Sudan University for Science and Technology
College of Graduate Studies

A Study of lung diseases using High Resolution Computed Tomography and Conventional x- ray

دراسه امراض الرئه باستخدام الاشعه عاليه الدقه والاشعه السينيه

A Thesis Submitted for partial fulfillments of the requirement of M.SC degree in Diagnostic Radiology

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الايه

بسم الله الرحمن الرحيم

قال تعالى:

(إِنَّ اللَّهَ لَا يَسْتَحْيِي أَنْ يَضْرِبَ مَثَلًا مَا بَعُوضَةً فَمَا فَوْقَهَا فَأَمَّا الَّذِينَ آمَنُوا فَيَعْلَمُونَ أَنَّهُ الْحَقُّ مِنْ رَبِّهِمْ وَأَمَّا الَّذِينَ كَفَرُوا فَيَقُولُونَ مَاذَا أَرَادَ اللَّهُ بِهَذَا مَثَلًا يُضِلُّ بِهِ كَثِيرًا وَيَهْدِي بِهِ كَثِيرًا وَمَا يُضِلُّ بِهِ إِلَّا الْفَاسِقِينَ)

صدق الله العظيم

سوره البقره الايه (26)

Dedication

Iam dedicating this work to those who loved me support me and was always there whenever I needed them.

To my parents whom without, I couldn't been able to achieve all this.

To my husband and my son, all what Iam doing is basically for you.

To my siblings, Moujahed, Mohamed, Sajda, for walking by my side the whole journey.

To my friends, and specially ***Dr: Hussein Ali Dinar,*** *who have helped me a lot.*

Thank you all

Acknowledgment

Most of all i want to thank god, for giving me the power to accomplish this work ,am so grateful.

Thank you ***Dr: Hussein Ahmed Hassan*** *for encouraging , inspiring challenging, and supporting me in writing this research.*

Abstract

Chest x-ray is important radiographic procedures during the management of lung disorders.

Aimed: to finding x-ray and high resolution computed tomography in lung diseases. The problem of study was when took the chest x-ray there on overlapped of pathology with dense structure and HRCT is the test performed by taken thin section that result a few image representative of lung in general. HRCT don't taken image of the whole lung because using widely spaced thin section **. Methods:** Retrospective cross sectional study Descriptive, 50 patients come to x-ray department for check up chest by x-ray and HRCT when suspected lung disease, Male and female. Were examined in Moaalem medical center, during the period from (January 2018 to march 2018). The variable collected from patients include

Gender, age, sigin and symptoms, clinical diagnostic, x-ray finding and HRCT finding.**Result:** the majority of samples were males greater than females, males 26 (52%) and females 24 (48%). In this study peak incidence was among the age between (years of age presenting(2%). The cough is the most sign and symptoms with 21 patient(42%). Most patient had suspected clinical diagnostic (consolidation) of 13 patient (26%). In x-ray finding about 18 patient (36%) was saw pleural effution when those patient did HRCT we saw 13 patitent (26%) scloratic changes with pleural effution.

Finally the study showed HRCT is golden modalities in lung interstitial disease combinations of modality enhance finding.

المستخلص

تعتبر اشعه الصدر السينيه والاشعه المقطعيه عاليه الدقه من اهم الفحوصات لدراسه امراض الرئه.هدفت الدراسه لرؤيه امراض الرئه بالاشعه السينيه والاشعه المقطعيه عاليه الدقه. ولكن المشكله في الدراسه ان بعض الاحيان يحصل تداخل بين المرض والتركيبه التشريحيه للصدر في الاشعه السينيه العاديه اما في الاشعه المقطعيه عاليه الدقه نستخدم شرائح صغيره لتكوين الصوره فنواجه ظهور كل الرئه .تم اجراء هزه الفحوصات علي 50 مريض من الرجال والنساء, المتوقع اصابتهم بواحد من امراض الرئه في مدينه المعلم الطبيه بالخرطوم في الفتره من يناير 2018 الي مارس 2018 .والبيانات التي استخدمت في هزه الدراسه هي : النوع, العمر, التشخيص المبدئي, ظهور الاشعه العاديه, ظهور الاشعه المقطعيه عاليه الدقه ثم تم جمعها وتحليلها . اظهرت النتائج ان عدد الرجال اكثر من النساء , الرجال 26 (52%) والنساء 24(48%) ووجدت الدراسه ان اكثر الفئات المصابه هي 40-50 وهي (24%) والكحه هي اكثر الاعراض والعلامات بالنسبه لي الاعراض الاخري 21 (42%). معظم المرضي كان هو التشخيص المبدئي لديهم 13 (26%) . وجدت الدراسه ان الاشعه السينيه العاديه توضح بعض علامات المرض في الرئه اما الاشعه المقطعيه عاليه الدقه تظهر العلامات بشكل اوضح وخاصه التغيرات الداخليه في الرئه. واوصت الدراسه بان تزيد المعرفه لدراسه امراض الرئه بالاشعه العاديه والاشعه المقطعيه عاليه الدقه. واخيرا اظهرت الدراسه ان الاشعه المقطعيه عاليه الدقه تظهر فيها العلامات بشكل افضل من الاشعه السينيه العاديه.

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Abbreviation

CT: computed Tomography

HRCT: high resolution computed Tomography

DFOV: display field of view

CF: cystic fibrosis

HMD: hyaline membrane disease

PE: pleural effusion

PF: pulmonary fibrosis

TB: tuberculosis

SPSS: statistical package of social science

SOB: short of breathing

PFT: pulmonary function test

Chapter one

Introduction

Chapter one

1.1 Introduction

X-ray imaging is a well-known imaging modality that has been used for over 100 years since roentgen discovered . x-ray imaging is based on through transmission and analysis of the resulting x-ray absorption data .chest x-ray is typically the first imaging test used to help diagnose symptoms and therefore physicians use the examination to help diagnose or monitor treatment for condition such as : tuberculosis, pneumonia, consolidation and other medical condition. The realm of diagnostic radiology encompasses various modalities of imaging that may be used individually or, more commonly, in combination to provide the clinician with enough information to aid in making a diagnosis such as computed tomography which discovered in 1979 by British Engineer named Sir Godfrey Housfield and Dr. Alan Cormack.the CT scanner have types called high resolution computed tomography which help in diagnostic of lung diseases. (www.medical radiation).

The one of type in CT scanner which called high resolution computed tomograghy. High resolution computed tomography is a technique introduced in mid-1980 s result of significant improvement in the CT process and in computers. The technical aspects of high resolution CT have been described by a number of workers. There are no general agreements among investigations are possible in obtaining on optimal study. Quantification of the various morphological features of lungs diseases is possible from HRCT images and diseases. (vined 1993).

High resolution computed tomography of chest is the noninvasive imaging method of evaluating lung disease and has improved our understanding of the patterns and pathology of many pulmonary diseases. It gives us detailed images as we see when we look at a gross pathological specimen. Lungs are very important organs in the body, and as responsible of gases exchange and

providing the body with oxygen which the body depend on. Diseases affecting the small airways of the lungs are difficult to detect by traditional diagnostic tests. Wide spread involvement is needed before symptoms and abnormalities on pulmonary function testing or chest radiograph become apparent. Quantification of the various morphological features of lungs diseases is possible from HRCT images and diseases.(vined 1993).

HRCT usually involves sampling 1mm sections of lung at 10-15mm intervals, and examination on high spatial resolution algorithm with wide window width. HRCT is imaging modality of choice for the morphological assessment of lungs diseases with expellant spatial resolution. The trade-off in increased sensitivity and specificity of HRCT over chest radiography is related to 2 radiation dose which is higher. However, conventional spiral computed tomography [CT] has an even higher radiation burden than HRCT . High-resolution CT (HRCT) is used to evaluate the lung parenchyma in patients with known or suspected diffuse lung diseases such as fibrosis and emphysema. Like airway imaging, HRCT protocols use thin sections (1.5 mm or less), a fast acquisition to reduce motion artifact, and optimal spatial resolution. In addition to the thin sections, spatial resolution is optimized by the selection of an edge-enhancing algorithm (such as a bone algorithm) and a display field of view (DFOV) that is just large enough to include the lungs. When the lungs are fully expanded the contrast between low-attenuation aerated air space and high-attenuation lung structure is maximized. Therefore, HRCT protocols are routinely obtained at full inspiration. However, expiratory images are useful in many instances. For example, expiratory images better depict bronchiolitis and air trapping.(vined 1993).

1.2 Objectives

1.2.1 General objective

To study between Conventional chest x-ray and high resolution computed tomography in diagnostic of Lung Diseases.

1.2.2 Specific objective

This study intended to:

- To identify importance of high resolution computed tomography in diagnosing lungs disease.
- Evaluation known or suspected chronic interstitial lung disease.
- To define lung disease by conventional x-ray.
- To determine the best modalities lung disease.

1.3 Problem of study

HRCT is the test performed by taken thin section that result a few image representative of lung in general. HRCT don't taken image of the whole lung because using widely spaced thin section however it is un suitable for assessment lung cancer or other localized lung diseases. HRCT imaging have very high level of noise , expensive and very limited section.

1.4 Thesis outlines

This thesis is concerned of evaluation of diagnostic role of HRCT of lungs disease. It divided into the five chapters. Chapter one, which is an introduction, deals with theoretical frame work of the study. It presents the statement of the study problems, objectives of the study, it also provides on outlines of the thesis. Chapter two includes theoretical background material for thesis, and literature review (previous studies). Chapter three deals with material and method used to evaluate diagnostic accuracy of HRCT of lungs disease. Chapter four deal with (result) data presentation, Chapter five discusses the data (discussion), analysis, and conclusion, recommendation for this thesis and suggestions for future work

Chapter two
Literature review

Chapter two

Literature review

2.1 Theoretical background

2.1.1 Anatomy

The lungs are the organs of respiration. They are composed of a sponge like material, the parenchyma, and are surrounded by the visceral pleura. The large conical shaped lungs extend up to or slightly above the level of the first rib at their apex, and down to the dome of the diaphragm at their wide concave-shaped bases or diaphragmatic surfaces . Each lung has a mediastinal or medial surface that is apposed to the mediastinum and a costal surface that is apposed to the inner surface of the rib cage. Each lung also has inferior, anterior, and posterior borders. The inferior border extends into the costo-diaphragmatic recess of the pleural cavity, and the anterior border of each lung extends into the costo-mediastinal recess of the pleural cavity . Two prominent angles can be identified at the medial and lateral edges of the lung bases. The medial angle is termed the cardiophrenic sulcus, and the lateral angle is termed the costophrenic sulcus .(Anatomy section19993.)

The lungs are divided into lobes by fissures that are lined by pleura . The right lung has three lobes (superior [upper], middle, and inferior [lower]), whereas the left lung has just superior (upper) and inferior (lower) lobes . The inferior lobe of the right lung is separated from the middle and superior lobes by the oblique (major) fissure, termed oblique because of its posterosuperior to anteroinferior . Separating the middle lobe from the superior lobe is the horizontal (minor) fissure . An oblique fissure also separates the superior and inferior lobes of the left lung . The left lung has a large notch on the medial surface of its superior lobe called the cardiac notch and a tongue-like projection off its inferoanterior surface termed the lingula . Each lung has an opening on the medial surface termed the hilum. This opening acts as a passage for mainstem bronchi, blood vessels, lymph

vessels, and nerves toenter or leave the lung and is commonly referred to as the root of the lungs.(Anatomy section).

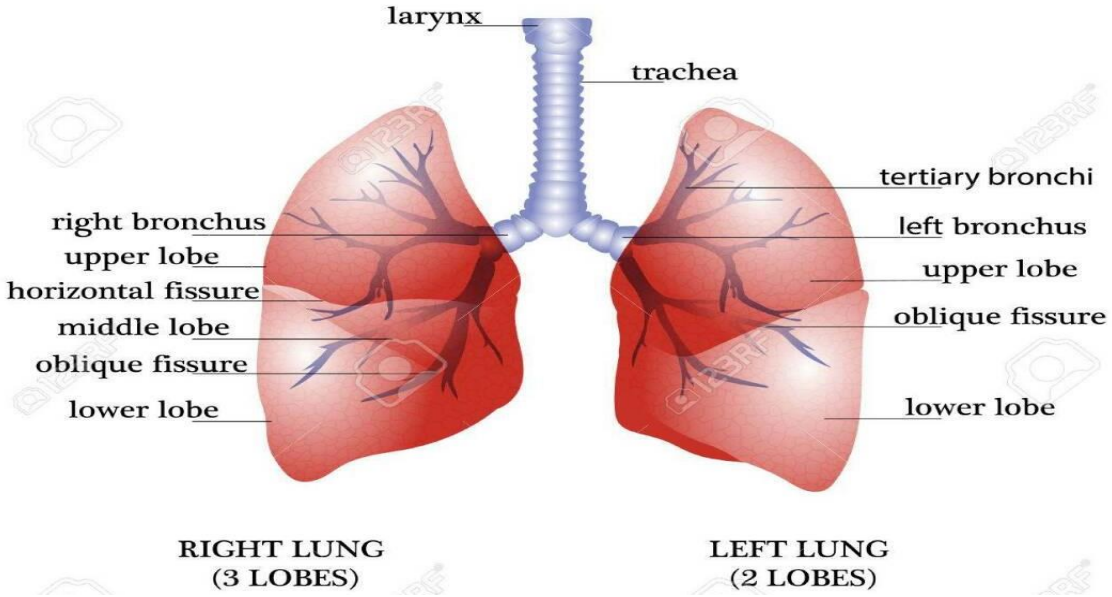

Figure 2:1 Anatomy of the lungs

(Medicinenet.com)

2.1.2 PHYSIOLOGY

2.1.2.1 Function of respiratory system

Through breathing and exhalation, the respiratory system facilitates the exchange of gases between the air and the blood and the blood and the body cells. The respiratory system also helps us to smell and create sound. (Tortora, Gerard J. 1987) .

- **Respiration**

The principal purposes of respiration are to supply the cells of the body with oxygen and remove the carbon dioxide produce by cellular activities. They three basic processes of respiration are pulmonary ventilation, external respiration, and internal respiration.

2.1.2.2 Pulmonary ventilation

Pulmonary ventilation [breathing] is the process by which gasses are exchange between atmosphere and lung alveoli.

- **Mechanism of inspiration**

Contraction of aspiratory muscles, expansion of the chest, reduction of intra pleural pressure, expansion of the lung, reduction of intra pulmonary pressure and then air move in to the lung. (Tortora, Gerard J. 1987).

2.2.3Mechanism of expiration

Relaxation of insoiratory muscles, increased intrapleural pressure, recoil of the lungs s to the expiratory position, increased intra alveolar pressure and then move out of the lung.

- **External respiration**

It result in the conversion of deoxygenated blood (more co2 than o2) coming from the heart to oxygenated blood (more o2 than co2) resulting to the heart. The po2 of alveolar air is 105mmHg. The po2 of deoxygenated blood is 40mmHg. As the result of different in po2 oxygen diffuse from alveoli in to the deoxygenated blood unit equilibrium is reached and the po2 of the new deoxygenated blood is 105mmHg. The p co2 of alveoli air is 40mmHg. The p co2 of deoxygenated blood is 45mmHg. As the result of this different of the p co2, co2 defuses from deoxygenated blood to the alveoli unit equilibrium is reached po2 and p co2 arriving the lungs are the same in alveolar air.

- **Internal respiration**

As soon as external respiration is completed, oxygenated blood leaves the lung s through the pulmonary veins and returns to the heart. From here it is pumped from the left ventricle into the aorta and through the systemic arteries to tissue cells. The exchange of the oxygen and canon dioxide

between tissue and blood capillaries and tissue cells is called internal respiration. . (Tortora, Gerard J. 1987).

2.2 Lungs pathology

Some disease of lung:

2.2.1 cystic fibrosis(CF)

Is congenital disorder resulting from agenetic defect transmitted as an autosomal recessive gene that affects the function of the exocrine glands. .in the respiratory system, evidence suggests that the lungs are histologically normal at birth.(Radiographic pathology).

2.2.2 Hyaline Membrane Disease(HMD)

Is congenital disease Also known as respiratory distress syndrome (RDS), hyaline membrane disease affects infants and is disorder of premature infants or those born at less than a 37-week gestation. .(Radiographic pathology).

2.2.3 Consolidation

Consolidation of the lung is simply a "solidification" of the lung tissue due to accumulation of solid and liquid material in the air space that would have normally been filled by gas. It is also known as pulmonary consolidation.(Radiographic pathology).

2.2.4 Pleural Effusion(PE)

A pleural effusion is an abnormal amount of fluid around the lung. In pleural effusion, fluid accumulates in the space between the layers of pleura. The fluid in pleural effusion also may result from inflammation. .(Radiographic pathology).

2.2.5 Pulmonary fibrosis(PF)

Pulmonary fibrosis is one of a family of related interstitial lung diseases that can result in lung scarring. Tissue deep in the lungs becomes thick, stiff and scarred. The scarring is called fibrosis. (Radiographic pathology).

2.2.6 Tuberculosis (TB)

Is an infection disease that may affect almost any tissue of the body, especially the lungs, caused by the organism mycobacterium tuberculosis and characterized by tubercles. (Radiographic pathology).

2.2.7 Lung abscess

A lung abscess is localized area of dead (necrotic) lung tissue surrounded by inflammatory debris. These abscess may result from periodontal disease, pneumonia, neoplasm or other organisms that invade the lungs. (Radiographic pathology).

2.3 Imaging modalities

2.3.1 Type of chest CT scans:

A CT scanner is a large machine with a tunnel-like hole in the center. During a chest CT scan, a person lies on a table as it moves small distances at a time through the hole. An x-ray beam rotates around the body as the person moves through the hole. A computer takes data from the x-rays and creates a series of picture, called slices, of the inside of the chest. Different types of chest CT scans have different diagnostic uses.

2.3.2 High-resolution chest CT scan

High- resolution CT (HRCT) scans provide more than one slice in a single rotation of the x-ray tube. Each slice is very thin and provides a lot of details about the organs and other structures in the chest.

2.3.3 HRCT technique

HRCT relies on the use of thin collimation and image reconstruction with a high spatial frequency algorithm. In most scanner system, 1 to 1.5 mm

collimation can be obtained and should be used routinely for HRCT. Five to eight slices with thin collimation should be obtained at different anatomic levels of the lung. Currently, there is no standard recommendation with regard to the use of a 1 cm, 2 cm, or 3 cm intersection gap. Scanning should be performed using a field of view large enough to encompass both lungs (35-40 cm). Retrospective targeting of the image reconstruction to a single lung or an even smaller portion of the pulmonary parenchyma increases spatial resolution, but, in most cases, does not add additional information. For 23 image photography, one should keep in mind that larger images are generally much easier to read. We, therefore, use a 6 on 1 format. It should be emphasized that although the manner in which images are photographed does not affect the actual spatial resolution of an image, the use of proper settings for window level and width is important for accurate interpretation. Currently, there are no "correct" window settings for image photography. Nevertheless certain window setting have gained acceptance throughout the radiological community. It is advantageous to use a double window with one window setting at 450/1,500 hounsfield units and a "lung density" window of -700/1,000 hounsfield units. Choosing different window levels and widths can be advantageous for specific cases. Because numerous patients demonstrate increased densities in the dependent portion of the lung, representing hypostasis and/or atelectasis, it is wise to evaluate patients not only in the supine position but also in the prone position to differentiate physiological densities from signs of diffuse lung disease. In general, HRCT images are obtained at full inspiration. In patients with suspected airway disease, additional CT scans should be obtained during expiration to facilitate detection of air trapping. The radiation does associated with HRCT scans is significantly less that associated with conventional CT. with HRCT, the mean skin radiation dose for scanning at 10 mm intervals is around 4 mGY, and for scanning at 20 mm intervals, around 2 mGY , respectively

2.4 previous studies

FATIH, ORS, et.al (2013) Chest x-ray has several limitation in detecting the exent of pulmonary disease in sarcoidosis. It might not reflect the degree of pulmonary involvement in patients with sarcoidosis when compared to compute tomography of the thorax. We aimed to

investigation the HRCT finding of pulmonary sarcoidosis and to find out the existence of possible relations between HRCT finding and PFTs.In addition, we aimed investigate the accordance between HRCT findings and conventional chest x-ray staging of pulmonary sarcoidosis.45 patients with sarcoidosis, six of them were female and 39 were male.Nodule, micro nodule, ground glass opacity and consolidation were the most common HRCT finding. Pulmonary sarcoidosis patients might various pulmonary parenchyma changes on HRCT. Thorax HRCT was

superior to chest x-ray in detecting pulmonary abnormalities. The degree of pulmonary involvement might closely related to the loss of pulmonary function measured by PFTs. Chest x-ray is considered to

have a role in the evaluation of pulmonary sarcoidosi.

JONATHAN B, et.al (1995) these study done to assess the sensitivity of high resolution chest computed tomography (HRCT) in detecting idiopathic pulmonary fibrosis proved by biopsy specimen. To determine the degree of physiologic and pathologic abnormalities in patients with

idiopathic pulmonary fibrosis who have a false-negative HRCT. All patients underwent physiologic and pathologic assessment. The result of HRCT was prospectively compared with the result of standard pulmonary functions test. Of 25 patient who had both HRCT and open lung biopsy.

26 In our patient's population, physiological test was more sensitive than HRCT in detecting mild abnormalities in patients with idiopathic pulmonary fibrosis proved by biopsy specimen.

P.A.de Jong, et.al (2004) for effective clinical management of cystic lung disease it is important to closely monitor the start and progression of lung damage. The aim of this study was to investigate the ability of high resolution computed tomography (HRCT) and PFTs to detect lung disease. This study done for 48 patients had two HRCT scans in combination with PFTs 2 years apart. These data show that HRCT is more sensitive than pulmonary function test in the detection of early and progressive lung disease, and suggest that the high resolution computed tomography may be useful in the follow up of cystic fibrosis as an outcome measure in studies that aim to reduce lung damage.

Chapter Three

Materials and methods

Chapter Three

Materials and methods

3.1 materials

Retrospective cross sectional study**.**

3.1.1 Area and Duration of the study

This study was conducted At Almoalem medical city in x-ray department during January 2018 to march 2018.

3.1.2 sampling

Convenient Fifty patient with report from x ray and HRCT.

3.1.3 equipment

The chest x-ray images were taken by the x-ray unit model **shimadzu** and chest CT images were taken by the **TOSHIBA** model CETF-006B.

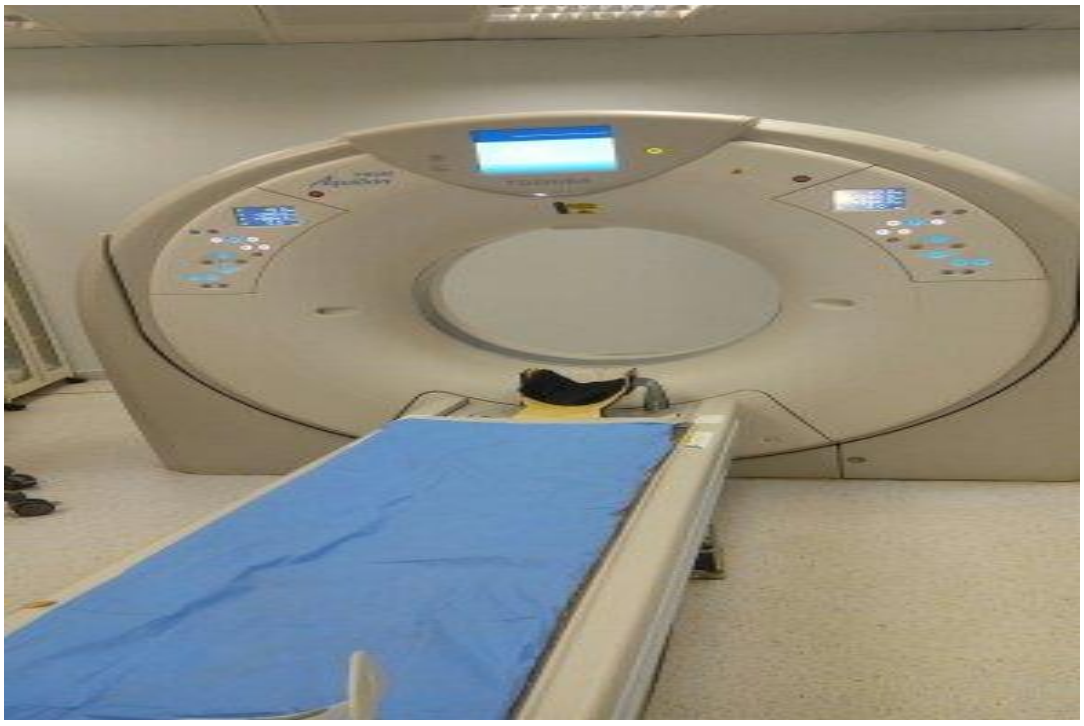

Figure 3.1 show CT machine

3.2 methods

3.2.1 study variable

The variable that collected from patient include gender, age, clinical sign, symptoms, x-ray finding and CT finding.

3.2.2 data collection

Data collected according to work sheet (appendix) include all above variable data.

3.2.3 image interpretation

The image was exam by technologist in Almoalem medical center.

3.2.4 data analysis

The data first summarize in to master sheet and then analized by SPSS (statistical package of the social science).

3.2.5 Ethical Consideration

There was official written permission state diagnostic centers to take the data.

No patients data were published, also the data was kept in personal computer with personal password.

s

Chapter four

Results

Chapter four

The Result

Table 4. 1 show gender frequency distribution among the sample

Gender		Frequency	Percent	Valid Percent	Cumulative Percent
	Male	26	52.0	52.0	52.0
	Female	24	48.0	48.0	100.0
	Total	50	100.0	100.0	

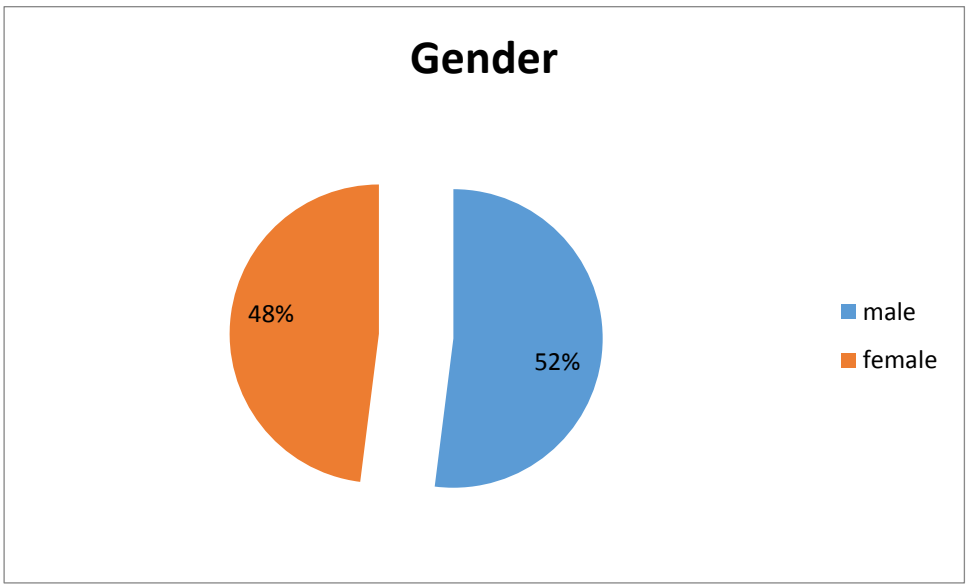

Figure 4. 1 shows gender distribution among sample

Table 4.2show age frequency distribution among the sample

Age	Frequency	Percent	Valid Percent	Cumulative Percent
10-20	1	2.0	2.0	2.0
21-30	5	10.0	10.0	12.0
31-40	9	18.0	18.0	30.0
41-50	12	24.0	24.0	54.0
51-60	6	12.0	12.0	66.0
61-70	8	16.0	16.0	82.0
>70	9	18.0	18.0	100.0
Total	50	100.0	100.0	

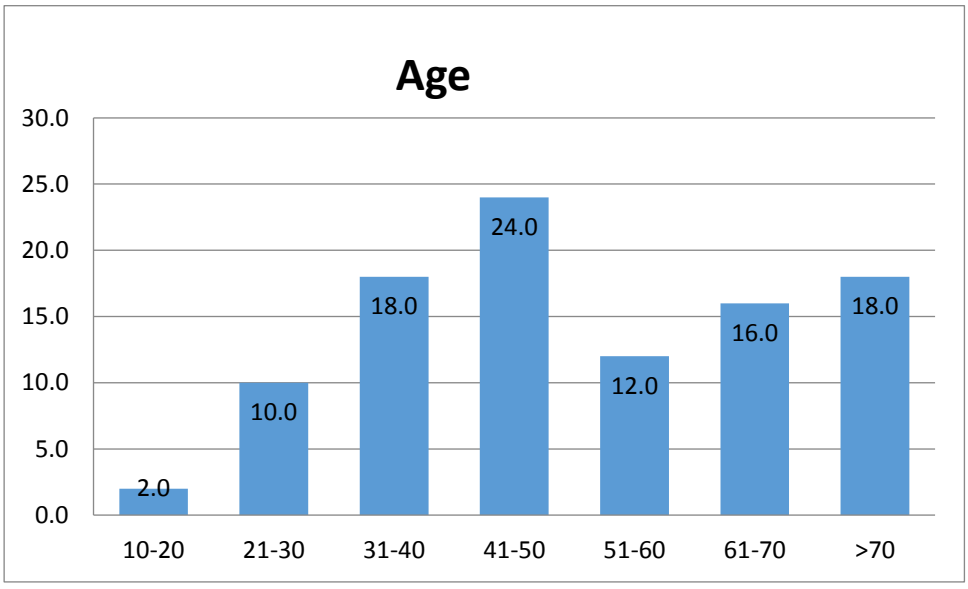

Figure 4. 2 shows age distribution

Table 4.3shows sign and symptom frequency distribution among the sample

Sign & symptoms		Frequency	Percent	Valid Percent	Cumulative Percent
	None	3	6.0	6.0	6.0
	Cough	21	42.0	42.0	48.0
	SOB	10	20.0	20.0	68.0
	Chest pain	9	18.0	18.0	86.0
	Dyspnea	4	8.0	8.0	94.0
	Sputum	3	6.0	6.0	100.0
	Total	50	100.0	100.0	

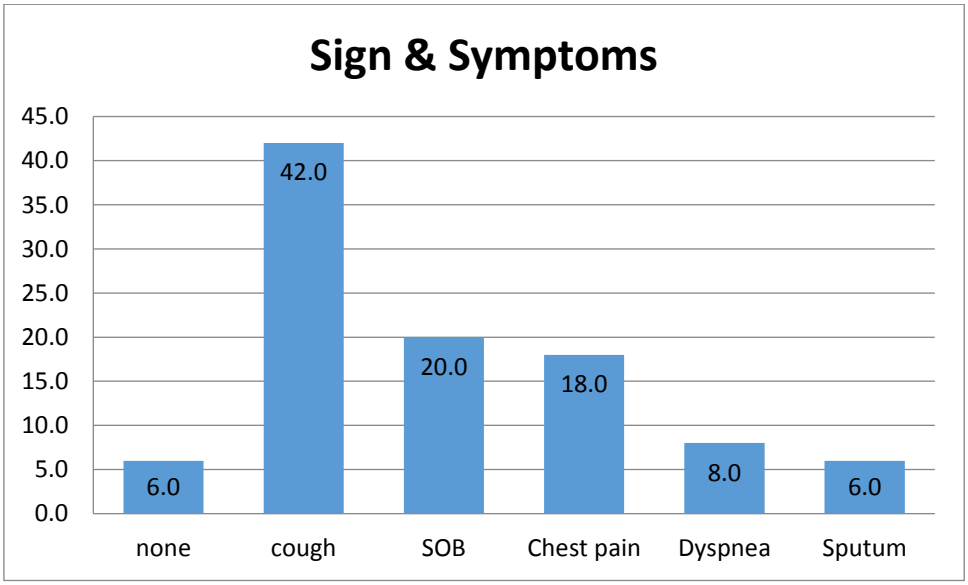

Figure 4. 3 shows sign and symptoms distribution

Table 4.4shows clinical diagnostic frequency

Clinical	Frequency	Percent	Valid Percent	Cumulative Percent
none	2	4.0	4.0	4.0
pleaural effusion	9	18.0	18.0	22.0
lug fibrosis	3	6.0	6.0	28.0
Consolidation	13	26.0	26.0	54.0
TB	7	14.0	14.0	68.0
pneumonia	6	12.0	12.0	80.0
Bronchoiatasis	5	10.0	10.0	90.0
emphysema	3	6.0	6.0	96.0
other	2	4.0	4.0	100.0
Total	50	100.0	100.0	

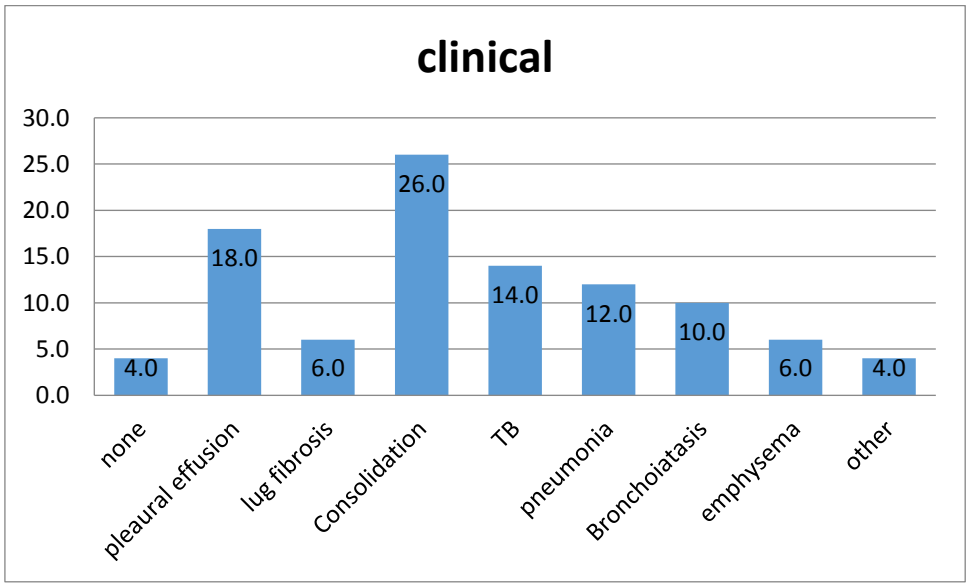

Figure 4. 4 shows diagnosis

Table 4.5shows conventional x-ray finding frequency among sample

x ray finding	Frequency	Percent	Valid Percent	Cumulative Percent
none	2	4.0	4.0	4.0
normal	1	2.0	2.0	6.0
consolidation	3	6.0	6.0	12.0
pleaural effusion	18	36.0	36.0	48.0
Air bronchogram	5	10.0	10.0	58.0
Cavities	4	8.0	8.0	66.0
Cardiomagaly	4	8.0	8.0	74.0
bronchial thickening	7	14.0	14.0	88.0
others	6	12.0	12.0	100.0
Total	50	100.0	100.0	

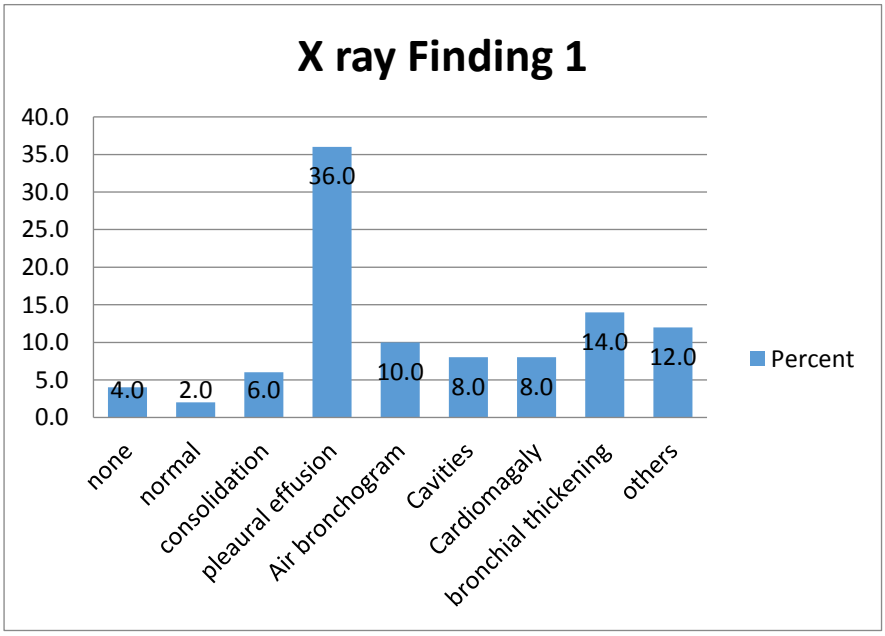

Figure 4. 5 shows finding x- ray

Table 4. 6shows HRCT finding frequency among the sample

HRCT		Frequency	Percent	Valid Percent	Cumulative Percent
	none	3	6.0	6.0	6.0
	sclerotic changes	13	26.0	26.0	32.0
	pleaural effusion	12	24.0	24.0	56.0
	Cardiomegaly	7	14.0	14.0	70.0
	Consolidation	9	18.0	18.0	88.0
	Air brochogram	2	4.0	4.0	92.0
	Emphysema	2	4.0	4.0	96.0
	ground glass shadow	2	4.0	4.0	100.0
	Total	50	100.0	100.0	

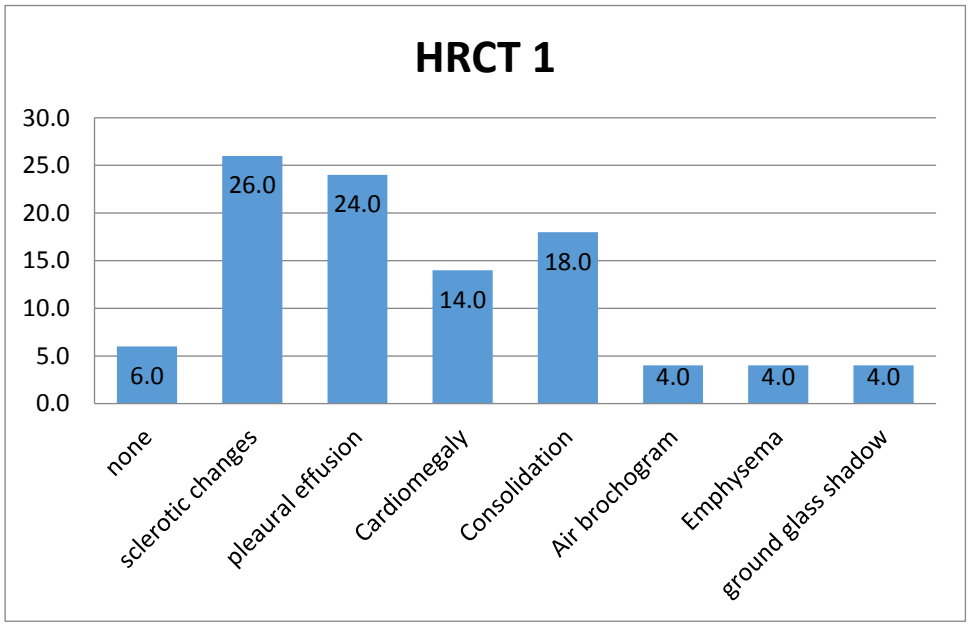

Figure 4. 6 shows HRCT finding distribution

Table 4.7shows Relation between age and clinical

			Age						
			10-20	21-30	31-40	41-50	51-60	61-70	>70
Clinical	none		0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
	pleural effusion		11.1%	11.1%	11.1%	11.1%	11.1%	22.2%	22.2%
	lug fibrosis		0.0%	33.3%	0.0%	33.3%	33.3%	0.0%	0.0%
	Consolidation		0.0%	0.0%	15.4%	38.5%	15.4%	7.7%	23.1%
	TB		0.0%	0.0%	14.3%	14.3%	28.6%	14.3%	28.6%
	pneumonia		0.0%	0.0%	16.7%	33.3%	0.0%	50.0%	0.0%
	Bronchiectasis		0.0%	40.0%	20.0%	20.0%	0.0%	20.0%	0.0%
	emphysema		0.0%	0.0%	0.0%	33.3%	0.0%	0.0%	66.7%
	other		0.0%	50.0%	50.0%	0.0%	0.0%	0.0%	0.0%

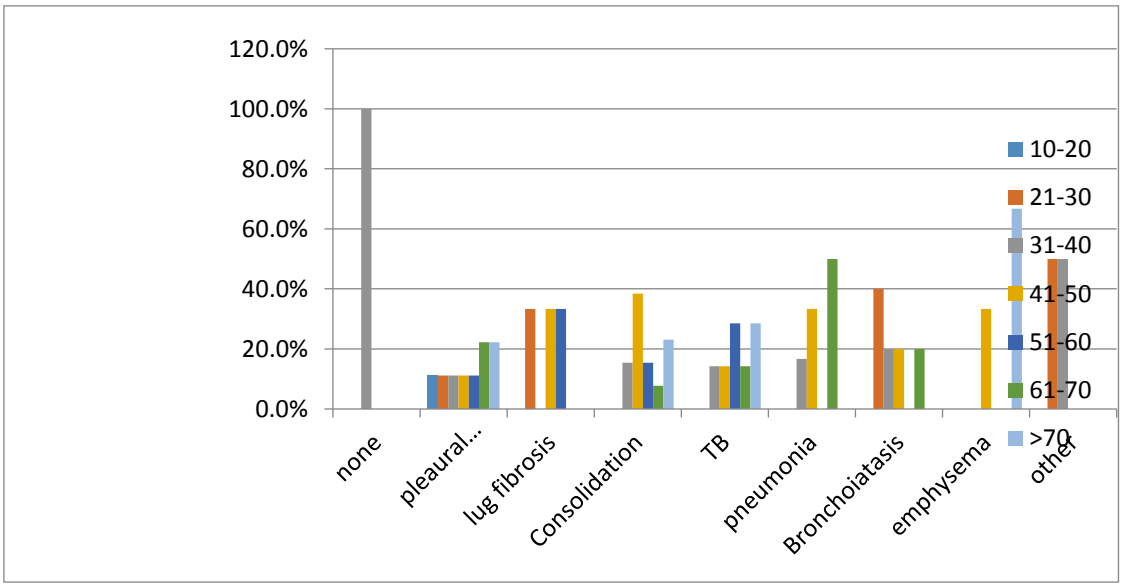

Figure 4. 7 shows relation between age and clinical

Table4. 8shows relation between clinical and sign &symptom

		Sign & symptoms					
Clinical		none	cough	SOB	Chest pain	Dyspnea	Sputum
	none	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	pleural effusion	0.0%	33.3%	33.3%	11.1%	11.1%	11.1%
	lug fibrosis	0.0%	66.7%	33.3%	0.0%	0.0%	0.0%
	Consolidation	0.0%	23.1%	30.8%	23.1%	15.4%	7.7%
	TB	0.0%	71.4%	14.3%	14.3%	0.0%	0.0%
	pneumonia	0.0%	50.0%	0.0%	50.0%	0.0%	0.0%
	Bronchiectasis	20.0%	40.0%	20.0%	20.0%	0.0%	0.0%
	emphysema	0.0%	66.7%	0.0%	0.0%	33.3%	0.0%
	other	0.0%	50.0%	0.0%	0.0%	0.0%	50.0%

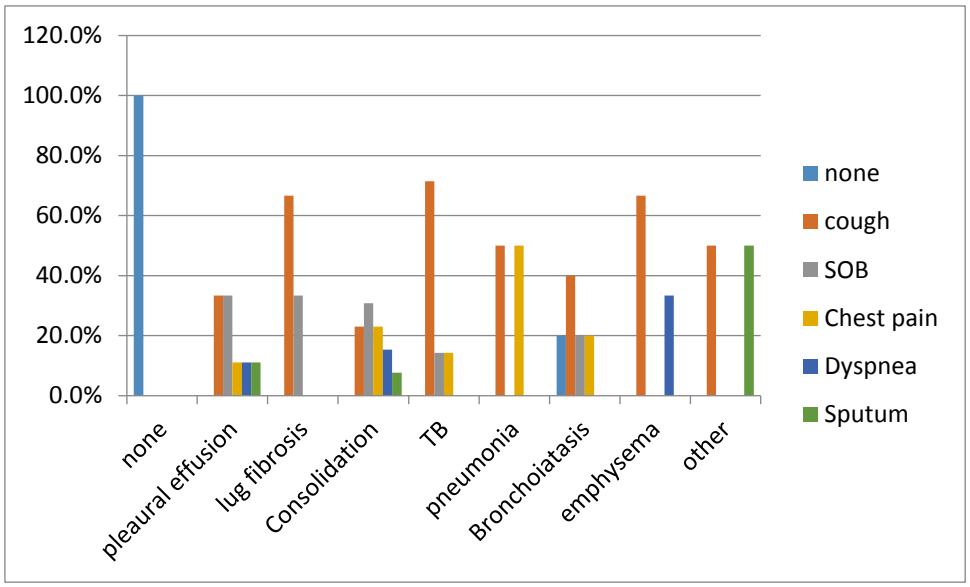

Figure 8.8shows relation between clinical and sign &symptom

Chapter five

Discussion, conclusion and recommendation

Chapter five

Discussion, conclusion and recommendation

5.1 Discussion

From our study the most affected gender by lung disease was found In male 52% regarding to age most affected group was 40-50 years old flowed by 31-40 years and more than 70 years with same percentage 18%. Most patient Sign and symptoms among sample came with cough ,SOB, chest pain, dyspnea, and sputum, with 42%, 20%,18%, 8% and 6% respectively .The most patient had clinical diagnostic with consolidation, pleural effusion, TB, pneumonia, bronchiectasis , emphysema, and other with 26% ,18% 12%, 10%, 6%and 4% respectively. Conventional x ray finding pattern was found to be pleural effusion , bronchial thickening ,others , Air Broncho gram ,cavities and cardiomegaly ,consolidation with 36%,14%,10%,8%,8% and 6 % respectively .

HRCT finding pattern was found to be sclerotic changes , pleural effusion , consolidation , cardiomegaly , none ,26%,24%,18,14%,6%, rest with same percentage 4%

MeiLan K. Han et al 2017 found that most prevalence of COPD regarding to gender is male 76% which is in contrast with our study finding .

Shigeko Kojima et al 2007 found that most affected aged group 25-49 in COPD in Japanese Which is equivalent to our study .From our study HRCT found that sclerotic change 26% on patient and this may be related to referrer physicians toward HRCT as golden methods to detection , High-resolution CT (HRCT) has been shown to be more accurate than chest radiography in detecting and characterizing diffuse lung diseases, and abnormalities on CT correlate more closely with pulmonary function test (PFT) abnormalities (Diane Stroll and Jonathan Goldin 2010),regarding to chest X ray most finding was found to be pleural effusion Standard poster anterior and lateral chest radiography remains the most important technique

for initial diagnosis of pleural effusion. Vinaya S Karkhanis and Jyotsna M Joshi 2012).

5.2 Conclusion

From discussion researcher conclude that chest x ray play important role in lung disease ,HRCT is golden modalities in lung interstitial disease , combinations of modality enhance finding. With attention to reduce dose with concern to ALARA principle .

5.3 Recommendation

More study need to be conducted to improve result of this study Chest x ray and HRCT should be prudent demanded by referrer ALARA principle should be implemented in department when HRCT is ordered.

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Data sheets

Name:

Age:

Gender:

Clinical diagnostic:

x-ray finding:

HRCT finding

Appendix

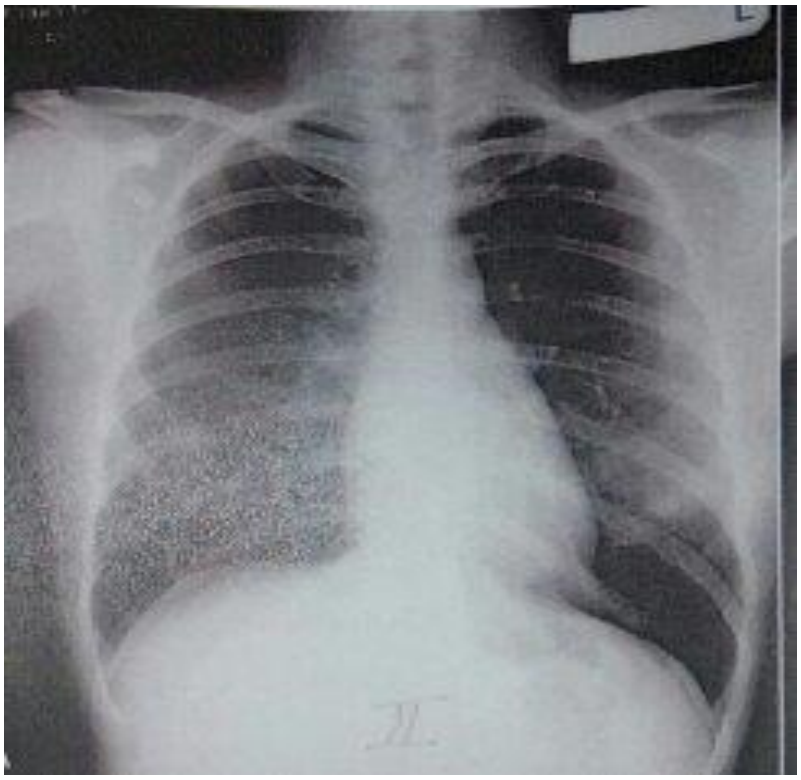

Image (1) : show normal appearance of CXR

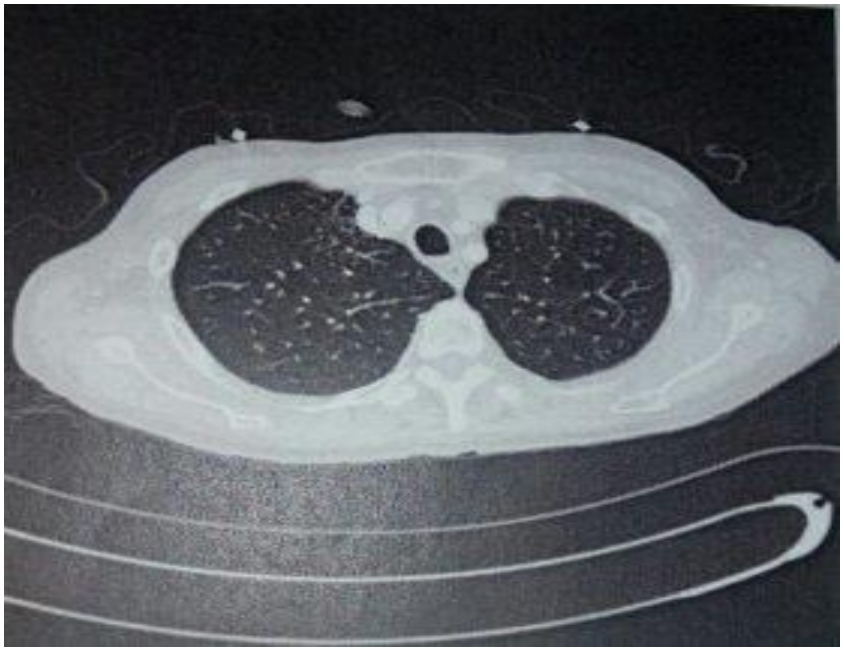

Image (2): show normal appearance of HRCT

Image:(3)A-44 years old man with symptoms cough, sputum show pulmonary fibrosis

Image:(4) show fibrosis

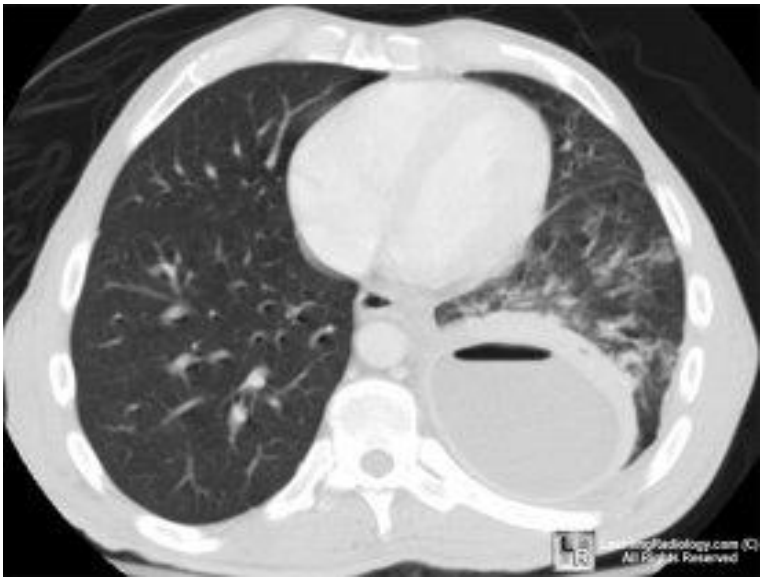

Image (5):A- 55 years old man with lung abscess