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INVITRO EVALUATION OF ANTIBACTERIAL ACTIVITY OF DIFFERENT SOLVENT EXTRACTS OF SECURIDACA LONGEPEDACULATA

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ABSTRACT

The objective of the present study was to assess the antibacterial activity of different solvent extracts of *Securidaca longependuculata*. The methanol, petroleum ether and aqueous extracts of the stem bark of the plant were examined for antibacterial activity against *Salmonella typhi*, *Escherichia coli*, *Staphylococcus aureus* and *Pseudomonas spp*, using the agar well diffusion method while the minimum inhibitory concentration of methanol extract was evaluated using agar dilution method. The extracts were graded into different concentrations of 100mg/ml, 50mg/ml, 25mg/ml and 12.5mg/ml. Results showed that petroleum ether extract had no antibacterial activity while the aqueous extracts showed the most potent activity against *Staphylococcus aureus* (22.5mm at 100mg/ml) and *Salmonella typhi* (19mm at 100mg/ml), *Escherichia coli* (18.5mm at 100mg/ml) and *Pseudomonas aeruginosa* (17.5 at 100mg/ml). Methanol extract had the second highest activity against the test organisms. The MIC of the methanol extract against the test organisms were 100mg/ml for *Staphylococcus aureus* and >100mg/ml for the rest of the organisms tested. The entire evaluations showed that *Securidaca longependuculata* had antibacterial activity against clinical isolates tested.

Keywords: *Securidaca longependuculata,* Antibacterial and Clinical Isolates.

INTRODUCTION

Since the dawn of humanity, war against diseases has been part of everyday life and the use of plant materials in the treatment of sicknesses has been carried out since time immemorial [1] . Plants readily synthesize chemical substances for the defence against attack by insects, herbivores and microorganisms[2] . The extracts of some food spices and a water soluble arrow root tea extract have been reported to inhibit the growth and multiplication of some intestinal pathogens including *Escherichia coli* 0157:H7[3,4]. Many plant extracts owe their potency to the presence of substances such as tannins and phenolic compounds. These substances are usually found in various parts of the plants like roots ,leaves ,shoots and bark. Many plants therefore have become sources of important drugs and pharmaceutical industries have exploited traditional medicine as a source of bioactive agents that can be used in the preparation of synthetic medicine. In recent times emphasis has been placed on the use of natural materials in the control and treatment of various infections and diseases as some chemically synthesized drugs have undesirable side-effects.[3]

Securidaca longipendaculata is a plant in the family Polygalaceae also known as Violet tree (English name), Umar magunguna (Hausa), Ezeogwu (Igbo) [6] Ipeta (Yoruba)[7] is a medicinal herb commonly used in Africa including Nigeria. The plant has slender erect branches and grows up to 30ft high, usually found in savannah areas ; the flowers are sweet scented ,bright purple, the fruits are round with a distinctive membranous wing up to 40mm; the root is very poisonous ,smell like

wintergreen oil and are said to contain methyl salicylate.[6] In some parts of West Africa they are used as arrow poison . The plant has many medicinal uses;[8] it grows in various parts of Western, Northern and Eastern Nigeria,[6] and also in the savannah woodland from Senegal to Northern and Southern Nigeria and other parts of tropical Africa.[9,10] Wannag et al 1999 also reported the anti-snake venom activity of the aqueous root extract of *Securidaca longependaculata.*[11] The name Securidaca comes from a Latin word "secures" meaning hatchet which it owes to the shape of the nut which has a curved membranous wing; and longependuculata comes from it characteristic long penduncle.[12] This study evaluated the antibacterial activity of the stem bark extracts of *Securidaca longependuculata*

MATERIALS AND METHODS

Collection and identification of Plant Material: The plant material was collected from botanical garden of Faculty of Pharmaceutical Sciences, Nnamdi Azikiwe University, Agulu and was subsequently identified by Mr A.O Ozioko of Department of Botany, University of Nigeria Nsukka.

Extraction of plant material: Approximately 200 g of pulverized stem bark were macerated in 500 ml of water, methanol and petroleum ether using the cold maceration method previously described by Esimone and Adikwu (1999).[13] The filtrate was exposed to air until the solvent evaporated to dryness. The residue recovered after drying was collected weighed and kept in a container for further use.

Test Organisms: The test organisms used were clinical isolates obtained from the Pharmaceutical Microbiology Laboratory, Nnamdi Azikiwe University, Agulu. They include *Staphylococcus aureus, Salmonella typhi, Pseudomonas aeruginosa and Escherichia coli*. Stock cultures were subcultured in Nutrient broth at 37°C for 24 hrs before use.

Antibacterial screening / sensitivity test: The sensitivity of selected clinical isolates to the aqueous, methanol and petroleum extracts were evaluated using a Modified cup-plate agar diffusion method.[14]

Minimum inhibitory concentration (MIC): The MIC of Methanol extract of *S. longependuculata* against the test organisms were evaluated using agar dilution method described by Esimone and Adikwu (1999).[13] The plates were incubated for 18-24 hrs and examined for activity.

RESULTS AND DISCUSSION

The antibacterial activity of the extracts (Aqueous, methanol and Petroleum ether) at different concentrations was determined by measuring the zone of inhibition. The results are given in the table 1. Both aqueous and methanol extract at different concentration exhibited antibacterial activity against all selected clinical isolates. Petroleum ether had no activity against the test organisms. Comparatively, aqueous extract exhibited a high degree of activity than the methanol extract.

This is in line with the work done before now by Wannag *et al* 1999 which revealed the anti- venom activity of aqueous extract of *S. longependuculata*. The aqueous extract was more effective against *Staphylococcus aureus* with a zone of inhibition of 22.5 mm diameter (at Conc. 100mg/ml) and was least effective against *Pseudomonas aeruginosa and Escherichia coli* with zones of inhibition of 17.5 (100mg/ml) and 18.5 (100mg/ml) respectively. Among the other bacterial species studied *Salmonella typhi* showed a zone of inhibition of 19mm at concentration of 100mg/ml. Gentamicin, standard antibiotics showed appreciable activity against *Staphylococcus aureus* and *Salmonella typhi* with inhibition zone diameter of 20mm and 21mm respectively. *E.coli* and *P.aeruginosa* were resistant to the said antibiotic. It was observed that petroleum ether extract was not active against all the clinical isolates evaluated. Also, MIC involving the methanol extract of *S.longependuculata* was evaluated. The result as in table 2 revealed that only *Staphylococcus aureus* had MIC of 100mg/ml while the other bacterial evaluated had MIC of 100mg/ml.

CONCLUSION

From the results, it can be concluded that the *Securidaca longependuculata* has got antibacterial activity after extensive investigation. Further work will emphasize the isolation and characterization of active principle responsible for the antibacterial activity of *Securidaca longependuculata*.

Table 1: Antibacterial Activities of the Different solvent extract of *Securidaca longependuculata*

Extract	Conc.(mg/ml)	Zone of Inhibition* (diameter-mm)			
		B1	**B2**	**B3**	**B4**
Aqueous	**12.5**	**11**	**11**	**10**	**8.5**
	25	**13.5**	**13**	**12**	**12.5**
	50	**15.5**	**15**	**13**	**16.5**
	100	**22.5**	**18.5**	**17.5**	**19**
Methanol	**12.5**	**10**	**10**	**18**	**10**
	25	**13.5**	**16**	**13**	**14**
	50	**12.5**	**15**	**19.5**	**15.5**
	100	**13**	**20**	**21.5**	**17.5**
Petroleum ether	**12.5**	**-**	**-**	**-**	**-**
	25	**-**	**-**	**-**	**-**
	50	**-**	**-**	**-**	**-**
	100	**-**	**-**	**-**	**-**
Gentamicin	**30µg/ml**	**20**	**-**	**-**	**21**

B1=*Staphylococcus aureus*, B2= *Escherichia Coli*, B3=*Pseudomonas aeruginosa*, B4=*Salmonella typhi*, *Each value represents the mean of two determinants.

Table 2: MIC of Methanol Extract of *S. longependuculata*

Organism	Minimum Inhibitory Concentration
B1	100mg/ml
B2	>100mg/ml
B3	>100mg/ml
B4	>100mg/ml

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