

## TO STUDY THE SIGNIFICANCE OF HRCT OVER CHEST X- RAY IN THE DIAGNOSIS OF INTERSTITIAL LUNG DISEASES

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### ABSTRACT

#### BACKGROUND

Interstitial lung disease (ILD) is a heterogeneous group of diffuse parenchymal lung diseases, characterized by restrictive physiology, impaired gas exchange, pulmonary inflammation and fibrosis. Chest radiograph (CXR) may be normal during early in the course of the disease and shows few abnormalities hence unable to identify the specific aetiology of ILD. HRCT (High resolution computed tomography) is the most accurate non-invasive, high spatial resolution descriptive imaging modality for evaluation of lung parenchyma. It assesses the presence of disease in lung, type of disease, changes of active lung disease, biopsy site localization, change in disease activity following treatment, characterization of interstitial lung disease (ILD) in appropriate clinical setting.

#### MATERIALS AND METHODS

The descriptive study was conducted on 40 patients having clinical suspicion of ILD in the Department of Tuberculosis and Chest Diseases, Varun Arjun Medical College and Hospital, Banthara & Department of Pulmonary Medicine, Rohilkhand Medical College and Hospital, Bareilly, during the period of January 2018 to August 2018.

#### RESULTS

In this study, the age of the patients ranged from 30 to 74 years. There were 65% male patients and 35% female patients. The most common presenting clinical feature was exertional dyspnoea present in 65% of patients followed by a cough which was present in 56% of cases. The spectrum of diseases included in the study was: Idiopathic pulmonary fibrosis (25%), hypersensitivity pneumonitis (17.5%), sarcoidosis (15%), rheumatoid arthritis (10%), silicosis (10%), LAM (7.5%), allergic bronchopulmonary aspergillosis (5 %) and lymphangitis carcinomatosa (5 %), COP (5%).

#### CONCLUSION

HRCT of the lung in cases of the suspected interstitial lung diseases forms an invaluable tool for accurate and early identification and in conjunction with the clinical findings can obviate the need of lung biopsy in diagnosis of ILD's.

#### KEY WORDS

High Resolution Computed Tomography, ILD.

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#### BACKGROUND

Interstitial lung disease (ILD) is a heterogeneous group of diffuse parenchymal lung diseases, characterize by restrictive physiology, impaired gas exchange, pulmonary inflammation and fibrosis.<sup>1,2</sup> In most cases the pathology of ILD lies in the pulmonary interstitium which consist of connective tissue space between the alveolar epithelial cells and the adjacent capillary endothelial cells. Extensive work up is needed for the diagnosis of ILD.<sup>3</sup> Although the majority of these disorders also involve the air spaces, the predominant abnormality is usually thickening of the interstitium which may be due to the accumulation of fluid, cells, or fibrous tissue.<sup>4</sup>

Over 100 distinct entities of ILD are recognized, idiopathic pulmonary fibrosis, sarcoidosis and connective tissue disease related ILD account for most of ILD. The prevalence of the IPF is around 54 per 100000 adults using broad case definition and 17 per 100000 using narrow case definition. Although ILDs are more commonly seen in adults, some forms such as hypersensitivity pneumonitis and idiopathic interstitial pneumonias are encountered in children.

The chest radiograph remains part of the initial assessment of ILD, but the radiographic pattern is often nonspecific, observer variation is considerable and may be normal during early course of the disease and shows few abnormalities hence unable to identify the specific aetiology of ILD.<sup>5,6,7</sup> Pulmonary function testing (PFT) cannot diagnose a specific ILD or distinguish between active lung inflammations versus fibrosis.<sup>8</sup> HRCT (High resolution computed tomography) is the most accurate non-invasive, high spatial resolution descriptive sectional imaging modality for evaluation of lung parenchyma. It assess the presence of disease in lung, type of disease, changes of active lung disease, biopsy site localization, change in disease activity following treatment, characterization of interstitial lung disease (ILD) in appropriate clinical setting. It is more

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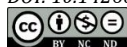
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sensitive than the plain radiograph in identifying ILD (sensitivity greater than 90%) and the image pattern of parenchymal abnormalities on HRCT often suggests a particular set of diagnostic possibilities.<sup>9</sup>

**Objectives of the Study**

1. To correlate the findings of conventional chest radiography and HRCT in interstitial lung diseases.
2. To evaluate ILD in symptomatic patients with normal or equivocal chest radiograph findings.
3. To study the different radiographic patterns associated with Interstitial Lung Disease in both conventional chest radiography and HRCT.

**MATERIALS AND METHODS**

The descriptive study was conducted on 40 patients having clinical suspicion of ILD in the Department of Tuberculosis and Chest Diseases, Varun Arjun Medical College and Hospital, Banthra & Department of Pulmonary Medicine, Rohilkhand Medical College and Hospital, Bareilly, during the period of January 2018 to August 2018.

**Study Design**

It was a descriptive study. Convenient sampling technique, taking all patients during study period was used.

**Inclusion Criteria**

1. Patients suspected of having interstitial lung diseases suspected on chest radiographs.
2. Patients with clinically suspected ILD with normal or equivocal radiographs.

**Exclusion Criteria**

1. Known cases of infective aetiology (Tuberculosis, HIV).
2. Known cases of chronic obstructive pulmonary disease.
3. Known cases of congestive cardiac failure.
4. Known cases of lung malignancy.
5. Hemodynamically unstable patients.
6. Pregnant patients.
7. Age < 15 years.

After inclusion of the patient in the study, detailed proforma was filled. The proforma included the patient's name, age, address, medical record number, complaints, risk factors, past history, laboratory investigation, and chest radiograph findings.

Thereafter HRCT chest was done using GE 16 SLICE BRIGHTSPEED SCANNER in supine position using standard HRCT protocol. Prone and expiratory scanning was done wherever needed.

**Statistical Analysis**

Statistical analysis was performed by using the Chi- square test and EPI. Info 7.2 program for windows. It is a non-parametric data therefore Chi- square test was applied for taking inferences. A p- value of less than 0.05 was considered statistically significant.

**RESULTS**

Of the 40 patients, 26 patients were males (65%) and 14 (35%) were females. The age of the patients ranged from 30 years to 74 years.

The most common presenting clinical feature was dyspnoea on exertion present in 65% of patients followed by the cough which was present in 56% of cases. Fever was present in 28% patients while arthralgia was seen in 10% of patients. And weight loss was seen in 8% of patients.

The spectrum of diseases included in the study was:

Idiopathic pulmonary fibrosis (25%), hypersensitivity pneumonitis (17.5%), Sarcoidosis (15%), rheumatoid arthritis (10%), silicosis (10%), LAM (7.5%), allergic bronchopulmonary aspergillosis (5 %) and lymphangitis carcinomatosa (5 %), COP (5%). The comparison between X-ray and HRCT in the detection of different findings are given below.

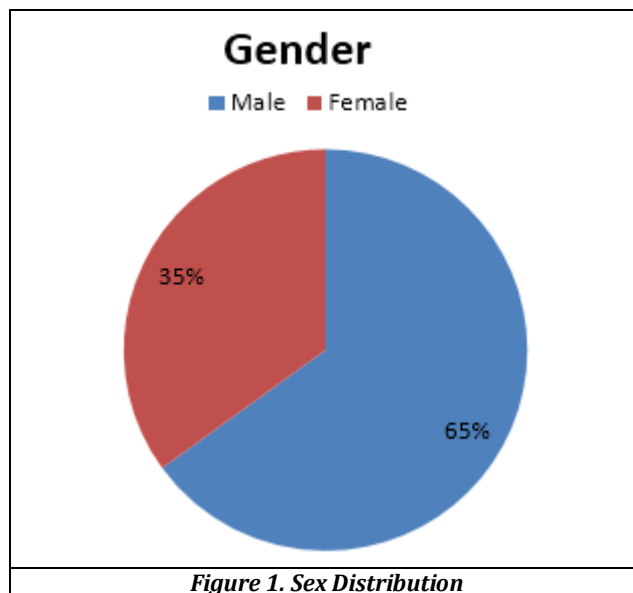
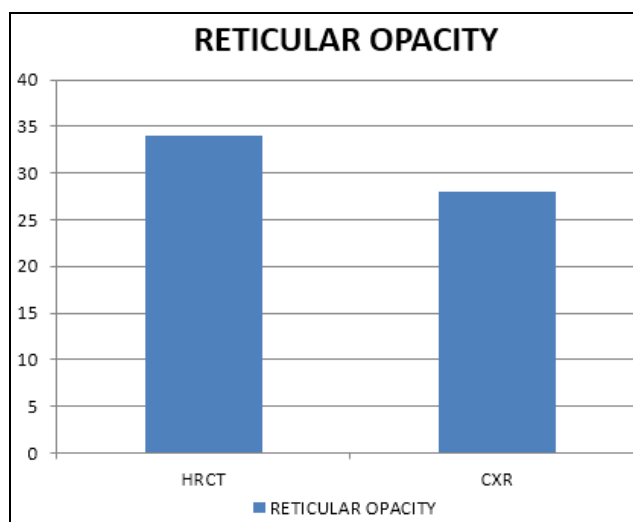


Figure 1. Sex Distribution

Reticular Opacity	HRCT		CXR		χ <sup>2</sup>	p Value
	N	%	N	%		
Present	34	85	28	70	2.580	0.108
Absent	6	15	12	30		
<b>Total</b>	<b>40</b>	<b>100</b>	<b>40</b>	<b>100</b>		

**Reticular Opacities**

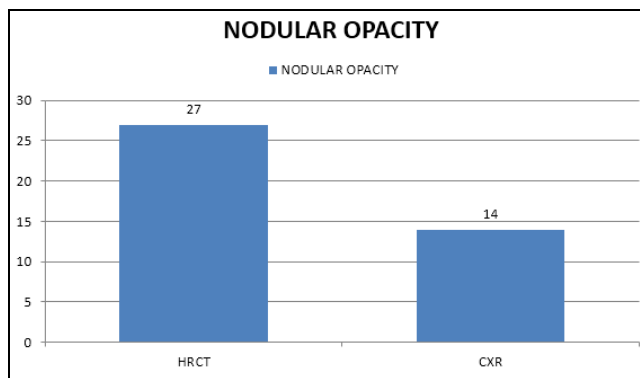
Higher number of reticular opacity were detected on HRCT thorax as compared to chest X-ray but it was not statistically significant (P>0.05).



Nodular Opacity	HRCT		CXR		$\chi^2$	P Value
	N	%	N	%		
Present	27	67.5	14	35%	8.455	0.003
Absent	13	32.5	26	65%		
<b>Total</b>	<b>40</b>	<b>100</b>	<b>40</b>	<b>100</b>		

**Nodular Opacity**

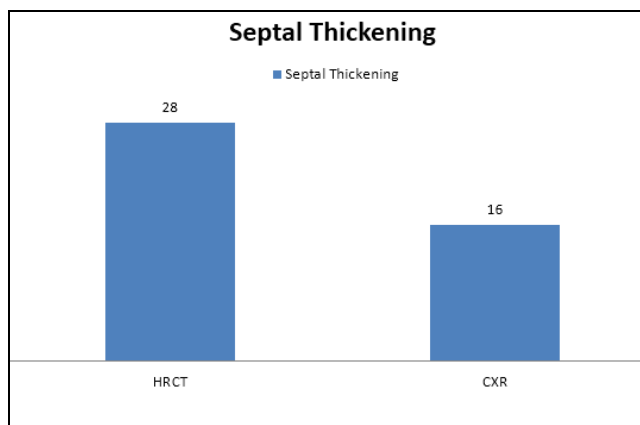
Higher number of nodular opacities were detected on HRCT thorax as compared to chest X-ray and it was statistically significant (P<0.05).



Septal Thickening	HRCT		CXR		$\chi^2$	P Value
	N	%	N	%		
Present	28	70	16	40	7.272	0.007
Absent	12	30	24	60		
<b>Total</b>	<b>40</b>	<b>100</b>	<b>40</b>	<b>40</b>		

**Septal Thickening**

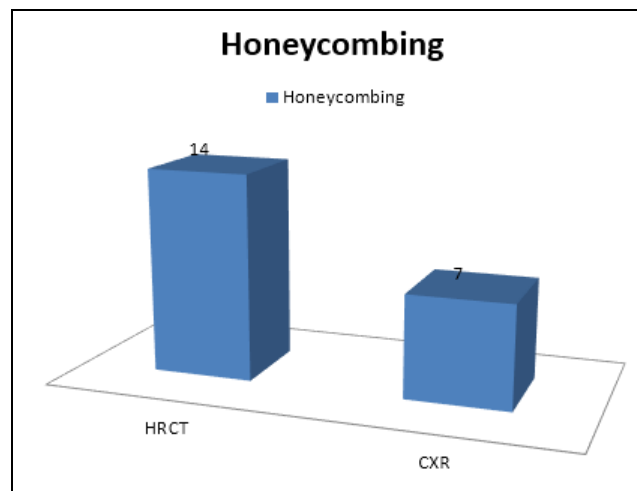
Higher number of septal thickening were detected on HRCT thorax as compared to chest X-ray and it was statistically significant (P<0.05).



Honeycombing	HRCT		CXR		$\chi^2$	p Value
	n	%	N	%		
Present	14	35	7	17.5	3.163	0.075
Absent	26	65	33	82.5		
<b>Total</b>	<b>40</b>	<b>100</b>	<b>40</b>	<b>100</b>		

**Honeycombing**

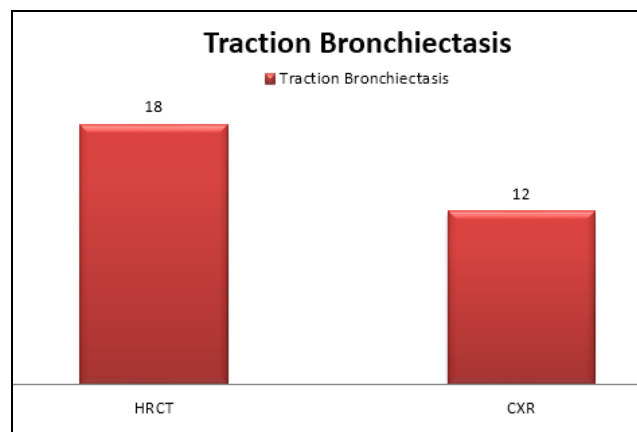
Higher number of honeycombing were detected on HRCT thorax as compared to chest X-ray but it was not statistically significant (P>0.05).



Traction Bronchiectasis	HRCT		CXR		$\chi^2$	p Value
	N	%	N	%		
Present	18	45	12	30	1.92	0.165
Absent	22	55	28	70		
<b>Total</b>	<b>40</b>	<b>100</b>	<b>40</b>	<b>100</b>		

**Traction Bronchiectasis**

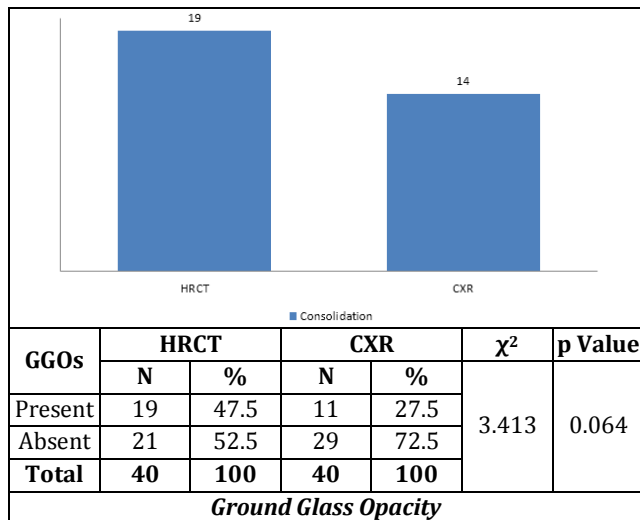
Higher number of traction bronchiectasis were detected on HRCT thorax method as compared to chest X-ray but it was not statistically significant (P>0.05).



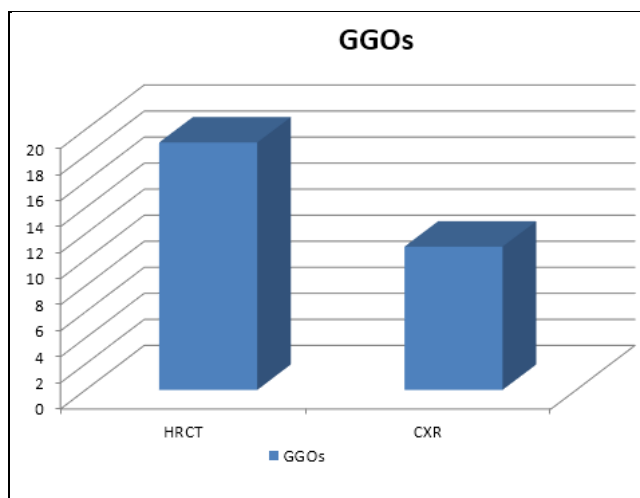
Consolidation	HRCT		CXR		$\chi^2$	p Value
	N	%	N	%		
Present	19	47.5	14	35	1.289	0.256
Absent	21	52.5	26	65		
<b>Total</b>	<b>40</b>	<b>100</b>	<b>40</b>	<b>100</b>		

**Consolidation**

HRCT thorax detected higher number of consolidation than chest X-ray but it was not statistically significant (P>0.05).



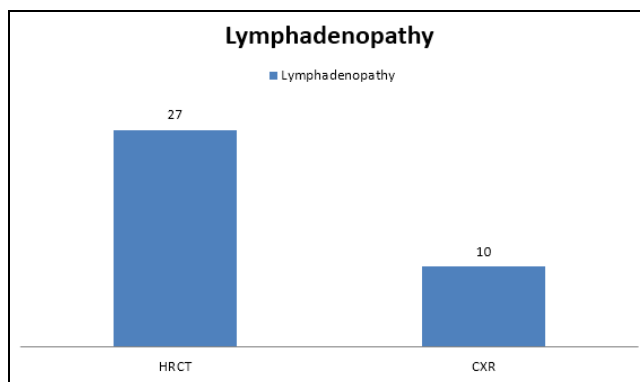
HRCT thorax detected higher no. of ground glass opacity than chest X-ray but it was not statistically significant ( $P > 0.05$ ).



Lymph-adenopathy	HRCT		CXR		$\chi^2$	p Value
	N	%	N	%		
Present	27	67.5	10	25	14.531	0.0001
Absent	13	32.5	30	75		
<b>Total</b>	<b>40</b>	<b>100</b>	<b>40</b>	<b>100</b>		

**Lymphadenopathy**

HRCT thorax detected higher number of lymphadenopathy than chest X-ray and it was statistically significant ( $P < 0.05$ ).



**DISCUSSION**

The main observation in our study was that higher numbers of samples with findings were detected by HRCT as compared to conventional radiography. Even when both modalities were able to detect the findings, HRCT could characterize the abnormality and specify its location much more accurately. The chest radiogram can appear completely normal in patients suffering from interstitial lung diseases. Therein lays the inherent lack of sensitivity of conventional chest radiography in the diagnosis of the conditions. In our study, 6 of the 40 patients (6.7%) had no abnormalities in their chest radiographs. However HRCT was able to show reticular changes in these patients.

**CONCLUSION**

The diagnosis of interstitial lung disease (ILD) is most of the times delayed because clinical findings are neglected and respiratory symptoms are thought to be of more common pulmonary diagnoses such as chronic obstructive pulmonary disease (COPD) in the primary care setting. In patients with progressive dyspnoea ILD should be ruled out as this is the most common complaint in ILD patients.

HRCT is able to detect abnormalities in patients when the clinical signs are very few or even when the chest radiograph appears completely normal. Chest radiography is a relatively insensitive modality of investigation for the diagnosis of ILDs. Ultimately all patients with clinical suspicion of ILDs should benefit from an HRCT scan of the thorax. High resolution computed tomography (HRCT) chest scans are very essential to the diagnostic work-up since each ILD form is characterized by a specific pattern of abnormalities and a confident diagnosis can often be arrived at by HRCT alone or in correlation with the clinical symptoms. When HRCT findings are characteristic in appropriate clinical settings, HRCT may even obviate the need for a lung biopsy.

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