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Full Length Research Paper

Assessment of traditional medicinal application of *Alchornea cordifolia*

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Ethanol and expressed extracts of the leaves of the shrub *Alchornea cordifolia* were prepared for testing their antibacterial activity using *Escherichia coli* and *Staphylococcus aureus* as test organisms. The broad-spectrum antibiotic Ampiclox was used in a 1:1 dilution to provide approximate bases for comparison of the antibacterial activity of the extracts. Indication was that the ethanol extract had a significantly higher inhibitory zone in all the tests against *E. coli* (P ≤ 0.001) ranging from 53.4 (± 4.8) to 30.4 (± 2.8) mm; this was followed by the expressed extract (the form in which *A. cordifolia* is used traditionally for treating fresh wounds). Interestingly, for activity against *S. aureus*, it was the expressed extract that exhibited the higher inhibitory zone (P ≤ 0.001) ranging from 12.6 (± 4.8) to 6.3 (± 1.8) mm. All the extracts showed higher activity than the diluted Ampiclox activity. The study albeit further detailed assessments, appears to have justified the various traditional applications of *A. cordifolia* in the cure of some of the illnesses.

Key words: *Alchornea cordifolia*, susceptibility, antibacterial, *Escherichia coli*, *Staphylococcus aureus*, traditional medicine.

INTRODUCTION

Alchornea cordifolia, Schum and Thonn (Family *Euphorbiaceae*) is a shrub found along the coastal areas of West Africa. According to Nyananyo (2006), *A. cordifolia* is a straggling shrub or small tree of swampy or dry locations; erect or half climbing. The leaves are simple, ovate, basically cordite, acuminate with sessile glands at the base close to the petiole. The flowers are greenish white. The plant is widely used in traditional medicine, in the Niger Delta Region of Nigeria to treat wound, rheumatism, arthritis, pile, toothache and inflammatory diseases.

The squashed leaf of *A. cordifolia* is used traditionally as an antibiotic and also in the treatment of common cold, cough and diarrhoea (Van Madendach dey Roy, 1996). A decoction of the leafy twigs is applied on the body to treat feverish chills, rheumatic pains and sores, and application for sore feet as a lotion. The young leaves are applied with pepper and white clay (*Tori* in Ijaw language) to prevent miscarriage (Bennett, 1950). The dried and powdered leaves are mixed with palm wine for the treatment of gonorrhoea. The leaves are used internally for the management of gastrointestinal disorders, respiratory and urinary tract infections.

Antimicrobial screening is a process of evaluating substances that act against clinical isolates. Many techniques have been introduced in determining antimicrobial susceptibility of a substance. However, the two most commonly used screening methods are; the broth dilution assay and the disk or agar well diffusion assay (NCCLS, 2000; Prescott et al., 2006). In this study the agar diffusion technique was applied. Investigations by Ebi (2001), Okeke et al. (1999) and Ajali (2000) indicated that *A. cordifolia* plant has antibacterial properties. This appears to be due to the presence of gallic, elagic acid, protocatechic acid, tannins, phenolic acids (Ogungbamila and Samuelson, 1990). Other chemical constituents include alkaloids, flavonoids, quercetin, hyperin and guaijaverin (Lanikanra et al., 1990; Ogungbamila and Samuelson, 1990; Ajali, 2000).

This study was designed to compare the antibacterial activity of the expressed (the traditional method for applying *A. cordifolia* to wounds) and the ethanol extracts of

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Figure 1. Fresh-leaves of *Alchornea cordifolia*.

the plant leaves using ampiclox as control.

MATERIALS AND METHODS

Location

The Niger Delta region is located in the central part of Southern Nigeria. It lies within the Ibo Plateau and the Cross River valley, a geopolitical entity which covers present Akwa Ibom, Bayelsa and Rivers States. The study was conducted in Bayelsa State, in the epicentre of the Niger Delta.

Collection of samples

Green leaves of *A. cordifolia* (Figure 1) were collected from the Niger Delta University Wilberforce Island, Amassoma, Bayelsa State, Nigeria. The leaves were identified using outlines and pictures of medicinal plants from Nigeria by Nyananyo (2006).

Preparation of extracts

One hundred grams of fresh leaves of *A. cordifolia* were weighed and rinsed thrice in sterile water and ground using an oven sterilized mortar and pestle. The ground sample was squeezed using autoclaved muslin cloth and the expressed fluid dispensed into a sterile conical flask and was stored in a refrigerator at 5°C for use. Another batch of 100 g fresh leaves was ground into a paste. The paste was extracted for 10 min in a separating funnel (in a cold room at 5°C) using 100 ml of absolute ethanol. The extract was stored in a refrigerator at 5°C until required for use.

Test bacterial isolates

Isolates of *Staphylococcus aureus* and *Escherichia coli* were obtained courtesy of the Medical Laboratory of the University of Port Harcourt Teaching Hospital (U. P. T. H) in Rivers State, Nigeria. Subculture was made in nutrient agar 3 times in order to purify the test bacterial strain and each was maintained on nutrient agar slant at 5°C in a refrigerator. The isolates which were isolated from patients were characterized with respect to their morphology, biochemical reactions and antibiotic susceptibility pattern.

Impregnation of extracts and ampiclox on filter paper discs

A broad spectrum antibiotic, ampiclox (which is commonly used for gram positive and negative bacterial infections) was used as control to provide bases of comparison of the antimicrobial activity of *A. cordifolia* on *E. coli* and *S. aureus.* 500 mg of ampiclox capsule was poured out and dissolved in 500 ml of distilled water in a conical flask to give a 1:1 dilution with a concentration of 1 mg ml^{-1}. From this, 0.1 ml was used to impregnate in triplicates, sterilized filter-paper discs (they were cut with a 10 mm borer). Also in triplicates, 0.1 ml of each of the extracts (of the expressed and alcohol-extracted) were impregnated; all the discs were allowed to dry at ambient temperature and kept dry in separate Petri dishes.

Antibacterial susceptibility

The ability of the various extracts to inhibit the growth of the test bacterial species was determined using the impregnated filter-paper discs in agar diffusion disk technique. Nutrient agar plates were inoculated with each test organism in a confluent-growth using sterile swab. For each extract and the ampiclox extract, two plates

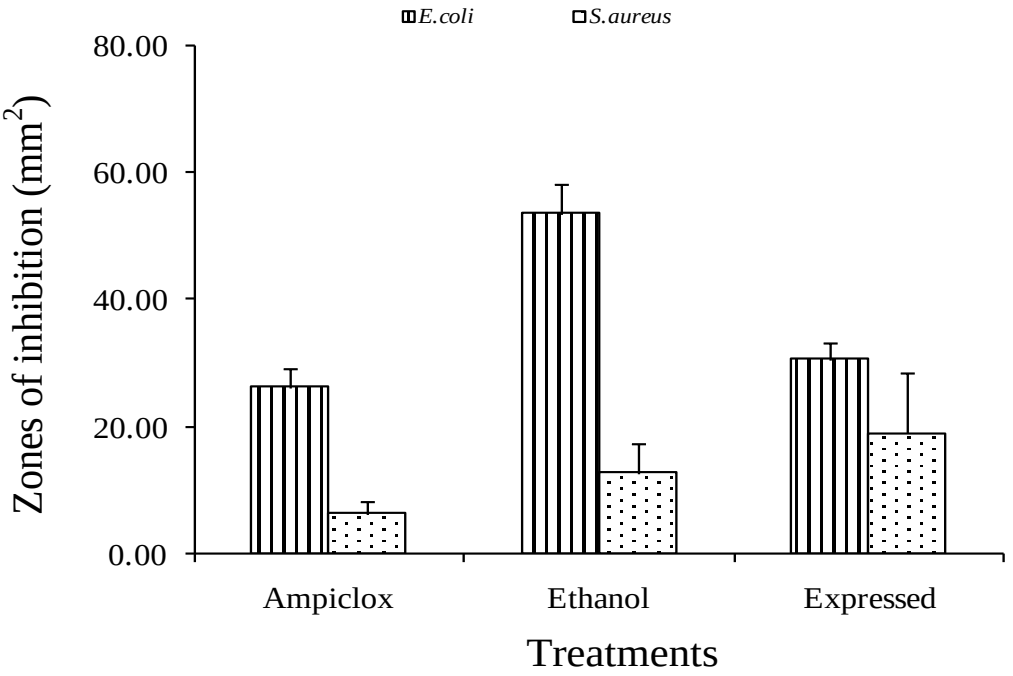

Figure 2. Zones of Inhibition of *Alchornea cordifolia* extracts and Ampiclox on *E. coli* (P = <0.001) and *S. aureus* (P = < 0.001). Mean = (± SE); n = 3.

(one plate for each of the test organisms) were prepared. The impregnated discs were properly spaced on the confluent cultured test organisms to prevent their zones of inhibition from over lapping. The inoculated nutrient agar plates were allowed to dry for 10 min at ambient temperature in an inoculating chamber. One way analysis of variance was used for the analysis of results.

RESULTS AND DISCUSSION

The zones of inhibition of *A. cordifolia* extracts on the test isolates were recorded after 72 h and the result is as shown in Figure 2. Indication was that the ethanol extract had the highest zone of inhibition on *E. coli* and this was followed by the expressed extract (P = < 0.001); ranging from 53.43 (± 4.8) to 26.2 (± 2.8) mm^2. Inhibitory pattern for *S. aureus* indicated that the expressed extract showed the higher zone of inhibition (P = < 0.001) ranging from 18.9 (± 9.4) to 6.3 (± 1.8) mm^2. Ampiclox (control) had the least mean values (26.2 ± 2.8 and 6.28 ± 1.79) for *E. coli* and *S. aureus*, respectively.

As indicated by Roy (1996) and Bennett (1950), *A. cordifolia* is used in the treatment of various kinds of microbial infections including inflammatory diseases, respiratory and urinary tract infections etc. Of particular interest was the observation by Etani et al. (1998) and Okigbo and Kalu (2005) that the ethanol extract of the plant contained bioactive ingredients that were inhibitory to the growth of common pathogens such as *E. coli* and *S. aureus*.

While there are many factors that could influence the active principles present in plants, such as the age of plant, extracting solvent, method of extraction and even the time of harvesting the plant materials (Amadioha and Obi (1999); Qasem and Abu-Blan (1996); Okigbo and Omodamiro (2004); Okigbo and Emoghene (2004)), the present study appear to have justified the traditional use of *A. cordifolia* for the treatment of a number of human diseases. The use of plants traditionally for the treatment of microbial infections could be effective as this could save lives especially where health facilities may not be easily available. There is obvious need to carry out further in-depth and more precise studies to confirm the findings.

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