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Original Article

Association of Smoking, Previous Tuberculosis, and Family History with HRCT Manifestations in Pulmonary Tuberculosis Patients

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ABSTRACT

Background: Pulmonary tuberculosis remains a major public health problem, and high-resolution computed tomography (HRCT) is an important imaging modality for evaluating parenchymal, airway, cavitary, and pleural manifestations. However, the relationship between selected clinical history factors and specific HRCT findings remains uncertain. Objective: To evaluate the association of smoking history, previous tuberculosis history, and family history of tuberculosis with HRCT manifestations among patients with pulmonary tuberculosis. Methods: This cross-sectional analytical study was conducted in the Department of Radiology, Lahore General Hospital, and included 94 adult patients with pulmonary tuberculosis who underwent HRCT chest evaluation. Clinical history variables included smoking history, previous tuberculosis history, and family history of tuberculosis. HRCT findings included consolidation, pleural effusion, tree-in-bud pattern, cavitation, and bronchiectasis. Categorical variables were summarized as frequencies and percentages, and associations were assessed using chi-square testing with odds ratios and 95% confidence intervals. Results: Smoking history was present in 38 patients (40.4%), previous tuberculosis history in 51 (54.3%), and family history of tuberculosis in 24 (25.5%). The most frequent HRCT findings were consolidation (46.8%), bronchiectasis (45.7%), and tree-in-bud pattern (42.6%), followed by cavitation (36.2%) and pleural effusion (27.7%). No statistically significant association was observed between any clinical history factor and HRCT manifestation. Conclusion: Smoking history, previous tuberculosis history, and family history of tuberculosis were not significantly associated with selected HRCT findings in this sample. Larger adjusted studies using standardized HRCT severity scoring are needed. Keywords: Pulmonary Tuberculosis; HRCT; Smoking History; Previous Tuberculosis; Family History; Bronchiectasis; Tree-in-Bud Pattern.

INTRODUCTION

Tuberculosis remains one of the leading infectious causes of morbidity and mortality worldwide, with a disproportionate burden in low- and middle-income countries where delayed diagnosis, overcrowding, malnutrition, poverty, and limited access to healthcare continue to sustain disease transmission (1). Pulmonary tuberculosis is clinically and radiologically heterogeneous, and its presentation may vary according to disease activity, host response, extent of parenchymal involvement, airway spread, and chronic structural damage. Although microbiological confirmation remains central to diagnosis, imaging has an important supportive role in detecting pulmonary involvement, assessing disease extent, identifying complications, and guiding clinical interpretation, particularly when symptoms are non-specific or chest radiographic findings are inconclusive (2).

High-resolution computed tomography has greater sensitivity than conventional chest radiography for characterizing pulmonary parenchymal and airway abnormalities in tuberculosis. It can demonstrate subtle endobronchial spread, centrilobular nodules, tree-in-bud opacities, cavitary lesions, consolidation, bronchiectatic change, pleural disease, fibrosis, and lymph node involvement with greater anatomical detail than plain radiography (2). In pulmonary tuberculosis, tree-in-bud appearance is generally interpreted as a marker of endobronchial dissemination, consolidation reflects active inflammatory parenchymal involvement, cavitation is clinically important because of its association with active disease and potential infectivity, bronchiectasis may reflect chronic airway injury or post-infective structural damage, and pleural effusion indicates pleural involvement in the disease process (3,4). Earlier CT-based studies have shown that HRCT is useful not only for identifying active pulmonary tuberculosis but also for recognizing residual and chronic thoracic sequelae after previous infection (5,6).

Clinical history remains an important component of tuberculosis assessment because patient-level exposures may influence susceptibility, disease recurrence, chronic lung damage, and transmission risk. Smoking is a recognized risk factor for pulmonary tuberculosis because it can impair mucociliary clearance, alter local immune defense, damage airway epithelium, and increase vulnerability to respiratory infection (7). Previous tuberculosis may predispose patients to residual structural abnormalities such as fibrosis, bronchiectasis, pleural thickening, or recurrent parenchymal injury, which may complicate the interpretation of current HRCT findings (8). Family history of tuberculosis may indicate shared household exposure, increased risk of transmission, delayed diagnosis among close contacts, or common environmental determinants, although its direct relationship with specific HRCT manifestations remains less clearly defined.

Despite the established value of HRCT in pulmonary tuberculosis and the recognized epidemiological relevance of smoking, previous tuberculosis, and family exposure, the extent to which these clinical history factors are associated with specific HRCT manifestations remains uncertain in local clinical populations. Many available studies focus either on imaging patterns of pulmonary tuberculosis or on epidemiological risk factors for disease occurrence, while fewer studies directly examine whether selected history variables correspond to particular radiological features such as consolidation, cavitation, tree-in-bud pattern, bronchiectasis, or pleural effusion. This distinction is clinically important because, if specific history factors were strongly associated with particular HRCT findings, radiological interpretation could be better contextualized during diagnostic evaluation and follow-up planning.

Using a PICO-based framework, the population of interest in the present study was adult patients with pulmonary tuberculosis undergoing HRCT chest evaluation; the exposures were smoking history, previous tuberculosis history, and family history of tuberculosis; the comparison groups were patients without these respective history factors; and the outcomes were selected HRCT manifestations including consolidation, pleural effusion, tree-in-bud pattern, cavitation, and bronchiectasis. Therefore, this study aimed to evaluate the association between smoking history, previous tuberculosis history, and family history of tuberculosis with HRCT manifestations among patients with pulmonary tuberculosis. The study hypothesis was that selected clinical history factors may show differential associations with specific HRCT findings in pulmonary tuberculosis patients.

MATERIALS AND METHODS

This cross-sectional analytical study was conducted in the Department of Radiology, Lahore General Hospital, over a two-month study period. The study was designed to evaluate whether selected clinical history factors were associated with specific HRCT manifestations among patients with pulmonary tuberculosis. A cross-sectional design was considered appropriate because the exposures of interest and HRCT findings were assessed at the time of radiological evaluation, allowing estimation of the distribution of imaging findings and their association with documented clinical history variables in the study population.

The study included 94 adult patients aged 18 years or above with pulmonary tuberculosis who underwent HRCT chest evaluation. Participants were selected using consecutive non-probability sampling, whereby eligible patients presenting during the study period were included until the final sample was achieved. Patients were eligible if they had pulmonary tuberculosis diagnosed on the basis of clinical evaluation, sputum examination, or radiological assessment; underwent chest HRCT for evaluation of pulmonary tuberculosis; had complete clinical history available for smoking status, previous tuberculosis history, and family history of tuberculosis; and had complete HRCT imaging records suitable for analysis. Patients were excluded if their clinical records were incomplete, HRCT images were of poor diagnostic quality or affected by motion artefact, they had another chest disease unrelated to tuberculosis such as lung malignancy, chronic obstructive pulmonary disease, or interstitial lung disease, or they were unwilling to participate.

Clinical history variables were recorded as binary exposure variables. Smoking history was categorized as present or absent according to the clinical history documented at assessment. Previous tuberculosis history was categorized as present when the patient had a documented or reported prior episode of tuberculosis and absent when no such history was recorded. Family history of tuberculosis was categorized as present when tuberculosis was reported among family members and absent when no such history was documented. The HRCT outcome variables were consolidation, pleural effusion, tree-in-bud pattern, cavitation, and bronchiectasis. Each HRCT feature was coded separately as present or absent, and findings were treated as non-mutually exclusive because more than one radiological manifestation could occur in the same patient.

Data collection was based on clinical history records and HRCT chest findings available for each eligible participant. The clinical variables included smoking history, previous tuberculosis history, and family history of tuberculosis. The radiological variables included the presence or absence of consolidation, pleural effusion, tree-in-bud pattern, cavitation, and bronchiectasis on HRCT chest imaging. Patients with incomplete data for the required clinical or HRCT variables were excluded to minimize missing-data bias. To reduce misclassification and selection bias, only patients with complete clinical history and diagnostically adequate HRCT images were included, and patients with non-tuberculous structural or malignant lung diseases were excluded because these conditions could independently produce HRCT abnormalities similar to those evaluated in the study.

The final sample consisted of 94 eligible patients recruited consecutively during the study period. This sampling approach was used to include all accessible patients who fulfilled the eligibility criteria and underwent HRCT evaluation for pulmonary tuberculosis within the defined study duration. Consecutive sampling helped reduce selective enrolment within the available clinical setting, although the study remained limited to a single-center hospital-based population.

Data were entered and analyzed using SPSS version 27.0. Categorical variables were summarized as frequencies and percentages. The distribution of smoking history, previous tuberculosis history, family history of tuberculosis, and HRCT findings was first described for the overall study population. Associations between each clinical history factor and each HRCT finding were assessed using the chi-square test. For each comparison, patients with and without the relevant clinical history factor were compared for the presence of each HRCT manifestation. A p-value of less than 0.05 was considered statistically significant. Because the study evaluated multiple HRCT outcomes across three clinical history variables, the association analyses were interpreted as exploratory, with emphasis on the direction and distribution of findings rather than causal inference. Records with incomplete clinical or radiological information were not included in the analysis.

Ethical conduct was maintained by including only eligible patients whose clinical and imaging information was available for study assessment and by excluding patients unwilling to participate. Patient information was handled for research purposes in a confidential manner, and the analysis was conducted using aggregated data without identifying individual participants. Data integrity was

supported by applying predefined eligibility criteria, using a consistent set of exposure and outcome variables, excluding incomplete records and poor-quality HRCT images, and analyzing all included patients according to the same statistical plan.

RESULTS

A total of 94 patients with pulmonary tuberculosis who underwent HRCT chest evaluation were included in the analysis. Clinical history factors and HRCT findings were coded as categorical variables and summarized using frequencies and percentages. Associations between each clinical history factor and each HRCT manifestation were assessed using chi-square testing, and odds ratios with 95% confidence intervals were added to support clinical interpretation of the direction and precision of associations.

Table 1. Distribution of Clinical History Factors Among Pulmonary Tuberculosis Patients

Clinical History Factor	Present, n (%)	Absent, n (%)	Total
Smoking history	38 (40.4)	56 (59.6)	94
Previous tuberculosis history	51 (54.3)	43 (45.7)	94
Family history of tuberculosis	24 (25.5)	70 (74.5)	94

Among the 94 patients included in the study, 38 patients (40.4%) had a history of smoking, while 56 patients (59.6%) were non-smokers. Previous tuberculosis history was present in 51 patients (54.3%) and absent in 43 patients (45.7%), making it the most frequent clinical history factor in the sample. Family history of tuberculosis was reported in 24 patients (25.5%), whereas 70 patients (74.5%) had no documented family history. These corrected values should replace the inconsistent figure description in the original manuscript, where previous tuberculosis history was inaccurately described as approximately 31% despite being 54.3% in the table.

Table 2. Distribution of HRCT Findings Among Pulmonary Tuberculosis Patients

HRCT Finding	Present, n (%)	Absent, n (%)	Total
Consolidation	44 (46.8)	50 (53.2)	94
Pleural effusion	26 (27.7)	68 (72.3)	94
Tree-in-bud pattern	40 (42.6)	54 (57.4)	94
Cavitation	34 (36.2)	60 (63.8)	94
Bronchiectasis	43 (45.7)	51 (54.3)	94

HRCT findings were not mutually exclusive, as more than one radiological manifestation could be present in the same patient. Consolidation was the most frequent HRCT finding, observed in 44 patients (46.8%), followed closely by bronchiectasis in 43 patients (45.7%) and tree-in-bud pattern in 40 patients (42.6%). Cavitation was identified in 34 patients (36.2%), while pleural effusion was the least frequent of the assessed HRCT findings, present in 26 patients (27.7%). The distribution indicates that parenchymal inflammatory involvement and airway-related changes were common in this pulmonary tuberculosis cohort.

Table 3. Association Between Smoking History and HRCT Findings

HRCT Finding	Smokers, n/N (%)	Non-Smokers, n/N (%)	Odds Ratio (95% CI)	χ^2	p-value
Consolidation	15/38 (39.5)	29/56 (51.8)	0.61 (0.26–1.40)	1.378	0.240
Pleural effusion	10/38 (26.3)	16/56 (28.6)	0.89 (0.35–2.25)	0.058	0.810
Tree-in-bud pattern	15/38 (39.5)	25/56 (44.6)	0.81 (0.35–1.87)	0.247	0.619
Cavitation	12/38 (31.6)	22/56 (39.3)	0.71 (0.30–1.70)	0.582	0.445
Bronchiectasis	18/38 (47.4)	25/56 (44.6)	1.12 (0.49–2.55)	0.068	0.795

Smoking history showed no statistically significant association with any assessed HRCT finding. Consolidation was observed in 15 of 38 smokers (39.5%) compared with 29 of 56 non-smokers (51.8%), giving an odds ratio of 0.61 with a wide 95% confidence interval crossing unity (0.26–1.40; p = 0.240). Pleural effusion was almost equally distributed between smokers and non-smokers, occurring in 26.3% and 28.6%, respectively (OR = 0.89, 95% CI: 0.35–2.25; p = 0.810). Tree-in-bud pattern and cavitation were numerically less frequent among smokers than non-smokers, but neither comparison reached statistical significance. Bronchiectasis was slightly more frequent among smokers, 47.4% versus 44.6%, but the

difference was minimal and statistically non-significant (OR = 1.12, 95% CI: 0.49–2.55; p = 0.795). Overall, the findings do not support a significant relationship between smoking history and the selected HRCT manifestations in this sample.

Table 4. Association Between Previous Tuberculosis History and HRCT Findings

HRCT Finding	Previous TB Yes, n/N (%)	Previous TB No, n/N (%)	Odds Ratio (95% CI)	χ^2	p-value
Consolidation	24/51 (47.1)	20/43 (46.5)	1.02 (0.45–2.31)	0.003	0.958
Pleural effusion	15/51 (29.4)	11/43 (25.6)	1.21 (0.49–3.02)	0.171	0.679
Tree-in-bud pattern	22/51 (43.1)	18/43 (41.9)	1.05 (0.46–2.39)	0.016	0.901
Cavitation	17/51 (33.3)	17/43 (39.5)	0.76 (0.33–1.78)	0.389	0.533
Bronchiectasis	20/51 (39.2)	23/43 (53.5)	0.56 (0.25–1.28)	1.915	0.166

Previous tuberculosis history was not significantly associated with any HRCT finding. Consolidation was nearly identical between patients with and without previous tuberculosis history, occurring in 24 of 51 patients (47.1%) with previous TB and 20 of 43 patients (46.5%) without previous TB (OR = 1.02, 95% CI: 0.45–2.31; p = 0.958). Pleural effusion was slightly more frequent among patients with previous TB history, 29.4% versus 25.6%, but the confidence interval was wide and the association was not significant (OR = 1.21, 95% CI: 0.49–3.02; p = 0.679). Tree-in-bud pattern showed a similar distribution between groups, 43.1% versus 41.9% (OR = 1.05, 95% CI: 0.46–2.39; p = 0.901). Cavitation was numerically lower among patients with previous TB history than those without previous TB history, 33.3% versus 39.5%, but the difference was not significant (OR = 0.76, 95% CI: 0.33–1.78; p = 0.533). Bronchiectasis was also numerically lower among patients with previous TB history, 39.2% compared with 53.5% among those without previous TB history, correcting the interpretive inconsistency in the original discussion; however, this difference remained statistically non-significant (OR = 0.56, 95% CI: 0.25–1.28; p = 0.166).

Table 5. Association Between Family History of Tuberculosis and HRCT Findings

HRCT Finding	Family History Yes, n/N (%)	Family History No, n/N (%)	Odds Ratio (95% CI)	χ^2	p-value
Consolidation	12/24 (50.0)	32/70 (45.7)	1.19 (0.47–3.00)	0.132	0.717
Pleural effusion	9/24 (37.5)	17/70 (24.3)	1.87 (0.69–5.04)	1.560	0.212
Tree-in-bud pattern	11/24 (45.8)	29/70 (41.4)	1.20 (0.47–3.04)	0.142	0.706
Cavitation	9/24 (37.5)	25/70 (35.7)	1.08 (0.41–2.82)	0.025	0.875
Bronchiectasis	14/24 (58.3)	29/70 (41.4)	1.98 (0.77–5.07)	2.058	0.151

Family history of tuberculosis was not significantly associated with any of the evaluated HRCT findings, although some radiological features were numerically more frequent among patients with a positive family history. Consolidation was present in 12 of 24 patients (50.0%) with family history and 32 of 70 patients (45.7%) without family history (OR = 1.19, 95% CI: 0.47–3.00; p = 0.717). Pleural effusion occurred in 37.5% of patients with family history compared with 24.3% of those without family history, corresponding to an odds ratio of 1.87, but the 95% confidence interval was wide and crossed unity (0.69–5.04; p = 0.212). Tree-in-bud pattern was present in 45.8% versus 41.4% of patients, respectively (OR = 1.20, 95% CI: 0.47–3.04; p = 0.706), while cavitation showed almost no difference between groups, 37.5% versus 35.7% (OR = 1.08, 95% CI: 0.41–2.82; p = 0.875). Bronchiectasis showed the largest numerical difference, being present in 58.3% of patients with family history compared with 41.4% of those without family history; however, this association remained statistically non-significant (OR = 1.98, 95% CI: 0.77–5.07; p = 0.151).

Overall, none of the selected clinical history factors—smoking history, previous tuberculosis history, or family history of tuberculosis—showed a statistically significant association with consolidation, pleural effusion, tree-in-bud pattern, cavitation, or bronchiectasis on HRCT. The wide confidence intervals across several comparisons indicate limited precision, suggesting that the absence of statistical significance should be interpreted cautiously. The observed distributions suggest that HRCT manifestations were broadly similar across clinical-history subgroups in this sample, although larger studies with adjusted analyses would be needed to determine whether the numerical differences observed for bronchiectasis and pleural effusion have clinical relevance.

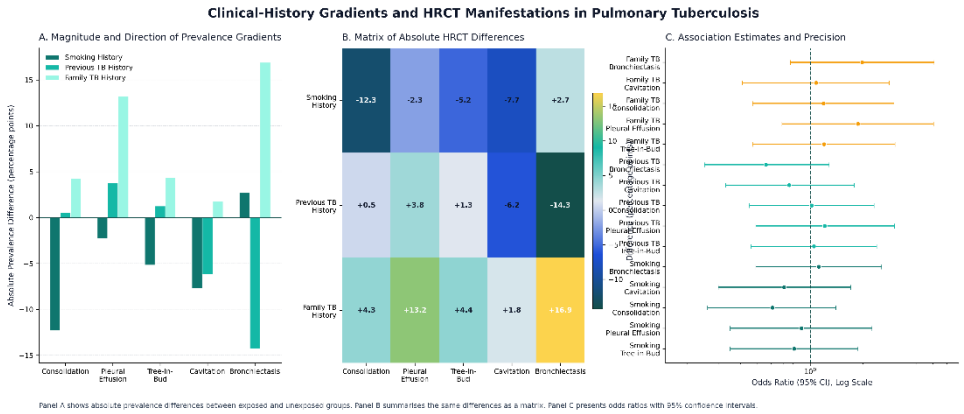

Figure 1. Clinical-History Gradients and HRCT Manifestations in Pulmonary Tuberculosis

The panelled figure demonstrates that none of the evaluated clinical-history variables showed a statistically significant association with HRCT manifestations, although clinically visible prevalence gradients were observed across selected comparisons. Family history of tuberculosis showed the largest positive absolute differences, particularly for bronchiectasis (+16.9 percentage points; 58.3% vs. 41.4%), pleural effusion (+13.2 percentage points; 37.5% vs. 24.3%), and consolidation (+4.3 percentage points; 50.0% vs. 45.7%), but the corresponding odds ratios had wide confidence intervals crossing unity, indicating limited precision. Smoking history was associated with lower observed frequencies of consolidation (-12.3 percentage points), cavitation (-7.7 percentage points), and tree-in-bud pattern (-5.2 percentage points), while bronchiectasis was only minimally higher among smokers (+2.7 percentage points). Previous tuberculosis history showed near-equivalent prevalence for consolidation (+0.5 percentage points) and tree-in-bud pattern (+1.3 percentage points), but bronchiectasis was numerically lower among patients with previous TB history (-14.3 percentage points; 39.2% vs. 53.5%). Overall, the visual pattern supports the statistical finding that HRCT manifestations were broadly distributed across clinical-history subgroups, with the most notable but non-significant gradients involving family history with bronchiectasis and pleural effusion.

DISCUSSION

This cross-sectional analytical study evaluated whether smoking history, previous tuberculosis history, and family history of tuberculosis were associated with selected HRCT manifestations among 94 patients with pulmonary tuberculosis. The principal finding was that none of the assessed clinical history factors showed a statistically significant association with consolidation, pleural effusion, tree-in-bud pattern, cavitation, or bronchiectasis on HRCT. Although some numerical gradients were observed, particularly higher bronchiectasis and pleural effusion frequencies among patients with family history of tuberculosis, all confidence intervals crossed unity and all p-values were greater than 0.05. These findings suggest that, within this sample, the selected clinical history variables did not independently identify distinct HRCT manifestation patterns, although the limited precision of estimates requires cautious interpretation.

The overall distribution of HRCT findings in this study was consistent with recognized imaging patterns of pulmonary tuberculosis. Consolidation was the most frequent finding, present in 44 patients (46.8%), followed by bronchiectasis in 43 patients (45.7%), tree-in-bud pattern in 40 patients (42.6%), cavitation in 34 patients (36.2%), and pleural effusion in 26 patients (27.7%). These manifestations reflect the broad radiological spectrum of pulmonary tuberculosis, in which active parenchymal inflammation, endobronchial spread, cavitary disease, airway injury, and pleural involvement may coexist. Previous radiological literature has described consolidation, tree-in-bud nodularity, cavitation, bronchiectasis, fibrosis, and pleural abnormalities as common CT features in active or prior pulmonary tuberculosis, supporting the clinical plausibility of the HRCT patterns observed in the present cohort (2–6).

Smoking history was not significantly associated with any HRCT manifestation in this study. Consolidation, tree-in-bud pattern, and cavitation were numerically less frequent among smokers than non-smokers, whereas bronchiectasis was only minimally higher among smokers. These results should not be interpreted as evidence that smoking has no clinical relevance in tuberculosis, because smoking has been consistently recognized as a risk factor for tuberculosis infection, disease progression, and adverse respiratory outcomes (7). Rather, the present findings indicate that a simple binary smoking-history variable did not differentiate the selected HRCT findings among patients who already had pulmonary tuberculosis. This may reflect the limited sample size, lack of smoking intensity data, and absence of exposure quantification such as duration, current versus former smoking status, and pack-years.

Previous tuberculosis history also showed no statistically significant association with HRCT findings. Consolidation and tree-in-bud pattern were nearly equivalent between patients with and without previous tuberculosis history, while cavitation and bronchiectasis were numerically lower among those with previous tuberculosis history. This finding is important because the initial expectation might be that prior tuberculosis would be associated with chronic airway or parenchymal sequelae. However, the study assessed only the presence or absence of previous tuberculosis and did not capture time since previous infection, adequacy of prior treatment, recurrence status, residual fibrosis, post-tuberculous lung disease severity, or baseline lung function. Prior tuberculosis can produce long-term thoracic sequelae, including bronchiectasis, fibrosis, pleural thickening, and structural distortion, but these changes are heterogeneous and may vary substantially according to disease extent, treatment history, and duration after the initial episode (8). Therefore, the absence of a significant association in this study should be interpreted as an exploratory finding rather than as evidence against post-tuberculosis structural change.

Family history of tuberculosis showed the largest numerical gradients among the three clinical history variables. Bronchiectasis was observed in 58.3% of patients with family history compared with 41.4% of those without family history, and pleural effusion was observed in 37.5% versus 24.3%, respectively. However, neither association reached statistical significance, and the confidence intervals were wide, indicating uncertainty around the estimates. Family history may indicate shared household exposure, delayed contact tracing, repeated infectious exposure, or common environmental determinants, but it does not necessarily determine the radiological phenotype once active pulmonary disease has developed. The present findings therefore suggest that family history may be more relevant as an exposure-risk marker than as a reliable predictor of specific HRCT manifestations.

The absence of statistically significant associations across all comparisons may have several explanations. First, the sample size of 94 patients may have been insufficient to detect modest differences in HRCT manifestations between clinical-history subgroups, especially where subgroup sizes were small, such as the family-history-positive group. Second, the exposures were measured as simple binary variables, which may have reduced sensitivity to clinically meaningful differences. Third, the HRCT findings were coded as present or absent rather than using a severity score, lobar distribution, laterality, extent of involvement, cavitary burden, bronchiectasis grade, or active-versus-chronic radiological classification. Fourth, potential confounders such as age, sex, nutritional status, diabetes, immune status, smear status, treatment phase, bacterial burden, and duration of symptoms were not included in the analysis. These limitations may partly explain why clinically plausible relationships did not reach statistical significance.

The findings should be interpreted within the limitations of the study design. The study was conducted at a single center using consecutive non-probability sampling, which may limit generalizability to other clinical settings. The study duration was short, and the sample was modest for evaluating multiple exposure-outcome associations. The analysis was primarily unadjusted, and odds ratios with confidence intervals indicate limited precision in several comparisons. In addition, smoking history, previous

tuberculosis history, and family history were not deeply characterized, and no multivariable model was used to control for confounding. The study also did not assess interobserver agreement for HRCT interpretation or use a standardized HRCT severity score. Despite these limitations, the study provides useful preliminary local evidence by systematically comparing selected clinical history factors with common HRCT manifestations in pulmonary tuberculosis patients.

Overall, the results indicate that consolidation, bronchiectasis, tree-in-bud pattern, cavitation, and pleural effusion were common but broadly distributed across smoking, previous tuberculosis, and family-history subgroups. The study does not support a statistically significant association between these clinical history variables and the evaluated HRCT manifestations. Future multicenter studies with larger sample sizes, standardized HRCT scoring, detailed exposure quantification, microbiological confirmation, and adjusted regression modeling are needed to determine whether clinical history factors meaningfully influence radiological phenotypes in pulmonary tuberculosis.

CONCLUSION

In this cross-sectional study of 94 patients with pulmonary tuberculosis undergoing HRCT chest evaluation, smoking history, previous tuberculosis history, and family history of tuberculosis were not statistically significantly associated with consolidation, pleural effusion, tree-in-bud pattern, cavitation, or bronchiectasis. Consolidation, bronchiectasis, and tree-in-bud pattern were the most frequent HRCT manifestations, while pleural effusion was the least frequent among the assessed findings. Although family history of tuberculosis showed numerically higher frequencies of bronchiectasis and pleural effusion, and previous tuberculosis history showed a numerically lower frequency of bronchiectasis, the wide confidence intervals and non-significant p-values indicate limited precision and do not support definitive subgroup differences. These findings suggest that the assessed HRCT manifestations were broadly distributed across the selected clinical-history groups in this sample, and larger adjusted studies using standardized HRCT severity assessment are required to clarify whether patient history factors have clinically meaningful relationships with radiological patterns in pulmonary tuberculosis.

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