Original Article

Study of Risk Factors Associated with Drug Resistant Tuberculosis

R. S. Senthil Kumar

Assistant Professor, Department of Thoracic Medicine, Government Thiruvarur Medical College, Tamil Nadu, India

Abstract

Introduction: There are many patient-specific factors, such as age, sex, alcohol abuse, poverty, HIV infection, smoking, substance abuse, a history of imprisonment, hospitalization, or recent immigration, all increase the probability of drug-resistant tuberculosis (DR-TB). However, although there are several risk factors for multi-DR-TB (MDR-TB), it should be noted that almost two-thirds of MDR-TB cases have never been previously been treated for TB or have none of these associated risk factors.

Aim: This study aims to study the risk factors associated with DR-TB in new cases.

Materials and Methods: In this retrospective study, 50 DR-TB patients were included, data such as demographic profile includes age, gender, occupation, comorbidities such as diabetes, alcoholism, chronic kidney disease, HIV and treatment history, and travel history were collected and analyzed.

Results: In 50 patients, the most common presenting complaint was cough (100%), patients with symptoms for more than 3 months were about 56%. In this study, the most common comorbidity was diabetes (21%). In our study also, majority was without any comorbidity (66.2%).

Conclusion: From the above study, it is concluded that there are some identifiable risk factors which will be associated with the development of primary DR-TB and they are non-specific since they are also associated with the development of drug-sensitive TB.

Key words: Drug-resistant tuberculosis, Risk factors, Universal drug susceptibility test

INTRODUCTION

Multidrug-resistant tuberculosis (MDR-TB) is emerging as a growing threat to TB control programs in many countries and accounts for 5% of all newly diagnosed patients worldwide.[1] The potentially serious impact of MDR-TB (TB strain resistant to at least isoniazid and rifampicin) has long been recognized;[2] however, the problem is of special concern because second-line drugs required for its treatment are often unavailable, are far more expensive than the first-line drugs, with only 65–75% efficacy, and have side effects that may require hospitalization.[3,4]

Interrupting treatment with anti-TB medicines in an individual infected with TB allows some bacteria to remain alive, giving them a chance to develop resistance. MDR-TB can either occur due to inadequate treatment or direct contact with a MDR-TB patient.[5] Furthermore, MDR-TB is considered to be a main barrier to the control of TB in humans worldwide.[6] Numerous risk factors for the development of TB resistance have been established by the World Health Organization.[7] Many studies have identified risk factors associated with MDR-TB, including poor adherence to treatment, improper dosage, a short duration of treatment, and inadequate drugs.[8]

The literature shows that factors such as young age, migration, unemployment at the time of diagnosis, poor nutritional status (based on low body mass index), history of alcoholism, homelessness, and comorbidities, such as, diabetes, HIV/AIDS, and so on, are associated with MDR-TB.[9-11]

Corresponding Author: R. S. Senthil Kumar, Department of Thoracic Medicine, Government Thiruvarur Medical College, Tamil Nadu, India.

Aim

This study aims to study the risk factors associated with DR-TB in new cases.

MATERIALS AND METHODS

This is a retrospective study done at DR-TB Centre, Department of Thoracic Medicine, Thiruvarur Medical College and Hospital, Tamil Nadu. The patients were selected for study from those who attending as outpatients for their follow-up or admitted as inpatients in the department of respiratory medicine from September 2020 to December 2020.

Inclusion Criteria

- All known newly diagnosed pulmonary TB patients with any form of drug resistance on treatment were included in the study.

Exclusion Criteria

The following criteria were excluded from the study:
- Previously treated TB patients
- Extrapulmonary TB patients
- Pregnancy
- Age <12 years.

Based on the criteria above, 50 DR-TB patients were selected for the study. Informed and written consent was obtained from all the patients. Data such as demographic profile include age, gender, occupation, comorbidities such as diabetes, alcoholism, chronic kidney disease, HIV and treatment history, and travel history were collected.

RESULTS

In the study 50 patients, majority was male (68%) patients and 50% of patients were between 40 and 60 years [Figures 1 and 2]. In the present study, the most common presenting complaint was cough (100%) which was productive in 96% of patients and fever was seen in 84% [Figure 3]. In this study, patients with symptoms for more than 3 months were about 56% [Figure 4]. In this study, the most common comorbidity was diabetes (21%). In our study also, majority was without any comorbidity (66.2%) [Figure 5].

DISCUSSION

India has the highest global burden of MTB and MDR-TB. Nearly half of the world's MDR-TB patients are from three countries, namely, India (27%), China (14%), and Russia (9%).[12] Indian survey of TB drug resistance in 2016 reports a lower incidence of MDR in treated (11.6% vs. 18%) and new

cases (2.84% vs. 3.4%) in comparison with the global WHO 2019 report.[13] This study observed a gradual decline in MDR-TB from 5.06% in 2015 to 1.34% in 2018, although these data pertain to presumptive MDR-TB cases. Monoresistance to rifampicin and isoniazid also shows a decline from 2015 onward, pointing to the effectiveness of the Revised National TB Control Program in the state. About 60%–70% of our rifampicin-resistant TB is multidrug resistant, in close concordance with the global value of 78%.[14]

Our study results in concordance with Micheletti *et al.*[15] the most common signs and symptoms were productive cough (80.4%), weight loss (69.8%), and fever (41.3%). In this
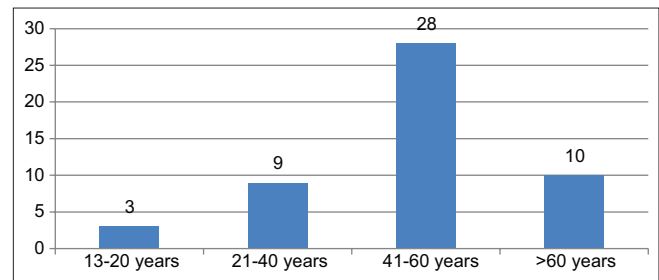

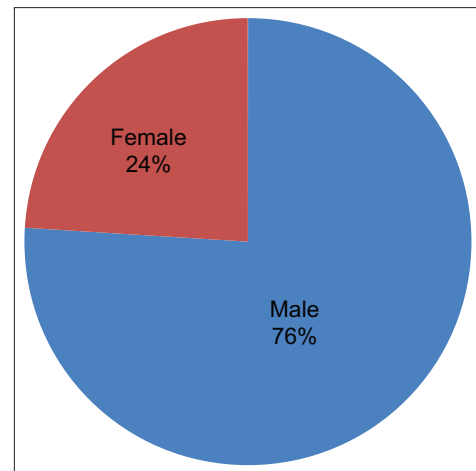**Figure 1: Distribution of age group**
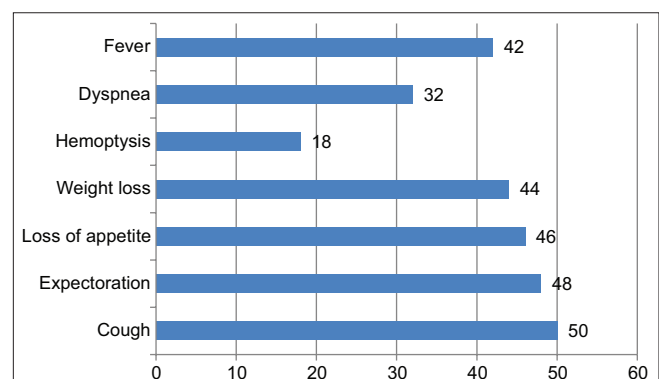

Figure 2: Distribution of gender

Figure 3: Distribution of symptoms
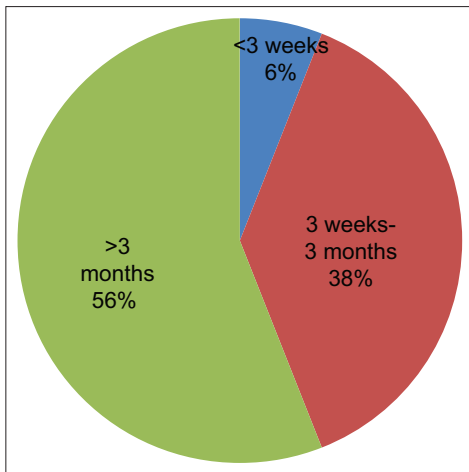
Figure 4: Distribution of duration of symptoms

Figure 5: Distribution of risk factors

with the development of primary DR-TB and they are non-specific since they are also associated with the development of drug-sensitive TB. Hence, risk factors based approach in evaluating TB patients for drug resistance is not useful in high endemic countries like India. Hence, it is necessary to follow universal drug susceptibility test principle as implemented by National TB Elimination Program to improve the favorable treatment outcomes and reduce the treatment failure and relapses.
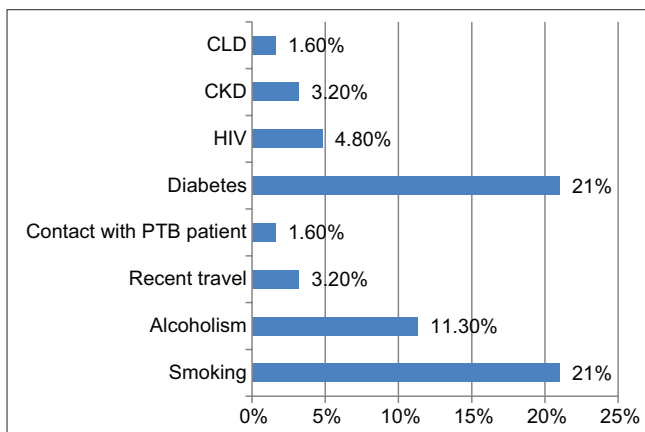
study, patients with symptoms for more than 3 months were about 54%. In Ricks *et al.*,[16] presentation with illness of long duration (>60 days) was a risk factor for the development of MDR-TB. In the current study, most common comorbidity was diabetes (21%). In Kang *et al.*,[17] DM was a relatively common comorbidity in DR-TB patients. However, in Micheletti *et al.*,[15] the most common comorbidity was HIV infection (26.2%) followed by diabetes mellitus (5.2%). Caminero[18] mentioned that high rate of primary MDR-TB in a general population with no identifiable risk factors for MDR-TB and suggested that in a high endemic area, targeting patients for MDR-TB based on the presence of risk factors are an insufficient intervention.

CONCLUSION

From the above study, it is concluded that there are some identifiable risk factors which will be associated

REFERENCES

1. World Health Organization. WHO Report 2008. Global Tuberculosis Control. Surveillance, Planning, Financing. Geneva: World Health Organization; 2008.
2. Iseman MD. Tailoring a time-bomb. Am Rev Respir Dis 1985;132:735-6.
3. Cobelens F, Heldal E, Kimerling M, Mitnick CD, Podewils LJ, Ramachandran R, *et al.* Scaling up programmatic management of drug-resistant tuberculosis: A prioritized research agenda. PLoS Med 2008;5:e150.
4. Partners in Health. Medical Management of MDR-TB. Boston, USA: Partners in Health; 2003.
5. Faustini A, Hall AJ, Perucci CA. Risk factors for multidrug resistant tuberculosis in Europe: A systematic review. Thorax 2006;61:158-63.
6. Goble M, Iseman MD, Madsen LA, Waite D, Ackerson L, Horsburgh CR Jr. Treatment of 171 patients with pulmonary tuberculosis resistant to isoniazid and rifampin. N Engl J Med 1993;328:527-32.
7. World Health Organization Companion Handbook to the WHO Guidelines for the Programmatic Management of Drug-resistant Tuberculosis; 2014. Available from: https://www.who.int/tb/publications/pmdt_companionhandbook/en. [Last accessed on 2020 Sep 26].
8. Günther G, van Leth F, Alexandru S, Altet N, Avsar K, Bang D, *et al.* Multidrug-resistant tuberculosis in Europe, 2010-2011. Emerg Infect Dis 2015;21:409-16.
9. Anonymous. Ivano Oblast. Vol. 48. Russia: MMWR; 1999. p. 661-3.
10. Farmer P. Infections and Inequalities: The Modern Plagues. Berkeley, CA: University of California Press; 1999. p. 231-61.
11. Gordin FM, Nelson ET, Matts JP, Cohn DL, Ernst J, Benator D, *et al.* The impact of human immuno deficiency virus infection on drug resistant tuberculosis. Am J Respir Crit Care Med 1996;154:1478-83.
12. Mishra GP, Mulani JD. First national anti-tuberculosis drug resistance survey (NDRS) from India-an eye opener. J Infectiol 2018;1:26-9.
13. World Health Organization. Global Tuberculosis Report. Geneva, Switzerland: World Health Organization; 2019.
14. Zhao Y, Xu S, Wang L, Chin DP, Wang S, Jiang G, *et al.* National survey of drug-resistant tuberculosis in China. N Engl J Med 2012;366:2161-70.
15. Micheletti VC, Kritski AL, Braga JU. Clinical features and treatment outcomes of patients with drug-resistant and drug-sensitive tuberculosis: A historical cohort study in Porto Alegre, Brazil. PLoS One 2016;11:e0160109.
16. Ricks PM, Mavhunga F, Modi S, Indongo R, Zezai A, Lambert LA, *et al.* Characteristics of multidrug resistant tuberculosis in Namibia. BMC Infect Dis 2012;12:385.
17. Kang YA, Kim SY, Jo KW, Kim HJ, Park SK, Kim TH, *et al.* Impact of diabetes on treatment outcomes and long-term survival in multidrug-resistant tuberculosis. Respiration 2014;86:472-8.
18. Caminero JA. Multidrug-resistant tuberculosis: Epidemiology, risk factors and case finding. Int J TB Lung Dis 2010;14:382-90.