Original Research Paper

Volume - 16 | Issue - 04 | April - 2026 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Clinical Microbiology

THE UTILITY OF RAPID MOLECULAR DIAGNOSTICS IN MANAGING XDR-TB: A CLINICAL MICROBIOLOGY PERSPECTIVE – A 3-MONTH OBSERVATIONAL STUDY

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ABSTRACT

Background: Extensively drug-resistant tuberculosis (XDR-TB) remains a major public health challenge in India. Conventional culture-based drug susceptibility testing is time-consuming, whereas rapid molecular tests such as GeneXpert MTB/RIF and Line Probe Assay (LPA) allow early detection of drug resistance. **Aim:** To evaluate the diagnostic yield and clinical utility of rapid molecular methods in detecting and managing XDR-TB cases over a three-month period in a tertiary care microbiology laboratory. **Materials and Methods:** A retrospective study (April–June 2024) at the Department of Microbiology, JLNMCH Bhagalpur analyzed 365 sputum samples from presumptive drug-resistant TB patients using Ziehl–Neelsen staining, GeneXpert MTB/RIF Ultra, first- and second-line Line Probe Assay (LPA), and the BACTEC MGIT 960 culture system **Results:** Rapid molecular diagnostics significantly reduced turnaround time. GeneXpert provided results within approximately 2 hours, LPA within 48–72 hours, whereas culture-based DST required 3–6 weeks. **Conclusion:** Rapid molecular diagnostics are critical for early detection and management of XDR-TB and should be integrated into routine diagnostic algorithms.

KEYWORDS : XDR-TB, GeneXpert, Line Probe Assay, Rapid Molecular Diagnostics, Drug Resistance, Tuberculosis

INTRODUCTION

Tuberculosis remains a major infectious disease burden globally. India contributes significantly to global TB and drug-resistant TB cases. XDR-TB represents a severe form of resistance requiring rapid diagnosis for early treatment initiation.

Aims and Objectives

1. To determine detection rates of MDR-TB and XDR-TB using rapid molecular methods.
2. To compare turnaround times between molecular diagnostics and conventional DST.
3. To assess clinical utility in early treatment initiation.

MATERIALS AND METHODS

Study Design: Retrospective observational study.
Study Duration: April–June 2024.
Study Setting: Department of Microbiology, JLNMCH, Bhagalpur, Bihar.
Sample Size: 365 sputum samples from presumptive DR-TB patients.
Laboratory Methods: Ziehl–Neelsen staining, GeneXpert MTB/RIF Ultra, First & Second line LPA, BACTEC MGIT 960 culture system.
Definition of XDR-TB: MDR-TB with additional resistance to fluoroquinolone and at least one second-line injectable drug.

RESULTS

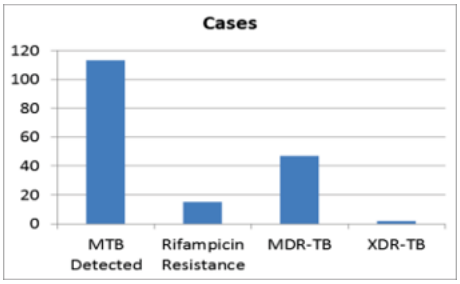
Total samples processed: 365.

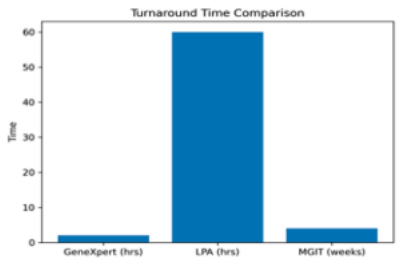
Rapid molecular methods significantly reduced turnaround time compared to conventional culture methods.

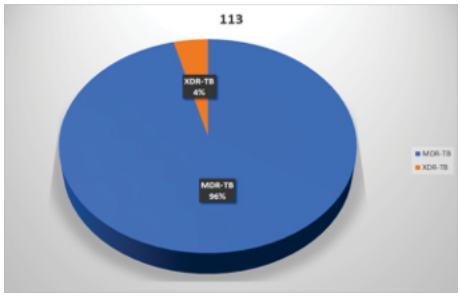
MDR-TB cases confirmed(LPA detected): 47

XDR-TB cases: 2(4.3% of MDR cases)

Figures







DISCUSSION

Rapid molecular diagnostics demonstrated significant advantages in early detection of drug resistance, facilitating timely initiation of appropriate therapy and reducing transmission risk.

CONCLUSION

Routine implementation of GeneXpert and LPA is essential in high-burden settings to strengthen TB control and improve patient outcomes.

Acknowledgement

We acknowledge the Department of Microbiology, JLNMCH, Bhagalpur, for laboratory and technical support.

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