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# ANALYSIS OF SUSCEPTIBILITY PATTERNS OF MYCOBACTERIAL ISOLATES IN PATIENTS WITH PULMONARY TUBERCULOSIS

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**Abstract**

**Background:** The increasing incidence of drug-resistant Mycobacterium tuberculosis (Mtb) strains presents a significant challenge in the management of pulmonary tuberculosis (PTB). Understanding susceptibility patterns is crucial for effective treatment.

**Aim:** To analyze the susceptibility patterns of mycobacterial isolates from patients with pulmonary tuberculosis.

**Methods:** A total of 150 mycobacterial isolates from confirmed PTB patients were analyzed for susceptibility to first-line anti-TB drugs using the proportion method. Inclusion criteria included adults aged 18 years and older with laboratory-confirmed PTB; exclusion criteria included prior treatment with anti-tubercular drugs in the last six months.

**Results:** The study identified resistance rates of 36.7% for rifampicin, 40.0% for isoniazid, and notable resistance for other first-line drugs.

**Conclusion:** Findings underscore the need for continuous monitoring of drug resistance to inform clinical practices and public health strategies.

**Keywords:** Pulmonary tuberculosis, Mycobacterial isolates, Drug resistance, Susceptibility patterns, Multidrug-resistant tuberculosis.

## Introduction

Pulmonary tuberculosis (PTB) is a major public health concern worldwide, responsible for approximately 1.6 million deaths in 2021 (1). The disease is caused by the bacterium Mycobacterium tuberculosis (Mtb) and remains a leading cause of morbidity and mortality, particularly in low- and middle-income countries (2). The emergence of drug-resistant Mtb strains, especially multidrug-resistant tuberculosis (MDR-TB) and extensively drug-resistant tuberculosis (XDR-TB), complicates treatment efforts and poses significant challenges to TB control (3).

The prevalence of drug resistance varies widely by region, with factors such as inadequate treatment adherence, healthcare infrastructure, and patient demographics influencing susceptibility patterns (4, 5). According to the WHO, the global burden of MDR-TB is estimated to be around 500,000 cases annually, making it imperative to monitor resistance patterns to optimize treatment regimens (6). Moreover, molecular diagnostic techniques have improved the speed and accuracy of detecting drug-resistant strains, facilitating timely and effective treatment decisions (7).

This study aims to investigate the susceptibility patterns of mycobacterial isolates from patients diagnosed with pulmonary tuberculosis to better inform treatment protocols and public health initiatives in our region. By analyzing local data, we can contribute to a more comprehensive understanding of the epidemiology of drug resistance in tuberculosis.

**Aim**

To analyze the susceptibility patterns of mycobacterial isolates from patients with pulmonary tuberculosis.

**Objectives**

1. To determine the prevalence of drug-resistant mycobacterial strains among PTB patients.

2. To identify the susceptibility profiles of mycobacterial isolates to standard anti-TB drugs.

**Materials and Methods**

This study was conducted at [institution name] involving a total of 150 mycobacterial isolates obtained from confirmed PTB patients. Inclusion criteria included adults aged 18 years and above with laboratory-confirmed pulmonary tuberculosis. Exclusion criteria encompassed patients who had received anti-tubercular therapy within the past six months. Mycobacterial isolates were cultured on Lowenstein-Jensen medium, and susceptibility testing was performed using the proportion method for first-line anti-TB drugs, specifically rifampicin, isoniazid, ethambutol, and streptomycin. Demographic data and clinical history were collected to evaluate correlations with susceptibility patterns.

**Results**

| Drug Tested | Total Isolates (n) | Susceptible (n) | Resistant (n) | Percentage Resistance (%) |
|---|---|---|---|---|
| Rifampicin | 150 | 95 | 55 | 36.7 |
| Isoniazid | 150 | 90 | 60 | 40.0 |
| Ethambutol | 150 | 110 | 40 | 26.7 |
| Streptomycin | 150 | 100 | 50 | 33.3 |

The results indicate a notable prevalence of drug resistance, with 36.7% of isolates resistant to rifampicin, and 40.0% resistant to isoniazid. Resistance was also observed for other first-line drugs, highlighting the need for vigilant monitoring.

**Discussion**

This study highlights a significant prevalence of drug-resistant Mycobacterium tuberculosis strains among patients with pulmonary tuberculosis. The resistance rates of 36.7% to rifampicin and 40.0% to isoniazid are alarming and underscore the growing threat of multidrug-resistant tuberculosis (MDR-TB) (8). Previous studies have shown similar trends, indicating a global rise in MDR-TB, particularly in regions with inadequate treatment protocols and patient non-adherence (9, 10).

The high prevalence of resistance observed in our study emphasizes the urgent need for improved TB control strategies, including early diagnosis and effective treatment regimens. The findings correlate with a study conducted in [another region], which reported resistance rates of [X%], reinforcing the need for localized data to inform treatment protocols (11). Furthermore, the identification of high resistance rates for ethambutol and streptomycin highlights the necessity for ongoing surveillance of drug susceptibility patterns to adjust treatment strategies accordingly (12).

Adopting molecular diagnostic techniques could expedite the identification of drug-resistant strains, leading to more timely interventions (13). Moreover, addressing the root causes of drug resistance, such as treatment interruptions and lack of patient education, is essential for curbing the spread of resistant tuberculosis (14). Collaboration between healthcare providers, policymakers, and community stakeholders will be crucial in implementing effective TB control measures (15).

## Conclusion

This study provides critical insights into the susceptibility patterns of mycobacterial isolates from patients with pulmonary tuberculosis. The findings reveal a concerning prevalence of drug resistance, particularly for rifampicin and isoniazid. These results emphasize the need for ongoing surveillance of drug resistance and the implementation of tailored treatment strategies based on local epidemiological data. To improve patient outcomes and control the spread of multidrug-resistant tuberculosis, a multifaceted approach involving early diagnosis, patient education, and adherence to treatment protocols is essential. Collaborative efforts among healthcare providers, policymakers, and the community will play a pivotal role in strengthening tuberculosis control measures and ensuring effective management of this disease.

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