

Analysis of Clinical Profile of Multi-Drug-Resistant Tuberculosis Patients: An Institutional Based Study

Kishore Reddy Bhimireddy¹, Srinivas^{2*}

¹Associate Professor, Department of TB & Chest,
Great Eastern Medical School & Hospital, Srikakulam, Andhra Pradesh, India.

^{2*}Professor, Department of General Medicine,
Great Eastern Medical School & Hospital, Srikakulam, Andhra Pradesh, India.

ABSTRACT

Background: The ongoing proliferation of drug-resistant tuberculosis (TB) represents one of the most pressing and complex challenges in the realm of global TB management. Individuals infected with strains that exhibit resistance to isoniazid and rifampicin, known as multidrug-resistant (MDR) TB, are largely unresponsive to conventional first-line therapies. Hence; the present study was conducted to analyse clinical profile of multi-drug-resistant tuberculosis patients.

Materials & Methods: A total of 100 patients were included in the study, specifically focusing on those diagnosed with multi-drug-resistant tuberculosis. Investigations included routine hemogram, ultrasound of the chest or affected area, two sputum acid-fast bacilli (AFB) smear tests using the Ziehl-Neelsen (Z-N) staining method, serological testing for HIV, routine urine analysis and microscopy, thyroid function tests, as well as sputum culture and sensitivity testing. Drug susceptibility testing (DST) was conducted for all patients. All data were entered into a Microsoft Excel spreadsheet and subsequently analyzed statistically using SPSS software.

Results: Mean age of the patients was 42.7 years. 65 percent of the patients were males while 61 percent of the patients were rural residence. Mean BMI was 24.9 Kg/m². Cough, fever, dyspnea, anorexia, hemoptysis and weight loss were seen in 93 percent, 100 percent, 72 percent, 100 percent, 76 percent

and 100 percent of the patients respectively. Unilateral involvement and bilateral involvement were seen in 43 percent and 57 percent of the patients while cavitation on radiographic assessment was seen in 44 percent of the patients.

Conclusion: The clinico-radiological features must consistently be assessed in situations where the administered pharmacological agents have failed to reach the requisite concentrations to effectively target the entire mycobacterial population.

Key words: Multi-Drug Resistant, Tuberculosis.

*Correspondence to:

Dr. Srinivas,
Professor,
Department of General Medicine,
Great Eastern Medical School & Hospital,
Srikakulam, Andhra Pradesh, India.

Article History:

Received: 14-08-2017, Revised: 04-09-2017, Accepted: 25-09-2017

Access this article online	
Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2017.3.5.097	

INTRODUCTION

The ongoing proliferation of drug-resistant tuberculosis (TB) represents one of the most pressing and complex challenges in the realm of global TB management. Individuals infected with strains that exhibit resistance to isoniazid and rifampicin, known as multidrug-resistant (MDR) TB, are largely unresponsive to conventional first-line therapies. Despite the fact that tuberculosis is a treatable infectious disease, approximately 1.3 million fatalities were attributed to TB in 2012. A significant contributing factor to this mortality rate is the disease's capacity to develop resistance to pharmacological treatments. For those afflicted with drug-susceptible TB, the standard regimen involving isoniazid and rifampicin—recognized as the most effective medications—yields

high cure rates. Conversely, patients with MDR-TB face severe challenges, as standard first-line treatments are largely ineffective against their infections.¹⁻³

In 2006, the designation extensively drug-resistant TB (XDR-TB) was introduced to characterize MDR-TB strains that also demonstrate resistance to fluoroquinolones and second-line injectable agents. Current estimates suggest that 9.6% of MDR-TB cases globally are classified as XDR-TB. The limited availability of second-line drug susceptibility testing (DST) in numerous regions worldwide often leads to the underdiagnosis of XDR-TB.^{4,5} Hence; the present study was conducted to analyse clinical profile of multi-drug-resistant tuberculosis patients.

MATERIALS & METHODS

A total of 100 patients were included in the study, specifically focusing on those diagnosed with multi-drug-resistant tuberculosis. The selection of patients was conducted randomly. Each participant provided a comprehensive clinical history, which encompassed symptoms, personal habits such as smoking and alcohol consumption, previous tuberculosis infections, family history of tuberculosis, and medication history. Clinical examinations were performed, including both general and systemic assessments. Investigations included routine hemogram, ultrasound of the chest or affected area, two sputum acid-fast bacilli (AFB) smear tests using the Ziehl-Neelsen (Z-N) staining method, serological testing for HIV, routine urine analysis and microscopy, thyroid function tests, as well as sputum culture and sensitivity testing.

Drug susceptibility testing (DST) was conducted for all patients. Treatment was administered following category-IV anti-tuberculosis therapy (ATT) in accordance with the Revised National Tuberculosis Control Program (RNTCP) and the

guidelines for the programmatic management of drug-resistant tuberculosis in India. Data regarding various patient parameters—including demographic, socio-economic, clinical presentation, radiological findings, previous treatment history, and drug sensitivity test results—were meticulously recorded. All data were entered into a Microsoft Excel spreadsheet and subsequently analyzed statistically using SPSS software.

RESULTS

The mean age of the patients was 42.7 years. 65 percent of the patients were males while 61 percent of the patients were rural residence. Mean BMI was 24.9 Kg/m². Cough, fever, dyspnea, anorexia, hemoptysis and weight loss were seen in 93 percent, 100 percent, 72 percent, 100 percent, 76 percent and 100 percent of the patients respectively. Unilateral involvement and bilateral involvement were seen in 43 percent and 57 percent of the patients while cavitation on radiographic assessment was seen in 44 percent of the patients.

Table 1: Demographic profile

Variable	Number	Percentage
Mean age (years)	42.7 years	
Males	65	65
Females	35	35
Mean BMI (Kg/m ²)	24.9 Kg/m ²	
Rural residence	61	61
Urban residence	39	39

Table 2: Clinical profile

Variable	Number	Percentage
Cough	93	93
Fever	100	100
Dyspnea	72	72
Anorexia	100	100
Hemoptysis	76	76
Weight loss	100	100

Table 3: Radiographic profile

Variable	Number	Percentage
Unilateral	43	43
Bilateral	57	57
Cavitation	44	44
Non-cavitation	56	56
Resistance pattern- Only R	39	39
Resistance pattern- Both H and R	61	61

DISCUSSION

In 2006, it was estimated that approximately 489,139 new cases of tuberculosis (TB), accounting for nearly 5% of all diagnoses, were classified as multidrug resistant (MDR), specifically resistant to isoniazid and rifampicin, the two most potent anti-TB medications. It marks a 12% increase since 2004 and a 56% rise since the year 2000. Furthermore, an estimated 1 to 1.5 million prevalent cases of MDR-TB were reported in 2006, leading to a total of nearly 2 million individuals suffering from active disease. The effective treatment of MDR-TB necessitates the administration of second-line drugs, which have historically posed significant financial challenges in low-resource environments. In

response to this issue, the World Health Organization (WHO) launched the Green Light Committee (GLC) in 2000 to enhance access to and ensure the regulated use of second-line medications for TB management. Despite the establishment of the GLC and a notable decrease in the costs associated with second-line drugs, the incidence of drug-resistant TB continues to escalate, posing a substantial challenge to healthcare systems in many regions. The recognition of the severity of the MDR-TB crisis, along with its related morbidity and mortality, has spurred recent initiatives advocating for increased research efforts and the expansion of treatment options.⁶⁻⁹

The mean age of the patients was 42.7 years. 65 percent of the patients were males while 61 percent of the patients were rural residence. Mean BMI was 24.9 Kg/m². Cough, fever, dyspnea, anorexia, hemoptysis and weight loss were seen in 93 percent, 100 percent, 72 percent, 100 percent, 76 percent and 100 percent of the patients respectively. Unilateral involvement and bilateral involvement were seen in 43 percent and 57 percent of the patients while cavitation on radiographic assessment was seen in 44 percent of the patients. Dholakia et al conducted a study examining the clinical features and treatment results of patients with drug-resistant tuberculosis (DR TB). This investigation involved a retrospective analysis of DR TB patients who were receiving treatment at a tuberculosis unit and through non-governmental organizations (NGOs). Among the 34 cases reviewed, 5 (14%) were identified as having mycobacterium species other than tuberculosis, while 24 cases were classified as pulmonary TB, 4 as extra-pulmonary TB, and 1 case exhibited both forms. The cohort included three individuals co-infected with HIV and two with diabetes mellitus. Notably, two patients were treatment-naïve. Of the 29 cases analyzed, 3 (11%) were found to be mono-resistant, whereas 20 (69%) were categorized as multidrug-resistant (MDR) TB, specifically exhibiting resistance to ethambutol, pyrazinamide, and isoniazid; 4 cases were classified as pure MDR TB. One patient was diagnosed with extensively drug-resistant TB (XDR TB), and 13 (44.8%) demonstrated resistance to at least one conventional second-line medication. Adverse drug reactions were reported in seven cases, with four necessitating a change in medication. Currently, two patients remain under treatment; of the remaining 27, 14 (51%) achieved successful treatment outcomes, 5 (18%) succumbed to the disease, 2 (7%) experienced treatment failure, 5 (18%) were lost to follow-up, and one patient migrated. The drug susceptibility testing (DST) profiles indicated significant levels of drug resistance, attributed to amplification, which ultimately contributed to unfavorable treatment outcomes.¹⁰

Shah I et al. conducted a study to elucidate the clinical characteristics of drug-resistant tuberculosis (DR-TB) in pediatric patients. The subjects were categorized into several groups: mono-resistant TB, polyresistant TB, multidrug-resistant TB (MDR-TB), and extensively drug-resistant TB (XDR-TB). Among the 500 children evaluated, 34 (6.8%) were identified as having drug-resistant TB. The average age at presentation was 6.8 years, with a male-to-female ratio of 13:21. Notably, 18 (52.9%) of these children had a history of prior tuberculosis treatment, although one had defaulted on therapy. Additionally, seven patients had been exposed to an adult with drug-resistant TB, and three (10.3%) were co-infected with HIV. The distribution of drug resistance revealed that 14 children (41.2%) had MDR-TB, 11 (32.4%) had partial XDR-TB, and one child each (2.9%) was diagnosed with polyresistant TB and XDR-TB. The clinical manifestations of DR-TB were found to be consistent across different age groups. A history of tuberculosis treatment and exposure to adults with drug-resistant TB emerged as significant risk factors for the development of drug-resistant TB in children.¹¹

CONCLUSION

The clinico-radiological features must consistently be assessed in situations where the administered pharmacological agents have failed to reach the requisite concentrations to effectively target the entire mycobacterial population. This evaluation is essential for the timely adjustment and enhancement of national programs, as well as for the analysis of trends in drug resistance patterns.

REFERENCES

1. Becerra M, Franke MF, Appleton SC, Joseph JK, Bayona J, Atwood SS, Mitnick CD. Tuberculosis in children exposed at home to multidrug-resistant tuberculosis. *Pediatr Infect Dis J* 2013; 32:115–9.
2. Wells CD, Cegielski JP, Nelson LJ, Laserson KF, Holtz TH, Finlay A, Castro KG, Weyer K. 2007. HIV infection and multidrug-resistant tuberculosis: The perfect storm. *J Infect Dis* 196: S86–S107.
3. Gelmanova IY, Keshavjee S, Golubchikova VT, Berezina VI, Strelis AK, Yanova GV, Atwood S, Murray M. Barriers to successful tuberculosis treatment in Tomsk, Russian Federation: Non-adherence, default and the acquisition of multidrug resistance. *Bull World Health Organ* 2007; 85: 703–711.
4. Johnson JL, Hadad DJ, Boom WH, Daley CL, Peloquin CA, Eisenach KD, Jankus DD, Debanne SM, Charlebois ED, Maciel E, et al. Early and extended early bactericidal activity of levofloxacin, gatifloxacin and moxifloxacin in pulmonary tuberculosis. *Int J Tuberc Lung Dis* 2006; 10: 605–612.
5. World Health Organization (WHO). 2013a. Global tuberculosis report 2013. World Health Organization, Geneva.
6. Zignol M, Hosseini MS, Wright A, et al. Global incidence of multidrug-resistant tuberculosis. *J Infect Dis*. 2006;194:479–485.
7. Anti-Tuberculosis Drug Resistance in the World: Fourth Global Report. Geneva: World Health Organization; 2008. WHO/IUATLD Global Project on Anti-Tuberculosis Drug Resistance Surveillance.
8. WHO, STOP-TB Partnership. The Global MDR-TB & XDR-TB Response Plan 2007. WHO/HTM/TB/2007; 2007. p.387.
9. Fauci AS: NIAID Tuberculosis Working Group. Multidrug-resistant and extensively drug-resistant tuberculosis: The National Institute of Allergy and Infectious Diseases Research Agenda and Recommendations for Priority Research. *J Infect Dis* 2008;197:1493–8.
10. Dholakia, Yatin N.; Shah, Divya P. Clinical profile and treatment outcomes of drug-resistant tuberculosis before directly observed treatment strategy plus: Lessons for the program. *Lung India* Oct–Dec 2013; 30(4):p 316-320.
11. Shah I, Chikkar S. Clinical Profile of Drug-Resistant Tuberculosis in Children. *Indian Pediatr* 2012;49: 741-744.

Source of Support: Nil.

Conflict of Interest: None Declared.

Copyright: © the author(s) and publisher. IJMRP is an official publication of Ibn Sina Academy of Medieval Medicine & Sciences, registered in 2001 under Indian Trusts Act, 1882. This is an open access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Cite this article as: Kishore Reddy Bhimoreddy, Srinivas. Analysis of Clinical Profile of Multi-Drug-Resistant Tuberculosis Patients: An Institutional Based Study. *Int J Med Res Prof*. 2017 Sept; 3(5): 470-72. DOI:10.21276/ijmrp.2017.3.5.097