

The Dual Front of Progress and Challenges in Multi-Drug Resistant Tuberculosis: A Review

Shivam Saxena¹ and Dr. Jitendra Malviya²

Research Scholar, Department of Microbiology¹

Research Guide, Department of Microbiology²

Sunrise University, Alwar, Rajasthan, India

Abstract: *Mycobacterium* is resistant to battlefront drugs such as rifampicin and isoniazid in MDR-TB. The current global challenge for treatment and diagnosis is imperative due to the fact that over 50% of drugs are resistant. There are five factors that are responsible for MDR as of today: (1) Errors in therapy management by physicians and patients, (2) Complexity and poor vascularization of granulomatous lesions, which obstruct drug distribution to certain sites, resulting in resistance development, (3) Intrinsic drug resistance of tubercle bacilli, (4) Formation of non-replicating, drug-tolerant bacilli within the granulomas, and (5) Development of mutations in *Mtb* genes, which are the most significant molecular mechanisms of resistance. The most significant contribution of this work is a concise and unambiguous explanation of the factors that contribute to the development of resistance, as well as the most recent diagnostic and treatment methodologies for MDR-TB. This investigation will assist researchers and scientists in the development of alternative swift diagnostic instruments, medicines, and treatment protocols.

Keywords: Antimicrobial Resistance, Treatment Regimens, Diagnostic Technologies, Public Health Strategies