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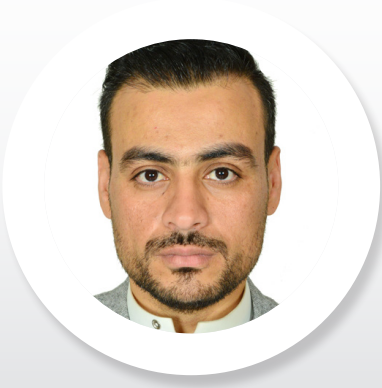
Multidrug-efflux pumps inhibitors study on selected medicinal plants



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Background: Multidrug-resistance among bacteria has become a global issue, bacteria resistance occurs as a result of mutations in bacterial genes or the acquisition of resistance determinants borne on plasmids, bacteriophages, transposons and/or by the action of multidrug-efflux pumps. These pumps work to remove a variation of structurally irrelevant antibiotics from the microorganism resulting in reduced susceptibility of the antibiotic; Staphylococcus aureus, Escherichia coli and Pseudomonas aeruginosa are an example of these expel mechanism. This focus the urgency for new antibiotics or the potentiation of existing antibiotics by inhibiting bacterial efflux pumps. This study inspects natural products for their in vitro antibiotic potentiation against S. aureus strains reveal distinct efflux-related multidrug-resistance pumps.

Methods: Quercus robur, Fraxinus excelsior, Fagus sylvatica, Ulmus minor, Robinia pseudoacacia, Baptisia tinctoria and Frangula alnus. Hexane, chloroform, methanol and aqueous extracts and fractions of each of the samples were investigated for their antibiotic potentiation activity, were screened against effluxing strains of S. aureus using a modulation assay. These strains included SA1199B (fluoroquinolone-resistant; NorA), RN4220 (macrolide-resistant; MsrA) and XU212 (tetracycline-resistant; TetK). Extracts and fractions were collected using Soxhlet, ultrasound-assisted and solid phase extraction.

Results: The results show that the chloroform extract of Baptisia tinctoria and Robinia pseudoacacia 3 has the highest antibiotic potentiation activity against all S. aureus effluxing strains tested. They also enhanced the activity of norfloxacin against SA1199B by a 256-fold reduction in concentration. The chloroform extract of Baptisia tinctoria enhanced the activity of erythromycin against RN4220 by 128-fold reduction. Where are the chloroform extract of Robinia pseudoacacia 3 enhanced the activity of erythromycin against RN4220 by an eight-fold reduction in the concentration of erythromycin needed to inhibit the bacterial growth, also it enhanced the activity of tetracycline and norfloxacin by an eight-fold.

Conclusions: Several of the extracts and fractions had observable potentiation activity.