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Original article

A STUDY OF SPECTRUM OF IMAGING FINDINGS ON HRCT THORAX IN DIFFERENT INTERSTITIAL PNEUMONIA

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ABSTRACT

Introduction:

The interstitial pneumonias are a heterogeneous group of nonneoplastic diffuse parenchymal lung diseases that result from damage to the lungs by varying combinations of inflammation and fibrosis. For accurate diagnosis, clinico- radiological-pathological correlation is needed. However, in majority of cases, radiological findings from chest imaging by HRCT thorax in clinically suspicious patient are adequate for diagnosis.

Aims & Objectives :-

- To determine the correlation between the patients socio-demographic factors and the interstitial lung pattern at HRCT imaging
- To determine the pattern of different lung parenchymal changes as seen at HRCT imaging.

Methodology:
A hospital based prospective study was done on total of 25 cases of clinically suspected interstitial pneumonia during period from December 2018 to may 2019. HRCT thorax imaging was performed using Phillips MX 16 Slice MDCT machine.

Results: Of the 25 cases, most common pattern was identified as usual interstitial pneumonia in 15 patients(60%). Patients of 60-70 year of age group and female were mostly diagnosed as usual interstitial pneumonia. Septal thickening was common finding in majority of the patiets.(22 patients).

Conclusion:

From these observations, it was found that HRCT thorax imaging is an excellent, non invasive modality with multiplanner capabilities. Clinical and laboratory finding along with HRCT workup is essential for the diagnosis of specific interstitial pneumonia. UIP was the most common interstitial pneumonia observed in our study.

Key words: interstitial pneumonia, HRCT thorax, usual interstitial pneumonia, nonspecific interstitial pneumonia

Introduction :-

Interstitial lung disease (ILD) is a heterogeneous group of diffuse parenchymal lung diseases, characterize by restrictive physiology, impaired gas exchange, pulmonary inflammation and fibrosis.[3] 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. Cigarette smoking, aspiration, certain drugs, radiation therapy, cancer, systemic diseases, environmental and occupational factors had been reported in association in one third cases.[7] Among them, Interstitial pneumonias may be idiopathic or can be secondary to a variety of other causes, including collagen vascular diseases, pneumoconiosis, infection, and smoking . Accurate diagnosis of these disorders requires interaction among pathologists, radiologists, and pulmonologists.

Chest radiograph (CXR) may be normal during early in the course of the disease and shows few abnormalities hence unable to identify the specificinterstitial pneumonia. Pulmonary function testing (PFT) cannot diagnose a specific interstitial pneumonia or distinguish between active lung inflammations versus fibrosis. HRCT (High resolution computed tomography) is the most accurate noninvasive, high spatial resolution cross 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, characterisation of interstitial pneumonia in appropriate clinical setting. It is more sensitive than the plain radiograph in identifying interstitial pneumonia and the image pattern of parenchymal abnormalities on HRCT often suggests a particular set of diagnostic possibilities. Present study aimed to study basic HRCT patterns associated with Interstitial pneumonia and correlation of HRCT patterns with clinical data in differential diagnosis of Interstitial pneumonias.

The American Thoracic Society and European Respiratory Society defined and established diagnostic criteria for the idiopathic interstitial pneumonias according to clinical manifestations and histologic and radiologic features. In this classification, the histologic pattern provided by the pathologist serves as the basis for the clinical-radiologic-pathologic diagnosis. [3]

Types include:

Major IIPs(Idiopathic interstitial pneumonia):

Chronic fibrosing IIPs:

usual interstitial pneumonia (UIP): idiopathic pulmonary fibrosis

non-specific interstitial pneumonia (NSIP)

Smoking related IIPs:

desquamative interstitial pneumonia (DIP)

respiratory bronchiolitis-interstitial lung disease (RB-ILD)

acute /subacute IIPs:

cryptogenic organising pneumonia (COP)

acute interstitial pneumonitis (AIP)/Diffuse alveolar damage

Rare IIPs:

lymphoid interstitial pneumonia (LIP)

usual interstitial pneumonia: The UIP pattern is most frequently associated with IPF. IPF is a chronic fibrotic disease of unknown cause and is the most common of the idiopathic interstitial pneumonias, accounting for 50-60% of cases . Most patients are 50 year or above in age. The CT findings of UIP are heterogeneous, with regions of fibrotic lung alternating with regions of normal lung. Characteristic CT features of UIP include reticular opacities, honeycombing, and traction bronchiectasis with a basal and peripheral predilection associated with lower lobe volume loss.[1] Honeycombing, identified in the immediate subpleural lung, is present in about 70% of cases of IPF. In severe cases, findings ofhoneycombing predominate, with multiple layers of honeycomb cyst being visible. Honeycomb cysts usually range from 3 mm to 2 cm in diameter.[1] Septal thickening is thickening of the lung interstitium by fluid, fibrous tissue, or infiltration by cells results in a pattern of reticular opacities due to thickening of the interlobular septa.

nonspecific interstitial pneumonia: NSIP represents the second most common idiopathic interstitial pneumonia, accounting for 14-36% of cases . Most patients are typically 40-50 years old at the time of diagnosis. The dominant CT finding in NSIP is ground-glass opacity, which is usually bilateral and symmetric with lower lobe predominance . Other common CT findings include fine reticulation, traction bronchiectasis, and lower lobe volume loss.[1] Honeycombing is not a predominant feature of NSIP and tends to be mild when present.

cryptogenic organizing pneumonia: Organizing pneumonia affects both men and women equally, with a mean age of onset of 55 years. Symptoms include cough and dyspnea that develop over a few weeks and are often preceded by an unconfirmed lower respiratory tract infection treated with antibiotics. The most common finding is bilateral patchy opacities with a predominantly peripheral or peribronchovascular distribution. Consolidation and ground-glass opacities are seen. The lower lungs are more often involved . Pulmonary nodules with pleural tags, pleural thickening, and parenchymal bands may be seen. Subpleural abnormalities, namely perilobular opacities and subpleural reticulation are noted.

Acute interstitial pneumonia: AIP is the only idiopathic interstitial pneumonia with an acute onset of symptoms. Patients often report a prodromal illness suggestive of a viral upper respiratory tract infection with symptoms such as fever, chills, myalgias, cough, and dyspnea followed by rapidly progressive severe exertional dyspnea that develops over a few days. In the early exudative phase,

ground-glass opacities are the dominant CT finding and are usually bilateral and patchy, with areas of lobular sparing producing a geographic pattern. Airspace consolidation also seen. The later fibrotic phase of DAD is associated with architectural distortion, traction bronchiectasis, and honeycombing.
respiratory broncholitis associated ILD and desquamative interstitial pneumonia:RB, RB-associated ILD, and DIP represent a continuum of smoking-related lung injury because of significant overlap in their clinical, imaging, and histologic findings.Most patients with RB-associated ILD and smoking-related DIP are in their fourth and fifth decades of life.The most common CT findings in patients with RB-associated ILD are small centrilobular ground-glass nodules, patchy ground-glass opacities, and bronchial wall thickening .The distribution is mostly diffuse Patchy regions of lobular hypoattenuation may be seen.The main difference between RB-associated ILD and DIP is the distribution of disease, which is centrilobular in RB-associated ILD and diffuse in DIP. Centrilobular nodules are uncommon in DIP. Ground-glass opacities are usually patchier, less well defined, and less extensive in RB-associated ILD.
lymophoid interstitial pneumonia: LIP is regarded as a variant of diffuse pulmonary lymphoid hyperplasia primarily affecting the interstitium. Abnormalities on CT in patients with LIP are usually bilateral and may be diffuse or have lower lung predominance . Thus, thickening of the bronchovascular bundles and interlobular septa is a frequent finding. Ground-glass opacities are a typical feature of this disease.Centrilobular nodules are also common. Perivascular cysts are identified in up to 80% of cases .These cysts are thin walled, typically few in number, measure less than 3 cm, and are seen in close association with adjacent blood vessels .The combination of perivascular cysts and ground-glass opacities is highly suggestive of LIP.

Methodology :-

Source of data: hospital based study enrolled after obtaining an informed consent of the patients.

Study type: Prospective cross sectional study.

All patients referred from clinicians who are suspected case of idiopathic interstitial pneumonias were seen by radiologist.Patients not willing to take part in the study or who are pregnant & patients with other pulmonary condition and other non interstitial lung disease were excluded. Known cases of infective etiology (Tuberculosis, HIV), chronic obstructive pulmonary disease, congestive cardiac failure, lung malignancy, hemodynamically unstable patients were excluded.

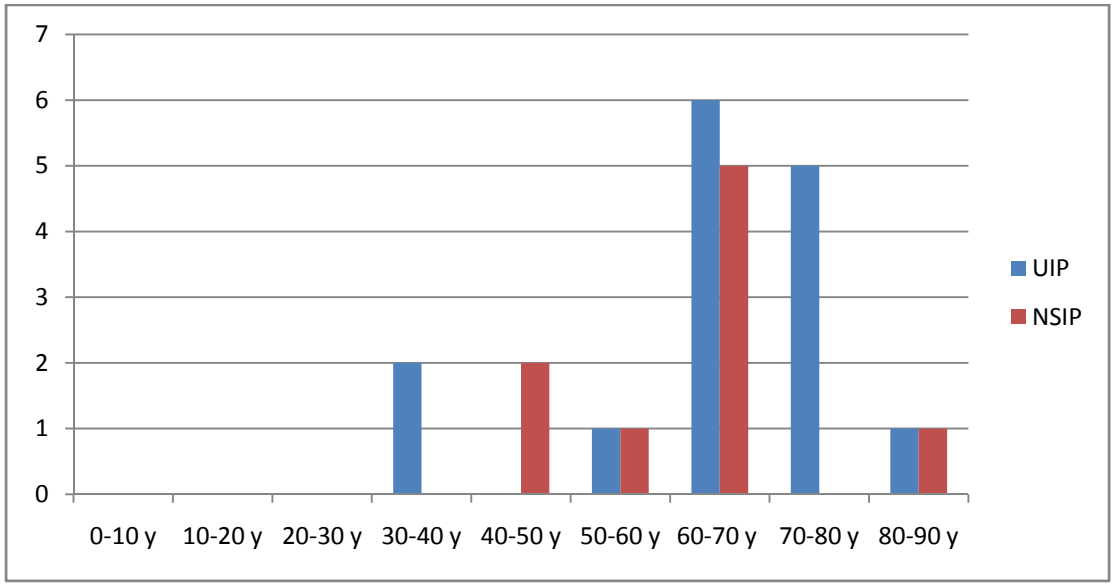
Sample size: 25 patients were taken for this study.

Study Time: Patients referred to the department of radiodiagnosis, L.G. hospital, Maninagar, Ahmedabad for a period from Dec 2018 to may 2019.

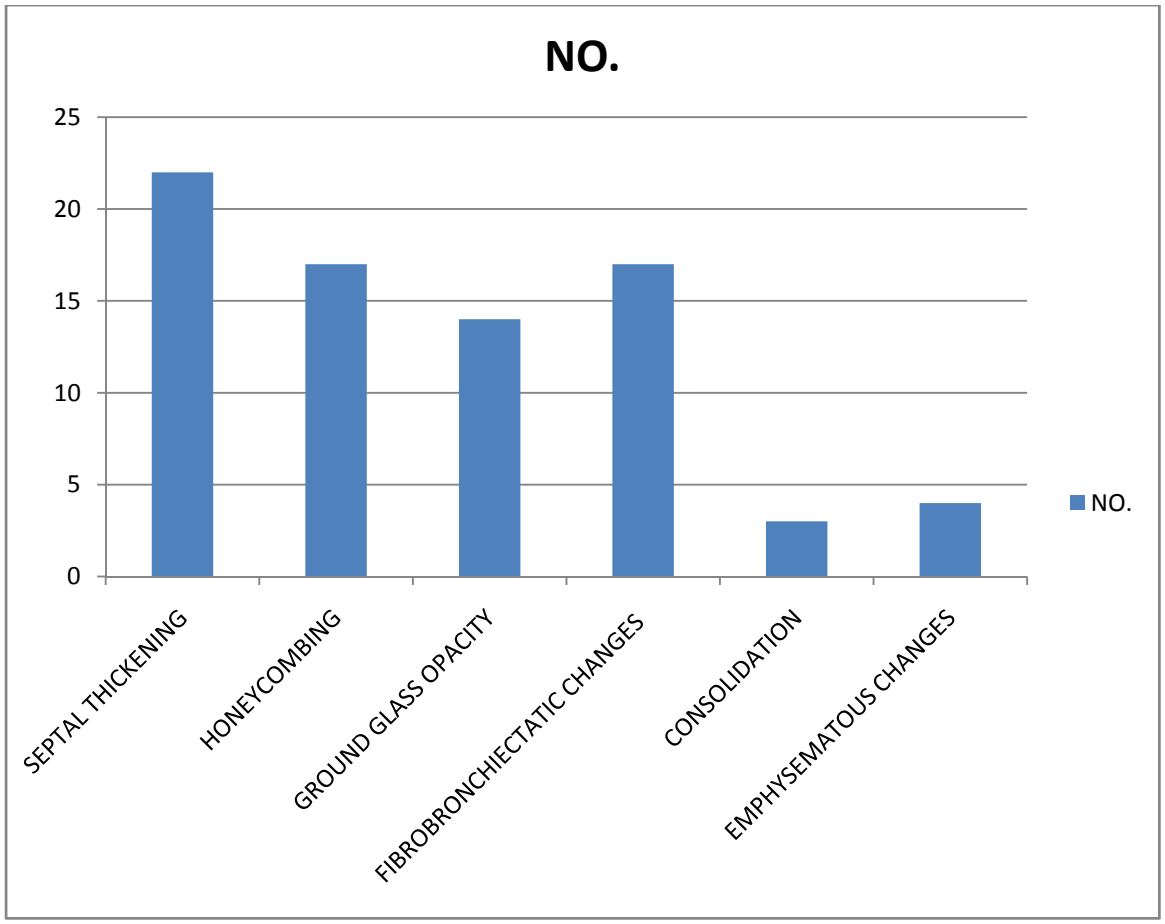
HRCT thorax study was performed in the sagittal, coronal and axial planes using a Phillips MX 16 Slice MDCT machine. Final possible diagnosis was made as per HRCT findings and clinical information.

Analysis : Data was analysed using appropriate statistical analysis like percentage, etc. .

Results:



	NUMBER(out of 25)	PERCENTAGE(%)
UIP	**15**	**60**
COP	**0**	**0**
NSIP	**9**	**36**
RB-ILD	**0**	**0**
DESQUAMATIVE ILD	**1**	**4**
LIP	**0**	**0**
AIP	**0**	**0**



In our study, out of 25 patients,the most common pattern found was usual interstitial pneumonia, which was seen in 15 patients(60%). The most common age group which presented with interstitial pneumonia was 60-70 year(44%) followed by 70-80 year. Among all the patients, female were more involved which were 14(56%). Septal thickening was the most commonly involved finding on HRCT thorax imagimg followed by honeycombing and fibrotic and bronchiectatic changes.

Out of 25 patients, most common symptom among patients was dyspnoea (22 patients,88%).the patients also had dry cough,low grade fever . Investigations like ANA(antinuclear antibody test),RF(rheumatic factor), sputum culture were also done, which showed RF positive in 4 patients(16%), 3 female and 1 male patient. All of the RF positive patients showed UIP pattern on HRCT thorax imaging.

Discussion:

In our study the most common age group at presentation was 60 to 80 years with 11 patients including 6 females and 5 males. Earlier Indian studies of Maheshwari U et al, Muhammed SK et al showed the age of presentation almost two decades earlier (40-60 year) than western study of Aziz ZA, et al. (60-80 years) with predominance of females. The age group of our patients is in variance with previously published Indian studies and matches that of western study. This might suggest a change in the Indian

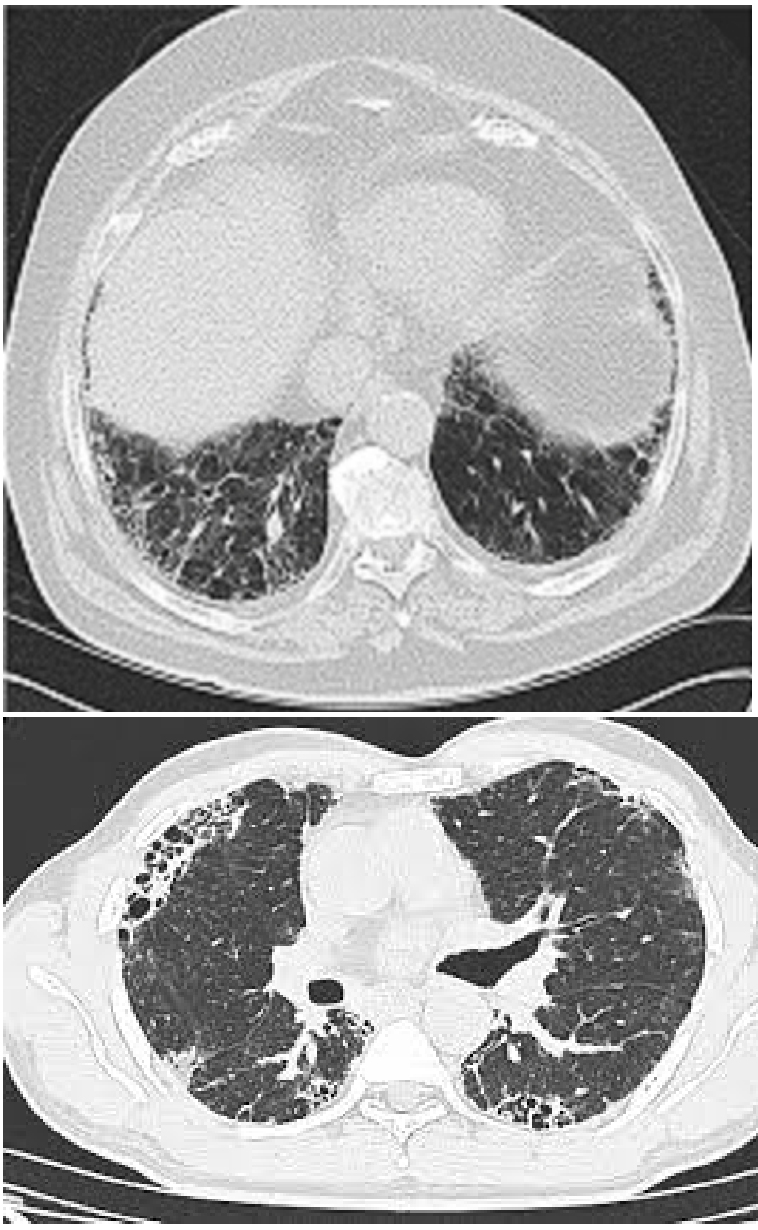
life styles towards more westernisation, small sample size and a more urban bias of the study population. The most common presenting complaint was progressive dyspnea seen in 22 patients (88%) followed by dry cough (74%) . These findings were in accordance to those reported by Muhammed SK et al in 2011.[9] Associated risk factors recorded in the present study were smoking (18%), allergy (16%).

In our study, out of 25 patients,the most common pattern found was usual interstitial pneumonia, which was seen in 15 patients(60%), which is followed by non specific interstitial pneumonitis in 9 patients(36%). These findings like those reported by Muhammed SK et al, Maheshwari U et al and Sen T Udwadia ZF et al.[8,9] In Muhammed SK et al, UIP pattern was seen in approximately 40% patients & NSIP pattern was seen in 24% of patients. As opposed to literature, other interstitial pneumonias were less in number, probably due to smaller sample size.

The most common finding associated with interstitial pneumonia was septal thickening(n=22; 88%) followed by honey combing and bronchiectatic changes(n=17,68%), followed by ground glass opacity(14,56%) .These findings correlated with findings of Muhammed SK et al. &[9] in which most common finding was The most commonly found pattern associated with interstitial lung disease was septal thickening (64%) followed by ground glass opacity(58%) on HRCT.

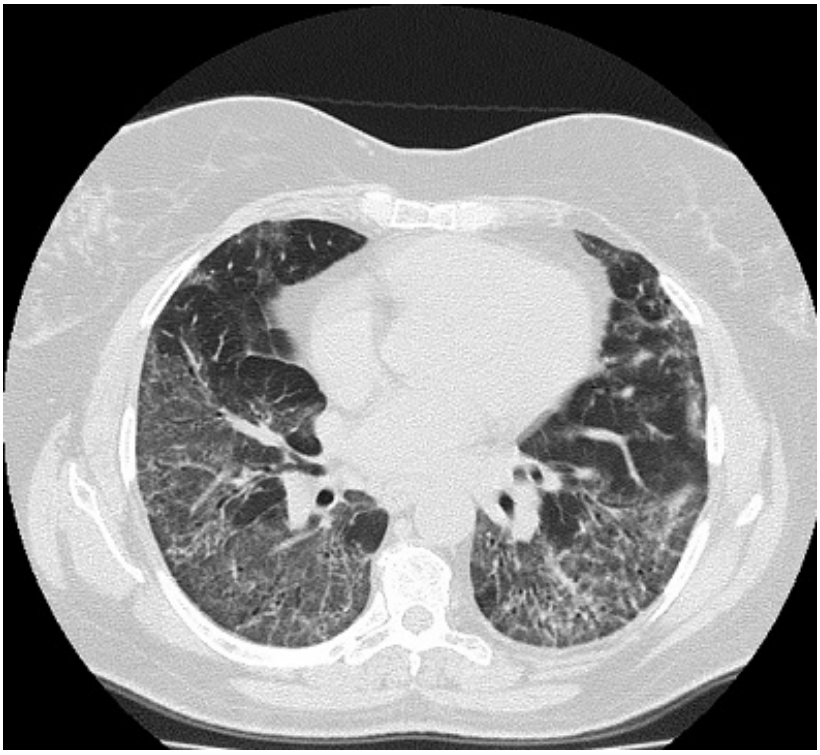
HRCT was superior to chest radiograph in detection of all basic patterns and their distribution associated with ILD. Chest radiograph is a nonspecific investigation and can be utilized as initial investigation in work up of ILD. However, HRCT of lungs along with clinical data is essential for the diagnosis of ILD. Septal thickening, honeycombing and traction bronchiectasis were commonest findings observed in almost all cases of UIP seen predominantly in basal and subpleural region corrosponding to the findings of the studies done by Maheshwari U et al.[8]

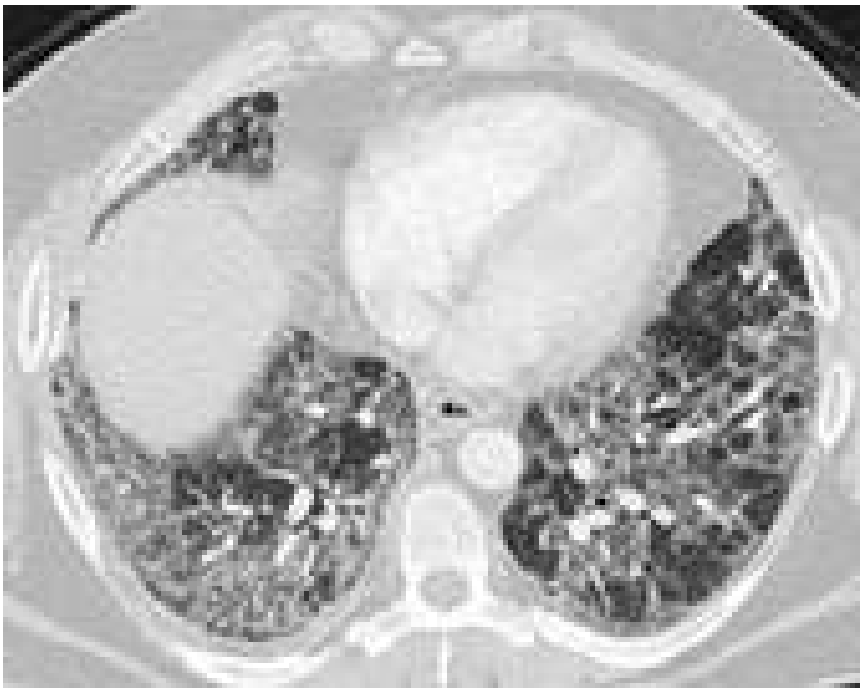
In our study, RF positive patients were 4 patients(16%), 3 female and 1 male patient. All of the RF positive patients showed UIP pattern on HRCT thorax imaging. These findings correlated with Pankaj Badarkhe-Pati , in which (22%) cases which were serologically positive for rheumatoid arthritis.Out of them, (9%) male and (91%) were females showing a clear female preponderance. Most common pattern found with rheumatoid arthritis was reticular opacity associated with UIP (27% case).[12]



Usual interstitial pneumonia

pattern, with septal thickening and subpleural honeycombing





Nonspecific interstitial pneumonia with septal thickening , ground glass opacity

<u>Conclusion:</u>

UIP was the most common interstital pneumonia observed in our study. In patients with progressive dyspnoea, interstitial pneumonia should be ruled out as this is the most common complaint in interstitial pneumonia patients. HRCT lung is a noninvasive investigation of choice in clinically suspected cases of interstitial pneumonia as it is very effective in visualizing the distorted architecture of lung parenchyma. HRCT along with clinical data and relevant laboratory investigations helps in arriving at the closest differential diagnosis in interstitial pneumonia .

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