ORIGINAL RESEARCH

A study of clinical and diagnostic profile of interstitial lung diseases at a tertiary care hospital

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ABSTRACT

Background: Interstitial pneumonias also called interstitial lung diseases (ILD) are a diverse group of over 100 diffuse parenchymal lung diseases often grouped together based on common clinical, radiological, and pathological characteristics. This study is sought to identify the etiology of the interstitial lung diseases in patients presenting to this tertiary care set up. **Materials and methods:** This was a prospective observational study, carried out at a tertiary care hospital from January 2021to June 2022. Adult patients presenting with respiratory symptoms and chest Xray findings suggestive of interstitial lung disease were screened further and checked for eligibility criteria. A total of 94 patients who met the eligibility criteria were subjected to routine diagnostic work up and HRCT chest to confirm the diagnosis. **Results**: This study revealed that Scleroderma was the most prevalent cause of ILD. CTD-ILD was the most common aetiology of ILD observed in this study.Additional causes included pneumoconiosis, smoking-related ILD, and hypersensitivity pneumonitis. Urban population (60.6%) made up the majority of participants, followed by suburban (23.4%) and rural (16%) populations. **Conclusion**: ILD is probably under reported in India, due to a lack of high-endfacilities, adequate awareness and clinical knowledge and appropriate testing at periphery. While CTD-ILD was shown to be the most prevalent cause in some Indian research, IPF was found to be the most common cause in others. According to this study, the most frequent cause of ILD in the local population presenting to this tertiary care institution is CTD-ILD.

Key Word: Diffuse Parenchymal Lung Disease, Interstitial Lung Disease, Connective tissue disorder-Interstitial Lung Disease. UIP, NSIP.

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INTRODUCTION

Interstitial lung diseases also called interstitial pneumonias are broadly classified as primary or idiopathic and secondary in association with other diseases. A newly revised classification includes eight pathologically defined categories, 6 common-UIP (usual interstial pneumonia), NSIP (non-specific interstitial pneumonia), COP(Cryptogenic organizing pneumonia), RBILD (respiratory bronchiolitis related), AIP (acute interstitial pneumonia) DIP (desquamative interstitial pneumonia), two less common LIP (lymphoid interstitial pneumonia) and PPFE (idiopathic pleuroparenchymal fibroelastosis) (2013, AJRCCM).The diagnosis is reached through a combination of clinical examination and history taking, laboratory work, physiologic studies, radiography, and, in some cases, pathologic tissue from a biopsy. Patient's usualpresenting scenario is a combination of symptoms ofdry cough and breathlessness,bilateral crepitations over chest on auscultation and bilateral infiltrates on chest Xray. Spirometry in majority of patients is of restrictive pattern. The primary feature of ILD is interstitium fibrosis, which causes the alveolar architecture to be disrupted, eventually decreasing their function [3]. The most common etiological causes of ILD (46.62%) were rheumatoid arthritis (13.32%), idiopathic pulmonary fibrosis (33.33%), and occupational factors, according to the article by Gagiya Ashok K [1]. To further simplify the diagnosis and

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management they were subcategorized into three types- chronically fibrosing type (UIP and NSIP), smoking related (DIP and RBILD) and those presenting acutely (COP and AIP).

MATERIALS AND METHODS

This is a prospective observational study, carried out on patients presenting to Department of Respiratory Medicine at Siddhartha Medical College, Vijayawada from January 2021 to June 2022. A total of 94 adult subjects, diagnosis consistent with ILD based on detailed history, physical examination and chest imaging (both male and females) were included in this study.

Study design: prospective observationalcross-sectional study.

Study location: Symptomatic patientspresenting to Pulmonary Medicine Department out-patient clinicsand emergency department of Government general hospital,Siddhartha Medical College, Vijayawada.

Study period: 18 months (January 2021 to June 2022)

Sample size:94

Sample size calculation: Prevalence is taken as 13.32% from the study by Gagiya AK et al [2], sample size is calculated by the formula$n = 4p(100 - p)/L$ 2 Where, P = prevalence i.e., 13.32%, L=allowable error=7%. The calculated sample size is equal to 94. Therefore, a minimum of 94 patients were taken up for the present study.

Inclusion criteria: Male and Female patients aged more than 18 years with presenting with unexplained respiratory symptoms and diffuse parenchymal infiltrateson Chest Xray, consistent with diagnosis of ILD on HRCT and willingness to participate in the study were included.

Exclusion criteria:

1. Patients with clinical or radiologicallly active tuberculosis.
2. Patients who are Sero-positive for HIV.
3. Patients with malignancy or other significant overlapping lung diseases.
4. Patients who have other severe comorbidities (cardiac failure, renal and liver failure etc)

Procedure methodology

After a detailed history and physical examination, the patients with likely diagnosis of interstitial lung disease, were subjected to necessary investigations like Xray and HRCT chest. Age, sex, occupation, and personal habits like smoking were among the demographic variables that were noted. Every patient had their symptoms and indicators such as hemoptysis, dyspnea, loss of appetite, and weight loss, evaluated. Several tests like urine RE, CBP with peripheral smear, blood urea, serum creatinine, random blood sugar, serum bilirubin, liver enzymes, bleeding time, clotting time and viral serology.Sputum testing for CBNAAT, malignant cytology, gram stain, and culture was done. Spirometry was done on cooperative and stable patients.Fibreoptic bronchoscopy to collect BAL sample for analysis was done in some patients. Connective tissue disease related markers (ANAs, Anti ds dNA, anti scl 70, Rh factor, C anca, Pancaetc)were sent when necessary. In patients presenting with pleural effusion, pleural fluid was sent for analysis. All investigative parameters along with physical examination were used to reach the diagnosis of ILD.

Statistical analysis

Data were transferred from data collection sheets to an Excel spread sheet (Microsoft, Redmond, WA, USA). Simple statistics such as percentages were used to calculate the prevalence.

RESULTS

During the study period of January 2021 to June 2022, after screening the symptomatics and excluding patients who are not eligible, 94 patients diagnosed as ILD were included. The participants' average age was 60.2 ± 8.7 years. 42 years old was the youngest and 89 years old. The majority of participants are between the ages of 51 and 60. In terms of age distribution, male participants made up 44.7% of the sample, while female participants made up over half (55.3%). Cough and Breathlessness were the prevalent symptoms reported at presentation, occurring in 80 patients (85.1%). Fall in oxygen saturation seen with exercise in some patients (38) while a few patients (11) have fall in oxygen saturation even at rest.

Table I shows that exposure history was seen with 14 patients. Exposure to birds was seen in 6 patients (42.8%) followed by Hay in 4 patients (28.5%), air conditioner in 3 patients (21.4%) and molds in 1 patient (7.1%).

Table II shows that 16 (17%) patients had hypertension and 11 (11.7%) had diabetes, some had history of atopy and asthma and some had associated cardiac manifestation.

Table IIICough and breathlessness were most common symptoms and common physical examination findings werebilateral crepitations in 75 patients.

Table IV shows that joint pain was seen in 12 patients (11.7%) and Raynaud’s phenomenon in 6 patients (6.4%). Scleroderma, SLE features in some.

Table V shows that Reticulonodular opacities (54.3%) was the most common finding in chest X-ray. Other findings like traction bronchiectasis and fibrosis with loss of lung volume also seen. Some Xrays didn’t reveal any gross findings.

Table VI shows that spirometry pattern in most of the patients was restrictive 72.05%, normal in 14.7%, mixed in 3% and 10.3% obstructive pattern. Restrictive pattern was most commonly with IPF patients (72.05%). Mean FVC (%) was 75.47±11.9. Spirometry was not performed in 36 patients.

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Table VIII shows that among the patients undergone for bronchoscopy and BAL, lymphocytes were seen in 7.4%, neutrophils in 5.3%, multicellular in 5.3% and macrophages in 3.2%.

Table 9 shows anti-scl 70 in 15 patients, RhF in 8 patients, anti-dsDNA in 3 patients, anti-JO1 in 1 patient.

Table I: Exposure history (N=14)

Exposure	Frequency (%)
Air conditioner	3 (21.4%)
Birds	6 (42.8%)
Hay	4 (28.5%)
Molds	1 (7.1%)

Table II: Co-morbidities associated with the patients (N=94).

Co-morbidities	Frequency (%)
Hypertension	16 (17%)
Diabetes	11 (11.7%)
Bronchial asthma	10 (10.6%)
Cardiovascular diseases (CVDs)	19 (20.2%)
No co-morbidities	61 (64.8%)

Table III: History and Physical examination findings among the patients (N=94).

Findings	Frequency (%)
Dyspnea	80 (85.1%)
Bilateral crepitations	75 (79.8%)
Cough	74 (78.7%)
Clubbing	22 (23.4%)
Normal findings	9 (9.6%)

Table IV: Extra pulmonary involvement among the patients (N=94).

Extra pulmonary findings	Frequency (%)
Joint pain and swelling	12 (11.7%)
Raynaud's and skin lesions	6 (6.4%)
Symptoms of GERD	6 (6.4%)
Skin tightening	4 (4.3%)
Normal findings	66 (70.2%)

Table V: Chest X-ray findings of participants (N=94)

Characteristics	Frequency (%)
Reticulonodular opacities	51 (54.3%)
Consolidation patches	7 (7.4%)
Reticular infiltrates	14 (14.9%)
Honey-Combing	18 (19.1%)
Ground glass opacities	8 (8.5%)
No gross abnormalities detected	13 (13.8%)

Table VI: HRCT pattern of patients (N=94).

Characteristics of HRCT pattern	ILD diagnosis	Frequency (%)
Subpleural and basilar predominant ground-glass opacities, reticular abnormality, honeycombing (UIP)	IPF	21 (22.35)
Basilar –predominant ground-glass opacities with or without subpleural sparing, reticular abnormality and no honeycombing (NSIP)	CTD- ILD	28 (29.8%)
	iNSIP	23 (24.5%)
Upper lobe predominant ground-glass opacities, poorly defined centrilobular nodules, mosaic attenuation, air trapping	HP	14 (14.9%)
Diffuse bronchial thickening with micronodules	RB-ILD	4 (4.3%)
Diffuse bronchial thickening with micronodules	DIP	2 (2.1%)
Upper predominant dense micronodules with current or past work occupation	Pneumoconiosis	2 (2.1%)

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Table VII: Spirometry pattern (N=68).

Characteristics	Frequency (%)
Restrictive	49 (72.05%)
Obstructive	7 (10.3%)
Mixed	2 (3%)
Normal	10 (14.7%)

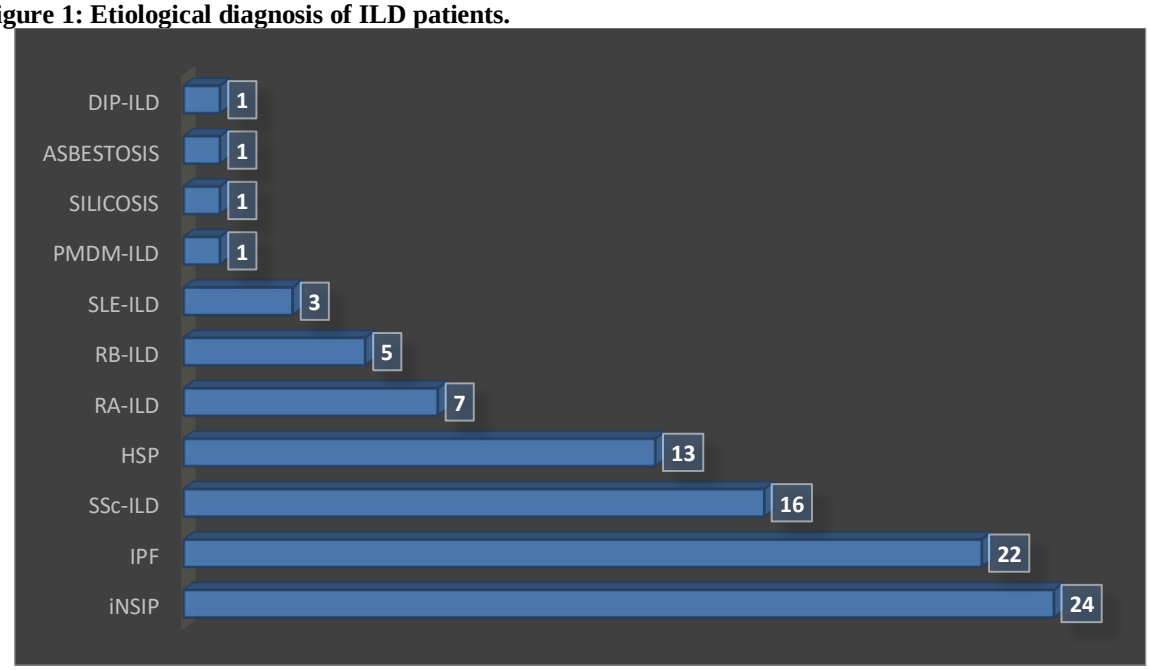
Table VIII: Broncho-alveolar lavage (BAL) (N=94).

Characteristics	Frequency (%)
Lymphocytes	7 (7.4%)
Neutrophils	5 (5.3%)
Multicellular	5 (5.3%)
Macrophages	3 (3.2%)
Uninterpretable	31 (38.3%)
Not done	46 (48.9%)

Table IX: Serum markers (N=27)

Serum markers	Type of CTD	Frequency (%)
Anti-scl70	Scleroderma	15 (55.6%)
Rh F	Rheumatoid arthritis	8 (29.6%)
Anti-dsDNA	Systemic lupus erythematotosis	3 (11.1%)
Anti-JO1	Polymyositis/dermatomyositis	1 (3.7%)

Figure 1: Etiological diagnosis of ILD patients.



DISCUSSION

Epidemiologic information regarding ILDs is varied, likely in part because of differences in patient selection and study design. Variations in the reporting of invalidated diagnoses and regional variations in diagnostic criteria resulting from variations in data collecting, diagnostic criteria, and procedures also contribute to discrepancies. It is possible that there have not been enough reports of ILD in India, owing to a lack of facilities, clinical knowledge, and appropriate diagnostic tests in the periphery. IPF and CTD-ILD have been reported to be the most common causes in several Indian research studies.

The majority of patients in the current study fell into the 51–60-year age group, followed by the 61–70 year age group. Peak incidence is similarly correlated with ages 50 to 59, according to the Kheliouen A [3] study. The study's patient population had an average age of 60.18± 8.7 years. In comparison to the Indian ILD registry, the mean age was less [9] This might be because there are more cases of CTD ILD, which manifest at a younger age.The higher percentage of females (55.3%) in our study may be attributed to the prevalence of CTD ILD (29.8%) in that population. In line with our findings, a study by Valappil et al. indicated that ILD linked to connective tissue disease was more common and that the population was

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primarily female. 54.3% of patients in the current study do not smoke, compared to 45.7% of smokers. In the current study, 14.8% of the patients had an exposure history. Of these, 6 patients (6.4%) had been exposed to birds, 4 patients (4.3%) to hay, 3 patients (3.2%) to air conditioners, and 1 patient (1.1%) to mould. Four patients (4.3%) had asbestosis and silica exposure at work. In our study, reticulonodular opacities (51%) were the most frequently observed radiological finding (HRCT Thorax).

In our study, cough (78.7%) and dyspnea (85.1%) were the most common symptoms. In 79.8% of the patients, there were bilateral crepitations. These results were in line with those of previous research. Patients with ILD who also had connective tissue disease had extra-pulmonary symptoms such as joint pain, skin thickening, Raynaud's phenomenon, hand ulcers, dry mouth, and dry eyes.

While bilateral reticular opacities were the most frequently observed chest radiograph finding (54.3%), 13.8% of the study population had a normal chest radiograph. This demonstrates that an HRCT is necessary for an accurate diagnosis of ILD and that the existence of a normal chest radiograph cannot rule out the condition.

The majority of cases are of connective tissue disease (ILD) idiopathic NSIP (24) wherespecific etiology couldn't be identified. Scleroderma (16). Rheumatoid arthritis (7) and systemic lupus erythematosus (3) are most frequently identified CTD related ILDs with NSIP pattern on CT scans. The next frequent cause idiopathic pulmonary fibrosis (22)UIP pattern on HRCT chest, followed by hypersensitivity pneumonitis (13) patients with exposure history..Respiratory bronchiolitis and desquamative interstitial pneumonitis pattern on HRCT chest, associated with smoking related ILD (5 patients) and pneumoconiosis (2 asbestosis and silicosis).

Spirometry was attempted in every patient;26 patients couldn't perform due dyspnea and coughing. Of the fifty-eight patients forty-nine had restrictive patterns, which are typically associated with most of the iLDs; seven had obstructive patterns; two had mixed patterns; and ten had normal results. In our study, the mean FVC (%) was 75.47±11.9. FVC was 75±18. DLCO was not performed in these patients.

Serum markers for anti-scl 70, Rh Factor, anti-dsDNA, and anti-JO1 were positive in 15 patients, 8 patients, and 1 patient, respectively, indicating a diagnosis of CTD-ILD. In particular, the diagnosis of HP heavily depends on a high index of clinical suspicion, a comprehensive history to extract environmental exposures linked to HP, and consistent HRCT imaging patterns. The best diagnosis could be made by histopathology, but lung biopsies were not possible for every patient. According to BAL results, 7.4% of patients who had bronchoscopies and BALs had lymphocytes, which were most frequently found in iNSIPpatients. 5.3% of IPF patients had neutrophils, 5.3% had multicellular organisms, and 3.2% had macrophages, which were frequently observed in ILD linked to smoking.

One of the study's limitations was that surgical lung biopsy (SLB) was not used for histopathology because it was impractical in the context of our investigation. As a result, in some patients, ILD diagnoses based solely on clinical criteria may not be accurate.

CONCLUSION

Finding etiology of ILD is a must as it will guide in the early diagnosis and management of the disease. Clinical prognosis and response to treatment protocols (steroids, antifibrotic drugs, immunosuppressants, mucolytics as indicated) are more likely to be determined by the etiology of ILD than any particular radiologic or histopathologic pattern.

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