Qualitative and Quantitative Analysis of Phytochemicals of Loranthisus bengwensis Leaf

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ABSTRACT
The present study investigates the qualitative and quantitative analysis of the major bioactive constituents of medicinally important plant, Loranthisus bengwensis in its aqueous and ethanolic extract of leaf. Alkaloids, flavonoids, tannins, cardiac glycoside, terpenes and steroids were present in both aqueous and ethanolic extract of the leaf. Meanwhile, saponin was absent in ethanolic extract but present in aqueous extract of the leaf. The quantitative phytochemical screening the aqueous extract revealed that the plant leaf contains 0.20% saponins, 0.30% flavonoids, 0.10% alkaloids and 0.21% anthraquinones. The significance of Loranthisus bengwensis in ethnomedicine may be attributed to the presence of the phytochemical constituents in the plant.

Keywords: Loranthisus bengwensis, Qualitative analysis, Quantitative analysis, Phytochemicals, Leaf.

INTRODUCTION
Medicinal plants are used to maintain and promote healthy life, prevent disease and cure ailments1. The World Health Organization supports the use traditional medicine provided they are proven to be efficacious and safe2. The medicinal value of these plants lies in bioactive phytochemical constituents that produce definite physiological action on the human body3. Some of the most important bioactive phytochemical constituents are alkaloids, essential oils, flavonoids, tannins, terpenoid, saponins, phenolic compounds and many more4.

In developing countries, a huge number of people lives in extreme poverty and some are suffering and dying for want of safe water and medicine, they have no alternative for primary health care5. There is therefore the need to look inwards to search for herbal medicinal plants with the aim of validating the ethno-medicinal use and subsequently the isolation and characterization of compounds which will be added to the potential list of drugs6.

Loranthisus bengwensis (African mistletoe) which is one of the groups in the Loranthaceae family is specific to Africa. It is found mainly in the tropics. The chemical composition of mistletoe varies somewhat; depending on the plant host tree7. Loranthisus bengwensis grown on an apple tree has the strongest pharmacologic effect8. The constituents of loranthus bengwensis are flavonoids, lectins, polypeptides, polysaccharides, saponins tannins, tri-terpines and viscotoxin. The major constituents are the lectins (carbohydrate binding proteins), which include viscumin, polypeptides known as viscotoxin (with a basic chemical structure of thionins) and a number of phenolic compounds (e.g. digallic acid, o-coumaric acid) found in their free states or as glycosides9. Extract from mistletoe has been found to promote insulin production by clonal pancreatic beta cells in culture10. Also, its preparations are commonly used in complementary medicines as anticancer agents11 and in the management of diabetes mellitus12,13. The present study was carried out to investigate the phytochemical constituents (qualitative and quantitative) of Loranthisus bengwensis leaf.

MATERIALS AND METHODS
Chemicals and Reagents
All chemicals and reagents used were of analytical grades and prepared in Biochemistry laboratory, University of Jos, Nigeria in glass apparatus using distilled water.

Plant Material
The leaf of Loranthisus bengwensis was obtained from Farin-Gada market in Jos metropolis, Plateau State, Nigeria and was authenticated at the Herbarium of the Department of Botany, University of Jos, Nigeria, where a voucher specimen was deposited at the Herbarium of the Institute.

Preparation of plant extract
The leaves of Loranthisus bengwensis were washed and oven dried at 40°C for 72 hours to a constant weight. The dried pieces were then pulverized using an electric blender. The powdered material was stocked in a glass container from which 50 g was extracted in 500 ml of cold distilled water for 48 hours at 37°C. This was then filtered with Whatman No. 1 filter paper. The filtrate was concentrated on a steam bath to give aqueous extract. The same procedure was repeated for ethanol with same type of plant. The extracts (aqueous and ethanol) was then used for qualitative and quantitative phytochemical analysis.

Qualitative phytochemical Screening
The presence of alkaloids, flavonoids, tannins, saponins, cardiac glycoside, terpenes, steroids, resins and phenols content of the plant were determined by the methods described by Sofowora14, Trease and Evans15 and Harborne16.
Quantitative phytochemical screening

The quantification of some detected phytochemicals was carried out as described for saponins\textsuperscript{19}, flavonoids\textsuperscript{19}, alkaloids\textsuperscript{20} and anthraquinones\textsuperscript{21}.

Statistical Analysis

The data obtained from this study were expressed as Mean ± Standard Error of Mean using statistical package for social sciences (SPSS) version 20.0.

RESULTS

Table 1 shows the qualitative phytochemical composition of Loranthus bengwensis leaf in two different solvents. Alkaloids, flavonoids, tannins, cardiac glycoside, terpenes and steroids were present in both aqueous and ethanolic extract of the leaf. Meanwhile, saponin was absent in ethanolic extract but present in aqueous extract of the leaf. The quantitative phytochemical screening of the aqueous extract revealed that the plant leaf contains 0.20% saponins, 0.30% flavonoids, 0.10% alkaloids and 0.21% anthraquinones (Table 2).

DISCUSSION

The present study carried out on the Loranthus bengwensis leaf revealed the presence of medicinal active constituents. The phytochemical active compounds of Loranthus bengwensis were qualitatively and quantitatively analysed for leaf and the results are presented in Table 1 and 2. In this screening process, alkaloids, flavonoids, tannins, cardiac glycoside, terpenes and steroids were present in both aqueous and ethanolic extract of the leaf while saponin was only present in the aqueous extract.

The medicinal value of plants lies in some chemical substances that have a definite physiological action on the human body\textsuperscript{5}. Different phytochemicals have been found to possess a wide range of activities, which may help in protection against chronic diseases\textsuperscript{6}. For example, saponins possess both beneficial (cholesterol-lowering) and deleterious (cytotoxic permeabilization of the intestine) properties and also exhibit structure dependent biological activities\textsuperscript{22}. Saponins have been found to be potentially useful for the treatment of hyperglycaemia\textsuperscript{23,24} and exhibits antibiotic properties\textsuperscript{5}. Alkaloids which are one of the largest groups of phytochemicals in plants have amazing effects on humans and this has led to the development of powerful pain killer medications\textsuperscript{25}. Also, studies have shown that alkaloid is capable of reducing headaches associated with hypertension\textsuperscript{26}. Steroids in plants have been shown to exhibits analgesic properties and responsible for central nervous system activities\textsuperscript{8}. Studies have shown that Terpenes and terpenoids prevent skin diseases by strengthen the skin, increasing the concentration of antioxidants in wounds and restoring inflamed tissues by increasing blood supply\textsuperscript{27}. Plants with tannins are used for healing of wounds, varicose ulcers, hemorrhoids, frost-bite and burns\textsuperscript{28,29}. Cardiac glycosides work by inhibiting the Na\textsuperscript{+}/K\textsuperscript{+} pump. This causes an increase in the level of sodium ions in the myocytes, which then leads to a rise in the level of calcium ions. This inhibition increases the amount of Ca\textsuperscript{2+} ions available for contraction of the heart muscle, improves cardiac output and reduces distention of the heart\textsuperscript{30}. The biological functions of flavonoids include protection against allergies, inflammation, platelets aggregation, microbes, ulcer and tumour\textsuperscript{31}, urinary tract infection, diarrhoea and dysentery\textsuperscript{32}. Studies have also shown that flavonoids have antioxidant, fever-reducing (antipyretic), pain-relieving (analgesic) and spasm-inhibiting (spasmolytic) activities\textsuperscript{30}. Phenolic compounds have antimicrobial properties. Phenol and phenolic compounds have been extensively used in disinfections and remain the standards which other bacteriacides are compared\textsuperscript{33}. The presence of these phytochemicals in the leaf of Loranthus bengwensis may be responsible for its medicinal properties.

CONCLUSION

This study has shown that Loranthus bengwensis leaf contains important and active phytochemical compounds which may be responsible for its ethnopharmacological uses in traditional medicine.

REFERENCE

13. Osadebe PO, Okide GB, Akabogu IC. Studies on antidiabetic activities of crude methanolic extract of loranthus micranthus

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Table 1: Qualitative phytochemical screening of Loranthus bengwensis leaf

<table>
<thead>
<tr>
<th>Phytochemicals</th>
<th>Aqueous</th>
<th>Ethanol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloids</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Flavonoids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Tannins</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Saponins</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Cardiac glycoside</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Terpenes</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Steroids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Resins</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Phenols</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Key= + present; - absent

Table 2: Quantitative phytochemical analysis of aqueous extract of Loranthus bengwensis leaf

<table>
<thead>
<tr>
<th>Phytochemicals</th>
<th>Composition (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saponins</td>
<td>0.20±0.20</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>0.30±0.10</td>
</tr>
<tr>
<td>Alkaloids</td>
<td>0.10±0.11</td>
</tr>
<tr>
<td>Anthraquinones</td>
<td>0.21±0.20</td>
</tr>
</tbody>
</table>

Values are expressed as Mean ± SEM (n = 3)