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RESEARCH ARTICLE
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A STUDY ON OUTCOMES OF VARIOUS TREATMENT REGIMENS IN DRUG- RESISTANT TUBERCULOSIS

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ABSTRACT

Background:
Drug-resistant tuberculosis (DR-TB) poses a significant challenge to global public health due to its complexity in treatment and the emergence of extensively drug-resistant strains. Conventional treatment protocols have shown varying success rates, necessitating exploration into alternative regimens. Understanding the outcomes of these diverse treatment approaches is crucial for optimizing patient care and combating the spread of resistant strains.

Aims & Objectives:
This study aims to investigate the outcomes of different treatment regimens employed for DR-TB.

Methodology:
This is a record-based study in a Government Medical college in Maharashtra during the year 2020 to 2022. All adult drug resistant TB cases registered were included, giving a sample size of 258. The outcomes of all regimens were examined.

Results:
Out of the total 258cases, 136(52.71%) were males and 122(47.28%) were females. Majority of them 90 (34.88%) belonged to age group of 21 to 30 years. The treatment outcomes were as follows: Out of the total 258 cases, 107(41.47%) were cured , 55(21.31%) completed treatment, 3(1.16%) were treatment failed, 6(2.32%) were lost to follow up, 45(17.44%) expired before treatment completion, 41(15.89%) required change of regimen.

Conclusion:
Optimizing treatment strategies for DR-TB is essential for improving patient outcomes, reducing transmission, and addressing the global burden of tuberculosis.

Key words: *Drug-Resistant Tuberculosis, Treatment Outcome*

INTRODUCTION

Tuberculosis is one of the most common infectious diseases in the world and a significant contributor to poor health. Prior to the COVID-19 pandemic, tuberculosis (TB) surpassed HIV/AIDS as the most common infectious agent-related cause of death.

Mycobacterium tuberculosis, the bacillus that causes tuberculosis, is dispersed into the air by TB patients when they cough or other respiratory secretions. Although it can affect other areas, the disease usually affects the lungs (pulmonary tuberculosis). Men are more likely than women to get the condition, with adults accounting for 90% of cases. Approximately 25% of people on the planet are afflicted with M. tuberculosis.

TB can be prevented and treated. A six-month medication regimen can effectively treat 85% of patients with drug sensitive TB disease, and one to six months of medication can be used to treat TB infection. [1]

Today, one of the most pressing and challenging issues facing worldwide tuberculosis control is the ongoing spread of MDR-TB. About 450,000 new cases of MDR-TB and 170,000 deaths were reported in 2012. 3.8% of newly diagnosed TB patients and 20% of those with a history of prior treatment worldwide have MDR-TB. Eastern European and Central Asian nations have the greatest rates of multidrug resistance (MDR), and these strains pose a threat to becoming just as widespread as pan-susceptible viruses. Up to 20% of new TB cases and significantly more than 50% of patients with a history of prior TB therapy are caused by MDR strains in certain countries.[2]

Types of drug resistance:

Monoresistance: Resistance to one first-line anti-TB drug only.

Polydrug resistance: Resistance to more than one first-line anti-TB drug, other than both isoniazid and rifampicin.

Multidrug resistance (MDR): Resistance to at least both isoniazid and rifampicin.

Rifampicin resistance (RR): Resistance to rifampicin detected using phenotypic or genotypic methods, with or without resistance to other anti-TB drugs. It includes any resistance to rifampicin, whether monoresistance, multidrug resistance, polydrug resistance, or extensive drug resistance.

Extensive drug resistance (XDR): Resistance to any fluoroquinolone, and at least one of three second-line injectable drugs (capreomycin, kanamycin, and amikacin), in addition to multidrug resistance. [3]

This study aims at studying the outcomes of the various drug regimens in use namely, H-mono (Isoniazid- mono), MDR, Pre- XDR and XDR-3

MATERIALS & METHODS

The present record based retrospective study was conducted in Government Medical College in Latur including all Drug Resistant TB cases of the districts Latur, Osmanabad, Nanded and Beed from the year 2020 to 2022. Necessary permissions were obtained before conducting the study. All the patents of the age more than 11 years, i.e., adult TB cases positive to Drug resistant TB were included in the study. Inclusion and exclusion criteria were defined. A total of 258 cases were included in the study. The data obtained was entered in Microsoft Excel sheet. The statistical level of significance is fixed at $p<0.05$. The data is represented in tables. Results of this study were compared with other similar studies.

RESULTS

A total of 258 cases were included in the study of which 136(52.71%) were males and 122(47.28%) were females. Majority of them 90 (34.88%) belonged to age group of 21 to 30 years, followed by 31 to 40 years (21.70%), 11 to 20 years (17.82%), 51-60 years (9.68%), 61 to 70 years (3.10%) and 71 to 80 years (0.77%). Table 1 shows the above information.

Table 1 showing Gender and Age distribution of study subjects (n=258)	
Gender	**n (%)**
Male	136(52.71%)
Female	122(47.28%)
Total	258(100%)
Age group (in years)	n (%)
11 to 20	46(17.82%)
21-30	90(34.88%)
31-40	56(21.70%)
41-50	31(12.01%)
51-60	25(9.68%)
61-70	8(3.10%)
71-80	2(0.77%)
Total	258(100%)

Most of the cases, 85(33.07%) were from the district Nanded, 62 (24.21%) were from Osmanabad, 56(21.79%) were from Latur district and 54(21.01%) were from Beed. The distribution is depicted in table 2.

Table 2 showing District-wise distribution of cases	
Name of District	**Number of cases n(%)**
Latur	55(21.31%)
Osmanabad	41(15.89%)
Nanded	105(46.69%)
Beed	57(22.09%)
Total	**258**

Out of the total 258 drug resistant TB cases , 244(94.57%) were pulmonary type of tuberculosis and 14(5.45%) were of Extra- pulmonary type. Table 3 shows the distribution of cases according to site of TB.

Table 3 showing distribution of cases according to site of TB.	
Site	**Number of cases n (%)**
Pulmonary	244(94.57%)
Extra-Pulmonary	14(5.42%)
Total	**258**

Among the total 258 cases, only 9(3.50%) were HIV positive and 249(96.50%) were HIV negative. Table 4 shows distribution of cases according to HIV status

Table 4 showing HIV Status of the cases.	
HIV status	**Number of cases n (%)**
Positive	9(3.48%)
Negative	249(96.51%)
Total	**258**

The treatment regimens of the cases were as follows. Majority of the cases, 193(74.03%) were on MDR regimen, 33(12.79%) were on H-mono (Isoniazid mono regimen), 31(12.01) were on Pre- XDR regimen and 3(1.16%) were on XDR regimen. The above information is depicted in table 5.

Table 5 showing treatment Regimens of drug resistant TB cases.	
Treatment regimens	**Number of cases n (%)**
H mono	34(12.79%)
MDR	193(74.03%)
Pre-XDR	21(12.01%)
XDR	10(1.16%)
Total	**258**

There were various outcomes for the different treatment regimens. Out of the total 258 cases, 107(41.47%) were cured, 55(21.31%) completed treatment, 3(1.16%) were treatment failed, 6(2.32%) were lost to follow up, 45(17.44%) expired before treatment completion,41(15.89) patients Regimen changed and 1(0.0038%) could not be evaluated since they were transferred out to other districts.
Among the total 107 cured cases, 73 belonged to MDR regimen, 19 belonged to isoniazid mono regimen, 10 belonged to Pre-XDR regimen, and 5 belonged to XDR regimen. Out of the total 55 treatment completed regimens, 40 belonged to MDR regimen, 7 belonged to Isoniazid Mono regimen ,10 pre – XDR regimen and 5 was on XDR regimen. Out of the total 3 treatment failure cases, 1 was on Isoniazid Mono regimen, 2 was on Pre- XDR regimen and none of them were on MDR & XDR regimen.
Among the total 6 cases those who were lost to follow up, 4 were on MDR regimen, 2 was on isoniazid Mono regimen and none of them were on Pre XDR and XDR regimen. Among the 45 expired cases, 36 were on MDR regimen, 3 were on isoniazid Mono regimen, 5were on Pre-XDR regimen and 1 was on XDR regimen. Total 41 cases required change of regimen out of which 39 were MDR cases 2 were isoniazid monoresistant cases.
The treatment outcomes are depicted in Table 6.

Outcome	**Overall**	**MDR**	**INH**	**Pre- XDR**	**XDR**
Treatment Failed	03(1.16%)	Nil	01(0.38%)	02(0.77%)	Nil
Cured	107(41.47%)	73 (28.29 %)	19(07.36%)	10(3.87%)	05(3.10%)
Completed	55(21.31%)	40(15.50%)	07(2.71%)	04(1.55%)	04(1.55%)
Loss to Follow up	6(2.32%)	04(1.55%)	02(0.77%)	NIL	NIL
Died	45(17.44%)	36(13.17%)	03(1.16%)	05(3.10%)	01(0.38%)
Not Evaluated	1(0.0038%)	01(0.0038%)	NIL	NIL	NIL
REGIMEN CHANGED	41(15.89%)	39(15.11%)	02(0.77%)	NIL	NIL
	258	**193**	**34**	**21**	**10**

DISCUSSION

In a Moroccan study done by Hamdouni et al, Treatment outcomes of tuberculosis patients were as follows: 45 patients were cured (44.5%), 9 completed treatment (8.9%), 5 patients died before completing the treatment, 35 patients were lost to follow up (34.6%) and 7 patients had treatment failure. In the present study, 41.47% patients were cured, 21.31% completed treatment, 17.44% patients died before completing the treatment, 2.32% patients were lost to follow up and 1.16% patients had treatment failure.[4]
In a systematic review and meta-analysis done by OS Pedersen et al, it was found that the proportion of successful treatment was 44.2 %. Similar findings were found in present study too. The proportion of successful treatment outcome was 41.47% [5]
In a study done by Lecai et al in China, it was found that of 261 MDR-TB patients receiving ambulatory treatment, 71.1% (186/261) achieved treatment success (cured or completed treatment), 0.4% (1/261) died during treatment, 11.5% (30/261) had treatment failure or relapse, 8.0% (21/261) were lost to follow-up, and 8.8% (23/261) were transferred out. In our study, 41.47% patients were

cured, 21.31% completed treatment, 17.44% patients died before completing the treatment, 2.32% patients were lost to follow up and 1.16% patients had treatment failure.[6]
Singh et al , in their study, observed that, 72.4% had successful treatment outcome, 10.2 % had treatment failure, 7.1% were default and10.2 expired before treatment completion. In present study, 41.47% had successful treatment outcome, 2.32% were lost to follow up, 1.16 % had treatment failure and 17.44 % expired before completion of treatment.[7]
A Brazilian study showed that out of the total Multi drug Resistant cases, the overall success proportion was 60%. In our study, the overall success proportion was found to be 41.47.[8]

CONCLUSION

Drug Resistant Tuberculosis continues to be a huge public health burden in India. In our study it was observed that the treatment success rate was 41.47 % far less than the WHO goal of 75% of treatment success rate. The proportion of treatment completion was found to be 21.31%. The proportion of treatment failure was 1.16%, 2.32% were lost to follow up and 17.44% of cases expired before completion of treatment.15.89% of cases required need of change of regimen. Targeted interventions to reduce defaulters and treatment failure can help in attaining the goal of 75% of TB treatment success rate.

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