Antibacterial activity of eight invasive alien plants against selected multi-drug resistant microorganisms

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Introduction

Antimicrobial resistance is a major concern for public health, and it has accelerated the search for new antimicrobials from natural sources. Invasive plants are a major threat to the ecosystem and economy of a country. This study attempts to address these two problems by screening eight invasive alien plants for their inhibitory potential against selected multidrug-resistant (MDR) organisms.

Methods

Samples of 15 parts from 8 invasive plants (*Dillenia suffructicosa*, *Mimosa pigra*, *Miconia calvescens*, *Ulex europaeus*, *Salvenia molesta*, *Lantana camara*, *Eichorrnia crassipes* and *Panicum maximum*) were used in the study. Dry plant powders were extracted using bottle extraction method with 50% methanol in dichloromethane at room temperature. Crude extracts were tested for antibacterial activity against 10 microorganisms: 5 MDR clinical isolates, methicillin-resistant *Staphylococcus aureus* (MRSA), *Pseudomonas aeruginosa*, *Acinetobacter* spp., *Escherichia coli* and *Klebsiella pneumoniae* and 5 relevant ATCC controls. Disc diffusion assay was performed in triplicate for each extract and minimum inhibitory concentration determined for the active extracts.

Results

The stem-bark and leaf extracts of *Miconia calvescens* exhibited antibacterial activity against both Gram-positive (MRSA) and Gram-negative (*P. aeruginosa*, *Acinetobacter* spp. and *K. pneumoniae*) bacteria. Against MDR *P. aeruginosa*, *Miconia calvescens* leaf and stem-bark extracts showed average zones of inhibition (ZOI) of 7.67±0.57 mm and 10.66±0.57 mm, respectively, and MIC values of 1.00 mg/mL and 0.1 mg/mL, respectively. Against MDR *Acinetobacter* spp., the corresponding values were 11.33±1.15 mm and 15.00±1.00 mm (ZOI), respectively, and 1.00 mg/mL and 0.1 mg/mL (MIC), respectively. Most of the extracts showed antibacterial activity against MRSA with ZOI in the range 7.33-16.00 mm and MIC in the range of 0.1-1.0 mg/mL. Eight extracts were active against at least one MDR organism.

Conclusions

Miconia calvescens stem-bark extract showed antibacterial activity against 6 microorganisms including 3 MDR clinical isolates, out of the 10 tested microorganisms. Further studies are required to isolate and identify the active compounds present in the crude extract.

Keywords: *Multidrug-resistance, invasive alien plants, Miconia calvescens, antibacterial activity*

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