

## Original Research

### Characterization Of Interstitial Lung Disease Using HRCT

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#### ABSTRACT:

**Background:** Interstitial lung diseases are a diverse group of diseases that affect the lung interstitium and share similar clinical and radiological manifestations. They are a heterogeneous group of disorders of the lower respiratory tract that are characterized by both acute and chronic inflammation and a generally irreversible and relentless process of fibrosis in the interstitium and the alveolar walls. **Material and methods:** The study was conducted on patients who were clinically suspected of ILD (interstitial lung disease). The subjects underwent an HRCT scan of the thorax. The study included 100 subjects, of either sex, with clinically suspected ILD. The objective was to assess if HRCT can detect abnormalities in patients with suspected ILD. Demographic details, occupational history, smoking history as well as other history of risk factors, symptomatology, history of associated co-morbidities and conditions, and relevant investigations like chest radiograph findings were noted. HRCT scans were obtained in the supine position. **Results:** 9 subjects were below 30 years of age, 15 as well as 56 subjects belonged to the age groups of 30-50 years as well as 50-70 years whereas 28 subjects were above the age of 70. Of 100 subjects, 58 subjects were smokers whereas rest 42 subjects were non-smokers. 57 subjects were having diabetes mellitus, 23 were suffering from hypertension as well as 20 subjects were suffering from asthma. Majority of the subjects were farmers accounting for 30 cases, followed by those handling poultry business accounting for 12 cases. 40 subjects presented with both as well as dyspnea followed by 26 subjects who presented with cough only whereas 20 subjects who presented with dyspnea only. 14 subjects didn't present with cough or dyspnea. **Conclusion:** The study concluded that HRCT is a reliable tool for determining the prognosis and assisting in patient care during follow-up visits. It lessens the requirement for a confirmatory lung biopsy as well as can help with the diagnosis of ILD and direct the surgeon in choosing the site for a lung biopsy.

**Keywords:** HRCT, Interstitial Lung Disease.

Received: 5 January, 2023

Accepted: 28 January, 2023

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**This article may be cited as:** Devediya S, Arora T, Jain B. Characterization Of Interstitial Lung Disease Using HRCT. Int J Res Health Allied Sci 2023; 9(2):104- 107

#### INTRODUCTION

Interstitial lung diseases are a diverse group of diseases that affect the lung interstitium and share similar clinical and radiological manifestations. They are a heterogeneous group of disorders of the lower respiratory tract that are characterized by both acute and chronic inflammation and a generally irreversible and relentless process of fibrosis in the interstitium and the alveolar walls.<sup>1</sup> The interstitium refers to tissues of the alveolar wall between the capillary endothelium and the alveolar epithelium and it is the site of the primary injury. The term "interstitial" can be misleading as most of these conditions also affect the

airway spaces and even the blood vessels, but it is the predominant and primary involvement of the interstitium that characterizes them.<sup>2</sup> Interstitial lung diseases are characterized by anatomical distortion of peripheral airways and interstitium, determined by the first stage of alveolitis followed by a stage of fibrosis. The natural history of several interstitial lung diseases is characterized by slow and progressive destruction of alveolar-capillary functional units, often with respiratory failure and death. For their smouldering evolution and non-specificity of symptoms, they may remain undiagnosed and not treated for a long time.<sup>3,4</sup>

Herein lies the importance of HRCT and other investigations in aiding an early diagnosis.

Idiopathic pulmonary fibrosis is the most common interstitial lung disease in adults and generally has a poor prognosis.<sup>5</sup> Idiopathic pulmonary fibrosis (IPF)/ Usual interstitial pneumonia (UIP) is not a very well-understood entity. Current explanations of the natural history and pathogenesis of IPF/UIP are controversial, and ongoing research continues to investigate multiple hypotheses.<sup>6</sup> Around 15% of patients with interstitial lung disease have an underlying connective tissue disorder.<sup>7</sup> In children, common diseases associated with interstitial lung diseases include viral respiratory tract infections (RSV, parainfluenza, etc.), gastroesophageal reflux, idiopathic pulmonary fibrosis, pulmonary hemosiderosis, eosinophilic pneumonia, pneumonitis associated with AIDS, etc.<sup>8-11</sup> In the diagnosis of interstitial lung diseases, clinical, radiological, and histological correlation is needed in most occasions. The chest radiogram remains the basic radiological tool in the investigation of these patients.<sup>12</sup> However, chest radiography is relatively insensitive and is normal in 10-20% of patients with histologically proven interstitial lung disease.<sup>12</sup> Many diseases remain occult or are not correctly diagnosed on chest X-ray, appearing as a nonspecific "reticulonodular pattern". It is not specific also in that different interstitial lung diseases can have similar radiographic appearances.

High-resolution computed tomography of the chest has become an invaluable tool in the diagnostic process of interstitial lung diseases. A confident diagnosis can often be made on the basis of high-resolution computed tomographic findings and the clinical context. Serologic testing can be helpful in selected cases.<sup>13</sup> HRCT has proved particularly accurate in establishing the diagnosis of silicosis, idiopathic pulmonary fibrosis, lymphangitic carcinomatosis, and sarcoidosis. In general, the accuracy of plain film diagnosis in the same disorders was much lower.<sup>14</sup> Hence this study was conducted to evaluate the "CHARACTERIZATION OF INTERSTITIAL LUNG DISEASE USING HRCT".

## MATERIAL AND METHODS

The study was conducted on patients who were clinically suspected of ILD (interstitial lung disease). The subjects underwent an HRCT scan of the thorax. The study included 100 subjects, of either sex, with clinically suspected ILD. The objective was to assess if HRCT can detect abnormalities in patients with suspected ILD. Demographic details, occupational history, smoking history as well as other history of risk factors, symptomatology, history of associated comorbidities and conditions, and relevant investigations like chest radiograph findings were noted. HRCT scans were obtained in the supine position.

Those having acute lung injury, acute respiratory distress syndrome as well as acute respiratory tract infection and chronic infection like tuberculosis,

chronic obstructive airway disease, dyspnea due to cardiac or renal causes were excluded from the study. Also, those having primary or secondary neoplasm of lungs were not included in the study.

## RESULTS

9 subjects were below 30 years of age, 15 as well as 56 subjects belonged to the age groups of 30-50 years as well as 50-70 years whereas 28 subjects were above the age of 70. Out of 100 subjects, 72 were men whereas 28 were women. Of 100 subjects, 58 subjects were smokers whereas rest 42 subjects were non-smokers. 57 subjects were having diabetes mellitus, 23 were suffering from hypertension as well as 20 subjects were suffering from asthma. Majority of the subjects were farmers accounting for 30 cases, followed by those handling poultry business accounting for 12 cases. 40 subjects presented with both as well as dyspnea followed by 26 subjects who presented with cough only whereas 20 subjects who presented with dyspnea only. 14 subjects didn't present with cough or dyspnea. The most frequently observed HRCT features were interseptal thickening accounting for 72 subjects, reticular patterns accounting for 63 subjects, followed by tractional bronchiectasis observed in 55 subjects and honeycomb appearance was observed in 51 subjects. Least observed feature was ground glass haziness which accounted for 30 subjects.

Table 1: Age wise distribution of subjects

Age group	Number of subjects	Percentage
<30 years	9	9%
30-50 years	15	15%
50-70 years	56	56%
>70 years	28	28%
Total	100	100%

Table 2: gender wise distribution of subjects

Gender	Number of subjects	Percentage
Male	72	72%
Female	28	28%
Total	100	100%

Table 3: Smoking history of subjects

Smoking habit	Number of subjects	Percentage
Present	58	58%
Absent	42	42%
Total	100	100%

Table 4: features on HRCT among subjects.

Features	Number of subjects
Ground glass haziness	30
Honeycomb pattern	51
Reticular pattern	63
Tractional bronchiectasis	55
Interseptal thickening	72

## DISCUSSION

Most of the study participants in this study belonged to the 50 – 70 years age group accounting for 56 subjects, followed by the more than 70 years age group (28%). Leland L. Fan et al state that ILDs are rare in children.<sup>15</sup> Results are consistent with Badarkhe- Patil. Et al,<sup>16</sup> who reported 60 – 80 years as the most common age group at presentation. Similarly, Maheshwari U et al<sup>17</sup>, Muhammed SK et al<sup>18</sup> observed, the most common age group at presentation was 40 – 60 years. In this study of 100 subjects, men and women were 72 as well as 28 in number which indicates that the condition is common among men. Similar observations were made by Almeida et al<sup>133</sup> where males constituted 52.5% and females constituted 47.5% of study subjects. Significant history of smoking was discovered in 58% of cases in this study. King TE, Jr. et al<sup>19</sup> in his literature on idiopathic pulmonary fibrosis quoted that a majority of patients are smokers. Smoking can be related to the causation of the disease, either directly or in conjunction with other processes. The most frequently occurring medical condition of the subjects was diabetes mellitus which accounted for 57% of the cases followed by hypertension accounting for 23% of the cases and asthma accounting for 20% of the cases. Almeida et al<sup>20</sup> also noted diabetes (29.1%) as the most common medical condition among the study subjects followed by, heart disease (18.9%) and connective tissue diseases (17.6%). Farming was popular among the study group accounting for 30% of the cases followed by poultry business accounting for 12% of the cases. In most of the study subjects, presenting complaint was cough along with dyspnoea accounting for 40% of the cases followed by cough alone taking into account 26 subjects and dyspnea alone observed in 20 subjects. Badarkhe-Patil et al<sup>16</sup>, Bhat IM et al<sup>21</sup>, and Muhammed SK et al<sup>18</sup> reported, that the most common presenting complaint was progressive dyspnoea followed by dry cough and arthralgia, fever, weight loss, Chest pain, and hemoptysis were some other symptoms seen in patients with ILD. HRCT displayed a variety of abnormalities in subjects thought to have ILD. On HRCT, 72% of cases showed interlobular septal thickening. Badarkhe-Patil, et al. reported interlobular septal thickening as the most common pattern of ILD on HRCT, followed by bronchiectasis and ground glass opacity. Similarly, Bhat IM et al<sup>21</sup> also observed the most common finding in ILDs on HRCT was septal lines seen in 21 (42%) patients followed by bronchiectasis seen in 20 (40%) patients, ground glass haziness seen in 16 (32%) patients, and honeycombing was present in 10 (20%) cases.

## CONCLUSION

The study concluded that HRCT is a reliable tool for determining the prognosis and assisting in patient care during follow-up visits. It lessens the requirement for a confirmatory lung biopsy as well as can help with the diagnosis of ILD and direct the surgeon in choosing the site for a lung biopsy.

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