and culture results, nine had positive sputum smear and culture findings, five had sputum smear negative and culture positive results, and 26 had BAL and TBLB results. In Naseem A 2009 et al [11] study Sputum smears were positive for AFB in 23 (46%) patients, whereas endobronchial washings smears were positive for AFB in 15 (30%)

cases. Additional sputum and endobronchial samples tested positive for AFB in 10% and 14% of the patients, respectively. In the Tozkoparan E 2005 et al [14] research, 52 of the 85 patients with PTB who had three negative AFB sputum smears and/or bronchoalveolar lavage smears were classified as having active PTB based on culture positive (46 patients) or caseous granulomatous inflammation (6 patients). TBB showed granulomatous inflammation in 16 individuals, with 10 of them having a positive culture. All of the patients who were given anti-TB medicines reacted effectively to the treatment, indicating that they had active PTB. Six of the patients had TBB samples with caseous granulomatous inflammation but no culture results. The remaining 33 people were labeled as PTBs who were no longer active. In H. Shaarrawy 2013 et al [13] study 60% of Sputum Smear Negative patients were positive for Culture. Thus the study thus correlates with DK Majmudar 2017, Shivraj M ingole 2017, Hussain I 2018, Soujanya Bolla 2014, Rahim A 2009, Naseem A 2009 et al. studies representing Sputum sensitivity [8-11].

The current study found that 98 percent of lesions in the right lung were in the upper lobe,

90% were in the middle lobe, and 64% were in the lower lobe. Up to 50% of the lung parenchyma in the upper lobe was often damaged. In Hussain I 2018 et al. studies in the right lung Upper lobe lesions were found in 99% of cases, middle lobe lesions in 89% of cases, and lower lobe lesions in 85% of cases. In the upper lobe, 25 to 50% of the lung parenchyma was commonly damaged. In Soujanya D Bolla 2014 et al [8] study the upper lobe is involved in 99% of the lesions, the middle lobe in 89%, and the lower lobe in 85 percent. The upper lobe is more often affected, with 25-50% of the lung parenchyma being affected. In Rahim A, 2009 et al [9] study All of the patients had chest radiographs that showed signs of active TB, such as infiltration or cavitation in the upper lobes. In the Naseem A 2009 et al [11] research, unilateral lesions in the right and left lung fields were seen in 24% (n=12) and 22% (n=11) of individuals on X-ray chest, compared to 6% and 8% of cases on HRCT. On X-ray chest, twenty-seven (54%) exhibited involvement of both lung fields, compared to 86 percent (n=43) on HRCT. The difference was found to be statistically significant (p 0.05). Cavitation was detected in 38 (76%) of cases on HRCT compared to 20 (40%) of patients on X-ray chest (p 0.05). Thus the study thus correlates with Hussain I 2018, Soujanya Bolla 2014, Rahim A 2009, Naseem A 2009 et al. studies representing commonest involvement of Right Upper lobe [8-10].

The upper lobe of the left lung had 98 percent of the lesions, whereas the lower lobe had 74%. In the upper lobe, 25 to 50% of the lung parenchyma was generally damaged. In the Hussain I 2018 et al. research, 98 percent of lesions in the left lung impacted the upper lobe and 86 percent involved the lower lobe. In the upper lobe, 25 to 50% of the lung parenchyma was frequently affected.

According to the Soujanya D Bolla 2014 et al [8] research, 98 percent of the lesions involve the upper lobe and 76 percent involve the lower lobe. Most instances include 25-50 percent of the lung parenchyma in the upperlobe. In Rahim A, 2009 et al [9] study. All of the patients had chest radiographs that showed signs of active TB, such as infiltration or cavitation in the upper lobes. Thus the study thus correlates with Hussain I 2018, Soujanya Bolla 2014, Rahim A 2009 studies representing involvement of Left Upper lobe [8,9].

Patients with active illness had 71.42% ill-defined nodules, 66.66% consolidation, 76.19 percent tree-in-bud look, 42.89% cavitations, and 47.61% peribronchial thickening, according to the research. In patients with inactive illness, traction bronchiectasis was seen in 62.06%, atelectasis in 51.72%, calcified granulomas in 20.69%, and peribronchial thickening in 31.03%. There is no preference for a certain lung zone when it comes to airspace consolidation caused by parenchymal granulomatous inflammation. According to the findings of this study, parenchymal disease mostly affects the upper lobes of both the right and left lungs, with 25 to 50 percent of the lung parenchyma being damaged in the majority of patients. The lymphadenopathy is generally unilateral, with the hilum or paratracheal area being the most prevalent sites. CT scans reveal expanded nodes with low density regions in the center, indicating caseous necrosis.

In this study, the presence of mediastinal lymphadenopathy was found to be an insignificant predictor of disease activity. Caseation, on the other hand, is seen in the vast majority of lymph nodes bigger than 10mm in size. We observed that 97 percent of patients with active disease had positive tuberculosis findings on HRCT, whereas 96 percent of patients with sputum negativity had positive tuberculosis findings on HRCT. Traction bronchiectasis, atelectasis, calcified granulomas, and peribronchial thickening were the most frequent inactive disease symptoms in this research. This data shows that HRCT can be used to assess the underlying illness and determine prognosis in sputum-negative individuals.

Table 4: Comparison of HRCT Findings in Active PTB

Comparison of HRCT findings of Active Tuberculosis with Previous Studies					
HRCT findings	**Steven et al[15] (N=45)**	**Lee et al[16] 8 (N=41)**	**Raniga et al.12 24 (N=25)**	**DK Majmudar et al.1 (N=22)**	**Present Study**
Ill-defined nodules	5(11%)	25(61%)	10(40%)	16(72%)	15 (71.42%)
Consolidation	23(51%)	17(41%)	13(52%)	15(68%)	14 (66.66%)
Tree in bud	32(71%)	39(95%)	20(80%)	17(77%)	16 (76.19%)
Cavity	16(36%)	24(58%)	16(64%)	9(40.9%)	9 (42.85%)

In DK Majmudar 2017 et al [1] study in patients with active disease Ill-defined nodules 16/22(72%) Consolidation 15/22(68%) Tree-in-bud 17/22(77%) Cavity 9/22 (40.9%) Ground glass opacity 4/22(18.1%) Traction bronchiectasis 4/22(18.1%) 18/28(64%) Atelectasis 2/22(9%) 14/28(50%) Calcified granuloma 0/22(0%) 6/28(21.4%).

Tree-in-bud look, ill-defined nodules, and consolidation were shown to have a high predictive value in identifying disease activity. In patients with negative disease: Ill-defined nodules 2/28(7.1%), Consolidation 3/28(10.7%), Tree-in-bud 2/28(7%), Cavity 4/28(14%), Ground glass opacity 2/28(7%). Traction bronchiectasis, scar formation, atelectasis, peribronchial thickening, and calcified granulomas were all signs of inactive illness.In Shivraj M ingole 2017 et al [5] study in active disease Ill-defined nodules 264(70.59), Consolidation 250 (66.84), Tree-in-bud 280 (74.87), Cavity 150(40.11), Ground glassopacity 60(16.04), Traction bronchiectasis 63(16.84), Atelectasis 30(8.02), Calcified granuloma 1(0.27), Peribronchial thickening 187(50.00). In Inactive disease Ill-defined nodules 33 (6.93), Consolidation 48(10.08), Tree-inbud 9(1.89), Cavity 28(6.00), Ground glass opacity 10(2.10), Traction bronchiectasis 299(62.82), Atelectasis 252(52.94), Calcified granuloma 95(19.96), Peribronchial thickening 80 (16.81). In Santosh Raj 2017 et al [6] study in active disease Centrilobular nodule 19/ 30, Tree in bud 18/30, Consolidation 4/30, Cavity 13/ 30 Ground glass opacity 6/ 30 Pleural effusion 5/ 30 Miliary nodules 0/ 30 lymphadenopathy 13/ 30, Bronchiectasis 15/ 30, Parenchymal calcification 0/ 30, Emphysema 0/ 30.

In inactive disease Centrilobular nodule 13/ 70, Tree in bud 13/ 70, Consolidation 2/ 70, Cavity 9/ 70, Ground glass opacity 5/ 70, Pleural effusion 6/ 70, Miliary nodules 0/ 30 2/ 70 lymphadenopathy 10 / 70, Bronchiectasis 53/ 70, Parenchymal calcification 13/ 70 Emphysema 12/ 70. In Hussain I 2018 et al [7] study in Patients with active illness had 69% ill-defined nodules, 64% consolidation, 77% tree-in-bud look, 33.6% cavitations, and 51% peribronchial thickening, according to the research. In patients with inactive illness, traction bronchiectasis was seen in 63%, atelectasis in 51.3%, calcified granulomas in 21%, and peribronchial thickening in 33%. Ill-defined nodules, consolidation, and a tree-in-bud appearance are more prevalent in sputum positive patients than in sputum negative patients. Sputum negative individuals had greater traction bronchiectasis, atelectasis, and calcified

granulomas than sputum positive patients. In Soujanya D Bolla 2014 et al [8] study, in patients with active disease, 71% had ill-defined nodules, 67% had consolidation, 75% had tree in bud appearance and 41.6% had cavitations and 50% had peribronchial thickening.

In patients with dormant illness Ill-defined nodules, consolidation, tree-in-bud look, and cavitation are the strongest indications of ongoing illness. 63.3 percent had traction bronchiectasis, 53.3 percent had atelectasis, 20 percent had calcified granulomas, and 30 percent had peribronchial thickening. In active sickness, the airway lumen narrows irregularly with thick walls, but in chronic disease, the airway lumen narrows gradually with thin walls. Traction bronchiectasis, atelectasis, calcified granulomas, and peribronchial thickening are signs of inactive illness. CT can also be used to evaluate long-term damaging lung lesions and tracheobronchial tuberculosis. Because it has a better sensitivity for differentiating active from inactive disease, HRCT is a helpful tool in the diagnosis and management of sickness.

In Rahim A, 2009 et al [9] study the positive acid fast bacilli in sputum and bronchial washing smears or cultures, as well as alterations on serial radiographs collected during therapy, were used 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.

In Rizwan HM, 2017et al [10] study Various radiological presentation Frequency Percentages Are Cavitation 49.2%, Alveolar Consolidation 42.4%, Reticulonodular Infiltration 3.2%, Nodular Pattern 3.2%, Reticular Pattern 2.0% in active PTB. In Vandna Raghuvanshi 2016 et al [17] study Centrilobular nodules 35/ 69 SSN 85.4%. Other minute nodules 35/ 69 69 SSN 85.4% Huge nodules 16/ 69 SSN 39 8 Fine reticular pattern 4/ 69 9.7% Branching linear opacity 4/ 41 9.7% Tree-in bud appearance 27 / 41 65.8% Lobular pattern of consolidation 29/ 41 70.7% Interlobular septal thickening 2/ 41 4.9% Consolidation 26/ 41, 63.4 %, Ground-glass opacity 33/ 41, 80.5%, Cavity 30/ 41, 73.2%, Bronchiectasis 7/ 41, 17 5%, Pleural effusion 2/ 41, 4.9%, LAP 41, 100 %. Main lesion in S1, S2, S6 30/ 41, 73.2%.As a result, the study shows that in active illness, centrilobular nodules and a tree-in-bud look on HRCT are more prevalent in early endobronchial dissemination. As a result, even if microbiological tests are waiting, a CT scan may be used to make a diagnosis. Inactive disease bronchiectasis, atelectasis, calcified granulomas, and peribronchial thickening were the most prevalent findings in the research. This data shows that HRCT can be used to assess the underlying illness and determine prognosis in sputum-negative individuals.HRCT is powerful and reliable inquiries in the diagnosis of TB, according to the study, when other diagnostic methods (e.g., culture, BAL) fail to resolve the problem, are not accessible, or are times demanding.

Conclusion

The strongest indications of active illness include ill-defined nodules, consolidation, tree-in-bud look, and cavitation. Inactive disease is indicated by traction bronchiectasis, atelectasis, calcified granulomas, and peribronchial thickening. It was discovered that combining indicators improves the prediction value. HRCT chest results can assist distinguish higher-risk individuals from those with active pulmonary tuberculosis but negative sputum smears. HRCT is a helpful diagnostic and treatment tool because it can distinguish between active and inactive disease.

Conflict of Interest: Nil Source of support: Nil

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