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Original Research Article

Spirometry assessment of interstitial lung disease patients and correlation with its clinical and radiological profile

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ABSTRACT

Background: Interstitial lung diseases (ILD) are a diverse set of lower respiratory tract illnesses that are defined by both abrupt and persistent inflammation as well as a largely irreversible and continuous progression of fibrosis in the interstitium and the walls of the alveoli. This study focuses on non-invasive techniques for clinically and radiographically confirmed situations. Since most patients refuse surgical or transbronchial lung biopsies and are in respiratory difficulty, an alternate method is preferable. Spirometry tests are often used as diagnostic aids. This study compares spirometry in ILD patients with their radiological and clinical features.
Methods: In this prospective observational study, 50 ILD patients who were diagnosed on the clinical and radiological grounds included. A detailed history of illness was obtained and noted. All patients were examined clinically and underwent basic investigations. All patients were performed 6 MWT O_2 saturation and spirometry. Correlation between spirometry findings and clinical and radiological profile was done.
Results: The study group of 50 patients with ILD, idiopathic pulmonary fibrosis was the most common cause of ILD consists of 32 patients performing 64% of the study group. Average duration of symptoms in ILD patients in this study was 5.46±5.49 months. The mean age of the patients was 61.58±12.92 years ranging from 27 to 88 years with 27 (54%) male and 23 (46%) female. Cough and dyspnoea were the most common features at presentation in our study group, present in almost all the patients. Crepitations were present in 41 (82%) patients. Most common chest X-ray feature was reticular opacities which was present in 24 (48%) patients. Ground glass opacity in high-resolution computed tomography (HRCT) was seen in 33 (66%) patients. Most common spirometry pattern seen in our study was Restrictive pattern which was present in 42 patients. In ILD patients, mean values of FEV1% was 59.2±20.33, FVC% was 60.76±25.45, FEV1/FVC was 100.86±20.12.
Conclusions: Idiopathic pulmonary fibrosis is the most common and chronic hypersensitivity pneumonitis along with cryptogenic organizing pneumonia are the second common ILD in our study. The underdiagnosis of interstitial lung disease is due to a lack of knowledge among doctors. Therefore, spirometry and 6MWT O_2 saturation should be performed in all patients presented with complaints of chronic cough and breathlessness as screening tool and then HRCT chest and biopsy can be done for confirmation of diagnosis. So early diagnosis and treatment of ILD patients is possible with use of spirometry.

Keywords: Interstitial lung disease, Idiopathic pulmonary fibrosis, Spirometry, FEV1/FVC, HRCT chest

INTRODUCTION

Interstitial lung diseases (ILD) are a diverse set of lower respiratory tract illnesses that are defined by both abrupt and persistent inflammation as well as a largely irreversible and continuous progression of fibrosis in the interstitium and the walls of the alveoli. ILDs can happen to non-immunocompromised people who have no clinical

manifestations of an infection or malignancy. Clinically, exertional respiratory discomfort, bilateral lung infiltrates on thorax imaging, alterations in pulmonary function, and disturbances in gas exchange are the main characteristics of ILDs in general.[1] Idiopathic pulmonary fibrosis (IPF), a major type of ILD has an incidence and prevalence of 14.6 per 100,000 person years and 58.7 per 100,000 people, respectively, according to an American study. According to these figures, there may be around 20,00,000 IPF sufferers in densely populated nations like Bharat, Brazil, China and Russia.[2]

The majority of ILDs observed clinically can be attributed to disorders, like idiopathic pulmonary fibrosis, sarcoidosis, and ILDs associated to connective tissue diseases, out of the prevalent over hundreds unique types of ILDs.[3] The most prevalent form of interstitial lung disease, accounting for half of total occurrences of ILD, is IPF.[4] When compared to other ILDs, the outcome is typically worse, with an average survival duration of 2 to 3 years.[5] ILDs have a wide range of origins, but they all share a few traits, including clinical symptoms, pathophysiology, histopathological patterns and radiological characteristics. However, in several individuals, the medical history, laboratory values, and high-resolution computed tomography (HRCT) findings can be used to make a definite diagnosis. A confirmation of some ILDs can be made with bronchoalveolar lavage (BAL) performed with a fibreoptic bronchoscope and, in some situations, transbronchial biopsy is needed for the confirmation. In the other situations, a surgical lung biopsy (SLB) may be necessary, either through a video aided thoracoscopic surgery (VATS) or an operative thoracotomy.[6]

This study focuses on non-invasive techniques for clinically and radiographically confirmed situations. Since most patients refuse surgical or transbronchial lung biopsies and are in respiratory difficulty, an alternate method is preferable. Spirometry tests are often used as diagnostic aids. This study compares spirometry in ILD patients with their radiological and clinical features.

METHODS

Study design and setting

This was a prospective observational study that aimed at characterizing the clinical and radiological profiles of ILD patients and its correlation with spirometry findings. This study was conducted in Dr. D. Y. Patil Medical College Hospital and Research Institute, a tertiary care hospital in Kolhapur, Maharashtra, for a period of two years between May 2020 and May 2022. Any patient who visited the general medicine outpatient's department as well as admitted as inpatient department of our hospital and fulfilled the American Thoracic Society (ATS) and European respiratory society (ERS) criteria for ILD were included in the study. ILD patients with an apparent underlying causes like sarcoidosis, pneumoconiosis, malignancy, vasculitis, patients with past history of chronic lung diseases causing lung fibrosis like tuberculosis and patients with obstructive lung disease such as chronic obstructive pulmonary disease (COPD) and asthma were excluded from the study. Informed consent was obtained from every patient, and ethical clearance was obtained from the institutional ethical board prior to the initiation of the study.

Sample size

The sample size was 50.

Procedure methodology

Study was started after approval of research and ethics committee. ILD was diagnosed on clinical and radiological ground as per ATS definition and ERS definition of ILD.[7] Patients enrolled for the study were counselled regarding nature of study. Written informed consent was taken in their own language. Detailed clinical history was taken and clinical examination was done.

Major criteria

Major criteria of the study were: assessments of impaired lung performance provide findings of limitation and defective gas transport; exclusion of further recognized causes of ILD, such as specific medication toxicity, atmospheric hazards, and connective tissue illnesses; bibasilar reticular defects on HRCT images with hardly detectable ground glass opacification; and transbronchial lung biopsy or BAL not demonstrating any characteristics to support a different diagnosis

Minor criteria

Major criteria of the study were: sickness duration more than 45 days, gradual development of exertional dyspnea that is otherwise undiagnosed, older than 50 years, and bibasilar, inspiratory crackles (fine or "Velcro"-type in character).

Baseline O_2 saturation was measured then after 6-minute walk test (6MWT) and O_2 saturation was measured and recorded. OXYGARD OG 05 of MEDTECH was used for SpO_2 recording. A resting oxygen saturation of less than 88% or desaturation of 4% from baseline after 6-minute walk test was regarded as inappropriate by the majority of experts. Spirometry was done by Spirotech spirometer of Clarity Medical Pvt. Ltd. Table 1 shows the various parameters and patterns of spirometry.[8]

Statistical analysis

Statistical analysis was performed using Microsoft excel 2016 (master chart preparation). Continuous variables were described by using mean±standard deviation and proportions for categorical variables. Quantitative variables were compared using mean values and

qualitative variables using proportions. Significance level was fixed at $p<0.05$.

Table 1: Interpretation of spirometry data.

Spirometry patterns	FEV1	FVC	FEV1/ FVC
Normal	Normal	Normal	Normal
Mixed	Decreased	Decreased	Decreased
Restrictive	Decreased/ normal	Decreased	Normal/ increased
Obstructive	Decreased	Decreased/ normal	Decreased

FEV1: forced expiratory volume in 1 second; FVC: forced expiratory capacity

RESULTS

In the present study, majority, 28 (58%) of the patients of ILD belong to age group 61 to 80 years followed by 16 (32%) from ae group 41 to 60 years. Mean age of the patients was 61.58±12.92 years ranging from 27 to 88 years. The most common clinical diagnosis was idiopathic pulmonary fibrosis in 32 (64%) patients. Cryptogenic organizing pneumonia and chronic hypersensitivity pneumonitis were seen in 4 patients each. early idiopathic pulmonary fibrosis, nonspecific interstitial pneumonitis and acute interstitial pneumonitis were seen in 3 patients each. We found only one case of lymphocytic interstitial pneumonia. Table 2 shows the diagnosis frequency of ILD patients.

Clinical profile

Most common presenting symptom was cough in all 50 patients followed by breathlessness in 49 (98%), chest pain in 26 (52%) and fever in 13 (26%) patients. Lesser common symptoms noted were haemoptysis, bilateral lower limb swelling, fatigue, join pain and weakness. Cough was present since 5.46±5.49 months, breathlessness since 6.37±7.48 months, chest pain since 0.63±0.54 months, fever and haemoptysis since 0.89±0.75 and 0.81±0.80 months respectively. Among patients, common co-morbidities were hypertension in 38 (76%) patients followed by diabetes mellitus in 20 (40%) and coronary artery disease in 8 (16%) patients. 9 (18%) patients were free from any co-morbidity. 44% patients had history of smoking and 38% had history of alcohol intake. Table 3 shows comparison of age, gender, presenting symptoms and duration of symptoms in IPF and other types of diagnosis.

Table 2: Diagnosis frequency.

Diagnosis	Frequency	%
Idiopathic pulmonary fibrosis	32	64
Cryptogenic organizing pneumonia	04	08
Chronic hypersensitivity pneumonitis	04	08
Early idiopathic pulmonary fibrosis	03	06
Nonspecific interstitial pneumonitis	03	06
Acute interstitial pneumonitis	03	06
Lymphocytic interstitial pneumonia	01	02
Total	50	100

Table 3: Clinical profile of ILD patients.

Clinical profile	Diagnosis							
	Total	**AIP**	**CHSP**	**COP**	**Early IPF**	**IPF**	**LIP**	**NSIP**
Number of subjects	50	3	4	4	3	32	1	3
Average age in years (mean±SD)	61.58± 12.92	66.67± 13.03	57.50± 14.67	51.25± 11.03	51.66± 10.35	63.06± 12.32	49.00± NA	60.00± 11.69
Female\male	23 (46)/ 27 (54)	2/1	2/2	2/2	2/1	13/19	1/0	1/2
Smoking	22 (44%)	1	0	2	1	16	0	2
Cough (duration in months) (mean±SD)	5.45± 5.49	0.61± 0.58	4.63± 4.02	0.41± 0.36	2.50±1.96	6.75± 5.77	0.47± NA	8.82± 7.46
Breathlessness (duration in months) (mean±SD)	6.36± 7.48	0.36± 0.34	12.03± 12.00	0.35± 0.36	4.44±4.13	7.02± 7.12	4.00± NA	8.72± 8.01
Cough	50 (100)	3	4	4	3	32	1	3
Breathlessness	49 (98)	3	4	4	3	31	1	3
Haemoptysis	4 (8)	1	0	1	0	2	0	0
Clubbing	28 (56)	1	2	0	2	22	0	1
Hypertension	38 (76)	1	1	3	2	27	1	3

IPF: Idiopathic pulmonary fibrosis; COP: cryptogenic organizing pneumonia; CHSP: chronic hypersensitivity pneumonitis; NSIP: nonspecific interstitial pneumonitis; AIP: acute interstitial pneumonitis; LIP: lymphocytic interstitial pneumonia; SD: standard deviation; 6MWT: 6-minute walk test

Based on type of diagnosis, patients are divided into 2 groups: IPF and non-IPF. Mean age of the patients with IPF was 63.29±13.35 years and 57.60±11.26 years for non-IPF patients. Difference was not significant (p value 0.156). Desaturation on 6MWT (6-minute walk test) was in 24 IPF patients and mean baseline SpO_2 was 95% and average SpO_2 after 6MWT was 91% which was higher as compare to non-IPF patients (91.50% and 79.67% respectively). Table 4 shows the desaturation on 6MWT in IPF as well as non-IPF patients.

Table 4: Desaturation on 6 minutes' walk test.

Measurements	Final diagnosis		P value
	IPF	Non-IPF	
Desaturation on 6 MWT	24	14	0.000
No desaturation on 6MWT	8	4	0.000
Baseline SpO_2 (%)	95	91.50	0.648
Average SpO_2 after 6MWT (%)	91	79.67	0.037

6MWT: 6-minute walk test; SpO_2: O_2 saturation

Spirometry

On pulmonary function test (PFT), 7 (14.0%) patients had mild restrictive pattern, moderate restrictive pattern was seen in 20 (40.0%), 15 (30.0%) had severe restrictive pattern and 1 patient had severe obstructive pattern. 7 (14.0%) patients had normal PFT. In IPF patients, Moderate restrictive pattern was most common (44.12%) followed by severe restrictive pattern in 26.47% patients. In non-IPF patients, severe restrictive pattern was most common (37.5%) followed by moderate restrictive pattern in 26.47% patients. Difference between groups was not significant (p value 0.522). Table 7 shows the association between diagnosis and spirometry patterns.

Radiological profile

Chest X-ray shows most common pattern as reticular in 24 (48%) patients followed by 7 (14%) showed reticulonodular pattern. Lesser common patterns were nodular in 3 patients and consolidation in 3 patients. 10 patients had normal chest X rays. In IPF patients, on chest X-ray, majority of the patients (64.71%) had reticular pattern followed by reticulonodular pattern in 11.76% patients. But in non-IPF patients, most common finding was consolidations and reticulonodular in 3 (18.75%) patients each. Difference between two groups statistically significant (p value 0.008). On HRCT chest, most common finding was ground glass opacities in 33 (66%) patients, followed by septal thickening in 28 (56%) and subpleural opacities in 22 (44%) patients respectively. Honeycombing, reticulonodular opacities and fibrosis were seen in 20 (40%), 17 (34% and 16 (32%) patients respectively. In IPF patients, common HRCT findings were ground glass opacities in 25 (73.53%), septal thickening in 21 (61.76%) and sub-pleural opacities in 19 (55.88%) patients. In non-IPF patients, common HRCT findings were ground glass opacities in 8 (50%), septal thickening and tractional bronchiectasis in 7 (43.75%) each. Ground glass opacities and honeycombing were significantly more in IPF patients and consolidations surrounded by GGO and mosaic attenuation were significantly more in non-IPF patients (p values <0.05). Table 7 shows HRCT chest findings in ILD patients.

Table 5: Association between diagnosis and pattern of PFT.

Pattern of PFT	Final diagnosis (%)		Total	P value
	IPF	Non-IPF		
Mild restrictive	5 (14.71)	2 (12.5)	7 (14)	0.522
Moderate restrictive	15 (44.12)	5 (31.25)	20 (40)	
Severe restrictive	9 (26.47)	6 (37.5)	15 (30)	
Severe obstructive	1 (2.94)	0 (0)	1 (2)	
Normal	5 (14.71)	2 (12.5)	7 (14)	
Total	34 (100)	16 (100)	50 (100)	

PFT: pulmonary function test; IPF: idiopathic pulmonary fibrosis

In ILD patients, mean values of forced expiratory volume in 1 second (FEV1) % was 59.2±20.33, (forced expiratory capacity (FVC) % was 60.76±25.45, FEV1/FVC was 100.86±20.12 and of peak expiratory flow (PEFR) was 36.48±20. In IPF patients, mean values of FEV1% (60.00±20.22 and 57.33±21.19), FVC% (61.77±26.51 and 58.40±23.50), FEV1/FVC (100.83±21.27 and 100.93±17.84) and PEFR (39.03±21.36 and 30.53±15.45) were higher as compared to that for non-IPF patients. But difference between groups was not significant (all p values >0.05). Table 6 shows the average spirometry parameters among ILD patients.

Table 6: Spirometry Values.

Average spirometry	Final diagnosis				P value
	IPF		Non-IPF		
	Mean	SD	Mean	SD	
FEV1%	60.00	20.22	57.33	21.19	0.675
FVC%	61.77	26.51	58.40	23.50	0.672
FEV1/FVC	100.83	21.27	100.93	17.84	0.987
PEFR	39.03	21.36	30.53	15.45	0.171

FEV1: Forced expiratory volume in 1 second; FVC: Forced vital capacity; PEFR: Peaked expiratory flow rate

Table 7: Association of HRCT chest findings.

HRCT findings	Final diagnosis				Total (%)	P value
	IPF	Percent	Non-IPF	Percent		
Ground glass opacities	25	73.53	8	50.00	33 (66)	0.016
Septal thickening	21	61.76	7	43.75	28 (56)	0.522
Sub-pleural opacities	19	55.88	3	18.75	22 (44)	0.254
Honeycombing	17	50.00	3	18.75	20 (40)	0.012
Reticulonodular opacities	14	41.18	3	18.75	17 (34)	0.187
Fibrosis	12	35.29	4	25.00	16 (32)	0.266
Tractional bronchiectasis	8	23.53	7	43.75	15 (30)	0.304
Lymphadenopathy	5	14.71	1	6.25	6 (12)	0.293
Pleural thickening	3	8.82	3	18.75	6 (12)	0.446
Consolidations surrounded by GGO	0	0.00	4	25.00	4 (8)	0.005
Mosaic attenuation	0	0.00	3	18.75	3 (6)	0.017
Cysts	1	2.94	1	6.25	2 (4)	0.674
Pleural effusion	1	2.94	0	0.00	1 (2)	0.449

GGO: ground glass opacities IPF: idiopathic pulmonary fibrosis

DISCUSSION

The current investigation involved 50 patients with interstitial lung disease who attended the outpatient department (OPD) or were hospitalized as IPD to the department of general medicine at a tertiary care facility.

Age distribution of the patients

In the present study, majority, 28 (58%) of the patients of ILD belong to age group 61 to 80 years followed by 16 (32%) patients from age group 41 to 60 years. So, majority of patient in our study are above 40 years. Mean age of the patients was 61.58±12.92 years. The mean age of diagnosis for ILD was 55.3±13.7 years, according to research by Singh and Collins et al.[9] The most prevalent age group in research on ILD (Table 8) was found to be approximately 50 to 60 years.[10-13]

Table 8: The common age group affected by ILD, in our population is similar to the one reported elsewhere.[10-13]

Study	Mean age (years)
Sreekala et al[10]	54.03±11.08
Rai et al[11]	52.7±14.9
Jafri et al[12]	49±13.2
Nipun et al[13]	53.68
Present study	61.58±12.92

Gender distribution of the patients

Male patients exceeded female patients by a proportion of 54% to 46%. The ratio of men to women was 1.17:1. Our analysis confirms the male preponderance of ILD, which is consistent with the majority of another research, including those by Mahasur et al, Gagiya et al, and Yadav et al.[14-16] Few research, such as those by Kumar et al, Jindal et al, and Subhash et al, reveal a female preponderance in comparison to our study.[17-19]

Presenting symptoms in patients

Most common presenting symptom was cough in all 50 patients followed by breathlessness in 49 (98%), chest pain in 26 (52%) and fever in 13 (26%) patients. Lesser common symptoms noted were haemoptysis, bilateral lower limb swelling, fatigue, joint pain and weakness. These findings were consistent with the literature.[20]

The current research's findings of coughing in all of the patients are consistent with the findings of Abhishek et al study (90%). In 98% of patients, breathlessness was evident.[20] In studies by Sen et al, Gagiya et al, Jindal et al, Mahasur et al, and Nipun et al, breathlessness presentation was 100%, while in studies by Kumar et al, it was 92%.[13-15,17,18,21]

Average duration of symptoms

In our study, cough was present since 5.46±5.49 months, breathlessness since 6.37±7.48 months, chest pain since 0.63±0.54 months, fever and haemoptysis since 0.89±0.75 and 0.81±0.80 months respectively. According to research by Dhooria et al, the typical sickness ranged between three to ten months.[22]

General examination

Non-smokers (28, 56%) made up the bulk of the patients. These findings resemble those of research by Singh and Collins et al, Jafri et al, and Kumar et al.[9,12,17] Of the patients, 28 (or 56%) have clubbing. On auscultation of the respiratory system, we detected crepitations in 41 (81%) individuals. Studies conducted by Kumar et al and Jafri et al both reported findings that were comparable.[11,12]

O_2 desaturation on 6MWT

In 38 (76%) individuals, the 6MWT revealed significant O_2 desaturation (SpO_2 88% or decline from baseline by >4%). The extensive state of the illness at presentation may be a tenable justification for this. After 6MWT, the average oxygen saturation dropped from 93.25% to 85.33%.

Diagnosis

Most common clinical diagnosis was IPF in 32 (64%) patients. Cryptogenic organizing pneumonia and chronic hypersensitivity pneumonitis were seen in 4 patients each. The findings were consistent with research by Jindal et al, Sen et al, and Kundu et al.[18,21,23] Early IPF, nonspecific interstitial pneumonitis and acute interstitial pneumonitis were seen in 3 patients each. We found only one case of lymphocytic interstitial pneumonia. In contrary to our study, research by Singh and Collins et al and Sreekala et al revealed that CTD related ILD was the most prevalent ILD, and research by Kumar et al stated that HSP was the most prevalent ILD.[9,10,17]

Pattern on spirometry

On spirometry, 7 (14.0%) patients had mild restrictive pattern, moderate restrictive pattern was seen in 20 (40.0%), 15 (30.0%) had severe restrictive pattern and 1 patient had severe obstructive pattern. Only 7 (14.0%) patients had normal spirometry. The study done by Nipun et al showed that 40% patients had restrictive pattern and 28% patient had obstructive pattern.[13] In a study by Mahasur et al documented many patients with airway restriction as measured by increased FEV1/FVC (97%) and forced vital capacity <30% on spirometry in 27% patients.[14] In our study, mean values of FEV1% was 59.2±20.33, FVC% was 60.76±25.45 and FEV1/FVC was 100.86±20.12. Kumar et al study itemized the mean values of FEV1, FVC and FEV1/FVC as 61%, 64% and 90 respectively which is closely resembles to our study.[17] One study from USA by Flaherty et al also discovered mean value of FVC (68%) which is close to results of our study.[25]

Chest X-ray findings

Chest X-ray shows most common pattern as reticular in 24 (48%) patients followed by 7 (14%) showed reticulonodular pattern. Lesser common patterns were nodular in 3 patients and consolidation in 3 patients. 10 patients had normal X rays. Yadav et al also described the similar chest X-ray findings in their study.[16] Conventional thoracic radiographs of patients with pulmonary fibrosis typically reveal widespread or localized, reticular or nodular opacities that are particularly prominent in the basal regions. Nevertheless, there isn't any clear link between the degree of fibrosis, the intensity of the illness, and radiographic results. Patients with ILD may have normal thoracic X-ray results.

HRCT findings

On HRCT, most common finding was ground glass opacities in 33 (66%) patients, followed by septal thickening in 28 (56%) and subpleural opacities in 22 (44%) patients respectively. Honeycombing, reticulonodular opacities and fibrosis were seen in 20 (40%), 17 (34%) and 16 (32%) patients respectively. In their research, Yadav et al also discussed the related HRCT thorax results.[16] The HRCT of the thorax has evolved into a crucial component of the assessment of patients with ILD because of the shortcomings of the thoracic radiograph. To distinguish IPF patients from those with other ILDs is the main goal of HRCT. There are three CT scanners accessible in India for every 10-lakh people. So, in comparison to industrialized countries, the penetration of CT scans is limited. Second, the price of the CT scan is unquestionably a factor that contributes to its restricted penetration. Larger rural populations lack exposure to CT scanners because most of them are located within and near metropolis, which further delays the diagnosis of ILD. Table 10 shows comparison of HRCT findings with other studies.

Table 9: Clinical characteristics of ILD patients are compared to those from previous research.

Characteristics	Present study	Deependra et al[11]	Jafri et al[12]	Yadav et al[16]	Sen et al[21]	Mahesh et al[24]
Number of subjects	50	262	253	116	273	35
Average age (years)	61.58±12.92	52±14.9	49±13.2	45	48	61.5
Male/female (%)	54/46	46/54	30/70	60/40	33/67	46/54
Smoking (%)	44	15	18	51	-	57
Duration of symptoms	5.45±5.49 months	2.8±2.7 years	-	2.47 years	18-27 months	15 months
Cough (%)	100	86	86	84	100	94
Breathlessness (%)	98	95	95	74	100	100
Clubbing (%)	56	48	47	41	50	57
Desaturation on 6 MWT (%)	76	-	43	62	-	-
Hypertension (%)	76	16	28	-	-	34
Crepitations (%)	82	83	73	-	-	88

Table 10: HRCT chest features compared with previous studies.

HRCT features	Present study	Manoj et al[26]	Patil et al[27]	Kundu et al[24]	Yadav et al[16]	Kumar et al[17]
GGO (%)	66	75	48	23	64	34
ST (%)	56	86	64	-	-	-
SPO (%)	44	86	-	75	-	38
HC (%)	40	55	-	84	35	37
RN (%)	34	-	64	82	-	-
F (%)	32	-	-	-	54	50
TB (%)	30	53	52	-	41	18

GGO: ground glass opacity, ST: septal thickening, SPO: subpleural opacities, HC: honey combing, RN: reticulonodular opacities, F: fibrosis, TB: tractional bronchiectasis

IPF and non-IPF patients

Clinical parameters

Based on type of diagnosis, patients are divided into 2 groups: IPF and non-IPF. The IPF patients were 32 while others were non IPF. Mean age of the patients with IPF was 63.29±13.35 years and 57.60±11.26 years for non IPF patients. Apparently, there wasn't any distinction between IPF and non-IPF patients in terms of respiratory complaints. In individuals who did not have IPF, the mean duration of the disease symptoms was around 2.7 months, but it was between 6 and 12 months in IPF patients. In IPF patients especially in comparison to non IPF patients, smoking history is more common. (50% versus 33%) Only 38% of non-IPF patients had clubbing, compared to 68% of IPF patients. The average baseline SpO_2 was 95 %, and the average SpO_2 after 6 MWT was 91%, which was greater than that of non-IPF patients (91.50% and 79.67%, respectively). Desaturation occurred in 24 IPF patients.

Pattern of spirometry and diagnosis

In IPF patients, moderate restrictive pattern was most common (44.12%) followed by severe restrictive pattern in 26.47% patients. In non-IPF patients, severe restrictive pattern was most common (37.5%) followed by moderate restrictive pattern in 26.47% patients. In IPF patients, mean values of FEV1% (60.00±20.22 and 57.33±21.19), FVC% (61.77±26.51 and 58.40±23.50), FEV1/FVC (100.83±21.27 and 100.93±17.84) and PEFR (39.03±21.36 and 30.53±15.45) were higher as compared to that for non-IPF patients. But difference between groups was not significant (all p values >0.05). These results are contrasting as compared with previous study done by Sreekala et al (mean FVC of IPF and non IPF was 48.1±16.2 and 51.2±23.8 respectively).[10] So, spirometry results are abnormal in ILD patients but the results were nonspecific.

Chest X-ray and HRCT findings

In IPF patients, on X-ray, majority of the patients (64.71%) had reticular pattern but in non-IPF patients, most common finding was consolidations and reticulonodular in 3 (18.75%) patients each, (p value 0.008). In IPF patients, common HRCT findings were ground glass opacities in 25 (73.53%) and septal thickening in 21 (61.76%). In non-IPF patients, common findings were ground glass opacities in 8 (50%), septal thickening and tractional bronchiectasis in 7 (43.75%) each, (p values <0.05). It is well recognized that the ILD clinical presentation is typical but not particular. As a result, for a precise diagnosis, spirometry should be utilized in combination with clinical, radiographic, and histological facts. Spirometry, on the other hand, can be utilized as an early diagnostic technique in patients who exhibit the proper symptoms. Spirometry is a helpful technique for determining the disease's intensity. Regardless of thoracic X-ray aberrations, individuals with classic complaints should be screened with spirometry. Although HRCT is regarded as the gold standard for identifying interstitial lung disease, it may not always be an affordable choice due to its high cost. On the other hand, spirometry is affordable, easily accessible, and may be completed even during doctor consultations. The main flaw in this study is that neither the patients nor the therapy response and subsequent prognosis of the patient were followed up on. The histological characteristics of diverse kinds of ILD are another crucial factor that we overlooked in our investigation. Therefore, there is room for more research to determine how illness progression affects spirometry results.

CONCLUSION

A significant portion of persons are affected with interstitial lung disorders. With characteristic appearance, clinical symptoms, and a history of occupational exposure, ILD must be suspected. In undetected situations, it necessitates further testing such as a chest X-ray, HRCT chest, and biopsy. Idiopathic pulmonary fibrosis is the most common and chronic hypersensitivity pneumonitis along with cryptogenic organizing pneumonia are the second common Interstitial Lung Disease in our study. The underdiagnosis of interstitial lung disease is due to a lack of knowledge among doctors. Therefore, spirometry and 6MWT O_2 saturation should be performed in all patients presented with complaints of chronic cough and breathlessness as screening tool and then HRCT chest and biopsy can be done for confirmation of diagnosis. So early diagnosis and treatment of ILD patients is possible with use of spirometry.

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