

Evaluation of the Antibacterial Activity of Miswak (*Salvadora persica*) and Persian Lime (*Citrus latifolia*) Extracts against *Escherichia coli* and *Staphylococcus aureus*

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Despite advances in medicine, the phenomenon of emerging drug resistance provokes novel research on active botanical compounds and alternative therapy development. Bioactive compounds present in plants possess potent antibacterial properties. The current study aims to evaluate and compare the bacterial susceptibility between miswak (*Salvadora persica*) and Persian lime (*Citrus latifolia*) extracts; a novel combination. Miswak sources unique phytochemicals, making it a superior tool for oral hygiene, while the volatile oil harbored within lime is traditionally used as a flavouring and cosmetic agent. Crude extraction of phytochemicals was done via cold maceration, employing polar solvents methanol and ethanol. Varying concentrations (150 mg/mL and 200 mg/mL) of extracts were subjected to antibiotic susceptibility testing (ABST) using agar well diffusion, while gentamicin and vancomycin served as positive controls. Both *Escherichia coli* and *Staphylococcus aureus* exhibited susceptibility toward all extracts that were assayed. Triplicate readings were statistically analyzed using a two-way analysis of variance (ANOVA) and student's t-test with a 95% confidence interval ($p \leq 0.05$). Mean zones of inhibition (ZOI) were wide-ranging, from 10.7 ± 0.6 mm to 13.7 ± 0.6 mm for miswak and 16.7 ± 0.6 mm to 19.7 ± 1.2 mm for lime. Methanolic lime of 200 mg/mL (M/L2) demonstrated a pronounced ZOI against *E. coli* (19.7 ± 1.2), proving its supremacy over miswak. Upon further testing, lime extracts displayed a minimum inhibitory concentration (MIC) at 12.5 mg/mL and a minimum bactericidal concentration (MBC) at 25 mg/mL. Nonetheless, based on overall results, both miswak and lime extracts serve as potential candidates that can be developed into therapeutic drugs in the phytopharmaceutical industry.

Keywords: *miswak, persian lime, ABST, MIC, MBC*