
Diverse Inhibition Pattern of a Group of Phytochemicals on Selected Human Pathogenic Bacterial Species

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The emergence of bacterial resistance to existing antibiotics has become a global crisis and there is an urgent need for the development of alternative antimicrobial agents with different chemical composition and/or mechanisms of action. In these circumstances, natural products such as phytochemicals play a crucial role in novel antimicrobial drug discovery. Since medicinal plants have been widely used to treat infectious diseases in folk medicinal systems worldwide, rationalizing their ethnobotanical significance is a timely requirement. Therefore, the present study was carried out to investigate the antibacterial activity of five different phytochemicals isolated from plants grown in Indian subcontinent namely stigmasterol, bixin, lupeol, andrographolide, and maslinic acid against selected bacterial strains. All compounds were tested against common bacterial pathogens; *Escherichia coli* (ATCC 25922), *Staphylococcus aureus* (ATCC 25923), and *Pseudomonas aeruginosa* (ATCC 27853) by broth micro-dilution method using ciprofloxacin as the positive control. The results indicated that all tested phytochemicals do not possess any antibacterial activity against *S. aureus* and *P. aeruginosa* except maslinic acid which showed bactericidal activity on *P. aeruginosa* with a minimum inhibitory concentration (MIC) of 0.4 mg/mL. Surprisingly, a diverse inhibition pattern was observed with stigmasterol, bixin, andrographolide, and maslinic acid against *E. coli* where the inhibition occurred in lower concentrations while the higher concentrations were unable to inhibit the bacterial growth. These observations resemble the “Eagle effect “ that has been referred to the paradoxically reduced antibacterial effect of some antimicrobial agents at high doses. The reported MIC of stigmasterol, bixin, maslinic acid was 0.002 mg/mL while the MIC of andrographolide was found as 0.01 mg/mL against *E. coli*. However, *E. coli* exhibited resistance to lupeol. These preliminary observations revealed the ethnopharmaceutical significance of the selected phytochemicals and their potential to be developed as antimicrobial substances.

Keywords: Antimicrobial, Eagle effect, Phytochemicals, Natural products