

TITLE: EVALUATION OF ANTIMICROBIAL ACTIVITIES OF BIOSYNTHESIZED GOLD NANOPARTICLES USING MIMUSOPS CORIACEA

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ABSTRACT:

Antibiotic resistance is a cause of concern that continues to challenge the health care field in several parts of the world. Metallic nanoparticles have emerged as a new platform against several microorganisms. Green methods to synthesize nanoparticles are inexpensive and ecofriendly, being the nanoparticles nontoxic to the human body. This study is focused on the green synthesis of gold nanoparticles (AuNPs) using the aqueous leaves extracts of *Mimusops coriacea* and the investigation of their antimicrobial properties. Different concentrations of McAuNPs (Mc 25 or 50 g/100mL combined with H₂AuCl₄ 1 or 2 mmol/L and AgNO₃ 0.25 mmol/L, with or without photo-reduction process with xenon lamp exposition) were evaluated against *Staphylococcus aureus* ATCC25923, *Escherichia coli* ATCC25922, *Pseudomonas aeruginosa* ATCC27853, and *Candida albicans* ATCC10231; and clinical isolates of *Enterococcus faecalis*, methicillin-resistant *S. aureus* (MRSA), *Klebsiella pneumoniae* (ESBL), *Escherichia coli* EAEC042 O44:H18, and *Stenotrophomonas maltophilia*. Minimum inhibitory concentration (MIC) and Minimal bacterial concentration (MBC) were determined by broth microdilution method. The presence of a resonant surface plasmon band at approximately 530 nm confirmed the formation of the gold nanoparticles for McAuNPs at 2 mmol. Zeta potential analysis showed good stability of prepared solutions. The shape and size of the nanoparticles, determined by transmission electron microscopy images, indicated an adequate structure with spherical and triangular nanoparticles. Nanoparticles solutions diluted twenty times showed a high percentage of antimicrobial activity (91.67-100%), both for Gram-positive and Gram-negative bacteria, as well as for yeasts, with the best results reached with Mc 50 g/100mL with H₂AuCl₄ 2 mmol/L. In general, the exposition of nanoparticles with photo-reduction does not presented good improvements in the inhibitory activity. The MIC of Gram positive strains was obtained at dilution of 1/10-1/160; 1/20-1/160 for Gram-negative strains, while for fungi it was 1/80-1/160. The MBC of Gram positive strains was <1/20 to 1/80, showing higher antimicrobial activity against Gram-negative strains (1/20 to 1/160), being smaller for yeast strain (<1/20). It can be concluded from the present investigation that the biosynthesis of gold nanoparticles from the leaf extract of *M. coriacea* can be used as potential antimicrobial agents.

Keywords: metallic nanoparticles, green synthesis, *Mimusops coriacea*, antimicrobial activity, minimum inhibitory concentration.

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