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Biochemical Investigations, Antimicrobial Activity, and Metallic Nanoparticle Synthesis Using Aqueous Extract of *Alchornea laxiflora* Leaf

Loveth Olawamide Adebayo [1*], Margaret O Oseni [2], Olatunde Abass Oseni [3]

[1]Department of Science Laboratory Technology, Faculty of Science, Ekiti State University, Ado-Ekiti, Nigeria
[2]Department of Chemistry, Federal University, Oye-Ekiti, Nigeria
[3]Department of Medical Biochemistry, College of Medicine, Ekiti State University, Ado-Ekiti, Nigeria

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* *Corresponding author:*
E-mail: adebayoloveth04@gmail.com

ABSTRACT

Introduction: Medicinal plants represent valuable sources for novel therapeutic compounds, with *Alchornea laxiflora* being traditionally used in West African medicine. This study aimed to characterize the biochemical composition, antioxidant activity, toxicological safety, antimicrobial efficacy, and green synthesis potential of *A. laxiflora* aqueous extract.

Methods: Fresh *Alchornea laxiflora* leaves were collected from Akure, Nigeria and subjected to aqueous extraction following standard protocols. Phytoconstituents were identified through qualitative screening. Antioxidant activity was assessed through DPPH scavenging and FRAP assays. Antimicrobial activity was evaluated against bacterial and fungal pathogens using agar well diffusion. Metallic nanoparticles were synthesized and characterized by UV-Vis and FTIR spectroscopy. Acute toxicity was studied in Wistar rats (200 and 400 mg/kg doses) with monitoring of liver enzymes.

Results: The extract contained alkaloids, flavonoids, tannins, saponins, and phenolic compounds. Significant antioxidant activity was observed in DPPH and FRAP assays ($p<0.05$). No adverse effects were noted in toxicity studies ($p>0.05$). The extract showed antimicrobial activity against all tested pathogens. Synthesized nanoparticles demonstrated enhanced antimicrobial properties.

Conclusion: This study validates the traditional use of *A. laxiflora* and supports its potential for pharmaceutical development in antimicrobial and nanomedicine applications.

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