Graveoline from Ruta angustifolia (L.) Pers. and Its Antimicrobial Synergistic Potential in Erythromycin or Vancomycin Combinations

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Abstract

Ruta angustifolia (L.) Pers. is a Rutaceous species which contains various anthranilic acid derived alkaloids including the bioactive quinolones. This study is aimed at identifying the antimicrobial active alkaloids of R. angustifolia and evaluating their potential as synergistic enhancers in alkaloid-antibiotic combinations. Antimicrobial bioautographyguided isolation of alkaloidal fractions of R. angustifolia leaves has led to the identification of 2,3-dimethoxy-1-hydroxy-10-methylacridone [arborinine]; and 4,7,8-trimethoxyfuro[2,3-b] quinoline [skimmianine]; together with the major active alkaloid, 1-methyl-2-[3',4'-methylenedioxyphenyl]-4-quinolone [graveoline]. Graveoline showed Minimum Inhibitory Concentration (MIC) values ranging from 500 to 1000 mu g/mL against Staphylococcus aureus ATCC 25923, Enterococcus faecalis ATCC 29212 and Escherichia coli ATCC 25922. Checkerboard assay for antimicrobial combination effects between graveoline with either erythromycin or vancomycin showed enhancement of the antimicrobial activity of both antibiotics with Fractional Inhibitory Concentration Indices (FICI) ranged from 0.37 to 1.50. Synergistic effect with FICI of 0.37 was observed for graveoline-erythromycin combination against S. aureus compared to FICI of 1.00 for ciprofloxacin-erythromycin additive effect. Graveoline was a potential candidate for antimicrobial combination agent especially against S. aureus. The result supports the idea of using plant metabolites as antimicrobial synergistic agents.

Keywords

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