

Research Article

The use of High Resolution CT (HRCT) for the Evaluation of Lung Parenchyma in patient with Arthritis

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Abstract: Background: Interstitial lung disease is an umbrella term used for a group of diseases that causes scarring, swelling, infection, Inflammation, Fibrosis and difficulty in breathing. HRCT is Gold standard modality to evaluate ILDS in RA patients because there are different appearances shows on CT in lungs that are used to evaluate the severity and extend of disease in lungs. **Objective:** To emphasize the use of High Resolution Computed Tomography in patients of arthritis having Lung parenchymal diseases. **Methodology:** An observation study of RA-ILD patients surveyed from May to November 2020. The 60 patients were ruled out with Arthritis in our Clinical Centre out of which 22 patients were taken to investigate that appearances like Ground glass, Honey comb, Enlarged lymph nodes, Bronchiectasis, Pleural effusion in the patients of Rheumatoid Arthritis. **Result:** In this study 22 patients were taken out of which Arthritis was present in 18 Patient and we evaluated the HRCT findings like Ground glass opacities, Honey comb appearance, lymph nodes, Bronchiectasis, Pleural effusion. Frequencies of different (ILDs) HRCT appearances were obtained. These outcomes recommend a positive relationship between the RA infection action and Lung aggravation in RA-ILD. **Conclusion:** In conclusion lung parenchymal changes due to Rheumatoid arthritis are more common in male than female. HRCT demonstrated sensitivity in the detection of anomalies, but clinically silent as well as not being diagnosed in simple radiography. It concludes that HRCT images are beneficial in diagnosing interstitial lung disease for rheumatoid arthritis patients.

Keywords: High Resolution Computed Tomography Rheumatoid Arthritis, Interstitial Lung Diseases, Ground Glass Appearance, Honey Comb Appearance, enlarged Lymph Node, Bronchiectasis.

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INTRODUCTION

Rheumatoid Joint pain is a persistent inflammatory illness and it impacts about the majority of individuals now a days and it likewise influence about 1% of white populace around the world. Rheumatoid joint inflammation (RA) is the most generally experienced connective tissue sickness. RA can affect pleura, airways, and the lung Parenchyma [1]. Rheumatoid joint pain (RA) is a foundational immune system sickness described by symmetric poly-arthritis that prompts reformist bone decimation and possible joint deformation whenever left untreated [2]. Early assessment of ILD is significant for the management of RA patients. Pulmonary manifestations can affects all the components of lungs with differing types of irritation and fibrosis [3].

Lung disease is also associated with Arthritis and is very common [4]. Lung sickness is second most basic reason of death (with 18% of patients with RA),

after contamination [5] Respiratory disease more commonly develops in men. RA related lung sickness incorporates: interstitial lung infections (ILD) or common interstitial pneumonia (UIP), arranging pneumonia (OP), vague interstitial pneumonia (NSIP), and diffuse alveolar harm (DAD); aviation route illnesses like bronchitis aspiratory vascular infection, and rheumatoid knobs [5]. Also pneumonic contamination and medication poisonous are intermittent confusions of RA lung sickness directly connected with the fundamental RA is more normal [4]. It shows the same number of various subtypes, and regular interstitial pneumonia (UIP) is one of the most well-known sorts while it is suggested in non-unequivocal UIP cases, the vast majority of the patients don't go through careful lung biopsy due to the high dangers related with it [3, 6]. So for the conclusion of RA-ILD is these days essentially dependent on high-resolution computed tomography, (HRCT) [6].

The First Report about Lung disease, related to RAE Ilman and Ball in 1948 [7], when the systemic nature of 'rheumatoid disease' was just becoming appreciated HRCT is a technique introduced in mid-1980 s result of significant improvement in the CT process and in computers [8, 9]. On the other hand HRCT is an ideal and Noninvasive method of imaging when ILD is suspected [10]. Subsequently, clear techniques for giving aftereffects of infection degree are as yet required, so the reports of the endurance relationship of perceptions made with HRCT have basically centered in a wide range of illnesses that are related with ILD [11].

The histo pathological examination has a decent relationship with Honey Combing and Reticulation when it is seen on HRCT [12]. High resolution Computed Tomography can likewise show pictures (Ground-glass mistiness) and it associate incendiary harm in pathological investigation of lung tissues [10]. These sorts of pictures are estimated with records which are introduced by the Kazerooni *et al*. [10].

The amount of slice thickness moved with slice thickness and the degree of lungs in different patients [13]. while on the other hand High resolution computed Tomography has become a cutting edge test for the detection of patients with various basic clinical complaints, incorporating patients with dyspnea and constant hack. HRCT allows to separate regions of possibly reversible infection from irreversible fibrosis and furthermore valuable in showing the best example and site of lung biopsy [14]. Structural alterations in the lungs can be perfectly visualized in patients with normal findings on the chest radiographs [15].

Furthermore, HRCT-derived scores for to correlate them with degree of physiological deficiency and fibrosis extent [4] while the fundamental part of HRCT is arranging and checking IPF or ILD after some time and the large test for radiologists is the likelihood to conjecture the sickness course (slow or quick) at the hour of conclusion [4,16]. However, prone position is useful in assessing the interstitial lung disease involving dependent portions of the lung [15].

Thin Section chest CT is an exact and delicate method for the assessment of ILD. In examination with normal CT, HRCT have the capacity to identify little structures, including interlobular septa, development dividers, interstitial septa, and bronchial dividers, by using High Spatial Frequency remaking Algorithms, extending spatial objective and reducing picture smoothing [17]. Normal chest radiographs are not delicate while the reported rate of ILD dependent on chest x-beams is 1–5%.The assessed prevalence of RA-ILD utilizing HRCT is 20–44%.

The study was to assess the Lung parenchyma by using HRCT in the Patients with RA and the use of HRCT for treating and diagnosing ILD because HRCT is Gold stander for the evaluation of ILD as compare it with normal Ct scan it is not as much useful for diagnosis and treatment while this study will also help to understand the modification in CT scans and there use in Lung diseases[18].

PATIENTS AND METHODS

A study that included patients from an accomplice of RA-ILD patients surveyed from May to November 2020.The 60 patients where ruled out with Arthritis in our Clinical Centre out of which 22 patients were taken to investigate that which appearance is more common in patients ARA rules for rheumatoid joint irritation [19]. All the patients referred to our foundation, it's a public clinical reference place for respiratory sicknesses, to assess their pneumonic side effects and I was doing rotation there. All patients are assessed by the experienced pulmonologist who have good experience in Interstitial lung disease radiologist and also with a rheumatologist whose experience is good in ILD-R[20].When Rheumatoid Arthritis with ILD was characterized as the reason for aspiratory indications and different reasons for pneumonic irregularities were avoided, the treatment chosen in agreement of the going to pulmonologist and then to rheumatologist After the total assessment of the patients in the ILD Department, patients were treated with DMARDs in immunotherapy or blend (Methotrexate, Leflunomide, Sulphasalazine or Azathioprine) notwithstanding Corticosteroids'. All these things are done by the consent of the patient because it is very important to tell about everything that is happening to the patient.

High resolution computed tomography scan

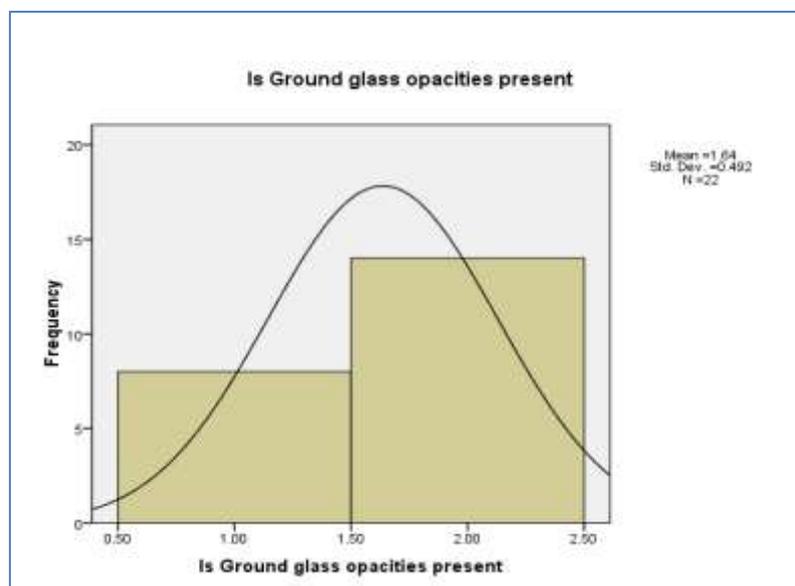
HRCT was performs with 1.0 or 2.0 mm thick pivotal segment taken at 2 cm spans all through entire chest, they were remade utilizing a High-spatial recurrence calculation. Somewhere in the range of 20 to 30 CT filter pictures were obtained in every patients scan. High resolution Computed Tomography was assessed by radiologist that is present in Clinical centre. In brief, peruser notices 3 pictures that are taken at Aortic Curve Level, the carina, 1 cm over stomach the afterward, givesa score on a size for both alveolar and ILD abnormality from 0 to 5as indicated by plan introduced by Kazerooni *et al*.4 Then from the obtained images a normal picture is determined. In most of the patients we found arthritis and the patients with Ground glass appearance are more common as compare to other appearances. The contrast study is beneficial in this case because its gives us detail image in HRCT as compare to Normal image. The patients with serious condition are on follow up and the medications that are given to them are DMARDs and Antibiotics that helps to fight against disease.

		Is Ground glass opacities present	Is Honey Comb appearance present	Is Bronchiectasis present	Is Pleuraleffusion Present	Is Enlarged lymph nodes present
N	Valid	22	22	22	22	22
	Missing	0	0	0	0	0

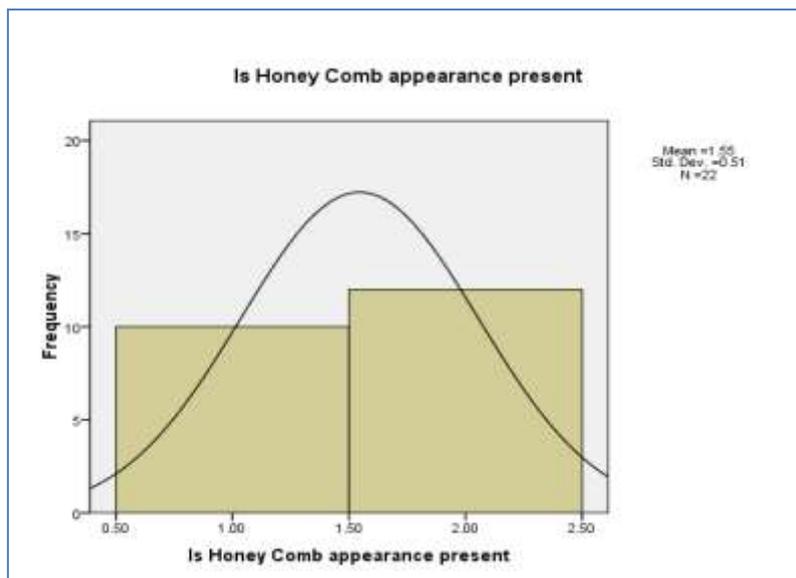
Statistics

CORRELATIONS							
			Is Ground glass opacities present	Is Bronchiectasis present	Is Honey Comb appearance present	Is Pleuraleffusion Present	Is Enlarged lymph nodes present
Spearman's rho	Is Ground glass opacities present	Correlation Coefficient	1.000	-.140	-.690**	.121	.332
		Sig. (2-tailed)	.	.535	.000	.592	.131
		N	22	22	22	22	22
	Is Bronchiectasis present	Correlation Coefficient	-.140	1.000	.388	-.388	-.624**
		Sig. (2-tailed)	.535	.	.074	.074	.002
		N	22	22	22	22	22
	Is Honey Comb appearance present	Correlation Coefficient	-.690**	.388	1.000	-.083	-.574**
		Sig. (2-tailed)	.000	.074	.	.712	.005
		N	22	22	22	22	22
	Is Pleural effusion Present	Correlation Coefficient	.121	-.388	-.083	1.000	.203
		Sig. (2-tailed)	.592	.074	.712	.	.366
		N	22	22	22	22	22
Is Enlarged lymph nodes present	Correlation Coefficient	.332	-.624**	-.574**	.203	1.000	
	Sig. (2-tailed)	.131	.002	.005	.366	.	
	N	22	22	22	22	22	
			Statistics				

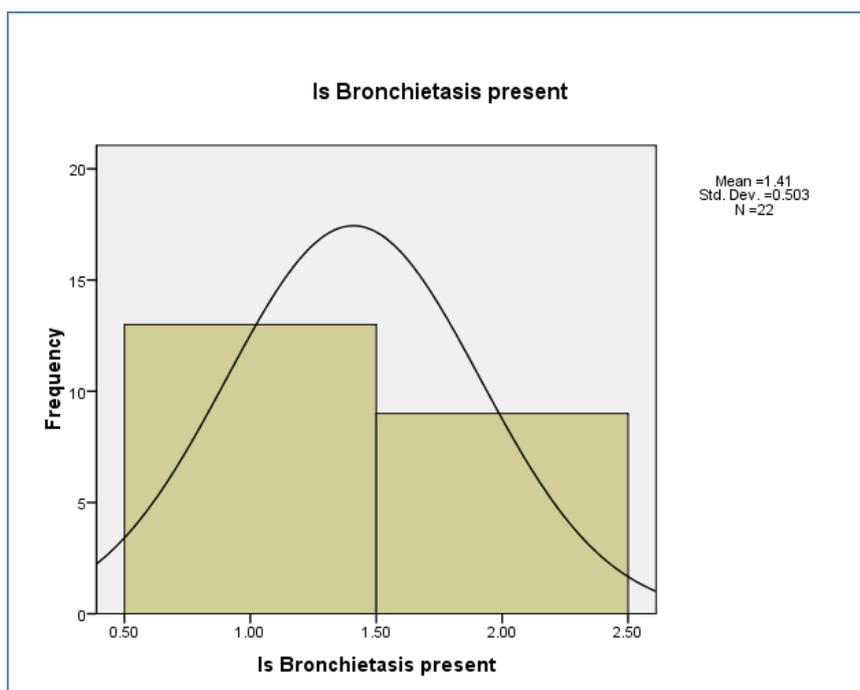
HISTOGRAM



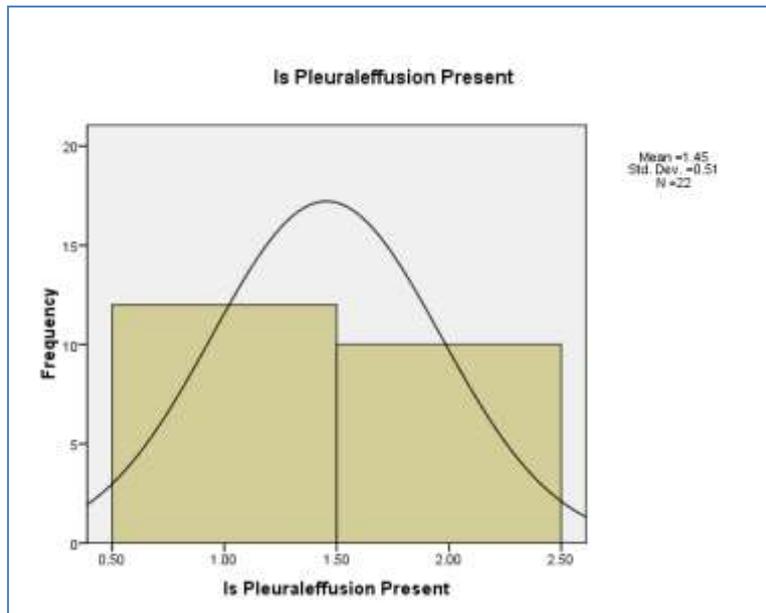
Is Ground glass opacities present					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	8	36.4	36.4	36.4
	No	14	63.6	63.6	100.0
	Total	22	100.0	100.0	



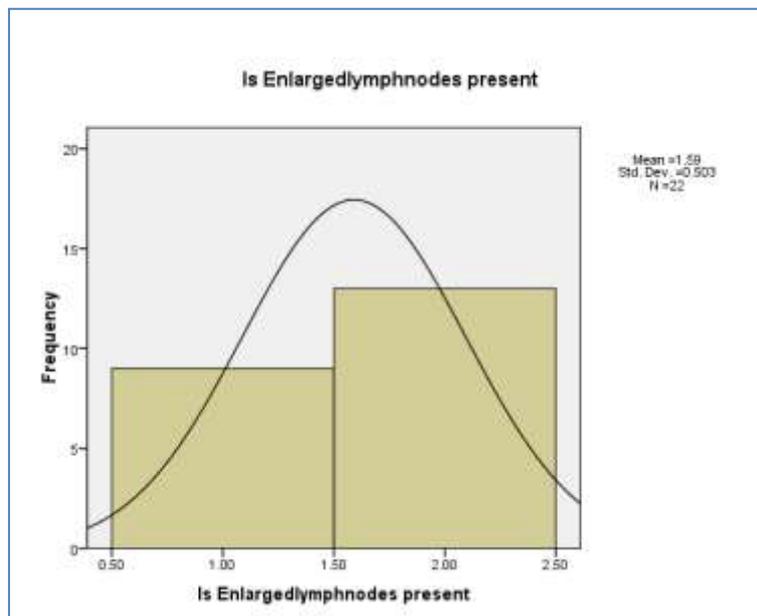
Is Honey Comb appearance present					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	45.5	45.5	45.5
	No	12	54.5	54.5	100.0
	Total	22	100.0	100.0	



Is Bronchiectasis present					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	13	59.1	59.1	59.1
	No	9	40.9	40.9	100.0
	Total	22	100.0	100.0	



Is Pleural effusion Present					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	54.5	54.5	54.5
	No	10	45.5	45.5	100.0
	Total	22	100.0	100.0	



Is Enlarged lymph nodes present					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	9	40.9	40.9	40.9
	No	13	59.1	59.1	100.0
	Total	22	100.0	100.0	

STATISTICAL ANALYSIS

In this study we use statistical tool of Spearman’s rank correlation coefficient by using SPSS.

It is used to evaluate the association between Ground glass opacities, Honey comb appearance, Enlarged lymph nodes, Bronchitis, Pleural effusion. First we put the data and set data labels and assign values and

variables. Then we go into the analysis and after selecting the correlate option there is bivariate option through which we select the spearman's rank correlation the alpha was set at, 2 followed. All examination finished with statistical bundle.

RESULT

In this study we have taken 22 patients out of which Arthritis was present in 18 Patient whose percentage is 81.8% and then we evaluate the HRCT findings like Ground glass opacities, Honey comb appearance, Enlarged lymph nodes, Bronchiectasis, Pleural effusion. The ground glass opacities were present in 8 patients whose percentage was 36.4% and it was not present in 14 patients whose Percentage range was 63.6%. After that we evaluate the honey Comb Appearance in RA patient and it was about present in 10 patients whose frequency was 45.5 % and was not present in 12 patients whose frequency was 54.5%. A

part from this we also consider the presence of Bronchiectasis in RA patient was about present in 13 patients out of 22 patients and its frequency was 59.1 % and was not present in 9 patients and its percentage was about 40.9%. While the Pleural effusion was present in 12 patients and its percentage was 54.5% and was not present in 10 patients and its percentage was 45.5% at the last we evaluate the Enlarged lymph node findings and it was present in 9 patients whose percentage was 40.9% and was not present in 13 patients whose percentage was 59.1%. Significant aspects associated with HRCT anomalies were patients with age above 40 years, because in this study we take patient ranging from 30yrs to 70 yrs IgM rheumatoid factor positive exams, rest hypoxia, and distal airway disorder LFT evidence. These outcomes recommend a positive relationship between the RA infection action and Lung aggravation in RA-ILD.

Ground Glass Finging in HRCT



DISCUSSION

The consequence of examination shows a relationship between RA infection movement and lung

aggravation assessed by High Resolution Computed Tomography in Rheumatoid Arthritis-Interstitial Lung Disease patients. Therefore the consequences of the investigation are as per the theory that lung aggravation

are seen in RAILD patients evaluated by HRCT is assistant to RA activity. The impression of this evaluation is that the Kazerooni ground-glass score and the CDAI score, yet not quantifiably huge, had lower scores after clinical treatment with DMARDs and prednisone.

In 2018, Hanna M. Nurmi studied in Finland on about 60 Patients on different Interstitial disease and then compare the presence and Extent of disease by using a Scoring system then they collect the data from a hospital by using the variable like Age, Gender etc. and then correlate there positive and negative result for their scoring rate and revealed that Numerous radiological discoveries partner with the course of the sickness of RA-ILD and might be valuable when arranging the RA therapy or assessing the danger of death in these patients [6].

A section from this Luling Li in 2019 surveys lung varieties from the HRCT and clarifies which oddity can anticipate the reformist fibrosis of rheumatoid joint irritation (RA) – related interstitial lung ailment (ILD). He studied on 1096 patient out of which 213 patient were diagnosed with RA-ILD by using HRCT they also take their clinical data and background history. The rate of ILD was increase in older age patients, the patient with smoking history, previous lung disease history etc. After that they take the percentages of the common disease and at the last they calculate the specificity and sensitivity ratio of most common two diseases that were diagnosed on Ct. The amassed appraisal of these two CT inconsistencies has an achievable data [13].

CONCLUSION

This study concludes lung parenchymal changes due to Rheumatoid arthritis are more common in male than female. Joint stiffness, joint swelling, chest discomfort is also 22 patients were evaluated out of which RA was present in 18 patients. The ground glass opacities were present in 8 patients whose percentage was 36.4%. Then we evaluate the honey Comb Appearance in RA patient and it was about present in 10 patients whose frequency was 45.5%. Bronchiectasis in RA patient was about present in 13 patients out of 22 patients and its frequency was 59.1%. The Pleural effusion was present in 12 patients and its percentage was 54.5%. Enlarged lymph node findings and it was present in 9 patients whose percentage was 40.9%. The sample analyzed in patients with rheumatoid arthritis, HRCT demonstrated sensitivity in the detection of anomalies, but clinically silent as well as not being diagnosed in simple radiography. Correlations between HRCT anomalies were inconsistent, and investigation results varied. It is concluded that HRCT images are beneficial in diagnosing interstitial lung disease for rheumatoid arthritis patients. This modality may use for reticular abnormalities, with a predominance in the middle to upper lung fields in future research study.

Ethical considerations

The creator announce that the procedures followed were according to the rules of reliable Clinical Research Ethics Committee and rules and regulations set by the ethical committee of university of Lahore will be followed while conducting the research and the rights of the research participants will be respected.

Secrecy of data

The creators express that they have followed the shows of their work put on the scattering of patient information and that all the patients that are for the evaluation have gotten adequate data and have given their educated agree recorded as a printed variant to take part in that overview and we ensure that their privacy is important to us and there whole data is in confidentiality.

Informed consent and right to privacy

We have gotten the informed consent with respect to patients and to other subjects that are referred in the article. Everything is in confidentiality and all the things that are mentioned in the article are with the permission of every single person which is considered in Article.

Conflict of interest

We declared that there is no conflict of interest in this study.

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