ABSTRACT

BACKGROUND: Emergence of Multidrug resistant Tuberculosis (MDRTB) has become a significant obstacle for Tuberculosis (TB) control. Rifampicin (RIF) resistance is an important indicator of MDRTB. Rapid simultaneous detection of Mycobacterium Tuberculosis (MTB) and RIF resistance are very essential for effective disease management. CBNAAT (Cartridge Based Nucleic Acid Amplification Test) also known as Gene Xpert MTB/RIF assay is a novel diagnostic tool for detection of MTB and RIF resistance.

AIMS AND OBJECTIVES: To study the usefulness of CBNAAT for rapid detection of MTB and RIF resistance in MDRTB suspected cases.

MATERIALS AND METHODS: 1002 sputum samples were collected retrospectively from MDRTB suspected cases including both new cases and previously treated cases. These were processed using Gene Xpert MTB/RIF assay. The results were statistically analyzed.

RESULTS: Out of 1002 sputum samples, Rifampicin resistance was detected in 202 (20.15%) samples and RIF sensitive was detected in 800 (79.84%) samples. Out of 800 rifampicin sensitive cases sputum smear positive in 443(55.37) and negative in 357(44.62). Out of 202 RIF resistant samples, sputum smear were positive in 127 (62.87%) cases and negative in 75 (37.12%) cases.

CONCLUSIONS: Gene Xpert MTB/RIF assay is a good screening tool for diagnosis of MTB and detection of RIF’s resistance from MDRTB suspected cases within a shorter period.

KEYWORDS

Mtb, CBNAAT, Rif Resistance,
resistant tuberculosis, community and geographical area.

In this study, the detection rate of M. tuberculosis was significantly higher in males than females. Likewise, reports from WHO, and Northeast China supports this finding. The reason for this might be due to social and health seeking behavior difference and higher exposure of males to outer environment, smoking and alcoholism. The highest proportion of Gene Xpert positive M. tuberculosis cases were seen in the age group of 18–30 years. This is consistent with previous reports in India. This might be due to more exposure to the outer environment, high work load and wide range of mobility of young people to acquire the TB bacilli as young people have [14].

In the present study, the proportion of M. tuberculosis was significantly higher in presumptive DRTB compared to presumptive TB patients (P < 0.001). This might be due to treatment failure and acquiring of resistant bacilli from drug resistant TB contacts. Moreover, significantly higher proportion of M. tuberculosis was found among patients treated with anti-TB drugs compared to treatment naïve patients in the present study. This finding was comparable to a study conducted in Zimbabwe [15].

Rifampicin-resistant M. tuberculosis is a serious health problem in the study population. The prevalence of rifampicin-resistant M. tuberculosis in this study was in keeping with previous studies in Nigeria [17], North India [18], Iran [19] and Northeast China [20]. However, it was higher than studies observed in Ethiopia, Kenya, Nigeria, Uganda and South of Iraq. In contrast, the proportion of rifampicin-resistant M. tuberculosis was lower than reports in other parts of Ethiopia and Chile. The variation could be due to difference in risk for HIV acquisition, exposure to anti-TB drugs and national TB control program. The relative higher proportion of rifampicin-resistant M. tuberculosis in our study could be due to the use of rifampicin to treat other conditions. Moreover, rifampicin has several adverse effects which could result in patient non-adherence and hence may lead to the selection of resistant strains.

In the present study, the proportion of rifampicin-resistant M. tuberculosis was significantly higher among previously treated patients compared to treatment naïve patients which might be due to failure from previous treatment and contact with drug resistant TB patients. However, the level of rifampicin resistance among previously untreated cases (6.7%) in the analysis close to the reported prevalence of rifampicin-resistant MTB (10.4%). This finding is a significant relevance in the current global and regional efforts to accurately and timely diagnose MDR-TB with the scale up of molecular technology like Gene Xpert MTB/RIF, providing quick results of rifampicin resistance as a proxy to MDR-TB.

In the present study, the proportion of extra-pulmonary tuberculosis was significantly higher compared to pulmonary tuberculosis; in addition the proportion of rifampicin-resistant M. tuberculosis was higher in non-respiratory specimens compared to sputum. This conforms to a study in Cambodia [20]. This demonstrates that rifampicin-resistant extra-pulmonary M. tuberculosis infection is a major health problem in resource-limited settings.

The major strength of this study was detection of M. tuberculosis and rifampicin resistance using the newly endorsed method Gene Xpert MTB/RIF assay from sputum and non-respiratory specimens. However, the major limitation of this study was determination of the sample size using single population formula which may overwhelm some of the associated factors. This study could not do the level of resistance to other anti-TB drugs and the finding of Gene Xpert was not compared to acid fast bacilli microscopy. Thus the finding of this study should be interpreted with these limitations.

CONCLUSION:
Rifampicin-resistant M. tuberculosis is prevalent both in pulmonary and extra-pulmonary tuberculosis cases in the study area. Previous treatment with anti-TB drugs was significantly associated with rifampicin resistance. The strong association of rifampicin resistance with previous treatment suggests that improved monitoring of treatment to limit the emergence of drug resistant M. tuberculosis. Hence, the use of Gene Xpert should be scaled up across the country for rapid diagnosis, management and expanded surveillance of drug-resistant M. Tuberculosis