



Profile of Drug-Resistant Tuberculosis Patients at the Haji Regional Hospital, East Java Province in 2019-2022

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ABSTRACT

Objective: To determine the profile of TB cases that are resistant to antibiotics and the resistance pattern of Mycobacterium tuberculosis in patients at Haji Regional Hospital, East Java Province

Method: The type of research is descriptive-retrospective based on primary data from patient medical records and laboratories in the 2019-2022 period

Results: The results show that the incidence of drug resistance based on the most OAT in Tuberculosis Drug Resistant Patients at the Haji Hospital of East Java Province in 2019-2022 is a combination of R+H as many as 69 patients (46%) and the origin of the most infection is relapse / recurrence of 73 patients (48.7%)

Conclusion: According to the characteristics, the majority of drug-resistant tuberculosis patients at Haji Hospital in East Java Province from 2019-2022 were male patients aged 19-59 years. According to the resistance pattern of M. tuberculosis bacteria, the most common type of drug resistance was MDR-TB (Multi-Drug Resistant Tuberculosis), and the most previous TB history was relapsed patients.

Keywords : Mycobacterium tuberculosis, tuberculosis, drug-resistant tuberculosis

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INTRODUCTION

Tuberculosis (TB) is caused by Mycobacterium tuberculosis, affects the lungs and is highly contagious through the air when people with active pulmonary TB cough, sneeze or talk (Adigun, 2024 & Coleman, 2022). TB is treated with anti-TB drugs for more than 2 months, divided into early and advanced stages. However, the side effects of the drugs and the long duration of treatment can cause patients to stop treatment early. Stopping treatment early can cause the bacteria to become resistant to the drugs, known as drug-resistant TB (Tobin, 2024 & Seung 2015). In 2015, the global prevalence of TB treatment discontinuation, which can lead to drug resistance, reached 22% (Merzistya, 2019).

Despite the availability of numerous effective drugs to treat tuberculosis (TB), the number of cases of the disease remains high. Approximately one-third of the global population has been infected by *Mycobacterium tuberculosis*, with the potential for the incidence of the disease to increase. According to data from the WHO, in 2020, approximately 1.5 million people died from TB, making it the 13th leading cause of death worldwide, surpassing HIV/AIDS. In the same year, it is estimated that there were approximately 10 million people suffering from TB worldwide, with the majority of cases occurring in several high-burden countries, including India, China, Indonesia, and others (WHO, 2023). Additionally, the number of multidrug-resistant TB (MDR-TB) cases has been on the rise, reaching approximately 28,000 cases in 2021, representing a notable increase from the previous year (KEMENKES, 2023).

Indonesia is confronted with the challenge of drug-resistant tuberculosis, including multidrug-resistant tuberculosis (MDR-TB) and extensively drug-resistant tuberculosis (XDR-TB). The detection and management of these cases necessitate the use of specialized facilities and personnel (KEMENKES, 2023). The study at the Haji Regional General Hospital of East Java Province sought to identify patient characteristics and drug resistance patterns in drug-resistant patients in order to reduce morbidity and mortality rates and prevent an increase in drug-resistant cases.

METHODS

Method used should be accompanied by references, relevant modification should be explained. Procedure and data analysis techniques should be emphasized to literature review article. The research stages should be clearly stated.

RESULTS AND DISCUSSION

Table 1. Patient characteristics distribution

Characteristics	Category	Frequency	Percentage (%)
Age	Teen (10-18 years)	2	1.3
	Adult (19-59 years)	127	84.7
	Elderly (>60 years)	21	14.0
Gender	Male	76	50.7
	Female	74	49.3

Based on the results in table 1 in this study, the largest number of patients were male, in total of 76 patients (50.7%) and the largest age group was adults aged 19-59 years (84.7%). Several studies also show that MDR TB occurs more often in male patients. Male patients are more at risk of developing MDR TB because men are usually responsible as the backbone of the family so interaction with the environment is higher. In addition, high activity causes male patients to get less rest. In addition, men's unhealthy lifestyles such as alcohol use, injecting narcotics, high criminal history, smoking, and lack of discipline in treatment can increase the risk of MDR TB. The high number of

MDR TB cases in the productive age group is caused by the vulnerability of MDR TB transmission through interaction with the surrounding environment, thus allowing MDR TB transmission to occur and also the patient feeling healthy and therefore not continuing treatment until completion (Wahidah, 2024).

Resistance patterns of *M. tuberculosis* bacteria based on anti-tubercular drugs

Based on table 2, it was found that the highest incidence of resistance based on antitubercular drugs was to the R+H combination, 69 patients (46%) and the most common previous history of TB was relapse patients, 73 patients (48.7%).

Table 2. Resistance patterns of *M. tuberculosis* based on antitubercular drugs and previous history of TB

	Category	Frequency	Percentage (%)
Anti Tuberculosis Drugs	R+H	69	46.0
	R+H+E	6	4.0
	R+H+E+S	3	2.0
	R+H+S	3	2.0
	R+H+H DT	36	24.0
	R+H+HDT+Z	8	5.3
	R+H+Z	25	16.7
	Failure	54	36.0
Previous History of TB	Relapse	73	48.7
	Loss to followup	23	15.3

Mycobacterium tuberculosis is a Gram-positive bacterium that has slow growth, dormancy, and a complex cell wall structure. Conditions of dormancy and slow growth play a role in the severity of infections caused by this bacterium, prolonging the therapeutic period and making treatment difficult. Dormancy occurs due to pressure on bacterial metabolic pathways by the cellular immune system, which is a defense mechanism but is unable to completely eradicate infection. A weakened or aging immune system can reactivate these infections. *M. tuberculosis* also has natural resistance to many antibiotics because its cell wall is hydrophobic, acting as a permeability barrier. Resistance to INH is caused by mutations in a number of genes, namely *katG*, *inh*, *kasA* and *NDH*. Most rifampicin-resistant clinical isolates have mutations in the *rpoB* gene resulting in decreased affinity for the drug and thus resistance develops. Approximately 96% of *M. tuberculosis* isolates are resistant to rifampicin (Siregar, 2019).

Based on Table 2, it shows that the highest incidence of resistance based on antitubercular drugs was R+H polyresistance, 69 patients (46%). These results are in line with several previous studies which showed that the majority of MDR-TB patients were resistant to RH drugs combination. Like research conducted by Wahidah et al. (2024) at MDR-TB Polyclinic dr. Soebandi Hospital and the Jember Lung Hospital Hospital for the 2018-2022 period showed that resistance to the

combination of rifampicin and isoniazid (RH) was experienced by 28 patients (43.8%). Patients are resistant to the RH combination because these two drugs are often used as first-line drugs in TB treatment.

Resistance patterns of *M. tuberculosis* based on previous TB history

TB patients receive intensive treatment for 6 months. One of the determining factors for the success of treatment is compliance. Patients who do not regularly take TB medication are at great risk of causing MTB bacteria to become resistant to the antibiotics used. A person can experience a recurrence or relapse after consuming OAT regularly and completely due to exposure to other sources of infection that have not been treated. Other factors that can also play a role include the presence of other diseases.

Based on table 2 above, it was found that the highest incidence of resistance based on the origin of infection was in patients who relapsed, amounting to 73 patients (48.7%). Recurrence (relapse) of Tuberculosis is a patient who has previously received TB treatment and has been declared cured or has had complete treatment, and is re-diagnosed with positive Acid-Fast Bacillus (AFB) test. Relapsed TB is defined as a new episode of disease after recovery from a previous episode. This can occur due to endogenous or exogenous reactivation of reinfection (Fajriah, 2022).

These results are in line with research conducted by Chen et al, 2019 in Jiangxi, China, that in older age RR-TB patients were more likely to occur in patients with recurrent infections or relapses, this could be due to the irregularity of taking medication among older patients. Meanwhile, according to Shukla et al, 2019, MDR-TB patients mostly come from patients who have previously taken antitubercular drugs, this can occur due to inadequate therapy. Some causes of inadequate therapy can be (a) health personnel not adhering to treatment guidelines, inadequate staff training and unsupervised treatment; (b) drug related issues such as poor quality, unavailability and wrong dosage; (c) patient-related such as poor compliance, poverty, adverse drug reactions, malabsorption and substance abuse (Chen, 2019).

In research conducted in Sudan by Ali et al, 2019, it was found that MDR-TB occurred most often in patients who had previously been prescribed antitubercular drugs compared to the incidence of resistant TB in new cases. This study also revealed a significant association between MDR-TB and failure cases. This is also related to this study where patients with cases of failed therapy are the second most drug resistant TB patients with a percentage of 36% (Ali, 2019).

CONCLUSION

According to the characteristics, the majority of Drug-Resistant Tuberculosis patients at Haji Hospital in East Java Province from 2019-2022 were male patients aged 19-59 years.

According to the resistance pattern of *M. tuberculosis* bacteria, the most common type of drug resistance was MDR-TB (Multi-Drug Resistant Tuberculosis), and the most common source of infection was relapsed patients.

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