ASSESSMENT OF MULTIDRUG-RESISTANCE TUBERCULOSIS: CLINICAL PATTERNS, RESISTANCE AND OUTCOMES IN A SOUTHERN COASTAL REGION TEACHING HOSPITAL

ABSTRACT

Background: Our study was focused Multi Drug resistance tuberculosis and their management in southern coastal region in India.

Objectives: 1] To study the age, gender, and treatment history of MDR-TB patients. 2] To evaluate treatment outcomes under the standard RNTCP regimens. 3] to access drug resistance patterns among MDR-TB cases. 4] To emphasize the need for improved TB control and patient support.

Methodology: A Retrospective record based study was conducted among the patient who was diagnosed for Multidrug resistant Tuberculosis and admitted in the government medical college and hospital, Nagapattinam for over a period of 6 months, from December 2024 - May 2025.

Results: The study revealed that most MDR-TB patients were in the 21–40 age group, with a male predominance (76%). A large proportion (64%) had a history of previous TB treatment, indicating a strong link between past treatment and the development of MDR-TB. Drug resistance was highest for Rifampicin (44%) and Isoniazid (38%), with 10% showing resistance to both. Treatment outcomes showed a cure rate of 44%, while 18% completed treatment without confirmation of cure. However, 10% experienced treatment failure, another 10% died, and 9% were lost to follow-up. These findings emphasize the critical need for improved diagnosis, adherence, and monitoring strategies to enhance treatment success and reduce the burden of drug-resistant TB.

Conclusion: This study highlights the major challenges in managing TB, especially multi drug resistant TB (MDR-TB), due to a high proportion of previously treated cases and significant drug resistance. To address this, there is an urgent need to strengthen TB control programs through enhanced patient adherence strategies (e.g., counselling, DOT, digital tools), early drug susceptibility testing, and wider access to newer MDR-TB treatment regimens. Additionally, strong surveillance systems and pharmacovigilance are vital to track treatment outcomes and adverse reactions. Community education and reducing stigma are also crucial to encourage early

diagnosis and treatment. Overall, targeted and coordinated interventions are essential to improve patient outcomes and prevent the spread of drug-resistant TB strains.

KEYWORDS: Multidrug-Resistant Tuberculosis (MDR-TB), Drug Resistance patterns, Treatment outcomes, RNTCP regimen, Southern India TB Epidemiology.

INTRODUCTION:

One of the most common infectious diseases in the world, tuberculosis (TB) presents serious public health issues, especially in low- and middle-income nations. The development and dissemination of drug-resistant strains of Mycobacterium tuberculosis pose a threat to undo the significant advancements made in TB control over the past few decades. TB control programs around the world are becoming increasingly concerned about multidrug-resistant TB (MDR-TB), which is defined as resistance to at least isoniazid and rifampicin, the two most effective first-line anti-TB medications.

Only a small percentage of the 10.6 million new TB cases and nearly 410,000 cases of MDR/RRTB (rifampicin-resistant TB) that were estimated by the World Health Organization (WHO) in 2023 alone were identified and treated effectively. Poor adherence, delayed diagnosis, insufficient infection control procedures, and incomplete or insufficient treatment are frequently blamed for the high burden of MDR-TB.

A considerable percentage of MDR-TB cases in many high-burden settings involve patients who have already received treatment, underscoring the significance of thorough treatment histories and effective drug-resistance surveillance. Furthermore, TB continues to disproportionately affect younger populations, especially those in the economically active age range, with socioeconomic repercussions for both individuals and communities.

New, shorter, and more efficient MDR-TB regimens have been developed as a result of recent developments in TB diagnostics and treatments. Nonetheless, there are still issues with implementation, accessibility, and tracking the results of treatment. Customizing successful TB control strategies requires an understanding of the local epidemiology, resistance patterns, and treatment responses.

In a clinical setting, this study intends to evaluate the treatment regimens, drug resistance patterns, treatment outcomes, and demographic profile of 100 TB patients. This study offers insights into the current state of TB and MDR-TB management by assessing the percentage of

patients who were cured, those who did not respond to treatment, and the burden of drug resistance. These findings have implications for clinical practice and policy.

MATERIAL AND METHODOLOGY:

A Retrospective record based study was conducted among the patient who was diagnosed for Multidrug resistant Tuberculosis and admitted in the government medical college and hospital, Nagapattinam for over a period of 6 months, from December 2024 - May 2025

SAMPLE SIZE:

The study population of 100 patient data was collected and analysed for the study.

INCLUSION CRITERIA:

Male and female Patients was included, additionally, patients who are suspect to MDR TB was also included, Pregnant patients and patients with co morbidities was excluded.

RESULT:

Table 1: Age wise

AGE	NUMBER OF PATIENTS
0 - 20	5
21 - 40	37
40 - 60	30
61 - 80	28
TOTAL	**100**

The majority of MDR-TB patients were in the 21-40 age group (37%), followed by 40-60 years (30%) and 61-80 years (28%). Only 5% of patients were aged 0-20 years, indicating that MDR-TB predominantly affects adults, especially those in their productive age group (Table-1).

Table 2: Gender wise

GENDER	COUNT OF GENDER	PERCENTAGE
MALE	76	76
FEMALE	24	24
TOTAL	**100**	**100**

The study showed a clear male predominance, with 76% of MDR-TB patients being male, while females accounted for 24%. This indicates that males were more commonly affected by MDR-TB in the study population (Table-2).

Table 3: Development of MDR TB

PREVIOUSLY TREATED	64
NEWLY DEVELOPED	22
PRESUMPTIVE TB	14

A majority (64%) od MDR-TB cases occurred in previously treated patients, suggesting a strong association between prior TB treatment and the development of drug resistance. Newly

Table 4: Resistant TB cases

1	ISONIAZID RESISTANT	38
2	RIFAMPICIN RESISTANT	44
3	BOTH RIFAMPICIN AND ISONIAZID RESISTANT	10
4	OTHERS	8
	TOTAL	100

developed cases accounted for 22%, while presumptive TB cases made up 14%, highlighting the importance of early detection and proper treatment in preventing MDR-TB (Table-3).

The most common drug resistance was to Rifampicin (44%), followed by Isoniazid (38%). Additionally, 10% of patient showed resistance to both Rifampicin and Isoniazid, indicating multidrug resistance. Others form‘s of resistance were observed in 8% of the cases. This highlights the high prevalence of primary and multidrug resistance among TB patients (Table-4).

Table 5: Treatment Outcome Chart

S.NO	TREATMENT OUTCOME	NEW	OLD	PERCENTAGE
1	CURE	28	16	44%
2	TREATMENT COMPLETED	15	3	18%
3	TREATMENT FAILED	3	7	10%
4	DIED	2	8	10%
5	LOST TO FOLLOW UP	5	4	9%
6	NOT EVALUATED	1	2	3%
7	REGIMEN CHANGED	4	2	6%

The overall cure rate was 44%, with more cures seen among newly diagnosed patients. 18% completed treatment without confirming of cure. Treatment failure and death each accounted for 10%, while 9% of patients were lost to follow-up. Additionally, 6% had their regimen changed, and 3% were not evaluated. These outcomes highlight the challenges in achieving successful MDR-TB treatment and the need for better patient management and follow-up strategies (Table-5).

DISCUSSION

TB remains a major health problem in India accounting for more than 20 percent of the global incident cases. Since 1997, the government of India has implemented under the revised National TB control Programme (RNTCP) the globally recommended DOTS strategy, and covered the entire country by

March 2006. Having achieved the global targets for cure rates among new smearpositive pulmonary TB cases detected under the programme, RNTCP is now implementing the programmatic management of multidrug- resistant TB (MDR-TB defined as resistance to at least isoniazid ana rifampicin) cases in the phased manner and a standardized category-IV treatment regimen (STR) has been approved by the RNTCP National DOTS-Plus committee. The emergence of MDR and XDR TB substantially challenges TB controls, where the highest prevalence of MDR (XDR cases is reported. The current management of patient with MDR/XDR is extremely complex for medical social and public health system. This document summarised about MDR-TB management. This study although based on a small number of patients, found that the standardized regimen recommended by RNTCP for the treatment of MDR-TB cases in India. A total of 100 patients with a TB diagnosis were included in this study; 76% of the patients were male and 24% were female. The cohort's male predominance is consistent with global epidemiological data, which show that TB is more common in men because of their greater exposure to risk factors like alcohol consumption, smoking, occupational hazards, and delaying seeking medical attention. With a mean age of 25, TB is still prevalent in the socially and economically active and productive age group, which has major ramifications for both public health and economic stability. Fortunately out of the 100 patients, 20 (20%) finished their treatment and 49 (49%) were deemed cured, meaning that 69% of the cohort had a positive treatment outcome. Although it is in line with WHO-recommended standards, there is still opportunity for improvement. Despite being encouraging, the cure rate should be interpreted cautiously because it might not accurately reflect relapses or long-term disease-free status. A 5% recorded mortality rate and 12% of patients experienced treatment failure. These numbers highlight the importance of early treatment failure detection, better adherence support, and attentive follow-up. A considerable percentage of retreatment cases were indicated by the fact that nearly half of the patients (48%) had a history of prior TB treatment. This might be a sign of poor adherence, reinfection, or insufficient prior treatment—all of which are known to contribute to the development of drug-resistant tuberculosis. In contrast, 22% were newly diagnosed cases, and 14% were presumptive TB cases, reinforcing the need for robust diagnostic strategies, especially among highrisk populations. Significantly, 42% of patients were still on older regimens for multidrug-resistant TB (MDR-TB), whereas 58% of patients were put on the new regimen. The trend toward more recent regimens is consistent with international guidelines that support shorter, more efficient MDR-TB treatment protocols, which are linked to improved results and lower toxicity. Although access, cost, and monitoring are still issues in many settings, the use of more recent medications like bedaquiline and delamanid in these regimens may offer improved bactericidal activity and better tolerability. Drug resistance analysis revealed that 38% of patients were resistant to isoniazid (H), and 44% to rifampicin (R), with 10% showing resistance to both rifampicin and pyrazinamide (Z). These results suggest that the study population has a significant burden of drug resistance. Rifampicin resistance, in particular, is a proxy marker for MDR-TB, and its high prevalence necessitates rapid molecular diagnostics

such as GeneXpert MTB/RIF and line probe assays for early detection and appropriate regimen initiation. The presence of resistance to other first-line agents in 8% of patients further complicates the management and suggests a potential for extensively drug-resistant TB (XDR-TB) in some cases.

CONCLUSION

The high proportion of previously treated patients and the substantial rate of drug resistance underscore the need for strengthened TB control programs focusing on:

- Patient adherence support through counselling, directly observed therapy (DOT), and digital adherence technologies.
- Early drug susceptibility testing (DST) for all patients, especially those with a history of previous treatment.
- Scale-up of newer MDR-TB regimens, ensuring access to quality-assured second-line drugs.
- Enhanced surveillance and pharmacovigilance to monitor outcomes and adverse drug reactions.
- Community education and stigma reduction to promote early diagnosis and treatment initiation.

In conclusion, the findings of this study highlight the ongoing challenges in TB management, particularly concerning MDR-TB. Targeted interventions are needed to improve treatment outcomes, reduce mortality, and curb the emergence and transmission of drug-resistant TB strains.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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