

DIFFERENCES IN SCORING OF THORACIC PHOTOGRAPHS BETWEEN MDR-TB AND DS-TB PATIENTS WITH PULMONARY TUBERCULOSISEpriyanto Tridharmadi^{1*}, Elisabeth Tri Wahyuni Widoretno², Paul L Tahalele³, Belinda Peregrina M. Nahak⁴*Correspondent author email: epriyanto@ukwms.ac.idDOI: <https://doi.org/10.33508/jwmj.v6i3.5759>**ABSTRACT**

Introduction: Tuberculosis (TB) is ranked as the second deadliest infectious disease in the world. There is a drastic increase in TB cases by 2023 with 92% of these cases being pulmonary TB infections. Thoracic photography is a standard examination performed to determine the development of tuberculosis disease through reviewing populations with TB risk factors, one of which is patients with MDR-TB (Multi-Drug Resistance) can result in increased opacity in the lower lung lobes with pulmonary, cavity, and parenchymal lesions. Thoracic photo scoring was performed to determine the severity of lesions in the thoracic photo images of TB patients with MDR (Multi-Drug Resistance) and DS (Drug-Sensitive). **Objective:** to compare the scoring of thoracic photographs between of TB patients with MDR-TB and DS-TB. **Method:** using observational analytic method with *cross-sectional* research design. The sampling technique used *purposive sampling* method through medical records with analysis using two tests, namely *Wilcoxon* and *Mann-Whitney* comparative test. Infiltrate, consolidation, cavity, ground glass opacity, fibrosis, bronchiectasis, calcification, node, atelectasis, bullae, emphysema, and other nonlung parenchymal abnormalities were among the radiologic findings that we examined. **Results:** The samples to be analyzed were 55 samples who had completed anti-tuberculosis therapy in the 6th month and had thoracic photographs. The *Wilcoxon* Comparative Test on two paired groups showed a significant difference between the TB group with MDR ($p=0.008$) and DS ($p=0.000$). In the *Mann-Whitney* comparative test on two unpaired groups, there were no significant results either TB groups with MDR and DS ($p=0.282$). Scoring results in MDR-TB patients after therapy showed mild (3.70%), moderate (44.44%), severe (51.85%) categories. In DS-TB patients showed mild (37.03%), moderate (48.15%), severe (14.81%) categories. **Conclusion:** There is a significant difference between the severity of thoracic photographs in TB patients with MDR and without MDR (Drug-Sensitive).

Keywords: Tuberculosis, Multi-Drug Resistance, Drug-Sensitive, Thoracic photo severity scoring

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INTRODUCTION

Tuberculosis is a contagious infectious disease caused by bacteria called *Mycobacterium tuberculosis* (MTB).¹ Based on data from the Ministry of Health Republic Indonesia as of February 2, 2023 there were approximately 969,000 estimated cases of TB and 15,186 TB patients died in Indonesia, 92% of which were pulmonary TB cases.² Therefore, Indonesia is the 8th country with the most MDR-TB (Multi-drug resistance) cases in the world, with estimated 6900 cases or 1.9% from new cases and 12.5% of old cases. MDR-TB diagnosis is made by performing the drug-sensitivity test of MTB and supported by physical examination, microbiology, and radiology.^{3,4}

Imaging has a big role in TB diagnosis due to the limitations of microbiology examinations in Indonesia. Radiologic examinations that can be used to diagnose TB and evaluate therapy in Indonesia are computed tomography and chest X-ray. Chest X-ray is preferable because can assess the treatment's effectiveness to enable an early MDR-TB diagnosis..⁴⁻⁶ X-ray of the chest It can identify the location, size, and shape of lesions, including cavities, consolidations, pleural effusions, and fibrosis. It is used in primary healthcare.^{7,8} Basic understanding of the differences between drug-sensitive

TB (DS-TB) and multidrug-resistant TB (MDR-TB) in chest X-ray results is necessary to improve early diagnosis of tuberculosis.⁴⁻⁶

METHODS

This study was conducted using an analytic observational study design with a *cross-sectional* method in MDR-TB patients and DS-TB at Gotong Royong Surabaya Hospital who had the results of thoracic photographs after antituberculosis therapy (6 months). Sample collection used secondary data through medical records. Inclusion criteria included (1) Pulmonary TB patients aged 40-60 years (2) Positive bacteriologically confirmed Pulmonary TB patients (BTA/ culture/TCM results) (3) Had completed 6 months of antituberculosis therapy with MDR and 1st Line or category 1 antituberculosis (4) There was thoracic photo examination data of diagnosis at the final antituberculosis treatment stage. Exclusion criteria were (1) Confirmed negative pulmonary TB patients (2) Relapsed TB patients, failed treatment cases, or bad tolerance treatment (3) Pulmonary TB patients without Chest X-Ray examination (4) TB treatment patients who have died during treatment and TB patients loss to follow up.

To assess the severity of chest

radiographs, the Aziza journal-based criteria (lesion area, infiltration, consolidation, cavitation, ground-glass opacity, fibrosis, nodules, atelectasis, bullae, hyperpnea, not belonging to the lung parenchyma) are used. Aziza G.et al. have been approved and are used at Persahabatan Hospital, Indonesia⁹ This analysis was used to test the comparison of MDR-TB and DS-TB after anti-tuberculosis treatment using two tests, namely the *Wilcoxon- Signed Rank test* and the *Mann Whithney test*.

RESULT

Table 1. Characteristics of TB Patients Based on Treatment History

History	Number (n)	Percent (%)
MDR-TB	28	50,91%
DS-TB	27	49,09%
Total	55	100%

The table above shows the distribution of TB patients to be analysed as many as 55 patients who were confirmed bacteriologically positive consisting 28 patients with MDR-TB and 27 patients with DS-TB.

Table 2. Distribution of Patients by Age

Age	History of Disease			
	DS-TB		MDR-TB	
	n	%	n	%
40-50	17	62,96	8	28,57
51-60	10	37,04	20	71,43
Total	27	100	28	100

Based on the table above, on the age category, he highest number of MDR-TB patients were aged 51-60 years, 71.43%,

while the highest number of DS-TB patients were aged 40-50 years, 62.96%.

Table 3. Distribution of Patients by Gender

Gender	Number (n)	Percentage (%)
Male	27	49,09
Female	28	50,91
Total	55	100

Table 3 shows that there is no significant difference between female and male gender.

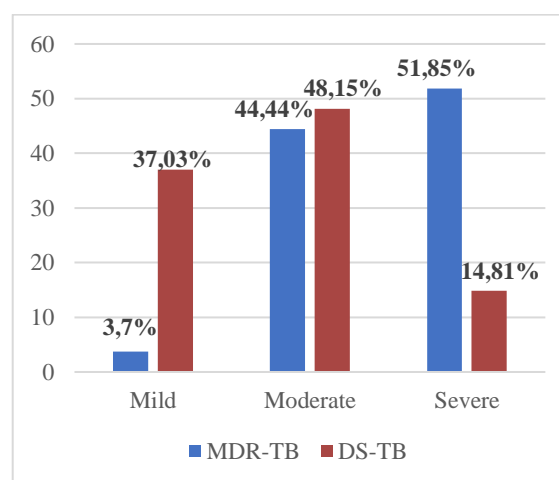


Figure 1. Distribution chart of the severity of thoracic photographs between MDR-TB and DS-TB patients after 6th month treatment with antituberculosis.

The graph above shows the distribution of the severity of thoracic photographs after 6th month treatment with antituberculosis between MDR-TB and DS-TB patients. The graph shows that the mild category after therapy was 3,70% in MDR-TB and 37,03% in DS-TB. The moderate category after therapy was 44,44% in MDR-TB and 48,15% in DS-TB, and the severe category after therapy

was 51.85% in MDR-TB and 14,81% in DS-TB.

Table 4. Correlation Test of Contingency Coefficient of Smoking Habit with Chronic Urticaria Incidence

			P-value
Differences of Thoracic Photographs in MDR-TB Patients	Severity of	in	0,008
Differences of Thoracic Photographs in DS-TB Patients	Severity of	in	0,000

The table above shows that there is a

DISCUSSION

This study presents a comparison of chest x-ray findings between MDR-TB and DS-TB in adult patients. This research analyzed 55 TB patients with confirmed positive bacteriological results, dividing them into 28 patients with MDR-TB and 27 patients with DS-TB. Based on age distribution, it was found that MDR-TB patients had the highest age range of 51-60 years (71.43%), while DS-TB patients had the highest percentage at the age of 40-50 years (62.96%).

Based on research by Dotulong *et al*¹⁰, the incidence of TB is often found in the 40-60 age range which is a productive age with dense work environment conditions and high mobility which can make it easier for someone with a productive age range to be more susceptible to pulmonary tuberculosis. According to

significant difference in each group based on the severity of thoracic photographs after therapy in MDR-TB patients ($p=0.008$) and DS-TB patients (0.000) using *Wilcoxon test*

Table 5. Results of the comparison analysis in unpaired group of thoracic photographs in MDR-TB and DS-TB patients

	Sig.
<i>Mann-Whitney Test Analysis</i>	0,282

research by Icksan *et al*⁹, Gender demographic distribution of both groups revealed that there were more men than women. 52% of men were excommunicated by family and friends because of pulmonary TB.^{2,4} Based on gender distribution, this study found no significant difference between males and females, therefore both males and females have the same risk of exposure to TB.

Analysis Differences of each group in the Severity of Thoracic Photographs in MDR-TB and DS-TB Patients.

There is a significant difference in the severity of each group thoracic photographs after antituberculosis therapy (Table 4). In accordance with the graph shown in Figure 1, that the mild category after therapy was 3,70% in MDR-TB and 37,03% in DS-TB. The moderate category after therapy was

44,44% in MDR-TB and 48,15% in DS-TB, and the severe category after therapy was 51.85% in MDR-TB and 14,81% in DS-TB.

Based on the studies of Deesuwan et al. and Cha et al., the most commonly seen active lesions on chest radiographs in MDR-TB patients were found to be multiple consolidations and multiple cavities. Multiple reticulonodular infiltrates, ground-glass opacities, and multiple or isolated cavities are the main radiographic findings in DS-TB patients.¹¹⁻¹³ These studies support the hypothesis that the main characteristic lesions of MDR-TB are multiple consolidations and multiple cavities.⁴⁴

All active lung parenchymal lesions in MDR-TB and DS-TB were mainly found in the upper lung regions. Some sources state that the primary consolidations and cavities in MDR-TB were caused by treatment failure after primary TB or by mutations in MTB that caused the bacteria to be resistant to anti-TB drugs. These resistant bacteria can cause TB reactivation and spread to the right and left lungs, forming and infiltrating masses in the early stages and developing into cavities via the lymphatic system, blood, or endobronchial tubes. Unhealed cavities can cause new consolidations and further form new cavities.

Other studies have shown that dental caries is a predisposing factor for TB treatment failure and recurrence.^{8,11,13,14} A study by Deesuwan et al. stated that the inactive lesions found in MDR-TB were multiple bronchiectasis. Bronchiectasis is the diffuse dilatation of multiple bronchi caused by the progression of active disease after primary pulmonary tuberculosis affecting the surrounding structures. Traction or obstruction of bronchi, bronchioles and their branches due to recurrent reactivation. As in the pathogenesis of cavitation, non-healing tubercles or tubercles become cavities that contain new pneumonia foci.^{8,11,13,15}

Comparison Analysis of unpaired group in the severity of Thoracic Photographs in MDR-TB and DS-TB patients

The difference between in the severity of thoracic photographs of MDR-TB and DS-TB patients after treatment with antituberculosis showed no significant difference. This can be observed in the table presented in Table 5, which shows that the $p=0,282$. Based on a study by Aziza G et al.⁹, the frequency and severity of each group depends on the size of the lesions. In the MDR-TB group, most patients have large lesions on chest radiographs, whereas small to medium-sized lesions predominate in the DS-TB group.

From the morphology point of

view, infiltrates and ground-glass opacities were more prevalent in the DS-TB group, whereas consolidation, cavities, fibrosis, bronchiectasis, calcifications, nodules, atelectasis, bullae, emphysema, and other non-pulmonary parenchymal findings were more prevalent in MDR-TB. According to research conducted by Fitri *et al*, there is a significant relationship between knowledge and drug compliance in TB patients. The success of tuberculosis therapy depends on the patient's knowledge, in addition to self-efforts or motivation and support for complete treatment will affect the success of treatment in tuberculosis patients.¹⁶

CONCLUSION

In this study, it was found that there was a significant difference of Thoracic Photographs between the severity in each groups MDR-TB and DS-TB patients. Meanwhile, a comparison analysis of Thoracic Photographs between MDR-TB patients and DS-TB patients showed no significant difference.

Further research is needed in groups with risk factors such as knowledge, drug compliance, smoking habit, or environmental factors that can affect the severity of TB conditions.

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