

ORIGINAL ARTICLE**Evaluation of proportion of rifampicin and isoniazid resistance in sputum positive smear cases of pulmonary tuberculosis**

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ABSTRACT:

Background: To assess proportion of rifampicin and isoniazid resistance in sputum positive smear cases of pulmonary tuberculosis. **Materials & method:** A total of 100 patients with potential symptoms suggestive of pulmonary tuberculosis and history of treatment with antituberculosis drugs reported to Chest and T.B department. All sputum smears positive cases with previous history of treatment with first line antituberculosis drugs were instructed to collect sputum sample in a sterile, leak proof falcon tube. The samples were immediately sent to Intermediate Reference Laboratory, Patiala for Line Probe Assay, as per guidelines. All the data were compiled in Microsoft excel sheet and were analysed by SPSS software. **Results:** H (Isoniazid): Sensitive, R (Rifampicin): Sensitive was found to be present in 59 percent of the patients, while R: Sensitive, H: Resistant was found to be present in 21 percent of the patients. H: Sensitive, R: Resistant was found to be present in 11 percent of the patients while H: Sensitive, R: Sensitive was found to be present in 9 percent of the patients. **Conclusion:** Since drug-resistance is a dynamic phenomenon, it is important to monitor the trend of drug-resistance periodically.

Key words: Tuberculosis, Rifampicin, Isoniazid

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INTRODUCTION

Tuberculosis remains a worldwide problem despite well documented, well publicised methods of prevention and cure. Poverty and HIV infection are major reasons for its persistence. Most tuberculosis programmes use direct smear examination of sputum but, if resources permit, culture is desirable. Reliable susceptibility testing is a luxury few developing countries can afford, although it is especially desirable for purposes of re-treatment. Rapid methods of culture and susceptibility testing are widely available in the wealthier nations.¹⁻³ Molecular techniques have provided quick, sensitive, and specific tests for Mycobacterium tuberculosis—such as polymerase chain reaction, DNA and RNA probes, and γ interferon tests—but these are expensive and technically demanding. They are most useful in diagnosing multi-drug resistant organisms quickly and in differentiating M tuberculosis from other, non-infectious mycobacterial species.⁴⁻⁶

The risk of progression to infection and disease is two different aspects and proper understanding of these factors is essential for planning TB control strategies. The risk of infection following TB exposure is primarily governed by exogenous factors and is determined by an intrinsic combination of the infectiousness of the source case, proximity to contact and social and behavioural risk factors including smoking, alcohol, and indoor air pollution. In settings with increased chances of social mixing (together with overcrowding) transmission will be high. Similarly, conditions which prolong the length of exposure to an infectious patient include health system-related factor

such as delay in diagnosis. Factors that increase the progression of infection to disease are primarily endogenous (host related). Conditions which alter the immune response increase the risk of progression to disease with HIV coinfection, the most important of these.⁷⁻⁹ Hence; the present study was conducted for assessing proportion of rifampicin and isoniazid resistance in sputum positive smear cases of pulmonary tuberculosis.

MATERIALS & METHOD

The present study was conducted for assessing proportion of rifampicin and isoniazid resistance in sputum positive smear cases of pulmonary tuberculosis. A total of 100 patients with potential symptoms suggestive of pulmonary tuberculosis and history of treatment with antituberculosis drugs reported to Chest and T.B department. So, study was conducted on sputum smear positive previously treated pulmonary TB patients and follow up sputum smear positive new pulmonary TB patients. Two Sputum samples from each patient were collected in sterile containers and immediately sent for AFB smear microscopy. All sputum smear positive cases with previous history of treatment with first line antituberculosis drugs were instructed to collect sputum sample in a sterile, leak proof falcon tube. The samples were immediately sent to Intermediate Reference Laboratory, Patiala for Line Probe Assay, as per guidelines. All the data were compiled in Microsoft excel sheet and were analysed by SPSS software. Fischer's exact t test was used for

assessment of level of significance. P- value of less than 0.05 was taken as significant.

RESULTS

In the present study, a total of 100 patients of pulmonary tuberculosis were analyzed. Mean age of the patients of the present study was 41.2 years. 46 percent of the patients belonged to the age group of 31 to 50 years. 73 percent of the patients were males while the remaining 27 percent were females. Fever and cough were found to be present in 92 and 98

percent of the patients. Shortness of breath and weight loss was found to be present in 56 percent and 79 percent of the patients respectively. H (Isoniazid): Sensitive, R (Rifampicin): Sensitive was found to be present in 59 percent of the patients, while R: Sensitive, H: Resistant was found to be present in 21 percent of the patients. H: Sensitive, R: Resistant was found to be present in 11 percent of the patients while H: Sensitive, R: Sensitive was found to be present in 9 percent of the patients.

Table 1: Clinical symptoms

Clinical symptoms	Number of patients	Percentage of patients
Fever	92	92
Cough	98	98
Shortness of breath	56	56
Hemoptysis	12	12
Chest pain	18	18
Weight loss	79	79
Night sweats	49	49

Table 2: Pattern of H and R resistance

H and R pattern	Number of patients	Percentage	p- value
H: Sensitive R: Sensitive	59	59	0.0001
H: Resistant R: Sensitive	21	21	
H: Sensitive R: Resistant	11	11	
H: Resistant R: Resistant	9	9	
Total	100	100	

DISCUSSION

Tuberculosis (TB) is a global health concern for both developing and developed countries and has recently become more complex due to persistence in aging populations and the rise of drug-resistant strains. In clinical practice, rapid TB diagnosis can be difficult, and early pulmonary TB detection continues to be challenging for clinicians. Prompt diagnosis of active pulmonary TB is a priority for TB control, both for treating the individual and for public health intervention to reduce further spread in the community. Chest X-ray is useful but is not specific for diagnosing pulmonary TB.^{6- 9}Hence; the present study was conducted for assessing proportion of rifampicin and isoniazid resistance in sputum positive smear cases of pulmonary tuberculosis.

In the present study, a total of 100 patients of pulmonary tuberculosis were analyzed. Mean age of the patients of the present study was 41.2 years. 46 percent of the patients belonged to the age group of 31 to 50 years. 73 percent of the patients were males while the remaining 27 percent were females. Fever and cough were found to be present in 92 and 98 percent of the patients. Shortness of breath and weight loss was found to be present in 56 percent and 79 percent of the patients respectively. Kandi S et al

assessed the proportion of the TB patients having MDR-TB at the initiation of retreatment regimen; the prevalence of isoniazid (INH) resistance in this geographical area. Sputum samples from 100 patients were subjected to acid fast bacilli (AFB) culture and drug sensitivity testing. Of these, 28 (28%) were MDR-TB, 42 (42%) were non-MDR-TB and 39% being INH resistance. In conclusion, one third of the retreatment pulmonary TB cases attending a tertiary care institute for TB will be MDR-TB at the initiation of treatment and there is a need to include ethambutol in the continuation phase of new TB case treatment in view of high INH resistance.¹⁰

H (Isoniazid): Sensitive, R (Rifampicin): Sensitive was found to be present in 59 percent of the patients, while R: Sensitive, H: Resistant was found to be present in 21 percent of the patients. H: Sensitive, R: Resistant was found to be present in 11 percent of the patients while H: Sensitive, R: Sensitive was found to be present in 9 percent of the patients. Out A et al analyzed the pattern of drug resistance among pulmonary tuberculosis patients. Sputum samples from consecutive TB patients in Calabar were subjected to culture on Lowenstein-Jensen (LJ) slopes followed by drug susceptibility testing (DST). The DST was performed on LJ medium by the proportion

method. Forty-two of the 100 *Mycobacterium tuberculosis* strains were found to be resistant to at least one drug. Resistance to only one drug (monoresistance) was found in 17 patients. No strains with monoresistance to rifampicin were found. Resistance to two drugs was found in 22 patients, while one patient was resistant to both three and four drugs. MDR TB was seen in 4% (4/100). The independent variables of HIV serology and sex were not significantly associated with resistance. There was a high prevalence of anti-TB drug resistance in Calabar.¹¹ Singhal R et al (2014) detected multi-drug resistant tuberculosis (MDR-TB) among MDR-TB suspects, and common mutations among MDR-TB cases using GenoTypeMTBDRplus. A total of 553 sputum samples from MDR suspects were received of which, 181 (32.7%) isolates were found to be multi-drug resistant. Missing WT8 along with mutation in codon S531L was commonest pattern for rifampicin resistant isolates (65.1%) and missing WT along with mutations in codon S315T1 of *katG* gene was commonest pattern for isoniazid resistant isolates (86.2%). Average turn-around time for dispatch of LPA result to these States from cultures and samples was 23.4 and 5.2 days, respectively. The MDR-TB among MDR-TB suspects in North-Eastern States of India was found to be 32.7 per cent. The common mutations obtained for RIF and INH in the region were mostly similar to those reported earlier.¹²

CONCLUSION

Since drug-resistance is a dynamic phenomenon, it is important to monitor the trend of drug-resistance periodically.

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