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A Hospital-Based Observational Study on the Clinical Spectrum of Interstitial Lung Diseases

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ABSTRACT

Introduction: Interstitial lung diseases (ILDs) are a diverse group of diffuse parenchymal lung disorders of varying aetiology, which cause considerable morbidity and mortality. These conditions include IPF, CTD-ILD, HP, sarcoidosis as well as other much less common forms. The ILDs constitute a significant group of diseases, with high morbidity and impaired quality of life, and are associated with increased health care usage. The purpose of this study was to assess the clinical features, radiological patterns, pulmonary function, and comorbidities of ILD subjects at a tertiary hospital.

Materials and Methods: The study was an observational hospital-based recruiting 70 consecutive patients with ILD from January 2024 until July 2025. The following factors were assessed: clinical characteristics, demographic information, pulmonary function, radiological pattern, and comorbid diseases. Inclusion criteria were adults older than 18 years with ILD diagnosed based on HRCT and discussed by a multidisciplinary team. Patients with active pulmonary infections, a history of malignancy, or incomplete data were excluded.

Results: The mean age was 56.8 ± 11.4 years; 60% were female. Idiopathic pulmonary fibrosis (IPF) was the most common subtype (34.3%), followed by connective tissue disease-associated ILD (CTD-ILD) (28.6%), hypersensitivity pneumonitis (HP) (18.6%), and sarcoidosis (11.4%). Dyspnea (92.9%) and cough (85.7%) were predominant symptoms. HRCT showed a usual interstitial pneumonia (UIP) pattern in 38.6% and nonspecific interstitial pneumonia (NSIP) in 27.1%. Mean FVC% predicted was 62.4 ± 12.8, and DLCO% was 48.6 ± 13.2. Comorbidities included systemic hypertension (32.9%) and diabetes mellitus (25.7%).

Conclusion: IPF and CTD-ILD were the most common ILD subtypes. Dyspnea and cough were the predominant clinical manifestations, and UIP was the most prevalent HRCT pattern. Early ILD identification is imperative in order to improve patient outcomes.

Keywords: *Interstitial lung disease, idiopathic pulmonary fibrosis, hypersensitivity pneumonitis, HRCT, pulmonary function test*

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1. INTRODUCTION

Interstitial lung diseases (ILDs) constitute a broad and heterogeneous family of diffuse parenchymal lung diseases of differing degree of inflammation and fibrosis within the lung interstitium. These conditions include IPF, CTD-ILD, HP,

sarcoidosis as well as other much less common forms. [1] The ILDs constitute a significant group of diseases, with high morbidity and impaired quality of life, and are associated with increased health care usage. [2].

The frequency and clinical forms of ILD change with geographical area, depending on the exposure to environment, genetic susceptibilities and healthcare systems. [3] Environmental exposures such as biomass fuel, bird handling, and agriculture in India have been associated with HP, while autoimmune diseases contribute substantially to CTD-ILD cases. [4] Furthermore, some Indian registries showed a higher prevalence of women as compared to the Western cohorts. [5]

IPF is a type of ILD that is characterized by a progressive fibrotic lung disease, which is relatively refractory to treatment and has a median survival of 3–5 years post diagnosis. [6] The introduction of antifibrotic agents (pirfenidone, nintedanib) has changed the therapeutic scenario, but the prognosis is still poor. [7] CTD-ILDs, such as those in connection with RA and SSc, show a wide range of clinical presentation and are frequently treated using immunosuppressants. [8] HP is due to repetitive antigen exposure and can improve with antigen avoidance and immunomodulation if diagnosed early. [9] Sarcoidosis is much less common, with discrete granulomatous inflammation, and can involve any organ. [10]

The diagnosis of ILD is difficult and a multidisciplinary approach between clinicians, radiologists, and pathologists is needed. [11] HRCT has become the primary imaging modality:[12] it provides pattern-based evidence to facilitate differentiation between UIP, NSIP, and organizing pneumonia patterns. [12] Pulmonary function tests (PFTs), forced vital capacity (FVC) and diffusing capacity for carbon monoxide (DLCO) are still crucial in determining severity and progression of disease. [13]

Although the understanding is increasing, studies are limited on ILD from low and middle-income countries, such as India. The ILD India registry also had its limitations in that the ILD subtypes found in India do not necessarily reflect what is seen globally, where HP and CTD-ILD form a larger chunk as compared with IPF. [14] Nevertheless, hospital–based observational data are still scarce and regional variation needs to be studied in detail. [15]

The purpose of this study was to assess the clinical features, radiological patterns, pulmonary function, and comorbidities of ILD subjects at a tertiary hospital. Results might help in understanding the demographic, and clinical trend, the disease heading in India and may pave way for better diagnostic and management interventions.

2. MATERIALS AND METHODS

This hospital-based observational study was conducted at the Department of Respiratory Medicine , Apollo medical college & Research(AIMSR), Chittoor between January 2024 and July 2025.

Study Population

A total of 70 consecutive patients diagnosed with ILD were enrolled. Diagnosis was made using a multidisciplinary discussion (MDD) that included pulmonologists, radiologists, and rheumatologists.

Inclusion Criteria

Age ≥18 years.

Confirmed ILD diagnosis on HRCT chest.

Availability of complete clinical, radiological, and functional data.

Consent to participate in the study.

Exclusion Criteria

Patients with evidence of active pulmonary infection (e.g., tuberculosis, pneumonia).

History of lung malignancy.

Incomplete medical records or inability to perform PFTs.

Patients lost to follow-up immediately after diagnosis.

Data Collection

The following demographic data (age, sex, BMI, smoking), symptoms on arrival (dyspnea, cough, chest pain, fever, hemoptysis), and comorbidities were collected. HRCT patterns were defined as UIP, NSIP, OP, and others. PFTs were forced vital capacity (FVC) (% predicted) and diffusing capacity of the lung for carbon monoxide (DLCO) (% predicted). Laboratory findings of suspected CTD-ILD and autoimmune serology were carried out.

Statistical Analysis

The analysis was performed using SPSS version 25. Continuous variables were presented as means ± SD, and categorical variables were presented as percentages. Subtype-wise, patients were compared among the ILDs. Statistical significance was defined as $p < 0.05$.

3. RESULTS

Table 1. Demographic Characteristics of ILD Patients (n=70)

Variable	Value
Mean Age (years)	56.8 ± 11.4
Female (%)	42 (60%)
Male (%)	28 (40%)
BMI (kg/m²)	24.6 ± 3.1
Smokers (%)	18 (25.7%)

In table 1, the mean age at diagnosis was around 57 years, suggesting that ILDs predominantly affect middle-aged to elderly individuals. The female predominance (60%) is noteworthy, reflecting trends reported in the Indian ILD registry.

Table 2. Clinical Presentation

Symptom	Frequency (%)
Dyspnea	65 (92.9%)
Cough	60 (85.7%)
Fatigue	30 (42.9%)
Clubbing	22 (31.4%)
Chest pain	12 (17.1%)

In table 2, Dyspnea (92.9%) and cough (85.7%) were predominant symptoms.

Table 3. ILD Subtypes Distribution

Subtype	n (%)
IPF	24 (34.3%)
CTD-ILD	20 (28.6%)
HP	13 (18.6%)
Sarcoidosis	8 (11.4%)
Others (unclassifiable)	5 (7.1%)

In table 3, Idiopathic pulmonary fibrosis (IPF) was the most common subtype (34.3%), followed by connective tissue disease-associated ILD (CTD-ILD) (28.6%), hypersensitivity pneumonitis (HP) (18.6%), and sarcoidosis (11.4%).

Table 4. HRCT Findings

Pattern	n (%)
UIP	27 (38.6%)
NSIP	19 (27.1%)
OP	10 (14.3%)
Ground-glass opacity	8 (11.4%)
Honeycombing	6 (8.6%)

In table 4, HRCT showed a usual interstitial pneumonia (UIP) pattern in 38.6% and nonspecific interstitial pneumonia (NSIP) in 27.1%.

Table 5. Pulmonary Function Test Results

Parameter	Mean ± SD
FVC % predicted	62.4 ± 12.8
DLCO % predicted	48.6 ± 13.2

In table 5, the mean FVC (62%) suggested moderate restrictive ventilatory impairment, while DLCO (49%) was more severely reduced, indicating significant impairment of gas exchange capacity.

Table 6. Comorbidities and Treatment

Variable	n (%)
Hypertension	23 (32.9%)
Diabetes mellitus	18 (25.7%)
Coronary artery disease	10 (14.3%)
Antifibrotics (Pirfenidone/Nintedanib)	20 (28.6%)
Corticosteroids/Immunosuppressants	25 (35.7%)

In table 6, Comorbidities included systemic hypertension (32.9%) and diabetes mellitus (25.7%).

4. DISCUSSION

This hospital record-based study offers a perspective of clinical profile of ILD patients in an Indian tertiary care center. All the average age at diagnosis was 56.8 years; this is in agreement with previous reports claiming that ILDs mainly occur in middle-aged and older individuals. [16] The female preponderance (60%) seen in our analysis is consistent with ILD India registry [17] which showed females having a higher number of ILDs compared to Western counterparts.

IPF was found to be the predominant subtype (34.3%), as has been observed worldwide where IPF represents one-third of ILDs. [18] Nevertheless CTD-ILD (28.6%) and HP (18.6%) were also common, in keeping with the Indian scenario where

environmental exposures and autoimmune diseases have a strong association^19^. In the Western data IPF is the main type and HP is minor. [19,20]

The most common symptoms at presentation were dyspnea and cough, similar to other registries. [21] Clubbing was reported in ~30% of patients, characteristic of fibrotic ILDs. By HRCT, UIP pattern was the most prevalent pattern (38.6%), consistent with IPF findings, but is also observed in end-stage CTD-ILD. [22] The prevalence of NSIP was 27.1%, which is consistent with a report in systemic sclerosis-ILD and other autoimmune diseases. [23]

Functional damage was significant with a mean FVC of 62.4% and DLCO of 48.6%. The absolute values suggest moderate to severe restriction, which is similar to the report from Indian cohort by Dhooria et al. [24] Moreover, the PFTs continue to be important in assessing disease progression and treatment responsiveness. [25]

Comorbidities such as hypertension (32.9%) and diabetes mellitus (25.7%) were common, underlining the importance of comprehensive care. Approximately 1/3 of patients received antifibrotics, which have penetration in IPF and emerging in progressive fibrosing ILDs. [26]

Our study contributes to a scanty Indian hospital-based literature and further substantiates the regional variations in spectrum of ILD. Strengths of the study are consistent assessment by MDD and extensive characterization. Limitations include single-center design and a relatively small number of patients (70) that may not be representative of larger epidemiologic trends.

5. CONCLUSION

This single hospital-based observational study includes 70 patients with ILD and shows that IPF and CTD-ILD are the most common subgroups in our series. Dyspnea and cough were the most common symptoms, the UIP pattern was the most frequent HRCT finding, and most patients demonstrated moderate to severe restriction on PFTs. These results are in accordance with Indian registry data and highlight the need for early detection and multidisciplinary treatment. In conclusion, our findings suggest that early recognition, assessment of environmental risk and prompt implementation of therapy may be necessary in Indian ILD patients.

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