Full Length Research Paper

Phytochemical and antimicrobial activity of ethanolic extract of _Landolphia owariensis_ leaf


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Ethanolic extract of the leaves of _Landolphia owariensis_ were subjected to phytochemical screening and antimicrobial activities on _Escherichia coli_, _Staphylococcus_ sp. and _Proteus_ sp. using dehydrogenase assay method. The phytochemical screening indicated the presence of alkaloids, flavonoids, tannins and saponins. The bacterial isolates were exposed to different extract concentrations (20 – 2000 μg/ml) of the extract in nutrient broth, and their response was concentration dependent. In all three bacteria, dehydrogenase activity was progressively inhibited at concentrations of about 20 μg/ml, with total inhibition observed with 700 μg/ml for _Staphylococcus_ sp., 1000 μg/ml for _Proteus_ sp. and 1800 μg/ml for _E. coli_.

Key words: Phytochemical activity, ethanolic extract, _Landolphia owariensis_, dehydrogenase assay.

INTRODUCTION

The medicinal use of plants leaves and roots in the management and treatment of diseases have been an age long practice (Sofowara, 1982). The continued investigation into the secondary plant metabolites has led to important breakthroughs in pharmacology. This has also helped, in no small measure, in the development of modern pharmacotherapeutics in Africa and other parts of the World (Doerge et al., 1971). The continued emergence or persistence of drug resistant organisms and the increasing evolutionary adaptations by pathogenic organisms to commonly used antimicrobials have reduced the efficacy of antimicrobial agents currently in use. Therefore, the search for new drugs from novel sources, such as plant, is necessary (Fransworth and Morris, 1976).

Many plant species have been found to have one or more medicinal properties. Majority of medicinal plants are flowering plants (angiosperms) and are readily available in rural areas (Fransworth and Morris, 1976). In southeastern Nigeria, many fruits, spices, herbs and leafy vegetables used as food and for medicinal purposes are obtained from wild tropical forest where they may be as many as a thousand species (Ibe and Nwufor, 2005). To date, plants continue to be a major source of commercially consumed drugs. Even most synthetic drugs have their origin from natural plant products (Sofowara, 1982).

_Landolphia owariensis_ P. beaur (Family: Apocynaceae) commonly called vine rubber and known locally by various names (Eso/Utu in Ibo, Mba in Yoruba and Ciwa in Hausa) is widely used for the treatment of many ailments (Owoyele et al., 2002). The decoction of its leaves is used as a purgative, and to cure malaria (Gill, 1992). The extract of the root is also used to treat gonorrhoea infection (Gill, 1992). Further reports have tried to validate the folkloric use of the plants extract as an antimicrobial agent (Ebi and Ofoefule, 1997). Lewis and Lewis (1977) also reported the use of the stem bark as vermifuge. The latex is drunk or used in French Equatorial Africa as enema for intestinal worms (Irvine, 1961). The latex is also used as a natural preservative (Anthony, 1995).

This study is aimed at investigating the antimicrobial properties of the ethanolic extract on three bacterial isolates so as to validate or otherwise the claim of the herbalists who use it as an antimicrobial remedy. The study will also expose new frontiers or improve on the current applications of the plant extract.
Preparation of plant materials

The leaves of *L. owariensis* were collected from their natural habitat in Otulu Ahiazu Mbaise, Imo State, Nigeria in the month of April 2006. The plant leaves were identified by Dr. S. E. Okeke, a plant Taxonomist of the Department of Plant Sciences and Biotechnology, Imo State University Owerri, Nigeria.

Extract preparation

The fresh leaves of *L. owariensis* were sun dried for ten days to a constant weight. The dried leaves were ground into powder using a mechanical grinder. 100 g of the leave powder was weighed and about 48 h. The solution was subsequently shaken and filtered covered, shaken every 30 min for 6 h and then allowed to stand for 48 h. The solution was subsequently shaken and filtered using Whatmann number 1 filter paper. The filtrate was evaporated to dryness using a rotary evaporator (Model type 349/2, Corning Ltd). A yield of 11% of aqueous extract was obtained. The extract was stored at 4°C.

Phytochemical studies

Phytochemical test for the presence of alkaloids, saponins, flavonoids, cyanogenic glycosides and proteins were carried out as described by Trease and Evans (1989).

<table>
<thead>
<tr>
<th>Plant</th>
<th>Saponins</th>
<th>Tannins</th>
<th>Alkaloids</th>
<th>Flavonoids</th>
<th>Cardiac glycoside</th>
<th>Cyanogenic glycoside</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>L. owariensis</em> leaf extract</td>
<td>++</td>
<td>++</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

++ = highly present; + = present; - = not present.

**RESULTS AND DISCUSSION**

Preliminary phytochemical screening revealed the presence of alkaloids, flavonoids, tannins, saponins (Table 1). Flavonoids, alkaloids and tannins have been associated with antimicrobial effects in various studies using plant extracts (Nweze et al., 2004; Abo et al., 1999; Corticchio et al., 1991). However, more research is required to determine the role of flavonoids, alkaloids and tannins in the antimicrobial activity of *L. owariensis*.

The dehydrogenase assay of the control showed that *E. coli* at 0.184 ± 0.041 had the least dehydrogenase activity, followed by *Proteus* sp. at 0.509 ± 0.056, and *Staphylococcus* sp. 0.660 ± 0.058 mg formazan per mg cell dry weight per hour respectively (Table 2; P < 0.05). *E. coli* and *Proteus* sp. are gram negative organisms while *Staphylococcus* sp. is gram positive. Gram-negative bacteria have been shown to have higher rates of dehydrogenase activity than the gram positive ones.
positive bacterium, had the highest dehydrogenase activi-

The present study show that Landolphia owariensis (Nweke et al., 2006). On the other hand, the results of the present study show that Staphylococcus sp., a gram positive bacterium, had the highest dehydrogenase activi-

Figure 1. 2,3,5-triphenyltetrazolium chloride (TTC) reduction activity in response to various concentrations of Landolphia owariensis ethanolic leaf extract by the bactera.

Figure 2. Polynomial regression of % inhibition of dehydroge-

Table 2. Dehydrogenase activities in the control bacterial tests.

<table>
<thead>
<tr>
<th>Test organism</th>
<th>Dehydrogenase activity* (mg formazan/mg cell dry weight/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococcus sp.</td>
<td>0.660 ± 0.058</td>
</tr>
<tr>
<td>Proteus sp.</td>
<td>0.509 ± 0.056</td>
</tr>
<tr>
<td>E. coli</td>
<td>0.184 ± 0.041</td>
</tr>
</tbody>
</table>

*Values represent mean ± standard deviation of triplicate tests.

REFERENCES


