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Overview of Radiological Images of Chest X-rays of Patients with Tuberculosis at BARI General Hospital, Palembang, Indonesia

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A B S T R A C T

Introduction: Tuberculosis (TB) is a chronic and contagious infectious disease that can attack almost all organs of the human body, especially the lungs, caused by the bacterium Mycobacterium Tuberculosis. Chest X-ray is a fast imaging technique and one of the main tools that have high sensitivity for diagnosing pulmonary TB. This study aimed to find out more about the overview of radiological images of chest X-rays of patients with tuberculosis at BARI General Hospital, Palembang, Indonesia. **Methods:** This study is a descriptive observational study. A total of 50 research subjects participated in this study. The radiological images of the chest X-rays are presented in the form of grouping, namely the presence of infiltrates, consolidation, fibrosis, cavities, and effusions. In addition, observations were made on the location of the emergence of various abnormalities on the radiological image of the chest X-rays in a descriptive way. **Results:** This study showed that the majority of study subjects had to infiltrate radiological features, and the majority of study subjects had lesions at the apex of the superior lobe. **Conclusion:** The radiological images of the chest X-rays in TB patients show the presence of infiltrate, consolidation, fibrosis, effusion, and cavity lesions, where the lesions are in line with the progressivity of TB.

1. Introduction

Tuberculosis (TB) is a chronic and contagious infectious disease that can attack almost all organs of the human body, especially the lungs, caused by bacteria. *Mycobacterium tuberculosis.* These bacteria are also called acid-fast bacteria (AFB) because of their rod shape, which is difficult to stain and be removed by acids. The acid fastness of these bacteria stems from their thick cell wall, which is composed of mycolic fatty acids. A study predicts that by 2025 there will be 2.5 million pulmonary TB patients, of whom 1.6 million are pulmonary TB with HIV-negative and 0.9 million HIV-positive pulmonary TB, with a total of 1,190,000 men, 780,000 women, and 440,000 children. In 2020 there was also an increase in the countries with a fairly high distribution of TB cases, with around one million cases per year. The dense population and the delay in the diagnosis of TB have resulted in a high increase and spread of TB cases in Indonesia.[1-5]

Mycobacterium tuberculosis bacteria carry out an infectious process in the lung tissue. Where at the same time, it will trigger the body's defense system to carry out the phagocytosis process of bacteria by macrophage cells. Bacteria that have been phagocytosed are able to live in macrophage cells and continue the infection process further and cause various damage and death to lung cells. Damage to cells and lung tissue will leave traces of scar tissue showing changes on radiological chest radiographs. Chest X-ray is a fast imaging technique and one of the main tools that have high sensitivity for diagnosing pulmonary TB. The most common radiological findings

are infiltrates, consolidation, fibrosis, pleural effusion, and cavities. Various forms of radiological images from chest X-rays of tuberculosis patients sometimes make it difficult for clinicians to establish a diagnosis of tuberculosis.[6-10] This study aimed to find out more about the overview of radiological images of chest X-rays of patients with tuberculosis at BARI General Hospital, Palembang, Indonesia.

2. Methods

This study is a descriptive observational study. This study uses secondary data obtained from the medical records installation of the BARI General Hospital, Palembang, Indonesia. A total of 50 research subjects participated in this study, where the research subjects fulfilled the inclusion criteria. The inclusion criteria for research subjects were patients seeking treatment at BARI General Hospital, Palembang, Indonesia, who had been diagnosed with TB, aged more than 18 years, and patients who had complete medical record data, especially chest radiological data. This study was approved by the medical and health research ethics committee of the Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia.

Observation of sociodemographic, clinical, and radiological data from chest X-rays was carried out in this study. The radiological images of the chest X-rays are presented in the form of grouping, namely the presence of infiltrates, consolidation, fibrosis, cavities, and effusions. In addition, observations were made on the location of the emergence of various abnormalities on the radiological picture of the chest X-rays in a descriptive way. Data analysis was carried out using SPSS software version 21. Univariate analysis was performed to present the frequency distribution of each data variable test in the form of frequency and percentage.

3. Results and Discussion

Table 1 presents the sociodemographic, clinical, and radiological frequency distribution of study subjects. The majority of research subjects are male, the majority of research subjects are not worked, and the majority of research subjects had senior high school education. This sociodemographic description shows that the majority of research subjects have socioeconomic factor status, which is classified as marginal, whereas several studies show that TB is often found in dense populations with socioeconomic levels that are classified as marginal.

Table 1 shows that the majority of study subjects had a chief complaint of coughing up phlegm, with chest radiological images of infiltrates and the location of the majority of lesions at the apex of the superior lobe. This study also shows the tendency of patients with complaints of coughing up phlegm to have a radiological picture of chest X-ray in the form of an infiltrate. The infiltrate is a fine thread-like appearance that is radiopaque in color and can be found in parts of the lung fields but is most often found at the apex of the lung. Infiltrates are often found because, based on the initial lesion in patients with pulmonary TB is a patchy lesion and nodular, indicating an active disease process after 10 weeks of infection.[11-13]

The results of the study also showed that patients with complaints of fever have a tendency to have radiological images of chest X-rays in the form of consolidation and fibrosis. The picture of consolidation and fibrosis is a condition that shows a chronic inflammatory process in the patient's lung tissue and is generally in line with the systemic inflammatory process that has occurred in the patient, so complaints of fever are often found.[14-16]

The results of this study also show that patients with shortness of breath have a tendency to have a radiological appearance in the form of pleural effusion. Pleural effusion is a condition in which the lungs experience a pressure process by the presence of fluid, which interferes with the process of expanding the lungs. This condition will initiate shortness of breath. Meanwhile, patients with complaints of decreased appetite showed a tendency for a radiological picture of chest X-rays in the form of cavities. A cavity describes a cavity in the lung tissue due to chronic damage to the lung tissue. As a result of this long-lasting inflammatory process, the body will experience conditions of deficit nutrition loss, which will cause an imbalance in the processes of catabolism and anabolism which will lead to complaints of decreased appetite in patients.[17-20]

Table 1. Distribution of sociodemographic, clinical, and radiological frequency of study subjects.

No.	Variable	Frequency	Percentage (%)
1.	Gender		
	Male	28	56
	Female	22	44
2.	Occupation		
	Not working	21	42
	Civil servant	10	20
	Self-employed	19	38
3.	Recent education		
	Senior high school	24	48
	Diploma	16	32
	Bachelor degree	10	20
4.	Main complaint		
	Cough with phlegm	18	36
	Fever	15	30
	Decreased appetite	7	14
	Shortness of breath	10	20
5.	Overview of chest radiology image		
	Infiltrate	18	36
	Consolidation	10	20
	Fibrosis	5	10
	Pleural Effusion	10	20
	Cavity	7	14
6.	Location of chest radiology image lesion		
	Superior lobe apex	28	56
	Medial lobe apex	15	30
	Inferior lobe apex	7	14

4. Conclusion

The radiological image of chest X-ray in TB patients shows the presence of infiltrate, consolidation, fibrosis, effusion, and cavity lesions, where the lesions are in line with the progressivity of TB.

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