

Determination of *in-vitro* antimicrobial activity of a polyherbal mixture against *Staphylococcus aureus* causing urinary tract infections

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Introduction and Objectives: Natural preparations are gaining attention as an alternative to synthetic antibiotics. Among many strategies, herbal remedies have been successfully used in traditional medicine and are well known for their effectiveness in treating urinary tract infections (UTIs). The current study was conducted to investigate the antimicrobial activity of methanolic extracts of a plant mixture consisting of Amla (*Phyllanthus emblica*), Gall nut (*Terminalia chebula*), Land calthrop (*Tribulus terrestris*), Hog weed (*Boerhavia diffusa*), climbing nettle (*Tragia involucrata*), Mountain knotgrass (*Aerva lanata*), Holy basil (*Ocimum tenuiflorum*), Ginger (*Zingiber officinale*) and Satawari (*Asparagus falcatus*) against *Staphylococcus aureus* ATCC 25923 causing UTIs.

Methods: An *in-vitro* experiment was carried out using a combination of dried fruits of *P. emblica* (0.5 g) and *T. chebula* (0.5 g), dried roots of *T. terrestris* (2 g), *B. diffusa* (0.5 g), *A. falcatus* (1.5 g) and *T. involucrata* (2 g), dried whole plants of *A. lanata* (2 g) and *O. tenuiflorum* (1 g) and dried rhizome of *Z. officinale* (1 g). These were powdered and extracted into methanol. Methanolic extracts of plant parts were screened against *S. aureus* ATCC 25923 and clinical isolates obtained from UTI-positive samples. Antibacterial activity was evaluated using agar well diffusion assay. Gentamicin (10 µg/ml) was used as the positive control. Dimethyl sulfoxide 50% (v/v) was used as the negative control.

Results: Methanolic extracts of the above polyherbal mixture showed an inhibition zone of 21 mm against *S. aureus* ATCC 25923, and gentamicin showed a zone of inhibition of 20 mm. The same plant mixture showed an inhibition zone of 17 mm against clinical isolates of UTI-positive samples, and inhibitory activity was higher than that of gentamicin which showed a 14 mm zone of inhibition. The negative control showed no inhibition zones.

Conclusions: The polyherbal mixture consisting of methanolic extracts of *P. emblica*, *T. chebula*, *T. terrestris*, *B. diffusa*, *T. involucrata*, *A. lanata*, *O. tenuiflorum*, *Z. officinale* and *A. falcatus* exhibited *in vitro* antibacterial activity against *S. aureus* ATCC 25923 and clinical isolates of UTI-positive samples. Development of a reliable and effective plant based therapeutic approach could be identified with this preliminary investigation while it may have the potential to successfully overcome UTI threats and treatment difficulties with synthetic antibiotics.

Key words: Antibacterial, UTI, Medicinal plants, Well diffusion assay

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