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RESEARCH PAPER

ANTIBACTERIAL ACTIVITIES OF BITTER KOLA (GARCINIA KOLA) ON UPPER RESPIRATORY TRACT ISOLATES FROM STUDENTS OF AMBROSE ALLI UNIVERSITY STUDENTS, EKPOMA, NIGERIA

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ABSTRACT

Concerns about the alarming cases of antimicrobial resistance have in recent times, prompted the search for therapeutic alternatives including herbal options. This study therefore, assesses the anti-bacterial potentials of *Garcinia kola* extracts on bacterial isolates from the upper respiratory tract of young adult undergraduates. The disc diffusion method was adopted, while phytochemical screening tests (PCST) was performed on the aqueous and ethanol extracts of *Garcinia kola* to ascertain their active components. The PCST revealed the presence of tanin and steroids, while saponin, flavanoids and cardiac glycosides were present only in the ethanol extract. Resin alkaloids were absent in both extracts. A comparative sensitivity test was also performed between *Garcinia kola* extracts and some conventional antibiotics (Ciprofloxacin and Augumentin). The results revealed that *Garcinia kola* extracts had inhibitory effect on the test isolates-*Staphylococcus*, *Streptococcus* and *Klebsiella species*; probably due the high tannin and flavanoid contents of the extrcts. Above all, our findings supports several claims that *Garcinia kola* has antimicrobial potentials and in turn, suggests that a regulated ingestion of *Garcinia kola* may to an extent, useful against bacterial infections since it is cheap and readily available.

Key words: Antibacterial activities, Bacteria, Garcinia Kola, Upper Respiratory tract

INTRODUCTION

The increasing cases of antimicrobial drug resistance is a serious global problem that has prompted the search for new organic molecules with antimicrobial properties and potentials to serve as sources of raw material for the synthesis of new drugs (Akaochere *et al*., 2002). Of interest are the over 65,000 flowering plants with medicinal properties (Akpulu *et al*., 1994), that have remained largely untapped in Africa; though the antimicrobial properties of some of them have been identified and documented (Iwu and Igboko, 1982), while the active ingredients in some others ha**ve** been isolated, tested and documented (Akinyuli *et al*. 1991).

Geographically, the Nigerian climate favours a great array of these medicinal plant species, especially those with antimicrobial properties (Akinyuli *et al*. 1991), and taken advantage of that, Nigerian traditional herbal practitioners have over the years, used them to prepare a variety of herbal therapies for various kinds of ailments including

gonorrhea, sore throat and skin infections; even with their little scientific knowledge and this is typically the scenario before the introduction of orthodox medicines into Africa (Olukoya *et al*., 1993). As such, our attention was specifically drawn to the medicinal qualities of *Garcinia kola* which, for many years, has been used for the treatment of various health conditions.

Descriptively, the parent tree is a large fruit tree that abounds in the rain forest belt of Southern Nigeria. The seed is edible and offered for consumption during cultural and social ceremonies. Scientifically however, several reports have highlighted the medicinal qualities of *Garcinia kola* especially its anti-parasitic, antimicrobial, antivival, and anti-flammatory potentials, as well as its usefulness in the treatment of gastroenteritis, rheutmatism, asthma, menstrual cramps, bronchitis, throat infection, headache, colic *Garcinia kola* chest colds, cough and liver disorders (Lewis 1977; Iwu *et al.* 1990). These therapeutic properties of *Garcinia kola* are attributable to the active constituents particularly its high tannin content (Etkin, 1981).

Recounting therefore, the growing concern about the increasing cases of antimicrobial drug resistance and the need to consider herbal alternatives, we set out to assess the anti-bacterial potentials of *Garcinia kola* extracts on bacterial isolates from the upper respiratory tract of young adult undergraduates and to compare its anti-bacterial potentials with that of well-known broad-spectrum anti-microbial drugs –Ciprofloxacin and Augumentin.

MATERIALS AND METHODS

Substance of Study: Fresh seeds of Garcinia kola (bitter kola) were purchased from Ekpoma Royal Market in Esan West Local Government Area, Edo State, Nigeria.The seeds were indentified and authenticated at the herbarium of the Botany Department, Ambrose Alli University, Ekpoma, Edo State. The seeds were preserved in a cool dry place before use. They were subsequently peeled and oven dried at 40^0c for 10 days before processing (grinding) into powdered form for extraction in hot water at 80^0c, cold water at room temperature and ethanol (70%) using standard laboratory procedures.

Ethical consideration: The principle of voluntary participation and confidentiality was employed in this study and after thorough explanation of the objective and the significance of the study, an informed consent was granted by each of the participants involved in this study.

Sample Collection: Following a simple serialized and rehearsed procedure, sputum samples were obtained from volunteer students of Ambrose Alli University, Ekpoma, Edo State, in clean universal bottles.

Phytochemical Screening: Phytochemical screening test on the different extracts of *Garcinia kola* was performed using the methods described by Solfowora (1982) and Trease and Erans (1978), to ascertain the presence of bioactive compounds like tanins, resins, alkaloids, saponins cardiac glycosides, flavonoids and steroids

Isolation of test organisms/ Laboratory Analysis: At the Centre for Disease Research Laboratory (CDR), Emaudo, Ekpoma, Edo State, the **s**putum samples collected were subjected to the cultural, morphological and biochemical tests previously described by Akinnibosun et al. (2009) and Cheesebrough et al. (2002) in other to isolate the test organisms. Gram stain was carried out on the culture that yielded growth, while catalase and coagulase test was carried out on gram positive *cocci* and all catalase positive *cocci* respectively. Overall, the organisms isolated included S*taphylocous aurens*, *Staphylococcus epidermis*, *Streptoccocus species* and *Klebsiella species*. Motility and comparative sensitivity tests were then performed on the isolates respectively using the method described by Stoke (1975). The Minimum Bactericidal Concentration (MBC) of Garcinia kola was also calculated.

RESULTS:

Phytochemical screening: The phytochemical screening results revealed the presence of tanin and steroids in both aqueous and ethanol extracts while saponin, flavanoids and cardiac glycosides were present only in the ethanol extract. Resin alkaloids were however absent in the extracts.

Sensitivity tests: The sensitivity test results showed that for the aqueous and ethanol (70%) extracts, the zones of inhibition for the different bacteria isolates ranged from 6 - 12mm for *streptoccocus species* and *staphylococcus species* (table 1) unlike the negative control (sterile distilled water) that showed no inhibition to the bacterial violates. The comparative sensitivity tests with Ciprofloxacin and Augumentin showed that Ciprofloxacin (5mg/ml)

exhibited an inhibition zone of 14-35mm, while Augumentin (30mg/ml) exhibited an inhibition zone of 9 - 23 mm (table 2).

Table 1: Active components of Garcinia kola in different extracts

Active Ingredient	Extracts	
	Aqueous	Ethanol
Tannins	+	+
Steroids	+	+
Saponins	+	+
Flavonoids	+	+
Cardiac glycosides	+	+
Resins	-	-
Alkaloids	-	-

Keys: + present; - not present

Table 2: Zone of inhibition of the extracts and sample orthodox antimicrobials

S/N	Extract	Zone of inhibition (mm)
1.	Aqueous extract of Garcinia kola	6 -12
2.	Ethanol extract of Garcinia kola	6 - 12
3.	Ciprofloxacin	14 -.35
4.	Augumentin	9 - .23

DISCUSSION:

The antimicrobial potentials of the extracts of *Garcinia kola* have been highlighted by this research work. This observation therefore supports the claims by some traditional healers on the antimicrobial efficacy of Garcinia kola. It is interesting to note that the extract of *Garcinia Kola* tested in this work were able to inhibit the growth of micro-organisms associated with upper respiratory tract infections like sore throat and pneumonia. Of course, our results indicate that *Garcinia Kola* has an inherent capacity to inhibit the growth of *streptococcus species, staphylococcus, aurens, staphylococcus epidermis and Klebsiulia pneumonia.* Although the inhibition zones exhibited by the extracts varied, it was obvious however, that *Garcinia Kola* compared favourably with those of the convectional antibiotics used in this study (ciprofloxain and Angumentin). This phenomenon has earlier been highlighted by Iwu et al. (1990).

Furthermore, that all the extracts demonstrated capacity to inhibit the growth of the bacteria species, indicate that *Garcinia kola* has broad spectrum antibacterial potential is in line with the reports by Akinnibosun and Itedjere (2013). In this regard, one can conveniently assert that the observed potentials explains why *Garcinia Kola* can be used in traditional medicine to treat ailments like gastroenteritis, urinary tract infections, upper respiratory infections and wound infections. Moreover, the high tannin and flavanoid contents can accounts for the observed anti-bacterial activities of the extracts.

Above all, our finding does suggest that a regulated ingestion of *Garcinia kola* can be considered as a prophylactic therapy against possible bacterial infections considering its availability and low cost. We opine however, that further studies be conducted to determine other specific clinical potentials of *Garcinia kola* while recommending that *Garcinia kola* be considered as a potential pharmacological raw material.

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AUTHOR'S CONTRIBUTIONS

The authors participated adequately in all aspects this study. No conflict of interest is declared.