Original research article

A Study of Clinical, Radiological, and Functional Profile of Patients with Interstitial Lung Disease

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Abstract

Background: Despite the rarity of these illnesses, some interstitial lung disease (ILDs) individuals may experience a progressive-fibrosing phenotype. A deterioration in lung function, increased respiratory symptoms, a limited response to immunomodulatory treatments, a reduction in quality of life, and perhaps an early death are all consequences of progressive fibrosis. We in the current study tried to evaluate the clinical, radiological, and functional profile of patients with interstitial lung diseases reporting to our tertiary care hospital.

Methods: Consecutive patients with the diagnosis of ILD as per guidelines with multidisciplinary modality were included in the study. A thorough medical history was obtained, followed by a comprehensive clinical examination. A complete hemogram, blood sugar levels, renal function tests, arterial blood gas analysis with calculation of the alveolo-arterial (Aa) gradient, spirometry with measurement of the carbon monoxide diffusion capacity (DLCO), six-minute walk distance (6MWD), post-exercise desaturation, and radiological investigations like chest roentgenograms (CXR) and high-resolution computerized tomography (HRCT) thorax were reported.

Results: Average duration of symptoms in patients was 42.54 (6.1) months. End-inspiratory Velcro crackles were the most common examination finding in 138 (98.57%) followed by clubbing in 78 (55.7%). Post-exercise desaturation was found in n=26 patients (89.66%). The common diagnosis was idiopathic interstitial pneumonias (IIP) n=17(58.62%). Other common etiologies were granulomatous diseases like sarcoidosis in n=2(10.34%) hypersensitivity pneumonitis in n=2(6.89%) and connective tissue disease associated with ILD in n=5(17.24%). Rest n=3 cases included occupational ILD, drug-induced ILD, and topical pulmonary eosinophilia in one case each.

Conclusion: Interstitial Lung disease (ILD) is a chronic respiratory disease, and its diagnosis must be done with a multidisciplinary approach without the requirement of a lung biopsy. Interstitial pulmonary fibrosis has a poorer prognosis compared to Nonspecific interstitial pneumonia despite optimal treatment. Cases with connective tissue disease-associated ILD, hypersensitivity pneumonitis and sarcoidosis show exceptional response to therapy.

Keywords: Interstitial Lung Disease (ILD), Pneumonia, Interstitial pulmonary fibrosis, Nonspecific interstitial pneumonia.

Introduction

Interstitial lung diseases (ILD) are a diverse range of conditions that affect the alveolocapillary membrane and have similar clinical, radiological, and pathophysiological characteristics. They are a collection of illnesses that are both poorly understood and undertreated. ILD also affects the alveolar and capillary membranes in addition to the interstitium. Inflammation and fibrosis of the interstitium, which results in a disturbance of alveolar architecture and the loss of functioning alveolar-capillary units, are the two most noticeable characteristics of ILD. [1, 2] There are more than 150 recognized factors that contribute to ILD. They may be due to a recognized cause, such as drug use, connective tissue diseases (CTD), or inherited conditions, or they may be idiopathic. [3] These diseases primarily fall under the category of idiopathic interstitial pneumonias. Combining clinical, radiographic, and pulmonary function test results can help make a diagnosis. With the introduction of modern diagnostic techniques, such as high-resolution computed tomography, a histological diagnosis is no longer necessarily required for the diagnosis of the disease. Unfortunately, the majority of patients still struggle to find the appropriate treatment, which frustrates both patients and doctors because illness often worsens, and problems arise despite immunosuppressive treatments. [4] In the majority of instances, histopathological confirmation of the diagnosis is not necessary. The advent of less intrusive techniques has led to a renaissance in interest in the study of these illnesses. Our diagnostic methods have been improved by the development of high-resolution computed tomography and the availability of video-assisted thoracoscopic lung biopsy. As of now, most of the research on ILD comes from the west, with few studies from India. The goal of this study is to better understand ILD in the Indian setting by analyzing the range of ILD, their common presentations, radiological characteristics, and comorbidities. Therefore, we decided to research the clinical characteristics of our institute's patients with interstitial lung disease.

Material and methods

This cross-sectional prospective study was conducted in the Department of Pulmonology, Government Medical College, and Hospital, Mahaboobnagar, Telangana. Institutional Ethical committee approval was obtained for the study. Written consent was obtained from all the participants of the study after explaining the nature of the study in the vernacular language. The cases included those who were referred to the pulmonary medicine department and were evaluated as per guidelines with multidisciplinary modality diagnosis of interstitial lung diseases. [1, 2]

Inclusion criteria

1. Aged above 18 years.
2. Males and females
3. With the diagnosis of ILD
4. Voluntarily willing to participate in the study.

Exclusion criteria

1. Patients diagnosed with malignancy.
2. Patients with active tuberculosis
3. Not willing to participate in the study.

The case records form was used to record information about the patient's demography, history, clinical data, and investigation findings. A thorough medical history was obtained, followed by a comprehensive clinical examination. A complete hemogram, blood sugar

levels, renal function tests, arterial blood gas analysis with calculation of the alveolo-arterial (Aa) gradient, spirometry with measurement of the carbon monoxide diffusion capacity (DLCO), six-minute walk distance (6MWD), post-exercise desaturation, and radiological investigations like chest roentgenograms (CXR) and high-resolution computerized tomography (HRCT) thorax were reported (Figure 1, 2, 3, 4). Pulmonary function tests were performed on a computerized spirometer. Following recommendations [1, 2] a few individuals who agreed to a surgical lung biopsy were assessed. According to British Thoracic Society (BTS) 2008 guidelines [1] the patients were divided into groups of interstitial lung illnesses according to recognized causes, idiopathic interstitial pneumonias, granulomatous lung diseases, and unique entities. According to the updated American Thoracic Society (ATS)/European Respiratory Society (ERS) 2013 classification of idiopathic interstitial pneumonias, idiopathic interstitial pneumonias were further divided into categories. [2] Patients were treated with medication and pulmonary rehabilitation in accordance with recommendations. Where available, a six-month follow-up was documented.

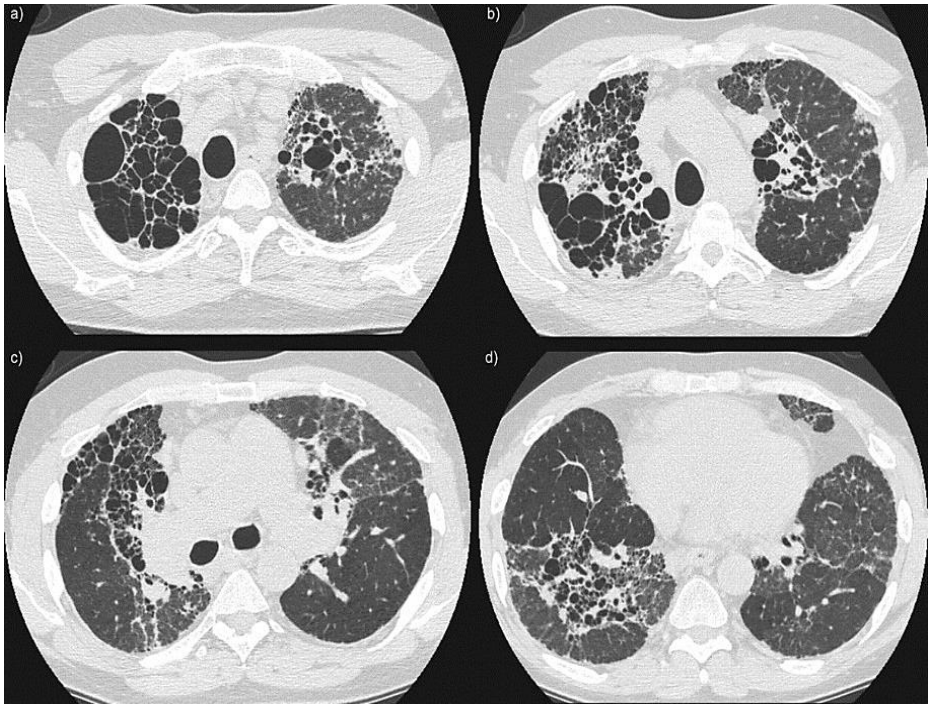

Figure 1: CT Findings of Sarcoidosis Stage 4 Suggestive of Pulmonary Artery Hypertension and Pulmonary Fibrosis

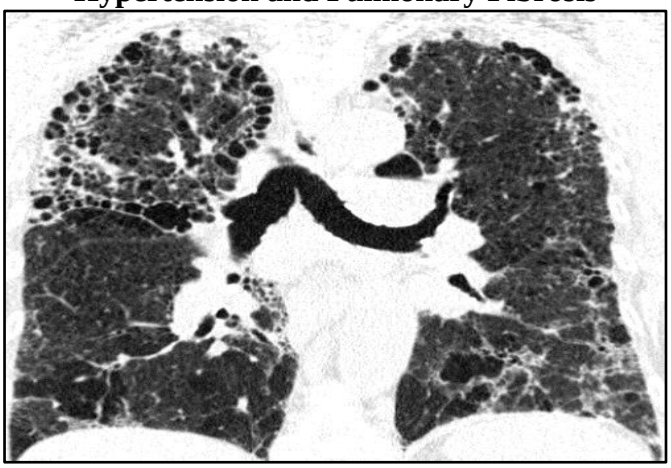

Figure 2: CT Findings suggestive of Chronic Hypersensitivity Pneumonitis

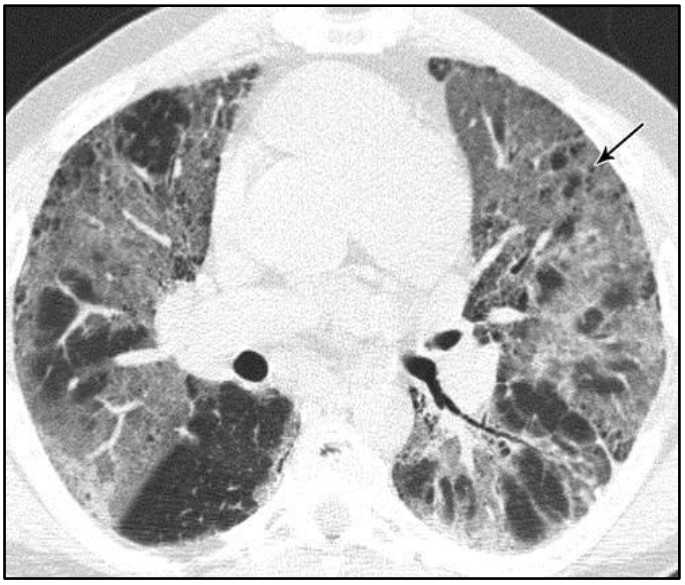

Figure 3: CT findings suggestive of NSIP pattern in CTD related ILD

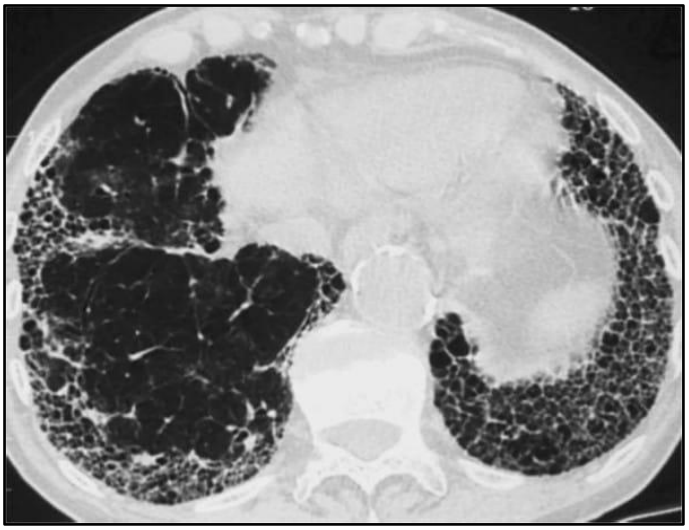

Figure 4: CT findings suggestive of UIP pattern in IPF

Statistical analysis: Frequencies and percentages were used in the analysis of qualitative data. The distribution of ages and sexes, the prevalence of different ILD subtypes, and the prevalence of different clinical and radiological variables were all examined as diverse clinical characteristics of interstitial lung disorders.

Results

A total of n=29 cases were included in the present study based on the inclusion and exclusion criteria. The age of distribution of cases was from 25 years to 77 years. The maximum number of cases was from the age group 51 – 60 years. The mean age of the cases in the study group was 54.5 ± 10.25 years. The detailed distribution of cases in the study has been depicted in table 1.

Table 1: Age-wise distribution of cases in the study

Age group	*Frequency*	*Percentage*
18 – 20	0	00.00
21 – 30	2	06.89
31 – 40	3	10.34
41 – 50	3	10.34
51 - 60	11	37.93
61 - 70	7	24.13
71 – 80	3	10.34
Total	29	100.0

In this study n=16 patients were males and n=13 were females depicted in figure 1. N=10 (34.48%) patients were smokers, cough and progressive breathlessness were the most common symptoms seen in n=27(93.1%) and n=26(89.65%) cases while other symptoms such as fever and chest pains were found in a few cases.

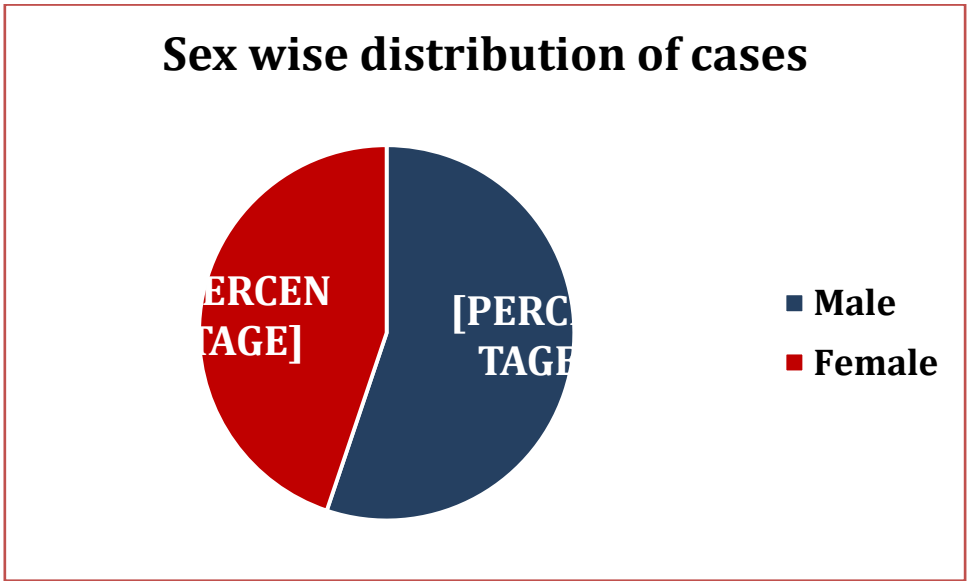

Figure 1: Sex-wise distribution of cases in the study

The average duration of symptoms in patients was 42.54 (6.1) months. End-inspiratory Velcro crackles were the most common examination finding in 138 (98.57%) followed by clubbing in 78 (55.7%). Post-exercise desaturation was found in n=26 patients (89.66%) details of signs and symptoms have been depicted in table 2.

Table 2: Clinical signs and symptoms recorded in the cases of the study.

Clinical symptoms	*Frequency*	*Percentage*
Breathlessness	27	93.10
Cough	26	89.66
Fever	03	10.34
Chest pain	05	17.24
Clinical signs		
Clubbing	16	55.17
Crackles	27	93.10
Post-exercise desaturation	26	89.66

Spirometry was done in all cases the mean forced vital capacity was 57.88% and FEV1 was 45.36%. The forced expiratory volume FEV1 / FVC ratio was 0.8 the mean diffusion capacity of lungs for carbon monoxide (DLCO) was 34.17%. The average 6-meter walking distance was 177.5 meters. On ABG, the average PaO2 was 76.02 (10.19) mmHg, PaCO2 was 35.02 (SD) mmHg and Aa gradient was 29.50 (12.5) depicted in table 3.

Table 3: Spirometry and other parameters recorded in the cases of the study.

Parameters	*Mean*	*± SD*
Forced Expiratory Volume (FEV1) in first second (%)	57.88	12.59
Forced vital capacity (%)	45.36	25.17
Forced Expiratory Volume in first second / Forced Vital Capacity ratio	0.8	0.04
Diffusion capacity of lungs for CO (%)	34.17	22.14
Six-minute walking distance (meters)	177.5	56
CRP (mg/dl)	2.2	1.6

Chest X-ray abnormality in the form of bilateral reticulonodular opacities was seen in all cases. The most common HRCT thorax findings were interlobular, intralobular, and septal thickening in n=23(29.31%) followed by honey coming in n=12(41.37%), centrilobular nodules in n=5(17.24%) Ground glass opacities in n=4(13.79%) and mediastinal adenopathy in n=2(6.89%) depicted in table 4.

Table 4: Radiological abnormalities on computed tomography of the thorax

CT abnormalities	*Frequency*	*Percentage*
Septal thickening	23	29.31
Ground glass opacities	4	13.79
Honeycombing	12	41.37
Centrilobular nodules	5	17.24
Mediastinal lymphadenopathy	2	6.89
Emphysema	2	6.89

Most of the cases in the study were belonging to idiopathic interstitial pneumonias (IIP) n=17(58.62%). Other common etiologies were granulomatous diseases like sarcoidosis in n=2(10.34%) hypersensitivity pneumonitis in n=2(6.89%) and connective tissue disease associated with ILD in n=5(17.24%). Rest n=3 cases included occupational ILD, drug-induced ILD, and topical pulmonary eosinophilia in one case each. Among the IIP cases, idiopathic pulmonary fibrosis was a common diagnosis in n=8(27.59%) followed by nonspecific interstitial pneumonia in n=7(24.14%) and respiratory bronchiolitis-associated ILD in n=2(6.89%). No cases in this study were diagnosed with desquamative interstitial pneumonia, cryptogenic organizing pneumonia, and acute interstitial pneumonia. The connective tissue disease associated with ILD was n=5 out of which rheumatoid arthritis was n=3 and n=2 had mixed connective tissue disease details depicted in table 5.

Table 5: Distribution of various types of interstitial lung diseases in the cases of the study

CT abnormalities	*Frequency*	*Percentage*
Idiopathic pulmonary fibrosis	8	27.59
Nonspecific interstitial pneumonia	7	24.14

Sarcoidosis	2	6.89
CTD associated ILD	5	17.24
Hypersensitivity pneumonitis	2	6.89
Respiratory bronchiolitis ILD	2	6.89
Occupational ILD	1	3.44
Drug-Induced ILD	1	3.44
Topical pulmonary eosinophilia	1	3.44

Given the inconsistent response and frequent side effects, ILD treatment is still up for dispute. As a result, a sizable portion of our patients with stable lung functions or who declined therapy was monitored closely. Among the cases who chose to get treatment, N=3(10.34%) received pirfenidone therapy and n=7(24.13%) received triple-drug therapy consisting of prednisolone, azathioprine/cyclophosphamide and N-acetyl cysteine, n=5(17.24%) received oral corticosteroids and n=2 cases of RBILD were managed with smoking cessation.

Discussion

The current study aimed to examine the clinical and radiological characteristics of individuals with interstitial lung disease. A heterogeneous collection of diseases known as interstitial lung disease (ILD) can manifest clinically and radiologically in many ways. [1, 2] A high degree of suspicion is kept for diagnosing this condition. Multiple anti-TB therapy regimens, including those for multidrug-resistant tuberculosis, are frequently administered to ILD patients. The prevalence of ILD is increasing, according to several pieces of research conducted in western countries. [5] Therefore, it is clear that the condition was previously both underdiagnosed and misdiagnosed. It is crucial to raise awareness of this illness among medical professionals and the general population. This illness has been the subject of very little research, particularly in the Indian scenario. [6-9] Hence, we conducted the present study. In the current study, we included n=29 consecutive cases diagnosed with ILD after multidisciplinary discussion. The age ranged from 24 – 67 years and the mean age of the cases in the study group was 54.5 ± 10.25 years. The findings of the current study were in concordance with several western studies and a few Indian studies in this field. [10 - 12] This study found no male preponderance for ILD similar reports have been published by Turner et al., [13] Sharma SK et al., [14] and Mahasur et al., [6] In this study we found n=5(17.24%) patients have a history of smoking. Smoking has been linked to many ILD, including IPF, RBILD, DIP, and CPFE. Patients who participated in our study received a customized ILD diagnosis based on their unique clinical and radiological characteristics. The majority of our patients n=17(58.62%) cases were classified as idiopathic interstitial pneumonias (IIP) Idiopathic pulmonary fibrosis was the most prevalent subtype n=8(27.59%). Followed by NSIP in n=7(24.14%), and connective tissue disease associated with ILD in n=5(17.24%). The results of the current study were similar to studies done by Kalra et al., [15] and Sen T et al., [10] and the western study by Coulltas et al., [16] The results of the ILD- Indian registry results which reported HP as the common cause of ILD in 47.3% and CTD associated ILD in 13.9% and IPF only in 13.7%. they attributed it to the increased use of air coolers in Northern India. The onset of symptoms of ILD is gradual and dyspnoea is the most prominent and disabling symptom. A non-productive cough that does not respond to antitussive medications is seen. Constitutional symptoms are unusual. In this study, we found dry cough and breathlessness were the common symptoms and constitutional symptoms such as fever and chest pain were less in a few patients. The important features of examination in cases of

ILD are clubbing, fine end-inspiratory Velcro crackles, and post-exercise desaturation. Several studies have found that clubbing may exist in up to 50% of cases and Velcro crackles in up to 80% of cases of ILD. [17, 18] This study found clubbing in 55.17% and crackles in 93.10% of cases respectively. The post-exercise desaturation was in 89.66% of cases. A significant post-exercise desaturation by greater than 4% is considered an important prognostic factor in ILD. Similar observations have been reported by other studies. [6, 19]

The majority of ILD may be diagnosed and classified using a multidisciplinary approach that includes clinical and radiographic correlation. Radiology is a crucial diagnostic tool. The requirement for surgical lung biopsy has been eliminated by more recent developments in imaging techniques. Some patients' chest radiographs may be normal. Reticulonodular opacities, the most typical CXR abnormality, were seen in every patient in our investigation. Interlobular and intralobular septal thickening in 79.8%, honeycombing in 41.37%, and centrilobular nodules in 17.24% were the most significant HRCT results. V Ramana et al., [8] in their study found septal thickening in 42% of cases, honeycombing in 38%, and ground glass opacities in 20%. Emphysema was seen in cases with combined pulmonary fibrosis and emphysema. Cottin et al., [18] found patients with severe hypoxemia and low DLCO well-preserved FVC severe pulmonary hypertension had higher mortality rates. The commonest spirometry abnormality in ILD is a restrictive picture with decreased DLCO. The most characteristic spirometry abnormality in ILD is a restrictive abnormality with decreased DLCO. Due to its easy availability, spirometry can be a very useful aid in the diagnosis, prognostication, and assessing response to therapy. In our study, all the patients showed a restrictive abnormality. Spirometry can be a highly helpful tool in the diagnosis, prognosis, and evaluation of therapeutic response due to its accessibility. In our investigation, restricting anomaly was present in every patient. ILD management begins with counseling on this chronic condition. The same advice was given to our patients and relatives' families. Pharmacotherapy for ILD aims to stop the disease's development rather than treat it. Triple medication therapy, which combines an oral corticosteroid, an immunosuppressive medicine such as azathioprine or cyclophosphamide, and N-acetylcysteine, was one of the most often used treatments for ILD. Newer research, however, has shown this treatment ineffective for IPF. Pirfenidone, an antifibrotic medicine, is one of the more recent medications used to treat IPF. Treatment with oral corticosteroids combined with immunosuppressive medications has been successful in treating non-IPF ILD in diseases like NSIP and CTD-related ILD.

Conclusion

Interstitial Lung disease (ILD) is a chronic respiratory disease, and its diagnosis must be done with a multidisciplinary approach without the requirement of a lung biopsy. Interstitial pulmonary fibrosis has a poorer prognosis compared to Nonspecific interstitial pneumonia despite optimal treatment. Cases with connective tissue disease-associated ILD, hypersensitivity pneumonitis and sarcoidosis show exceptional response to therapy. Patients with ILD required in-depth counseling that includes an explanation of the condition's natural course, treatment alternatives, side effects, and the best way to manage any treatable comorbidities that may be present.

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