

Screening and Isolation of Lead Molecules from South Indian Plant Extracts against NDM-1 Producing Escherichia coli

Authors : B. Chandar, M. K. Ramasamy, P. Madasamy

Abstract : The discovery and development of newer antibiotics are limited with the increase in resistance of such multi-drug resistant bacteria creating the need for alternative new therapeutic agents. The recently discovered New Delhi Metallo-beta-lactamase-1 (NDM-1), which confers antibiotic resistance to most of the currently available β -lactams, except colistin and tigecycline, is a global concern. Several antibacterial drugs approved are natural products or their semisynthetic derivatives, but plant extracts remain to be explored to find molecules that are effective against NDM-1 bacteria. Therefore, it is necessary to explore the possibility of finding new and effective antibacterial compounds against NDM-1 bacteria. In the present study, we have screened a diverse set South Indian plant species, and report most plant species as a potential source for antimicrobial compounds against NDM-1 bacteria. Ethanol extracts from the leaves of taxonomically diverse South Indian medicinal plants were screened for antibacterial activity against NDM-1 E. coli using streak plate method. Among the plant screened against NDM-1 E. coli, the ethanol extracts from many plant extracts showed minimum bactericidal concentration between 5 and 15 mg/ml and MIC between 2.54 and 5.12 mg/ml. These extracts also showed a potent synergistic effect when combined with antibiotics colistin and tetracycline. Combretum albidum that was effective was taken for further analysis. At 5mg/L concentration, these extracts inhibited the NDM-1 enzyme in vitro, and residual activity for Combretum albidum was 33.09%. Treatment of NDM-1 E. coli with the extracts disrupted the cell wall integrity and caused 89.7% cell death. The plant extract of Combretum albidum that was effective was subjected to fractionation and the fraction was further subjected to HPLC, LC-MS for identification of antibacterial compound.

Keywords : antibacterial activity, combretum albidum, Escherichia coli, NDM-1

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