JBP
Journal of Biochemicals and Phytomedicine
eISSN: 2958-8561

Phytochemical Analysis and Antimicrobial Efficacy of *Calotropis procera* Stem Bark Extracts and Isolated Compounds Against Clinical Pathogens

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ARTICLE INFO

Article Type:
Research

Article History:
Received: 07 May 2025
Revised: 27 Jun 2025
Accepted: 9 Jul 2025
Available online: 11 Oct 2025

Keywords:
Anti-Bacterial Agents,
Antifungal Agents
Methicillin-Resistant,
Staphylococcus aureus,
Plant Extracts,
Phytochemicals

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ABSTRACT

Introduction: *Calotropis procera* is a medicinal plant traditionally used for treating various ailments, but the bioactive constituents of its stem bark require further investigation. This study aimed to evaluate the phytochemical composition and antimicrobial potential of *C. procera* stem bark extracts and to isolate and characterize active compounds against a panel of clinical isolates.

Methods: Methanol and ethyl acetate extracts of the stem bark were subjected to phytochemical screening. Their antimicrobial activity was assessed against clinical isolates of Methicillin-resistant *Staphylococcus aureus* (MRSA), *Escherichia coli*, *Pseudomonas aeruginosa*, *Candida albicans*, and *Salmonella typhi* using agar well diffusion, broth dilution for Minimum Inhibitory Concentration (MIC), and Minimum Bactericidal/Fungicidal Concentration (MBC/MFC) assays. Bioassay-guided fractionation of the active ethyl acetate extract led to the isolation of three compounds (SCP-A, SCP-B, SCP-C) using column chromatography. Their structures were elucidated through spectroscopic analysis (FT-IR, ^{1}H NMR, ^{13}C NMR).

Results: Phytochemical analysis confirmed the presence of tannins, saponins, flavonoids, and other secondary metabolites. The methanol extract demonstrated broad-spectrum activity, particularly against MRSA, *E. coli*, *P. aeruginosa*, and *C. albicans*, with MIC values ranging from 0.63 to 1.25 µg/ml. The isolated compounds SCP-A and SCP-B exhibited significant and superior antimicrobial effects compared to the crude extracts, showing potent activity against all tested pathogens except *S. typhi*. SCP-C showed more limited activity. Spectroscopic data identified SCP-A as octadecan-2-yl acetate, SCP-B as propan-2-yl 2,2-dimethylpropanoate, and SCP-C as bis(2,2-dimethylpropyl)(cyclopentyl)silane.

Conclusion: The stem bark of *C. procera* contains bioactive compounds with promising antimicrobial properties against key clinical pathogens, including multidrug-resistant MRSA. These findings justify further investigation into the development of these compounds as potential antimicrobial agents.

Please cite this paper as:
Oyebanjo OO, Adeniran OI, Fatokun AO. Phytochemical analysis and antimicrobial efficacy of *Calotropis procera* stem bark extracts and isolated compounds against clinical pathogens. Journal of Biochemicals and Phytomedicine. In press. doi: 10.34172/jbp.2025.x7