Scientific Research and Essay Vol. 3 (11), pp. 562-564, November, 2008
Available online at http://www.academicjournals.org/SRE
ISSN 1992-2248 © 2008 Academic Journals

Short Communication

Antibacterial activity of ethanolic leaf extract of *Ficus exasperata* on *Escherichia coli* and *Staphylococcus albus*

Odunbaku, O. A.[1]*, Ilusanya, O. A.[2] and Akasoro, K. S.[1]

[1]Department of Plant Science and Applied Zoology, Olabisi Onabanjo University of Ago Iwoye, Ogun State, Nigeria.
[2]Department of Microbiology, P. M. B.2002, Ago-Iwoye. Ogun State, Nigeria.

Accepted 31 October, 2008

The ethanolic leaf extract of *Ficus exasperate* was screened for antibacterial activity against *Escherichia coli* and *Staphylococcus albus*. The satisfactory MIC of the plant extract against *E. coli* is 300 mg/ml while that of *S. albus* is 700 mg/ml. The study also revealed that the combination of the crude plant extract and the protein synthesis inhibitors had the highest inhibitory activity.

Key word: Antibacterial activity, ethanolic extract, *Ficus exasperate*.

INTRODUCTION

Ficus is the largest genus in the family *Moraceae*, with 800 species occurring in the warmer part of the world, chiefly in indomalaya and Polynesia. Nigeria forests are replete with over 45 different species of Ficus (Keay and Onochie, 1964). Some of them are *Ficus goliath, Ficus capensis*, *Ficus ingens*, *Ficus glomosa*, *Ficus lecardi* and *Ficus elastica*. They can be found in the savanna, rain-forest, beside rivers and streams. These are about 20 species of *Ficus* in Ogun State of Nigeria out of which 7 species are indigenous to Ago-Iwoye (Keay and Onochie, 1964).

Ficus exasperata Vahl is commonly known as sand paper tree ("*Ewe* I*pin*" in Yoruba) and is widely spread in West Africa in all kinds of vegetation types and particularly in secondary forest re-growth (Gbile et al., 1993). The leaves are used for haemostative ophthalmia, coughs and heamorrhoid. It is also used for treating various infections and as sand paper for polishing woods (Cousins and Michael, 2002)

In Nigeria, the young leaves of *F. exaperata* are prescribed as a common anti-ulcer remedy. Various pharmacological actions such as anti-ulcer, anti-diabetic, lipid lowering and antifungal activities have been described for *F. exasperate* (Sonibare et al., 2006). Several other Industrial uses such as stabilization of vegetable oils, suppression of foaming and supplement as food stock have been reported for the plant. Antimicrobial work on *F. exasperate* is rare in Nigeria and hence this study seeks to justify the ethobotanical uses of the plant and study the synergistic relationship between the plant extract and some antibacterial drugs.

*Corresponding author. E-mail: Esthershow2005@yahoo.com.

MATERIALS AND METHODS

Extraction of plant material

Leaves of *F. exasperata* were collected in Ago-Iwoye and were air dried at room temperature. Identification of herbarium specimen was carried out at El-Kaf Herbarium, Olabisi Onabanjo University where a voucher specimen was lodged. Soxthlet apparatus was used for extraction. 1 litre of ethanol was used to extract 250 g of *F. exasperate* at 78°C. The extract was stored in a refrigerator until required.

Biological assay bacterial inoculation and incubation with extracts

Pure culture of *Escherichia coli* and *Staphylococcus albus* were collected from Ogun State University Teaching Hospital, Sagamu, Ogun State, Nigeria. They were kept in McCartney bottles, with slant preparation of nutrient agar, to maintain their growth. Nutrient agar and nutrient broth (oxoid) were prepared according to the manufacturers' recommendations. The agar-well diffusion method was used for the inoculation of the bacteria. Plates containing 15 ml of sterile nutrient agar each were inoculated with standardized innocula (1.5 x 10^8 cells/ml) (Olafimihan and Fawole, 2003) using

Table 1. Antibacterial activity on test organisms using 100 to 1000 mg/ml of ethanolic leaf extract.

Organism	Average inhibitory zones (mm)									
	100	**200**	**300**	**400**	**500**	**600**	**700**	**800**	**900**	**1000**
Escherichia coli	-	-	10*	13	16	19	21	25	27	30
	-	-	+	+	++	+++	+++	+++	+++	+++
Staphylococcus albus	-	-	-	-	-	9	10	15	18	20
	-	-	-	-	-	+	+	++	++	+++

No inhibitory reaction observed in the negative control (ethanol).
- = No inhibition/effect; + = low level of inhibition; ++ = moderate level of inhibition; +++ = high level of inhibition.
*Values are zone of inhibition (mm).

Table 2. Effect of antibiotics on *E. coli* and *S. albus.*

Organism		**Gen.**	**Tetra**	**Chlora.,**	**Thro.**	**Samt**	**Amp.**	**Pro. Pen.**
	Conc. (mg/ml)	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**
E. coli	Zone of inhibition (mm)	28	24	23	22	18	-	-
		+++	+++	+++	+++	++	-	-
	Conc. (mg/ml)	0.2	0.2	0.4	0.2	0.2	0.4	0.4
S. albus	Zone of inhibition (mm)	22	18	16	16	18	-	-
		+++	+++	++	++	+++	-	-

- = No inhibition/effect; + = low level of inhibition; ++ = moderate level of inhibition; +++ = high level of inhibition.

Table 3. Result of synergisms between drugs and plant extracts on the organisms.

Drug target	**Antibiotic**	***E. coli***			***S. albus***		
		Conc. of extract + antibiotic (mg/ml)	**Zone of inhibition (mm)**		**Conc. of extract + antibiotic (mg/ml)**	**Zone of inhibition (mm)**	
Protein synthesis	Gentomycin	600 + 0.2	30	+++	1000 + 0.2	30	+++
	Tetracycline	600 + 0.2	28	+++	1000 + 0.2	28	+++
	Chloramphenicol	600 + 0.2	26	+++	1000 + 0.2	26	+++
	Erythromycin	600 + 0.2	24	+++	1000 + 0.2	26	+++
Folic acid Nucleic acid	Samtrim	600 + 0.2	24	+++	1000 + 0.2	24	+++
Cell wall synthesis	Ampicillin	600 + 0.2	20	+++	1000 + 0.4	21	++
	Pro. Penicillin	600 + 0.2	20	+++	1000 + 0.4	21	++

- = No inhibition/effect; + = low level of inhibition; ++ = moderate level of inhibition; +++ = high level of inhibition.

sterile Pasteur pipette. Wells of 5 mm diameter were made at the centre of each plate and 0.15 ml of the various concentrations of the plant extracts were dispensed into each well.

The extracts were allowed to diffuse into the medium for 1 h at room temperature. This was then incubated for 24 h at 37°C after which the zones of growth inhibition were measured and recorded in millimeter. The negative and positive controls was set up in a similar manner except that the extract was replaced with sterile distilled water and commercial antibiotics, respectively.

RESULTS AND DISCUSSION

The antibacterial properties of ethanolic leaf extract of *F. exasperata* at different concentrations ranging from 100 – 1000 mg/mg against *E. coli* and *S. albus* is presented in Table 1. The satisfactory MIC of the plant extract against *E. coli* is 300 mg/ml while that of *S. albus* is 700 mg/ml. Table 2 is the effect of seven antibiotic drugs on *E. coli* and *S. albus*. The protein synthesis inhibitors presented the strongest inhibitory activity followed by the folic acid inhibitor while the cell wall inhibitors had the least inhibitory activity. Table 3 is the result of synergism between the antibiotic drugs and the crude plant extract on the organisms. The combination of the crude plant extract and the protein synthesis inhibitors had the highest inhi-

bitory activity followed by the folic acid inhibitor, while the cell wall inhibitors produced the least inhibitory activity.

The MIC of plant extract against *S. albus* (700 mg/ml) is rather too high and indicates that *F. exasperata* crude extract would not be good enough to treat any infection caused by *S. albus*. The result also revealed that *F. exasperate* had the same activity at the concentration tested against *E. coli* as the protein synthesis inhibitors and the folic acid inhibitors.

The antibiotic drugs had higher inhibitory activities against *E. coli* when compared with *S. albus*. This is so because *E. coli* is a gram-negative bacteria with a single layer of cell wall which is not complicated while *S. albus* is gram-positive with about cell wall of various polypeptide polymers and this could be the more reason for the drugs to have had reduced effect. However, *E. coli* was resistant to ampicillin (Ajaiyeoba, 2000) but *S. albus* was partially susceptible. The area of target of ampicillin is the cell wall. The cell wall of *S. albus* is a target zone of pharmacokinetics of ampicillin, being a semi-synthetic penicillin. *E. coli* has grown resistant to ampicillin and penicillin over the years. The synergism between the plant extracts was higher than the extract activities and this is a good indication that drugs can be combined (Joyce et al., 2006).

Conclusion

The plant extract has displayed antimicrobial activity and therefore justifies its ethnobotanical uses for the treatment of ophthalmic, coughs, colic and hemorrhoids. *F. exasperata* could be taken alongside some synthetic drugs, during the treatment of diseases caused by *E. coli* and *S. albus*. For future study on this plant, the active ingredient(s) of the plant should be investigated.

REFERENCES

Ajaiyeoba EO (2000). Phytochemical and antimicrobial studies of *Gynandropsis gynandra* and *Buchholzia coriaceae* extracts. Afr. J. Biomed. Res. 3(3):161–165.

Cousins ON, Michael AH (2002). Medicinal properties in the diet of Gorillas. An ethno-pharinacological evaluation. African study of monographs. 23(2): 65– 89.

Gbile ZO, Adesina SK, Odukoya OA, Akinwusi DD (1993). Survey on indigenous useful plants of West Africa with special emphasis o medicinal plants and issues associated with their management.

Joyce ECB, Rebecca PM, Lidiane NBL, Claudio DS, Ary FJ (2006). Synergism between plant extracts and antimicrobial drugs used on Staphylococcus aureus diseases .Mem insti Oswaldo cruz, Rio de Janeiro ,101(4): 387-390.

Keay RWJ, Onochie CFA (1964). Nigeria Trees. Vol I & II. Department of Forestry Research, Ibadan.

Olafimihan CA, Fawole MO (2003). Antibacterial properties of the stem bark of *Azadirachta indica* (The Neem Tree). Niger. J. Pure Appl. Sci. 18: 1707–1412.

Sonibare MO, Isiaka AO, Taruka MW, Williams NS, Soladoye M, Emmanuel O (2006). Constituents of *Ficus exasperata* leaves. Natural product communications, pp. 23-26