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Drug resistance patterns of *Mycobacterium tuberculosis* complex and associated factors among retreatment cases at Jimma University Specialized Hospital, South West Ethiopia

Kedir-Abdella, Gameda-Abebe and Ketema Abdissa
Jimma University, Ethiopia

Background: The global burden of tuberculosis (TB) has been accompanied with the emergence of multidrug-resistant tuberculosis (MDR-TB). The rate of MDR-TB is five times higher among previously treated tuberculosis cases than new cases.

Objective: The objective of this study was to determine drug resistance patterns of *Mycobacterium tuberculosis* complex (MTBC) isolates and associated factors among retreatment cases.

Methods: A facility-based cross-sectional study was conducted in from March 2012 to April 2013. A total of 79 sputum smear positive retreatment cases were enrolled in the study. Socio-demographic characteristics and clinical data of patients were collected using questionnaires. Sputum specimens were collected, cultured and drug susceptibility testing (DST) was done for four first line drugs of streptomycin, isoniazid, rifampicin and ethambutol system using indirect proportion method. Statistical analysis of the data (Chi-square and logistic regression) was done using SPSS V-20.

Results: DST was conducted for 70 MTBC isolates. Any drug resistance was detected in 58.6% of isolates. The overall prevalence of MDR-TB was 31.4%. Place of residence ($p=0.032$, 95% CI =1.11, 10.60), duration of illness ($p=0.035$, 95%CI= 1.10, 10.62) and multiple treatment ($p=0.048$, 95%CI=1.01, 8.86) were associated with any drug resistance. The history of treatment failures ($p=0.028$, 95% CI: =1.14, 10.28) was found to be predictor for MDR-TB.

Conclusion: The prevalence of MDR-TB was higher than the world health organization estimation for Ethiopia. The rate of MDR-TB was higher in patients with the history treatment failures. Hence, patients with the history of treatment failures should timely be identified and referred for culture and drug susceptibility testing.

kedirab2@yahoo.com

Strain improvement of *Brevibacillus borostelensis* R1 for optimization of α -amylase production by mutagens

K Suribabu¹, T Lalitha Govardhan¹ and K P J Hemalatha²
¹Dr.Lankapalli Bullayya Post-Graduate College, India
²Andhra University, India

Physical and chemical mutagens are promising and are used for screening of high yielding strains. The exponential increase in the application of amylases in various fields has placed stress and demand in both qualitative improvement and quantitative enhancement through strain improvement. Ultraviolet light exerts its mutagenic effect by exciting electrons in molecules. The potent UV mutants which showed more than 20 mm zone of starch hydrolysis were screened and selected at 42% of survival time at 80minutes of exposure. The wild strain with fixed parameters yielded (3000 U/ml). The major findings of the strain improvement were out of ten mutants isolated, two (UV-3 and UV-10) showed 3000-4000 U/ml of amylase activity. The % of survival of *Brevibacillus borstelensis* R1 in Pikovskaya's medium was 25.75% at 120 minutes of exposure. Ten mutants (HNO2-10, HNO2-30, EMS-4, EtBr-40, EtBr-50, Acr-1, Acr-20, Acr-30, Acr-4 and 5'-FU-50) out of fifty mutants isolated showed 3000-4300 U/ml of amylase activity which was higher than the wild strain. The potent *Bacillus* species screened from marine water was *Brevibacillus borstelensis* R1. The α -amylase was found to be useful in bakery, food, fodder for poultry, automation dishwashing and laundry industries.

ksuribabu_sda@yahoo.com