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PHYTOCHEMICAL CONSTITUENTS AND ANTIBACTERIAL ACTIVITIES OF FRUIT EXTRACTS OF *Xylopia aethiopica* ON SOME CLINICAL ORGANISMS

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Abstract: **The present study was designed to evaluate the phytochemical and antibacterial properties of fruit extracts of *Xylopia aethiopica* on selected clinical isolates. The clinical isolates obtained from a high grade medical laboratory center which includes *Escherichia coli, Pseudomonas aeruginosa* and *Staphylococus aureus* were confirmed using biochemical tests and then standardized with 0.5 McFarland. Standard techniques were used in crude extraction followed by phytochemical screening. The antibacterial activities of the different extracts were investigated using agar diffusion and broth microdilution methods. Findings revealed that *Xylopia aethiopica* fruit extracts was found to contain flavonoids, terpenoids, saponins, alkaloids and cardiac glycosides. Antibacterial activities showed that ethanol and aqueous fruit extracts possessed inhibitory effects on *Staphylococus aureus, E. coli* and *P. aeruginosa* that ranged between 9mm to 18mm, 7mm to 15.5mm and 6mm to 12 mm respectively and 9mm to 15mm, 7mm to 12mm and 6mm to 8.5mm respectively. Among all strains tested, *S. aureus* and *E. coli* showed the best sensitivity with a MIC of 50 mg/mL. The findings indicate that *Xylopia aethiopica* have potential to mitigate bacterial infections and reduce reliance on synthetic antibiotics.**

Keywords: Xylopia aethiopica, **Extracts, Phytochemical, Antibacterial, Isolates.**

1. INTRODUCTION

Traditional medicine is a possible substitute for the healthcare delivery system for a large portion of the world's population. The search for agents to cure infectious diseases began long before people were aware of the existence of microbes. These early attempts used natural substances, usually whole plants or their extracts and many of these herbal remedies proved successful.

Xylopia aethiopica, commonly known as "Ethiopian pepper" or "Guinea pepper," is an aromatic tree that belongs to the family of Annonaceae. It is widely used in ethnomedicine for managing various ailments including skin infections, candidiasis, dyspepsia, cough and fever (Ekpiken *et al*., 2023). Some studies have also demonstrated the efficacy of *X. aethiopica* oil as anticancer, antioxidant, antimicrobial, anti-inflammatory, anticholinesterase, antimalarial, antitrypanosomal, antidepressant and insecticidal (Ndoye *et al*., 2024).

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Plants are rich in a variety of secondary metabolites. These phytochemical compounds which are present in any part of a plant have been reported to have antimicrobial properties in vitro. Phytochemical compounds confer high medicinal potency on plants enabling them to be used as a source of raw materials for the production of many drugs (Ekpiken *et al*., 2023).

Treatment of infectious diseases has been threatened by the emergence and spread of antibiotic resistant organisms which has significant public health concerns (Manandhar *et al*., 2019). There is therefore, urgent need to find new antimicrobial agents as alternative therapy. Hence, this study was undertaken to investigate the phytochemical and antimicrobial properties of the different fruit extracts of *Xylopia aethiopica*.

2. MATERIALS AND METHODS

COLLECTION OF PLANT MATERIALS

The plant material *Xylopia aethiopica* fruit was purchased from local vegetable market in Aba North Local Government Area of Abia State. The plant material was transported to the department of Biology/Microbiology for taxonomic identification.

PREAPARATION OF SAMPLE AND EXTRACTION PROCEDURE

The plant materials; fruits of *Xylopia aethiopica* was air dried at room temperature under a shade and ground into uniform powder using electric blender. Maceration method was adopted for aqueous and ethanol extraction, where 200g of the plant fruit powder was weighed into different clean grease free glass container and 500ml of each of the solvents was added into different containers containing plant powder, shake vigorously, and allowed to stand for 24 hours. The extracts were filtered separately using muslin cloth and concentrated using a water bath at a temperature of 60^0C. Different concentrations of the extracts were prepared, such as 25 mg/ml, 50 mg/ml, 75 mg/ml and 100mg/ml respectively.

PHYTOCHEMICAL SCREENING OF FRUIT EXTRACT OF *Xylopia aethiopica*

Extracts were qualitatively screened for phytochemicals of medicinal importance following standard protocols described by Aguoru *et al*. (2016).

TEST MICROORGANISMS

The organisms used for the test were *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*. The stock cultures were obtained from a high grade medical laboratory in Aba, Abia State, Nigeria

ANTIBACTERIAL SCREENING

The agar well diffusion method was used to screen the antibacterial activity of various extract of seeds of *Xylopia aethiopica*. Nutrient agar plates were prepared for bacteria isolates and each plate was inoculated with pathogens. 8mm well was cut on the agar plate surface using a sterile borer. Four different concentrations (25mg/ml, 50mg/ml, 75mg/ml, and 100mgl) of the extract was added to the well. The plates were incubated for 24 hours at 37^0C for bacteria. After incubation the plates were observed for zone of inhibition around the well. The zones were measured with a transparent ruler and the result recorded.

DETERMINATION OF MINIMUM INHIBITORY CONCENTRATION (MIC)

Determination of minimum inhibitory concentration (MIC) of *Xylopia aethiopica* seed extracts were determined using microbroth dilution technique described by Emeh *et al.* (2020). The extracts were diluted ranging from 100mg/ml to 5mg/ml and checked for MIC against bacterial isolates after 24 hours.

3. RESULTS

Table (1) summarizes the phytochemical screening of ethanol and aqueous crude extracts of *X. aethiopica* fruits. The fruit extracts show the presence of alkaloids, flavonoids, cardiac glycosides, saponins and terpenoids. Table 2 reveals the extracts showed maximum inhibition against *Staphylococcus aureus* (18mm) followed by *Escherichia coli* (15mm) and *Pseudomonas aeruginosa* (12mm). Minimum inhibitory concentration (MIC) of the extracts of *Xylopia aethiopica* seed on test isolates is shown in table 3 revealed 50mg/ml for *Escherichia coli*, 50 mg/ml for *Staphylococcus aureus* and 100mg/ml *for Pseudomonas aeruginosa.*

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Table 1: Phytochemical screening of ethanol and aqueous crude extracts of *X. aethiopica* fruits.

Bioactive components of the plant *X. aethiopica* fruits	Ethanol	Aqueous
Alkaloids	+	+
Flavonoids	+	+
Saponins	+	+
Tannins	-	-
Cardiac glycosides	+	+
Terpenoids	+	+
Anthraquinones	-	-

Table 2: Antimicrobial activities of *Xylopia aethiopica* fruit aqueous and ethanolic extracts on clinical isolates

Zone of Inhibition(mm)/Concentration (mg/ml)									
TEST ISOLATES	**Ethanol**				**Aqueous**				**Control (µg/ml)**
	100	**75**	**50**	**25**	**100**	**75**	**50**	**25**	**Streptomycin**
Escherichia coli	15.5	13	10	08	12	10	07	-	25
Staphylococcus aureus	18	16	13	11	15	13	12	09	21.5
Pseudomonas aeruginosa	12	09	08	05	8.5	06	-	-	27

Table 3: Minimum Inhibitory Concentration (MIC)

Isolates	**Conc. (mg/ml)**
Escherichia coli	50
Staphylococcus aureus	50
Pseudomonas aeruginosa	100

4. DISCUSSION

The results of phytochemical and antimicrobial screening of *Xylopia aethopica* fruit extracts showed that the plant contain some bioactive substances which is evident in the various zones of inhibitions observed against bacteria organisms tested. These bioactive substances are alkaloids, terpenoids, saponins, flavonoids and cardiac glycosides. This result confirms reports of Ngwoke *et al*. (2015) and Aguoru *et al*. (2016) who reported presence of these phytochemical substances as observed in this study.

The findings of the study demonstrates remarkable antibacterial activities of ethanol extracts from *Xylopia aethiopica* fruits against various test bacterial isolates and its effectiveness varies depending on the bacterial strain. The results also revealed that the extracts exhibited increased antibacterial activity as the concentration increased. Some studies have confirmed that extracts of various parts of the plant through in vitro studies have anti-microbial activity. For instance, Musbau *et al.* (2024) reported that both ethanol and chloroform extracts displayed significant antibacterial activity *Escherichia coli*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Shigella boydii* and *Klebsiella oxytoca* which was comparable to reference drug, amikacin. Ezenobi *et al*. (2023) research work also confirmed the antimicrobial activity of *Xylopia aethiopica* fresh fruit extract against *Candida albicans*, *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. Reports on the ethnopharmacological uses of various parts of *X. aethiopica* supports these findings.

Although *Xylopia aethiopica* has shown to be of potential pharmacological benefits, research and published data on pre-clinical and clinical studies conducted on its bioactive constituents are largely lacking. There is therefore the need for further research to be conducted on various extracts of *Xylopia aethiopica* in diseased conditions both in *in vitro* and animal studies to ascertain its potency, safety and efficacy in humans.

REFERENCES

[1] Aguoru, C. U., Pilla, C., & Olasan, J. O. (2016). Phytochemical screening of *Xylopia aethiopica* with emphasis on its medicinally active principles. *Journal of Med Plants Res*., 10(22): 306– 309.

[2] Amaechi, G., Oridikitorusinyaa, O. & Emmanuel, O. O. (2024). Antimicrobial Activity of *Xylopia aethiopica* extract on microorganisms associated with the spoilage of vegetables in Mile 3 Market, Port Harcourt Nigeria. *Microbiol Res J Inter*., 34(12): 234-243

[3] Ekpiken, E., Ekong, U., Upula, S., Oka, I., & Ekong, M. (2023). Antibacterial activities of leaves extracts of *X. aethiopica* against some enterobacteriaceae and gc-ms analysis of phytoconstituents. WJPMR, 9(8): 10–18.

[4] Emeh, A. A., Anyanwu, G, O., Onyeulor, P, N., Chimereze, N. C. and Abba-Father, C. A.M.(2020). Antimicrobial and synergistic potentials of *Xylopia aethiopica* (UDA) and *Occimum gratissimum* (Nchanwu) leaf extracts. *IJISRT*, 5(4): 1179 – 1185.

[5] Ezenobi, N. O., Chinaka, C. N. & Osigwe, C. A. (2023). Phytochemical and In vitro Antimicrobial Activities of the Fruit Extracts of *Xylopia aethiopica* [Dun] A. Rich. (Annonaceae). GSC Biological and Pharmaceutical Sciences, 22(3): 082–087.

[6] Manandhar, S., Luitel, S., & Dahal, R. K. (2019). In Vitro Antimicrobial Activity of Some Medicinal Plants against Human Pathogenic Bacteria. *Journal of Trop Med*., 2019: 1–5.

[7] Musbau, S., Asiru, R. A., & Odewade, J. O. (2024). Evaluation of inhibitory and toxicity effects of *Xylopia aethiopica* fruit extract against ESBL-producing bacterial strains. *Fudma Journal of Sciences*, 8(6), 339-345.

[8] Ndoye, S. F., Tine, Y., Seck, I., Ba, L. A., Ka, S., Ciss, I., Ba, A., Sokhna, S., Ndao, M., Gueye, R. S., Gaye, N., Diop, A., Costa, J., Paolini, J., & Seck, M. (2024). Chemical Constituents and Antimicrobial and Antioxidant Activities of Essential Oil from Dried Seeds of *Xylopia aethiopica*. Biochem R Int., 3923479.

[9] Ngwoke, K. G., Ikeanyi, A. U., Eze, P. M., Ezemokwe, I. C., Abba, C. C. & Ugwu, M. C. (2015) "Phytochemical And Antioxidant Properties Of Extracts Of *Xylopia aethiopica* Fruits". *Chem Sci Rev Lett.*, 4(13): 267-270