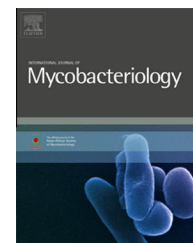


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## Short Communication

# Low levels of anti TB drug resistance in Rayagada district of Odisha, India



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## ABSTRACT

A study was conducted at Rayagada district of Odisha, India, among smear-positive tuberculosis (TB) patients to determine the resistance pattern to first-line drugs. Sputum samples were collected from 405 new and 37 previously treated patients and were tested at Regional Medical Research Centre, Bhubaneswar. Resistance to any anti-tubercular drug was observed to be 5.2% among new cases and 16.1% among previously treated patients, while multidrug-resistant tuberculosis (MDR-TB) was found to be 0% in new and 8.1% in previously treated cases. Such a low level of resistance may be due to the limited use of TB drugs outside the ongoing program.

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## Introduction

Globally, the progress of tuberculosis (TB) control activities has been challenged by the emergence of multidrug-resistant (MDR) and Extensively Drug Resistant (XDR) strains resulting in an increased burden to low- and middle-income countries. MDR-TB prevalence in India varies from 0.5% to 5.7% in newly diagnosed [1–3] and 11.8–47.1% in retreatment cases [4–7]. An isolated study conducted in Odisha, India, during 2000–2001 has reported 0.7% of MDR-TB [8]. The present study provides the current status of drug resistance during the initial phase of programmatic management of drug-resistant (PMDT) TB in Rayagada district of Odisha.

## Materials and methods

This cross-sectional study was carried out in Rayagada district Odisha in collaboration with State and district TB departments, government of Odisha. The Rayagada district is part of the KBK, which is a special economic zone of the State

because of pan-developmental indices, and a major part of the population (55.6%) belongs to Scheduled tribes. According to RNTCP status report 2011, the district reported 1,148 smear-positive TB cases, of which 936 (81.5%) were newly diagnosed cases. In this study, suspected pulmonary TB patients attending all the 18 out of 20 (2 excluded due to very low patient intake) Designated Microscopy Centers (DMCs) of the district whose sputum was found AFB-positive by Ziehl-Neelsen (ZN) staining were requested to provide additional sputum samples, preferably two specimens: early morning (EM) and spot for drug sensitivity testing. However, patients providing only one specimen, spot or EM, were also processed for culture. New and previously treated patients were categorized based on treatment history verified by TB number at DMC level. Sputum samples were collected in 50 ml falcon tubes with equal volumes of Cetylpyridinium chloride–sodium chloride (CPC–NaCl) was added [9] and kept at room temperature until processed. Samples were processed following standard method [9] at Regional Medical Research Centre, Bhubaneswar TB laboratory that conforms to the external

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**Table 1 – Pattern of primary drug resistance in new and previously treated cases.**

Drug resistance pattern	New cases, n = 405		Previously treated cases, n = 37		Total n = 442	
	N	%(95% CI)	N	%(95% CI)	N	%(95% CI)
Susceptible to all drugs	384	94.8(92.1–96.7)	29	78.4(61.3–89.6)	413	93.4(90.6–95.4)
Resistance to any drug	21	5.2(3.4–7.8)	8	21.6(10.4–38.7)	29	5.6(4.5–9.4)
Resistance to H	10	2.47(1.4–4.5)	2	5.4(1.0–19.5)	12	2.71(1.5–4.8)
Resistance to S	10	2.47(1.4–4.5)	2	5.4(1.0–19.5)	12	2.71(1.5–4.8)
Resistance to S+H	1	0.2(0–1.6)	1	2.7(0.1–15.8)	2	0.5(0.1–1.8)
Resistance to H+R	0	0	2	5.4(1–19.5)	2	0.5(0.1–1.8)
Resistance to S+H+R+E	0	0	1	2.7(0.1–15.8)	1	0.23(0.0–0.0)
MDR	0	0	3	8.1(2.1–23.0)	3	0.7(1.2–2.1)

\*95% CI with continuity correction.

quality assessment (EQA) of Supra National Reference Laboratory (National Institute for Research in Tuberculosis, Chennai) prior to and during the study period. Deposit specimens were inoculated into Lowenstein Jensen (LJ) medium, and isolates were identified by growth rate, colony morphology, para-nitrobenzoic acid susceptibility, and catalase and niacin tests. Drug susceptibility testing (DST) was performed by the economic version of proportion method for drug concentrations using streptomycin (S) 4 µg/ml, isoniazid (H) 0.2 µg/ml, rifampicin (R) 40 µg/ml, and ethambutol (E) 2 µg/ml. Internal quality assurance for DST results was performed using two strains: one susceptible H37Rv strain; and one fully resistant strain of *Mycobacterium tuberculosis* provided by NIRT, Chennai. Written informed consent was obtained from all the patients after explaining the details of the procedure and the benefit of the study. The study protocol was approved by the Ethical Committee of the Institute.

## Results

The study was undertaken in Rayagada district during the period February 2012 to April 2013. During this study period 1037 new cases were registered with the district TB program.

Sputum samples were collected from 518 smear-positive TB patients who consented and complied with the request to provide additional sputum specimens. After processing and inoculation in LJ medium, 442 (85.3%) samples showed isolates of *M. tuberculosis*, while 54 cases did not show any growth, 19 showed contamination and 3 were nontuberculous mycobacteria (NTM). The age of the 442 patients ranged between 10 and 70 years (mean ± SD, 36.74 ± 13.51, median 36). Among them 78.7% were males and 91.6% were newly diagnosed cases. The age of newly diagnosed cases ranged between 10 and 67 years (mean ± SD, was 36.4 ± 13.45, median 35), and 37 previously treated cases ranged between 13 and 70 years (mean ± SD, 40.16 ± 13.80, median 40). From the above 442 isolates resistant to any drug was 5.2% (95% CI, 3.4–7.8) and 21.6% (95% CI, 10.4–38.7) among new and previously treated cases respectively, Table 1. When each drug was considered separately, H and S resistance was 2.5% (95% CI, 1.4–4.5) each for new and 5.4% (95% CI, 1.0–19.5) each for previously treated cases respectively. Prevalence of MDR-TB was 0% and 8.1% (95% CI, 2.1–23.0) among new and previously treated cases. Out of the three MDR-TB patients, two were females permanently staying in the district and were

HIV negative. The other patient was a male on a transferable job and he was transferred out of Odisha State, whose HIV infection status was not known.

## Discussion

The study was conducted in a district of Odisha with 40% of its area covered by forest and home to 55.6% indigenous population. In newly diagnosed cases the resistance to the first-line drugs was observed to be 2.7% for isoniazid or streptomycin and no resistance to rifampicin or ethambutol. Similar observations were reported in the earlier study, from another indigenous people dominated district in Mayurbhanj of Odisha that reported 2.5% and 3.9% resistance to isoniazid and streptomycin respectively [8]. In comparison with other reported studies in India [1–3], a low prevalence of MDR-TB was found among new smear-positive cases in Rayagada district. The observed 8.1% MDR-TB prevalence among previously treated patients was also lower than the reported prevalence of 11.8–47.1% in other parts of India [4–7]. This study demonstrates a relatively low level of overall resistance to first-line anti-tuberculosis drugs and also a low level of MDR-TB both in new and retreatment cases. Some of the reasons for this low level could be: (i) the higher treatment success rate which has been consistently above 85% in the district; (ii) limited availability of anti-TB drugs outside the RNTCP system; and (iii) working of LEPRO society in the district from the year 2008 to 2012 under SA-HYOG project for improved case detection, treatment and awareness among TB patients.

## Conclusion

This study indicates that primary drug resistance is low in the district and suggests that more attention to early detection and treatment through DOTS can sustain this low level of resistance to anti-TB drugs for a longer period.

## Conflict of interest

We wish to confirm that there are no known conflicts of interest associated with this publication.

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