

Synergistic antibacterial activity of gentamicin combined with *Psychotria sarmentosa* (Gonika) leaf extract against *Escherichia coli*

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Introduction and Objectives: Increasing resistance of *Escherichia coli* to standard antibiotics poses a major problem to global health. The interaction of the finding of synergistic effects between plant extracts and antibiotics could be a way to revive the ability of antibiotics. *Psychotria sarmentosa* (Gonika) is a medical plant in Sri Lanka which is used to treat infections. The aim of this work was to determine the synergistic antibacterial action of ethanol leaf extract *P. sarmentosa* with gentamicin against *E. coli*.

Methods: Fresh leaves of *P. sarmentosa* were collected, shade-dried, powdered, and extracted using 95% ethanol. Broth dilution together with subculturing was used to determine the Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) of the extract against *E. coli* (ATCC 25922). The sub-inhibitory concentration of gentamicin (0.125 µg/ml) was combined with serial dilutions of the extract. Synergistic interaction was evaluated using the Fractional Inhibitory Concentration Index (FICI), calculated as:

$$FICI = (\text{MIC of Extract in Combination} / \text{MIC of Extract Alone}) + (\text{MIC of Gentamicin in Combination} / \text{MIC of Gentamicin Alone}).$$

FICI ≤ 0.5 indicates synergy, 0.5–1.0 additive effect, 1–4 indifference, and >4 antagonism.

Results: The result indicated that the ethanol extract of *P. sarmentosa* has a MBC of 125 mg/ml which makes it bactericidal against *E. coli*. Also, gentamicin produced both MIC and MBC values of 1 µg/ml. When combined with gentamicin (0.125 µg/ml), the extract MBC reduced into 7.8 mg/ml. The value of FIC Index was 0.1874 confirming that the interaction between gentamicin and the plant extract was synergistic (FICI ≤ 0.5).

Conclusion: Ethanol extract of *Psychotria sarmentosa* significantly enhanced the antibacterial effect of gentamicin against *E. coli*. This synergetic effect will aid the possibility of plant-antibiotic combinations in enhancing treatment efficacy and overcoming antibiotic resistance.

Keywords: Antimicrobial activity, *Escherichia coli*, FIC Index, Gentamicin, *Psychotria sarmentosa*, Synergistic effect,

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