ORIGINAL RESEARCH

Pattern of drug-resistance in multidrug-resistant pulmonary tuberculosis

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ABSTRACT

Background: In India, tuberculosis (TB) is a leading cause of morbidity and mortality. One-fifth of the cases of tuberculosis worldwide occur in India. The present study was conducted to assess pattern of drug-resistance in multidrug-resistant pulmonary tuberculosis. **Materials &Methods:** 120 patients of multidrug-resistant pulmonary tuberculosis of both genders were selected. Sputum specimens were collected in sterile wide mouthed bottles from sputum smear-positive patients of pulmonary TB. Sputum culture and drug sensitivity tests (DST) were carried out. **Results:** Out of 120 patients, 78 were males and 42 were females. Resistance pattern against HR was seen in 23, HRE in 15, HRS in 32 and HRSE in 50 patients. The difference was significant (P< 0.05).17 HR, 11 HRE, 24 HRs and 40 HRSE cured. 1 HR, 1 HRE, 2 HRS and 2 HRSE died. **Conclusion:** The commonest pattern observed in this study was resistance to all four first-line drugs followed by resistance to isoniazid plus rifampicin plus streptomycin.

Keywords: multidrug-resistant, pulmonary tuberculosis, Sputum

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INTRODUCTION

In India, tuberculosis (TB) is a leading cause of morbidity and mortality. One-fifth of the cases of tuberculosis worldwide occur in India.[1] The World Health Organization (WHO) estimates that 9.4 million new cases of tuberculosis are identified year, resulting in around 2 million fatalities.[2] There are 1.96 million tuberculosis cases in India each year, of which 0.8 million are new sputum smear-positive cases, or 75 new cases per lakh. Additionally, there are 0.33 million tuberculosis fatalities annually. Drug-resistant tuberculosis (TB) is becoming more common around the world.[3] China and India together account for over half of all multidrug-resistant (MDR-TB) cases worldwide.In India, tuberculosis (TB) is a leading cause of morbidity and mortality. The World Health Organization (WHO) estimates that 9.4 million new cases of tuberculosis are identified year, resulting in around 2 million fatalities.[4] There are 1.96 million TB patients in India each year, of which 0.8 million are new sputum smear-positive cases, or 75 new cases per lakh, and 0.33 million of these cases result in death. Drug-resistant tuberculosis (TB) is becoming more common around the world. China and India together account for over half of all multidrug-resistant (MDR-TB) cases worldwide.[5]

A patient with multidrug-resistant tuberculosis (MDR-TB) is one whose sputum culture is positive for Mycobacterium tuberculosis and which, based on drug sensitivity tests, is resistant in vitro to isoniazid (INH) and rifampicin, either with or without resistance to additional anti-tuberculosis medications.[6] Treatment of multidrug-resistant tuberculosis (MDR-TB) is more difficult and necessitates the prudent use of different regimens according to resistance patterns at specialized and designated centres since second-line anti-tuberculosis treatment (ATT) is more toxic and less effective than first-line drugs.[7]The present study was conducted to assess pattern of drug-resistance in multidrug-resistant pulmonary tuberculosis.

MATERIALS & METHODS

The study was carried outon 120 patients of multidrug-resistant pulmonary tuberculosis of both genders.All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Sputum specimens were collected in sterile wide mouthed bottles from sputum smear-positive patients of pulmonary TB. Sputum culture and drug sensitivity tests (DST) were carried out. Results thus obtained

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were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table IDistribution of patients

Total- 120		
Gender	**Male**	**Female**
Number	78	42

Table I shows that out of 120 patients, 78 were males and 42 were females.

Table II Various resistance patterns

Resistance patterns	Number	P value
HR	23	0.05
HRE	15	
HRS	32	
HRSE	50	

H=Isoniazid, R=Rifampicin, S=Streptomycin, E=Ethambutol

Table II, graph I shows that resistance pattern against HR was seen in 23, HRE in 15, HRS in 32 and HRSE in 50 patients. The difference was significant (P< 0.05).

Graph I Various resistance patterns

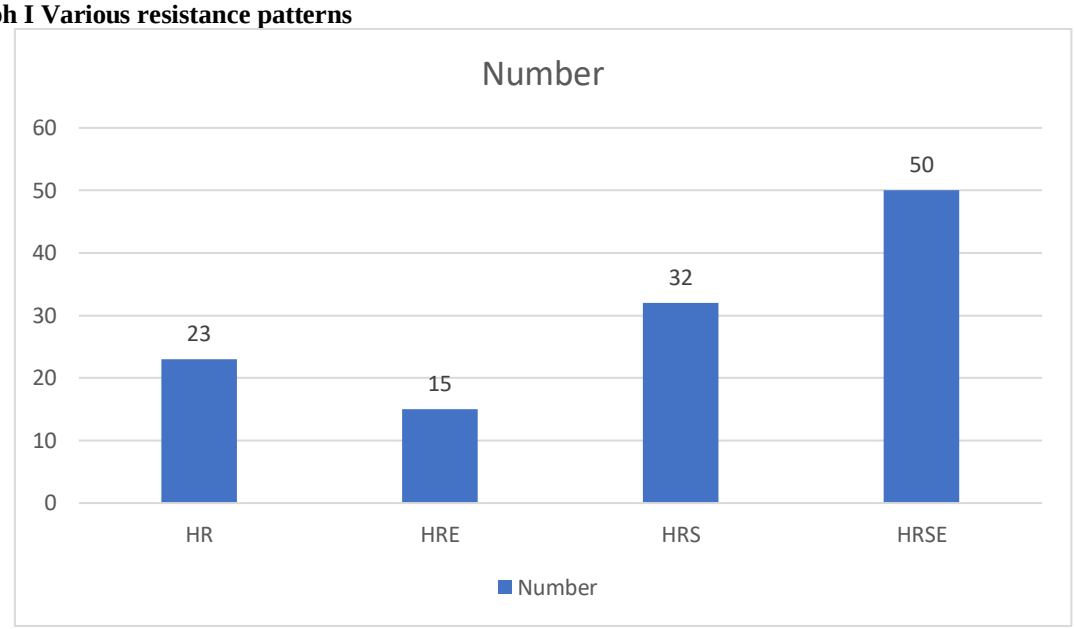

Table III Treatment outcomes

	HR	HRE	HRS	HRSE	Total
Cured	17	11	24	40	92
Defaulter	2	1	3	4	10
Failure	3	2	3	4	12
Death	1	1	2	2	6
Total	23	15	32	50	120

Table III shows that 17 HR, 11 HRE, 24 HRs and 40 HRSE cured. 1 HR, 1 HRE, 2 HRS and 2 HRSE died.

DISCUSSION

To start a good regimen in accordance with DST and improve treatment outcomes, patients with proven MDRPTB must have an appropriate assessment of various types of drug resistance performed on them.[8] Merely identifying MDR-PTB and starting second-line ATT without appropriate regimens based on DST may not be sufficient to produce a favourable course of treatment.[9,10] Given the rising trend of MDR-PTB in India, it is imperative that treatment regimens consisting of newer medications be properly formulated based on different patterns of drug resistance in cases of proven MDR-PTB.[11]The present study was conducted to assess pattern of drug-resistance in multidrug-resistant pulmonary tuberculosis.

We found that out of 120 patients, 78 were males and 42 were females. Nagaraja et al[12]studied the pattern of drug-resistance and treatment outcomes among patients with confirmed multidrug-resistant

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pulmonary tuberculosis (MDR-PTB). Of the 224 MDR-PTB patients, 146 (65.2%) were resistant to all first-line drugs, 39 (17.4%) to isoniazid, rifampicin and streptomycin; 19 (8.5%) to isoniazid, rifampicin and ethambutol; and 20 (8.9%) to isoniazid and rifampicin. Among them, 145 (64.7%) patients were cured, 5 (2.2%) had treatment-failure, 10 (4.4%) died, and 64 (28.5%) defaulted. Among 145 cured cases, 100 (69%) were resistant to all first-line drugs, 23 (16%) to isoniazid, rifampicin and streptomycin, 11(8%) to isoniazid, rifampicin and ethambutol, and 11(8%) to isoniazid and rifampicin

We found that resistance pattern against HR was seen in 23, HRE in 15, HRS in 32 and HRSE in 50 patients. We found that 17 HR, 11 HRE, 24 HRs and 40 HRSE cured. 1 HR, 1 HRE, 2 HRS and 2 HRSE died. Masjedi et al[13] in their study forty-three patients diagnosed with MDR-TB, with a mean age of 44.38 +/- 19.05 years, received treatment; of these, 27 (62.8%) were male. Twenty-three were (53.5%) Iranians and the remainder were Afghans. All patients were acquired MDR-TB cases. Of the 43 cases, 25 (58.1%) experienced severe clinically significant adverse effects; 29 (67.5%) had a successful outcome and 14 (32.5%) had a poor outcome (treatment failure in six [14%] and death in eight [18.6%]). Mortality was higher in Iranians (P = 0.039) and in patients whose initial regimen was changed due to adverse drug reactions (P = 0.01). Forson et al[14]evaluated the frequency and pattern of drug resistance of Mycobacterium tuberculosis isolated from patients with chronic smear positive pulmonary tuberculosis.*M. tuberculosis* was recovered from 28 (70%) of the 40 patients. Of the 28 culture positive cases, 10 (36%) had resistance to at least rifampicin and isoniazid (multi-drug resistant TB), 22 (79%) isolates had resistance to streptomycin and 13 (46%) to ethambutol. Of the patients with a positive culture, only one (3.6%) had a fully susceptible organism. Of the 10 patients with MDR TB, 7 had received two or more retreatment courses.

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that the commonest pattern observed in this study was resistance to all four first-line drugs followed by resistance to isoniazid plus rifampicin plus streptomycin.

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