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An urgent need for building technical capacity for rapid diagnosis of multidrug-resistant tuberculosis (MDR-TB) among new cases: A case report from Maharashtra, India



Sachin Atre*,¹

Dept. of Anthropology, University of Pune, Maharashtra 411007, India

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KEYWORDS

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Summary Multidrug-resistant tuberculosis (MDR-TB), the prevalence of which has increased across the globe in recent years, is a serious threat to public health. Timely diagnosis of MDR-TB, especially among new TB cases, is essential to facilitate appropriate treatment, which can prevent further emergence of drug resistance and its spread in the population. The present case report from India aims to address some operational challenges in diagnosing MDR-TB among new cases and potential measures to overcome them. It argues that even after seven years of implementing the DOTS-Plus program for controlling MDR-TB, India still lacks the technical capacity for rapid MDR-TB diagnosis. The case report underscores an urgent need to explore the use of WHO-endorsed techniques such as Xpert MTB/Rif and commercial assays such as Genotype MTBDR for rapid diagnosis of MDR-TB among new cases. Suitable applications may be found for other TB high-burden countries where MDR-TB is a major concern.

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Introduction

Multidrug-resistant tuberculosis (MDR-TB) is a condition in which a *Mycobacterium tuberculosis* strain is resistant to at least two first-line potent anti-TB drugs such as rifampicin and isoniazid. MDR-TB presents a threat to public health and has recently

* Tel.: +91 9850735008.

E-mail address: atresachin2000@yahoo.com

¹ Currently, the author serves as a technical consultant on an assignment for the Global Tuberculosis Program of the World Health Organization, Geneva.

increased in prevalence worldwide [1,2]. It is problematic because it requires long-term (18–24 months) and expensive treatment, which is less effective and more toxic than first-line treatment [3]. India carries the highest burden of TB as well as MDR-TB cases among notified pulmonary TB cases and hence needs serious attention [1]. The Global Tuberculosis Report 2014 noted that 2.2% (CI 1.9–2.6) of new and 15% (CI 11–19) of previously treated TB cases in India were MDR-TB; according to this report, the estimated burden of MDR-TB in India is nearly 61,000 cases with 20,000 (CI 17,000–24,000) new and 41,000 (CI 30,000–52,000) previously treated cases [1]. Because prior anti-TB treatment is a major risk factor that is associated with MDR-TB [4], previously treated cases remain the focus of MDR-TB control programs. Nevertheless, attending MDR-TB among new cases is equally important, especially in India for several reasons. Diagnosed new TB cases are often initially treated in the weakly regulated private sector and/or under the Revised National TB Control Program (RNTCP). Private providers are known to deviate from the program guidelines [5,6] and often prescribe monotherapy or inadequate treatment. Conversely, some patients receive inadequate anti-TB treatment due to their inability to afford full treatment in the private sector. Some patients treated under the RNTCP may also receive inadequate anti-TB treatment as a result of treatment interruption due to reasons such as social problems, early symptomatic relief or no symptomatic relief. These scenarios eventually give rise to the emergence of anti-TB drug resistance. Those who have ‘primary MDR-TB’ (i.e., an initial infection with an MDR-TB strain prior to starting any anti-TB treatment) fail the first-line treatment regimen and eventually die or may develop resistance to other drugs besides isoniazid and rifampicin via ‘amplification of resistance’ [7]. Lastly, in the absence of appropriate treatments for MDR-TB, mycobacterial strains from these MDR-TB cases continue to transmit in the population and thus present a threat to public health. To prevent emergence and spread of MDR-TB, its timely diagnosis, especially among new cases, is one of the most essential steps. However, there are operational challenges for timely MDR-TB diagnosis. The present case report aims to address some of them along with potential measures to overcome these challenges.

Methods

This case report belongs to a patient who was initially diagnosed with TB. His sputum sample was

collected as a part of a larger epidemiological study that was conducted in Maharashtra state during 2004–2007. Ethics approval for this study was provided by the Institutional Ethics Committee of the Foundation for Medical Research, Mumbai. The author personally conducted an in-depth interview of this patient after seeking his appropriate written consent. The interview was conducted in two sittings during 2006–2007; however, only a part of the interview was utilized here to contextualize this case report.

A case of MDR-TB

Rajaram was a 49-year-old man and a resident of a village in the Pune district of Maharashtra State. He owned a small piece of land, but income from the land was not sufficient for his family, which included his parents, wife and a son. Therefore, he went to Mumbai² and sought a welding job. However, he was alone and detached from his family, so he quickly became addicted to liquor and smoking. He spent nearly 20 years in Mumbai during which he occasionally used to visit his village and family with a young son. After 20 years, he permanently returned to his village. Within a few months after his return, he started coughing and had a fever. Initially, he went to a private doctor, but even after 10–15 days treatment, he could not get symptomatic relief. The doctor referred him to a nearby government health center, where he was diagnosed with TB and started a Category-I regimen (comprising of isoniazid, rifampicin, ethambutol and pyrazinamide) as a ‘new case’ per India’s Revised National TB Control Program (RNTCP) guidelines [8]. He was treated with the above-mentioned first-line regimen for six months. However, his cough recurred within three months after he finished his course of treatment. His condition became so serious that his family took a decision to shift him to a tertiary care center in Pune city. There he was treated with Category-II (retreatment) regimen, which contained streptomycin in addition to the regimen described above. After approximately three months, Rajaram died in that hospital. The drug susceptibility test (DST) results of his sputum sample that was collected prior to starting treatment (as a part of a research project) indicated that Rajaram was infected with a strain that was resistant to all first-line drugs. Clearly he had MDR-TB. The DOTS Plus program for MDR-TB management was launched in India

² A metropolitan city and financial capital of India. It is a densely crowded city, noted as TB hyper endemic area.

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