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RESEARCH ARTICLE

ANTIMICROBIAL ACTIVITIES OF CRUDE ETHANOLIC EXTRACT OF XYLOPIA AETHIOPICA

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ABSTRACT

Crude ethanolic extract of *Xylopia aethiopica* traditionally used as condiment in food and against bacterial infections, cough and inflammations was evaluated invitro for its antimicrobial activities against *Escherichia coli, Salmonella typhi, Bacillus aurum, Staphylococcus aureus, Bacillus subtilis* and a fungus pathogen *Candida albicans,* so as to justify its medicinal activities and validate its traditional use scientifically. The agar diffusion technique was used to determine the zone of inhibition and the minimal inhibitory concentration (MIC) respectively. The extract was active against *E. coli, S. typhi, Candida albicans, B. aurium* with 15mg/ml MIC, though was most active against *S .typhi* and *B. aurum* and compared favourably and significantly with ampicillin. *X. aethiopica* did not show any activity against *S. aureus and B. subtilis*. This study has provided relevant scientific information for the potential use of *X. aethiopica for* antimicrobial activities. It therefore suggests that *X. aethiopica* contain a broad spectrum antibiotic compound, which if properly harnessed can be used in managing an array of pathogens.

INTRODUCTION

Xylopia aethiopica called African guinea pepper, is an angiosperm of the family Annonaceae, and grows predominantly in humid forest zones of West Africa. It is used as a spice and possesses great nutritional and medicinal values in traditional medicine (Oluwatosin *et al,* 2010). The Annonacea family, species such as *Xylopia* has been source of multiple biologically active compounds, specifically with microbicidal (Lopez *et al.,* 2009). In Nigeria, they are used as a carminative and stimulating additive to other medicines and also as cough medicines (Asekun and Adeniyi, 2004). The powdered root is employed as a dressing and in the local treatment of cancer (Asekun and Adeniyi, 2004).

MATERIALS AND METHODS

Plant Material

The fresh fruits of Xylopia aethiopica were bought from the popular Oyingbo market in Lagos and were authenticated in Forestry Research Institute Ibadan (FRIN) with voucher no FHI 107696. The dried fruits were obtained after air- drying the fresh fruits in shade.

Extraction

The dried Xylopia fruits were granulated to powdered form, and 300g was soaked in 600ml absolute ethanol for 48 hours after which the solution was filtered through a filter paper. The filtrate was placed in rotary evaporator to recover the ethanol, and the crude extract freeze-dried to obtain 28.2g.

Microbial samples

The following seven bacteria; *S. typhy, Candida albicans, B. aurium, S. aureus, and B. subtilis, E. coli, E. coli m103,* were used for the study. The first six were cultured in our laboratory and the last one obtained internationally.

Well diffusion method

Antibacterial activity of the plant extract was tested using Well diffusion method (Bauer *et al*., 1996). The prepared culture plates were inoculated with different selected strains of bacteria using streak plate method. Wells were made on the agar surface with 6mm cork borer. The extracts were poured into the well using sterile syringe. The plates were incubated at 37ºC$\pm$2ºC for 24 hours. The plates were observed for the zone clearance around the wells. The concentrations (5mg, 10mg and 15mg) of the plant extract were tested against different bacterial pathogens. The zone of inhibition was calculated by measuring the diameter of the inhibition zone around the well (in mm) including the well diameter. The readings were taken in three different fixed directions in all 3 replicates. *X.aethiopica* was effective against *E.coli, S.thyphi,*

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candida albicans and *B. aurium*. No zonal inhibition was observed in *S. aureus and B. subtilis.*

RESULTS AND DISCUSSION

Ethnobotany is a vital and veritable tool in drug discovery (Buenz *et al.,* 2007). Selecting a precise and proper plant for pharmacologic activities is normally tasking (Buenz *et al.*, 2007), but fortunately ethnobotany can possibly provide a guide , not only to the specie of plant but also the part of plant and the stage of maturity required (Buenz, 2006).

S. aureus and B. subtilis. The inhibition observed in *C. albicans and E.coli* may be due to the presence of some essential oil (Fleisher *et al*., 2008: Tatsadjieu *et al*., 2003). Okigbo *et al*., (2005) had earlier demonstrated the inhibitory activities of *X. aethiopica* on *C. albicans*. The inhibition effect of *X. aethiopica* on S.typhi also corroborated with the studies of Obiukwu and Nwanekwu (2010). Okigbo and Ajalie (2005) also inferred the possible availability of bioactive ingredient that can checkmate the growth of some pathogenic microbes in *X. aethiopica*. *Salmonella typhi* was the most sensitive followed by *B. aurium. C albicans* and *E.coli* were

Table 1. Antimicrobial activity of crude ethanolic extract of *Xylopia aethiopica*

Bacterial strains	Concentration and zone of inhibition			
	5mg	10mg	15mg	Ampicillin 1mg
E.coli	1.3 ± 1.8mm	3.3 ± 1.1** mm	6.6±1.1**mm	1.8±0.5mm
*E. coli m*103	2.0 ± 0.0 mm	4.0 ± 0.0** mm	6.7±1.1***mm	1.9±0.3mm
S. typhy	8.7±2.0**mm	23 ± 2.3*** mm	24±2.4***mm	3.2±1.2mm
Candida albicans	2.0 ± 0.0 mm	4.0 ± 0.0** mm	6.0±0.0**mm	2.0±0.6mm
B. aurium	7.7±1.1**mm	17 ± 2.3** mm	19±3.4**mm	3.0±1.1mm
S. aureus	-	-	-	3.0±1.2mm
B. subtilis	-	-	-	3.1±0.7mm

** Significant against control; *** Very significant against control; - = No inhibition; Values are mean± SEM

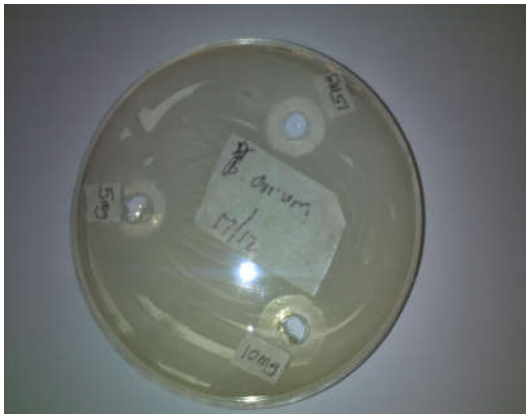

Fig. 1 . Inhibition zone against B. *aurium*

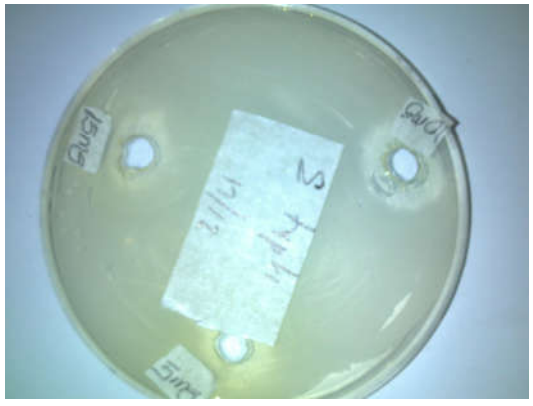

Fig. 2. Inhibition zone against S. *typhi*

From several studies *X. aethiopica* has shown a wide range of biological activities, such as antimicrobial, anti-inflammatory, antitumoural and insecticidal effect among others (Fleisher *et al.,* 2008). In this study, whole fruit of the plant inhibited the growth of *E.coli, S.thyphi, candida albicans* and *B. aurium*, with an MIC of 5mg/ml. The extract was not effective against the least sensitive. The inability of the extract to inhibit the growth of *B. subtilis* may be attributed to the fact that the bacteria has the ability to form resting spores, enabling them to be more resistant to environmental conditions (Nacimento *et al*., 2000) than other tested bacteria. However the extract compared favourably and significantly with the ampicillin for microbes inhibited. The antimicrobial activities suggest that *X. aethiopica* contain a broad spectrum antibiotic compound, which if properly harnessed can be used against an array of pathogens.

Conclusion

Sequel to this study, Xylopia aethiopica portray a potential for antibiotic candidate vis- a-vis new drug entity for the management of some pathogenic diseases.

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