

Comparing The Antibacteria Activity Of Ethanolic Extract Of Vernonia amygdalina and Occimum gratissimum with some Antibiotics of choice

J B.S, I T.A, O O

Citation

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Abstract

Aqueous and ethanolic extracts of Vernonia amygdalina and Ocimum gratissimum were assessed for their antibacterial activities at varying concentrations against medically significant pathogenic bacterial strains capable of causing gastroenteritis. The ethanolic extracts showed a better antibacterial potency with diameter of zones of inhibition ranged 1.0 ± 0.33 to 9.33 ± 0.63 (mm). Selected antibiotics of choice were tested against the test isolates and compared with the results of the extracts. The antibiotics had better activity compared to the extracts at the same concentration but relatively comparable at 100% increment of the concentrations of the extracts.

INTRODUCTION

Infectious diseases are the leading cause of death world wide (Parekh and Chanda, 2007). The clinical efficacy of many existing antibacterial is being threatened by emergence of multi drug resistance pathogen (Bandow et al; 2003). The increasing failure of chemotherapeutic agents has led to the screening of several medicinal plants for their potential antimicrobial activity comparable to some antibiotics (Scazzchio et al; 2001). Many plants are consumed as food without in-depth knowledge of their exact chemical composition and contribution to health, although their utilization has passed through several ancestral generations who probably realized from experience that those plant food materials are beneficial (Ghani et al; 1989). Traditional therapy involves the use of plant extracts or their active principles which may serve as a source of modern drugs and source of intermediate compounds for synthesizing analog drugs with more desirable properties (Akerle, 1993).

As a result of much folklore uses of the leaves of two Nigerian vegetables, Vernonia amygdalina being a stomach tonic and for treating gastrointestinal infections (Anonymous 2000) and Ocimum gratissimum to treat cough and diarrhea (Onajobi, 1986). In recent years, there has been a resurgence of interest in plant kingdom as a source of drug. There are several reports in the literature regarding the antibacterial activity of crude extracts prepared from these plants. The aim of this work was to prepare aqueous and

ethanolic extracts of these plants and compare their antibacterial activities with selected antibiotics of choice in treating gastroenteritis.

MATERIALS AND METHODS

PLANT MATERIALS: Leaves of V. amygdalina and O. gratissimum were collected from a farm within Rufus Giwa Polytechnic, Owo, Ondo State, Nigeria.

PREPARATION EXTRACTS: The aqueous and ethanolic extracts of the leaves of the plants were prepared as described by Madunagu et al (2001). Leaves samples were thoroughly cleaned with sterile distilled water. 40g of ground pulp of each plants leaves were soaked in 200ml of sterile distilled water and ethanol (98%) for 72 hours. The extracts were filtered and evaporated under vacuum using rotary evaporator. The residues of the extracts were stored in bottles in refrigerator prior to use.

TEST ORGANISMS: The test organisms employed in this study were medical isolates of Bacillus cereus, Staphylococcus aureus, Shigella dysenteriae, Salmonella paratyphi and Escherichia coli. They were collected from microbiology unit of Nigeria Institute of Medical Research, Yaba, Lagos State.

MEDIA: Nutrient agar and broth were used for assaying the antibacterial activity. All were product of LABM, Laboratories England.

ANTIBIOTICS OF CHOICE: Antibiotics used for this study were Metronidazole, Tetracycline, Chlorophenicol, Amoxylin, and Cloxycillin.

DETERMINATION OF ANTIBACTERIAL ACTIVITY

The antibacterial activity testing was done using agar well diffusion technique of Nair and Chanda (2005). Eight different concentrations of the crude ethanolic preparations were used for the test (10mg/ml, 15mg/ml, 20mg/ml, 25mg/ml, 30mg/ml, 40mg/ml, 45mg/ml, 50mg/ml, and 55mg/ml.) The tests were repeated using the standard antibiotic of choice using the earlier mentioned method. The diameters of zones of inhibition were measured in millimeters (mm) to give the results of the antibacterial activities of the ethanolic extracts of the two plants and that of the antibiotics.

RESULTS AND DISCUSSION

Since ancient times, plants have been a veritable source of drugs. Different extracts from traditional medicinal plants have been tested to identify the source of the therapeutic effects. Table 1 showed the antibacterial activity of the crude extracts of both plants at varying concentrations. From the diameter of zones of inhibition, it showed that the higher the concentration, the better the activity of the extracts while table 2 showed the result of antibacterial activity of the standard antibiotics of choice. The antibiotics showed greater activity compared to the crude preparation at comparable concentrations. In developing countries the search for new drugs is centered upon the investigation of medicinal plants (Sofowora, 1993). The present research work has tested crude extracts of plants locally used for the treatment of gastrointestinal disorders and compared with antibiotic of choice to ascertain the degree of their antibacterial activities at comparable concentrations.

The antibacterial susceptibility test showed that the ethanolic extracts of both plants has higher inhibition on all the test isolates giving a zone of inhibition with diameter range of 1.0 ± 0.33 to 9.33 ± 0.63 mm as compared to the aqueous extract with low inhibition activity of 1.0 ± 0.71 to 5.7 ± 1.2 mm. The ethanolic extracts of the plants generally showed greater antibacterial activity than the aqueous extract which coincides with the work of Mintenot and Mogessie (2004) due to its better extraction power as an organic solvent. The high activity of the ethanolic extracts verifies the use of the ethanolic extraction method by local herbalist (Allero and Afolayan, 2006). It is interesting to note that

some of the crude extracts showed relative degree of inhibition at 100% increment of their concentrations compared to the standard antibiotics. The fact that the crude extracts of these plants inhibited these medically important isolates which were comparable to those of standard antibiotics of choice proved that these plants might have some potential as an alternative source of anti gastroenteritis substances (Parekh and Chanda, 2007). Therefore these screening experiments form a primary platform for further phytochemical and pharmacological studies that may open the possibility of finding new effective antibacterial compounds from these extracts.

CONCLUSION

The ethanolic extracts of the plants showed a better antibacterial activity than the aqueous extracts but not comparable to the antibiotics of choice. The standard antibiotics showed better antibacterial activity than the crude preparations of the plants as a result of proper purification, quality chemotherapeutic index and pharmaceutical analysis which the extracts lacked. There is need to isolate and elucidate the chemical components of the plants' extracts to be able to establish which of the bioprinciples is/ are responsible for the ethnopharmacological activity of the plant extracts. This study therefore collaborate the local use of these plants extracts as anti-diarrhea decoctions and can compare considerably with the antibiotics of choice.

Figure 1

Table: ANTIBACTERIAL ACTIVITY OF STANDARD ANTIBIOTICS AGAINST THE TEST ISOLATES.

TEST ORGANISMS	Metronidazole (25mg/ml)	Tetracycline (15mg/ml)	Chloramphenicol (25mg/ml)	Amoxicillin (30mg/ml)	Cloxacillin (15mg/ml)
<i>E. coli</i>	10.0±0.03	13.0±0.15	12.0±0.23	10.0±0.33	14.0±0.31
<i>Staphylococcus aureus</i>	12.0±0.17	11.0±0.11	9.0±0.31	9.0±0.19	12.0±0.39
<i>Bacillus cereus</i>	5.0±0.00	4.0±0.33	8.0±0.16	6.0±0.22	6.0±0.00
<i>Shigella dysenteriae</i>	9.0±0.05	9.0±0.86	8.0±0.00	7.0±0.05	7.0±0.11
<i>Salmonella paratyphi</i>	7.0±0.10	8.0±0.90	10.0±0.32	11.0±0.16	11.0±0.13

Mean ± standard deviation of the triplicate results

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Author Information

Jude Ojei B.S

Department of Nutrition and Dietetics, Rufus Giwa Polytechnic

Ibrahim T.A

Department of Food Science and Technology, Rufus Giwa Polytechnic

Ola Iyabo O

Department of Pure and Applied Biology, Ladoke Akintola University of Technology