Evaluation of Proximate Composition and Phytochemical analysis of *Terminalia schimperiana* root.

[1]O. S Awotunde [2] S.O Adewoye, [3] J. Hawumba Joseph and [4] Nuwamanya Ephraim.

[1]Department of Biochemistry, Habib Medical School, P.O Box 2555, IUIU, Kampala, Uganda.

[2] Department of Environmental Biology, Faculty of Pure and Applied Sciences, P.M.B 4000 Ladoke Akintola University of Technology, Ogbomoso, Nigeria and [3]Department of Biochemistry and Sport Science , College of Natural science, P.O.Box 7062, Makerere University, Kampala, Uganda and [4] National Crops Resources Institute, Kampala, Uganda.

Correspondence should be addressed to O.S. Awotunde, derockng@gmail.com.

Abstract

The Proximate composition and phytochemical characteristics were determined for *Terminalia schimperiana* root. The root was collected and extracted with water and the phytochemical screening was carried out using the standard procedures. Phytochemical screening of the aqueous extract of *Terminalia schimperiana* root revealed the presence of alkaloids, saponins, Phenolics, anthocyanin and Tannins. The Proximate analysis results obtained showed the amount of crude protein, crude fat and total carbohydrates to be 6.31±0.75, 4.64±0.82 and 17.79 ±0.53 respectively of the sample while the percentage of crude fiber, ash and moisture content in the root sample were 32.72 ±0.59, 0.35±0.12 and 10.35±0.18 respectively. The present study revealed that the plant contain many nutrients and phytochemicals that may be responsible for some medicinal and aphrodisiac properties.

Keywords: Phytochemical, *Terminalia schimperiana*, crude fiber, proximate composition.

Introduction

Traditional medicine has been practiced from many centuries by rural people for management and treatment of several diseases because of its availability, low cost and little side effects. Nature has provided a source of medicinal agents for

thousands of years and an impressive number of modern drugs have been isolated from natural sources, many based on their use in traditional medicine (1). *Terminalia schimperiana* belong to the order myrtales and family combretaceae, it is known as Idi in Yoruba language. It is a broadleaved small tree that can reach up to 7–14 m, variably deciduous in the dry season to semi-evergreen, depending on the climate. The leaves are alternate, simple, elliptic to obovate, 9–15 cm long and 3–8 cm broad, green above with pale undersides. The flowers are tiny and form pale spikes at the base of the leaves. The fruit is a samara with a single wing 6–9 cm long, that turns brown with age (2). It can be found in open forest habitats with more than 1300 mm of rainfall per year, when it is found in closed forest, it typically part of the forest canopy and it may be the dominant tree species where it is found (3). In parts of West Africa, *T. schimperiana* is used as a medicinal plant; the bark being applied to wounds while the twigs may be chewed to promote oral hygiene. In laboratory, experiments on extracts of the plant were found to have *in vitro* antibiotic properties against *Staphylococcus* (4) and the plant extract has been found to also have antifungal properties *in vitro* (5). The infusion of the plant root is claimed to be used as aphrodisiac by the locals of oko community, Nigeria. In the present study the phytochemical and proximate analysis of the root of *Terminalia schimperiana* was done for the presence of various secondary metabolites present.

Materials and methods

The roots of *Terminalia schimperiana* were collected from Oko, irepodun local government area of Kwara state in Nigeria. Identification and authentication of plant was carried out at the botany unit of the department of pure and applied biology, Ladoke Akintola College of science and technology, Ogbomoso, The root of *Terminalia schimperiana* plant was obtained, cleaned, cut into pieces and oven-dried at 40^0c, the dried pieces were then pulverized into powder using an electric grinder. 200g of the powder was percolated in 2000ml of distilled water with constant shaking for 48hrs at room temperature. The extract was filtered with Whatman no.1 filter paper, the filtrate was lyophilized and the percentage yield calculated and stored until further use. The phytochemical screening of the plant was carried out on the aqueous extract of the plant root of *Terminalia schimperiana* to detect the active components that are present using the following standard procedures;

Test for Alkaloids

In order to demonstrate the presence of alkaloids, 1.0cm^3 of 1% v/v HCl was added to 3.0cm^3 of the crude extract of the plant in a test tube. The mixture was heated for 20 minutes, cooled and filtered, 2 drops of Mayer's reagent was added to 1.0 cm^3 of the aqueous extract filtrate. A creamy precipitate indicates the presence of alkaloids in the extract. (6).

Test for Steroids

In order to demonstrate the presence of steroids, 1ml of the crude extract was pipette into a test tube and 10 ml of chloroform added. After mixing the two thoroughly on a vortex, an equal volume (11ml) of concentrated sulphuric acid was then added by sides of the test tube. The turning red of the upper layer while the sulphuric acid layer showed yellow /green fluorescence indicates the presence of steroid. (6).

Test for Terpenoids

In order to demonstrate the presence of terpenoids, 2ml of crude extract was added to 2ml of acetic anhydride and 2ml concentrated H_2SO_4 was added to 2ml of the plant extract. The formation of blue green ring indicates the presence of terpenoids (6).

Test for Tannins

In order to demonstrate the presence of tannins, few drops of 1% (w/v) lead acetate was added to 2ml of crude extract, and the yellowish precipitate indicates the presence of tannins (6).

Test for Saponins

In order to demonstrate the presence of saponins, 5ml of crude extract was mixed with 20ml of distilled water and then agitated in a graduated cyclinder for 15 minutes. Formation of foam indicates the presence of Saponins (6).

Test for Anthocyanins

In order to demonstrate the presence of anthocyanins**,** 2ml of 2 N Hcl and 2ml of ammonia were added to 2ml of crude extract. The appearance of pink-red which turns to blue-violet indicates the presence of anthocyanins (6).

Test for Coumarins

In order to demonstrate the presence of coumarins, 3ml of 10% (w/v) NaOH was added to 2ml of crude extract and the formation of yellow colour indicates the presence of coumarins (6).

Test for Flavonoids

In order to demonstrate the presence of flavonoids, 1 gm. of the powdered root sample was suspended in 10 ml of distilled water and boiled for 5 minutes. Thereafter, the boiled suspension was filtered and few drops of 20% (w/v) sodium hydroxide solution was added to 1ml of the cooled filtrate, a yellow colour indicates the presence of flavonoids (6).

Test for Cardiac glycosides

In order to demonstrate the presence of cardiac glycosides, 5 ml of crude extract was treated with 2ml of glacial acetic acid containing one drop of ferric chloride Solution. Then 1ml of concentrated sulphuric acid was added. A brown ring at the interface indicates cardiac glycosides. A violet colour may also appear below the ring and while in the acetic acid layer, a green ring may be formed (6).

Test for Glycosides

In order to demonstrate the presence of glycoside, few drops of glacial acetic acid, ferric chloride and concentrated sulphuric acid was added to 1 ml of the crude extract. A reddish brown colour observed at the junction of 2 layers and the bluish green colour in the upper layer indicates the presence of Glycosides. (6).

Test for Phenols

In order to demonstrate the presence of phenols, crude extract was mixed with 2ml of 2% (w/v) $Fecl_3$ solution. A blue green or black colour indicates the presence of phenols. (6)

Test for Quinones

In order to demonstrate the presence of quinones, dilute sodium hydroxide was added to the 1ml of crude extract and the blue green coloration indicates the presence of quinones. (6)

Test for Betacyanin

In order to demonstrate the presence of betacyanin, 1ml of 2N NaOH was added to 2ml of crude extract and heated for 5min. The Formation of bluish green colour indicates the presence of anthocyanin and Formation of yellow colour indicates the presence of betacyanin (6)

The nutritional composition of *Terminalia schimperiana ro*ot was also determined by the following methods;

Moisture Content

In order to determine the moisture content, powdered plant material (2 g) was taken in a tarred silica crucible and dried in an oven at 105 °C for 30 min, cooled at room temperature in desiccator until constant weight. The powder was then weighed to calculate the moisture content based on the loss of weight on drying and the results was expressed as a percent of dry powder (7).

Ash content

In order to determine the ash content, ten grams (10 g) of the root sample was added to a pre weighed crucible. The root sample was then placed in a muffle furnace at 550°C for 4 h, and thereafter cooled in desiccator and reweighed. The ash content

was determined as the difference of the weight before heating and weight after heating (7).

Crude Fiber Content

In order to determine the crude fiber content, (2 g) root sample was put into 250 ml of conical flask containing 1.25% (v/v) Sulfuric acid solution and then heated for about 30 min, filtered then washed with hot water and petroleum ether until traces of acid could not be detected using pH paper. The sample was transferred into crucibles and oven dried at 120°C for 12 hours, it was then transferred to a desiccator cooled and weighed (W1). After, the root sample was ashed at 60°C for 24 hours, cooled and weighed (W2). The fiber content was determined as the difference of the weight before ashing and weight after ashing (7).

Estimation of total Protein

In order to determine total protein, 5 g of root sample was extracted 3 times with 50 ml of water by overnight cold percolation method. To 0.5 ml of sample, blank and standard taken in duplicate, 0.5ml of alkaline copper reagent was added, mixed and allowed to stand undisturbed for 10 minutes. Then 2 ml of phenol reagent was added to each tube; mixed immediately and left to stand at room temperature for 5 minutes. The absorbance of samples and standard was taken at 615 nm against blank. The protein content of the root sample was calculated by comparing with the standard curve (7).

Estimation of crude fat

In order to determine the amount of crude fat, 2 g of root sample was weighed into a fat-free extraction thimble which has been previously dried in an oven and weighed (W1). It was plugged with cotton wool and weighed again (W2). The thimble was placed in the extractor and the solvent petroleum ether (60-80°C) was added until it siphoned over once. More solvent added until the barrel of the extractor was half full. The condenser was replaced and placed so that the solvent boiled gently, it was operated for 6 hours. After this, the solvent was allowed to siphon over and the barrel of the extractor was empty. The condenser was detached

and the thimble removed, dried in a clean beaker in the oven at 60^{o}C. It was then weighed (W3) (7). Percentage of crude fat was calculated by the formulae;

$$\frac{\text{Weight loss of sample (W2-W3)}}{\text{Weight of sample (W2-W1)}} \times 100$$

Estimation of total Carbohydrate

In order to determine the total carbohydrate, percentage carbohydrate was given by: 100-(percentage of ash + percentage of moisture + percentage of fat + percentage of protein) (8).

Results

Table 1: Phytochemical constituent of *Terminalia schimperiana* root.

Phytochemicals	**Present**
Alkaloids	+
Steroids	-
Anthocyanin	+
Cardenolides	-
Dienolides	-
Saponins	+
Phenolics	+
Flavonoids	-
Cardiac glycosides	-
Tannins	+
Triterpenes	-

+: (present), –: (absent)

Table 2: Nutritional composition of *Terminalia schimperiana* root.

Composition	(%)
Ash content	0.35±0.12
Moisture content	10.35±0.18
Total carbohydrate	17.79 ±0.53
Total Protein	6.31±0.75
Crude Fat	4.64±0.82
Crude Fiber	32.72 ±0.59

Means ± SEM, n=4

Discussion

Phytochemical screening of aqueous extract of *Terminalia schimperiana* root revealed the presence of bioactive agents such as alkaloids, saponins, Phenolics, anthocyanin and Tannins (Table 1). Others like steroids, Flavonoid, Cardiac glucoside, cardenolides, dienolides, and triterpenes were however not detected. The phytochemicals present in the aqueous extract of *Terminalia schimperiana* root (Phenolics, Alkaloids, Tannins and Saponins) are good candidates that can be used to explain the various pattern of results obtained in the sexual behavior effect study of the plant. Saponins and alkaloids have been shown by previous authors to be responsible for enhancing male sexual behaviour in animals (9). Saponins act by increasing the biosynthesis of androgens, alkaloids dilate blood while tannins possesses anti-inflammatory, anti-bacterial and wound healing effect vessels (10) (11). Similarly, the present bioactive agents may also be responsible for the toxicity observed in this study. The proximate analysis of *Terminalia scimperiana*

root is shown in table 2. The amount of crude protein, crude fat and total carbohydrates were found to be 6.31±0.75, 4.64±0.82 and 17.79 ±0.53 respectively of the sample while the percentage of crude fiber, ash and moisture content in the root sample was 32.72 ±0.59, 0.35±0.12 and 10.35±0.18 respectively. The plant composition shows that the consumption of the plant can improve general health and well-being and can lead to a burst of energy and translate into an increased sexual appetite.

Conclusion

The Present study of aqueous extract of *Terminalia schimperiana root* revealed the presence of alkaloids, saponins, Phenolics, anthocyanin and Tannins while the Proximate analysis results obtained showed the amount of crude protein, crude fat and total carbohydrates to be 6.31±0.75, 4.64±0.82 and 17.79 ±0.53 respectively of the sample while the percentage of crude fiber, ash and moisture content in the root sample were 32.72 ±0.59, 0.35±0.12 and 10.35±0.18 respectively. This compositions may be responsible for the aphrodisiac and medicinal properties of the plants.

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