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Phytochemical Analysis of *Telfaria Occidentals* and *Ocimum Gratissimum* Samples Collected from Gwarimpa Abuja Nigeria

Abdulrasheed Hadiza Haruna[1], Mohammed Mairo[2, *], Mariya Akilu[1]

[1]Physical and Life Sciences Unit, Department of Engineering and Space Systems, National Space Research and Development Agency, Abuja, Nigeria

[2]Department of Food Science and Technology, Faculty of Agriculture, Bayero University, Kano, Nigeria

Email address:
hadizaabdulrasheed@gmail.com (A. H. Haruna), mmuhammad.fst@buk.edu.ng (M. Mohammed), makilu75@gmail.com (M. Akilu)

[*]Corresponding author

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Abstract: This study aims at determining the presence of phytochemical constituents in *Telfaria occidentalis* and *Ocimum gratissimum* collected from a location in Abuja, FCT. Standard laboratory procedures were employed to achieve the set objectives. To ascertain the phytochemical components responsible for the ethno medicinal properties, a qualitative and quantitative screening of the extracts of the sampled plants was conducted. *Telfaria occidentalis* and *Ocimum gratissimum* leaves were collected from the Kado-Bimko market, Gwarinpa-Abuja in October 2016. Phytochemical screening of the plant materials revealed some differences in the phytochemical constituents of the plants tested but showed the presence of Flavonoids, Alkaloids, Anthraquinones, Saponins, and Tannins. The present data suggest that these extracts could be potential sources phytochemicals that could be of great importance for the treatment of various diseases. It is expected that the important phytochemicals recognised in the study of the medicinal plant sample extracts will be very useful in the curing of various diseases in Nigeria.

Keywords: Phytochemicals, *Telfaria Occidentalis*, *Ocimum Gratissimum*, Phytomedicine

1. Introduction

Plants have been used for medicinal purposes long before the prehistoric period. Traditional systems of medicine continue to be widely practiced on many accounts. Population rise, inadequate supply of drugs, the prohibitive cost of treatments, side effects of several synthetic drugs for infectious diseases have led to increased emphasis on the use of plant materials as a source of medicine for a wide variety of human ailments.

Phytochemicals are chemical compounds produced by plants, generally to help them thrive or thwart competitors, predators, or pathogens. They have the potential for use as drugs, and the content and known pharmacological activity of these substances in medicinal plants is the scientific basis for their use in modern medicine if scientifically confirmed [1].

Phytochemicals consist of a diverse group of natural bioactive molecules vastly distributed in plants. They are basically classified into three classes namely Alkaloids, Phenolics and Terpenoids. The molecules in these classes are further grouped due to their numerous modifications, thus emphasizing the diversity of secondary metabolites [2].

Recently, WHO estimated that 80 percent of people worldwide rely on herbal medicines for some aspect of their primary health care needs. WHO [3], defines a medicinal plant as herbal preparations produced by subjecting plant materials to extraction, fractionation, purification, concentration or other physical or biological processes that may be produced for immediate consumption or as a basis for herbal products. The World Health Organization formulated a policy on traditional

medicine in 1991, and since then has published guidelines for them, with a series of monographs on widely used herbal medicines [4-5].

Telfairia occidentalis commonly called fluted pumpkin occurs in the forest zone of West and Central Africa, most frequently in Benin, Nigeria, and Cameroon. It is a popular vegetable all over Nigeria that originated in south-east Nigeria and was distributed by the Igbos, who have cultivated this crop since time immemorial. The leaves contain a high amount of antioxidants and hepatoprotective and antimicrobial properties [6].

The herbal preparation of the plant has been used in the treatment of anaemia, chronic fatigue and diabetes [7, 8, 9]. Folk medicine preparation, *Telfairia occidentalis* is always used in the management of various diseases like diabetics, anaemia and gastrointestinal disorder [10] as an inhibitory effect on some enterobacteria [11], whereas Mbagwu FN et al.[12] reported *Telfairia occidentalis* anti-inflammatory.

Scent leaf, which is botanically known as *Ocimum gratissimum* is a tropical plant species that belongs to the family of Labiatae. This is a homegrown shrub used mainly as spices for cooking delicacies due to its unique aromatic taste. African countries like Nigeria, Ghana, and Cameroun use *Ocimum gratissimum* for both nutritional and medicinal purposes. The tribes of Nigeria use the leaf extract in treatment of diarrhoea, while the cold leaf infusions are used for the relief of stomach upset and haemorrhoids [13]. The plant is commonly used in folk medicine to treat different diseases such as upper respiratory tract infections, diarrhoea, headache, diseases of the eye, skin diseases, pneumonia, cough, fever and conjunctivitis [14].

Medicinal plant-based drugs have the advantage of being simple, effective and exhibit broad-spectrum activity. The revival of interest in the use and importance of African medical plants by WHO and many developing countries has led to intensified efforts on the documentation of ethnomedical data of medicinal efforts. Researchers are increasingly turning their attention to natural products looking for new leads to develop better drugs against cancer, as well as microbial and viral infections [15].

2. Materials and Methods

2.1. Plant Materials

The fluted pumpkin leaves (*Telfaria occidentalis*) and African Basil (*Ocimum gratissimum*) leaves used for this study were collected from the Kado-Bimko market Gwarinpa-Abuja.

2.2. Sample Preparation

The plant leaves were washed thoroughly under running water, chopped into uniform sizes and dried in an oven at 60 ^{O} c until adequately dehydrated. With the aid of mortar, pestle, miller, grinder, these plant parts were homogenized to a fine powder and stored in airtight bottles and containers for phytochemical analysis.

2.3. Extraction of Plant Materials

Both plant samples were macerated separately in Ethanol (solvent) for 24 hours. After which it was filtered using suction filtration. The filtrate of each sample was further concentrated using the Rotary Evaporator at reduced temperature and pressure. The concentrated extracts were finally dried on the water bath and transferred to sample bottles for further analysis.

2.4. Preliminary Phytochemical Screening of Different Extracts Samples

Chemical tests for the screening and identification of bioactive chemical constituents in the plant extracts were carried out with the extracts using standard clinical laboratory methods.

2.4.1. Test for Tannins

3g of the powdered samples were boiled in 50ml of distilled water for 1 minute on a hot plate. The mixture was filtered and the resulting filtrate was used to carry out the following test for tannins.

i. Ferric Chloride Test

A portion of the water extract was diluted with distilled water in a ratio of 1:4 and a few drops of 10% ferric chloride was added. A blue or green color indicates the presence of tannins.

ii. Lead Sub-Acetate Test

To 1ml of the extract, 3 drops of lead sub-acetate solution. Production of brown precipitate indicates the presence of tannins.

iii. Ferric Ammonium Citrate Test

To 1ml of the water extract, 0.25% ferric ammonium citrate solution. To the mixture, sufficient solid sodium acetate was added to adjust the solution of pH 8 using an indicator paper. This was boiled on a water bath and filtered. A dark green precipitate indicates the presence of tannins.

2.4.2. Test for Saponins

i. Froth Test

To a small quantity of the powdered sample, 95% ethanol was added and boiled. The mixture was filtered and 2.5ml of the filtrate was added to 10ml of diluted water in a test tube. The test tube was stoppered and shaken vigorously for about 30 seconds. It was then allowed to stand for half an hour. Persistent homogenous froth is indicative of the presence of Saponins.

ii. Fehling's solution test

To 2ml of the samples extract, an equal amount of Fehling's solution. A bluish-green precipitate shows the presence of saponin glycoside.

2.4.3. Test for Alkaloids

An extract was prepared by macerating 3g of the powdered samples in 50ml methanol. The extract was evaporated to dryness. 0.5g of the residue was mixed with 10ml of the 1% aqueous hydrochloric acid on a water bath.

1ml each of the filtrate was treated with a few drops of the

following reagents:

(1) Mayer's reagent (potassium mercuric iodine solution)
(2) Dragendorff's reagent (potassium bismuth iodine solution)
(3) Wagner's reagent (solution of iodine in potassium iodide)
(4) 10% tannic acid solution (a solution of picric acid)

Turbidity or precipitation with all of these reagents is indicative of the presence of alkaloids in the extract [16].

2.4.4. Test for Flavonoids

5g of the powdered sample was completely de-tanned with acetone. The residue was extracted in warm water after evaporating the acetone on a water bath. The mixture was filtered and the filtrate was used for the following tests:

i. Lead Acetate Test

To 5ml of the de-tanned water extract, a 10% lead acetate solution was added. A colored precipitate indicates the presence of flavonoids.

ii. Sodium Hydroxide Test

5ml of 10% sodium hydroxide was added to an equal volume of the de-tanned water extract. A yellow solution indicates the presence of flavonoids.

iii. Shinoda Test

0.5g of the powdered sample was extracted in ethanol by boiling on a water bath for 5 minutes, filtered and cooled. To the filtrate was added four pieces of magnesium filing followed by a few drops of concentrated hydrochloric acid. A pink or red color indicates the presence of flavonoids [17].

iv. Amyl Alcohol Test

3g of the powdered sample was macerated in 50ml of 1% hydrochloric acid and filtered. The filtrate was used for the following tests:

(1) 4ml of the filtrate was shaken with 5ml of amyl alcohol. Production of a yellow color indicates the presence of free flavonoid aglycones.
(2) 10ml of the filtrate was shaken with 7ml of amyl alcohol and the mixture was transferred into a separating funnel. The amyl alcohol layer was discarded and the aqueous layer boiled with 10ml of 10% hydrochloric acid for 2minutes. The acidic solution was cooled and divided into two portions. The first portion was shaken with amyl alcohol. Production of a yellow color indicates the presence of a combined flavonoid. To the second portion, magnesium turning was added and the color of the solution was observed [18]. Production of a red color indicates the presence of flavanone and flavonol glycoside.

2.4.5. Test for Glycosides

i. Test for Cardiac Glycosides

0.5g of the powdered sample was boiled with 10ml of 95% alcohol for 2 minutes. The resulting mixture was filtered and cooled. The filtrate was diluted with water and three drops of a strong solution of lead sub-acetate were added. This was mixed thoroughly and filtered. The filtrate divided into two portions; one portion was kept for further test and the other portion was extracted with 5ml of chloroform in a separating funnel. The lower chloroform layer was divided into two evaporating dishes, evaporated to dryness and used for the following tests:

ii. Keller- keliani test for deoxy sugars

One of the chloroform residues was dissolved in 1ml of glacial acetic acid containing a trace of ferric chloride solution. The mixture was carefully poured on the surface of 1ml of Sulphuric acid already contained in a test tube to form a separate layer. A reddish-brown color at the interface of the liquid indicates the presence of digitoxase.

iii. Legal Test for Cardenolide aglycone

The second chloroform residue was dissolved in a few drops of pyridine and a few drops of 20% sodium hydroxide was added. A deep red color indicates the presence of cardenolide aglycone [19].

iv. Kedde test for free or combined cardenolide aglycone

The reserved filtrate was treated with 1ml of 2% solution of 3, 5 dinitro benzoic acid in alcohol. The solution was made alkaline with 5% sodium hydroxide. A purple-blue color indicates the presence of the free or combined cardenolide aglycone [19]

2.4.6. Test for Terpenes and Sterols

5g of the powdered sample was extracted by the maceration with 50ml of ethanol (95%), filtered and the filtrate was evaporated to dryness. The residue was dissolved in 10ml of anhydrous chloroform and then filtered. The filtrate was divided into two equal portions and the following tests were carried out.

i. Liebermann-Burchard Test

The first portion of the chloroform solution from the above was mixed with 2ml of acetic anhydride, followed by the addition of 1ml of concentrated Sulphuric acid down the wall of the test tube to form a lower layer. The formation of reddish-violet color at the junction of the two liquids and green color in the chloroform layer indicates the presence of terpenes.

ii. Salkowski's Test

The second portion of the solution was mixed with 2ml of concentrated Sulphuric acid carefully s that the acid forms a lower layer. A reddish-brown color at the interface indicates the presence of a steroid.

2.4.7. Test for Resins

15ml of petroleum ether extract was made using 0.1g of the powdered sample and filtered into a test tube. An equal volume of copper acetate solution was added and shaken vigorously then allowed to separate. A green color indicates the presence of resins.

2.4.8. Tests for Anthraquinones Derivatives

To show for the presence of free and/or combined anthraquinones:

0.5g of the powdered sample was boiled with 10ml of 10% hydrochloric acid for 2 minutes. The extract was filtered. To the filtrate, an equal volume of chloroform was added, the test tube was inverted a couple of times avoiding vigorous shaking. The solution was transferred into a separating funnel

and the two layers were allowed to separate. The lower chloroform layer was poured into a clean test tube and the ammonia solution was added shaken. The two layers were again allowed to separate. The bright pink color in the upper aqueous layer indicates the presence of free and/or combined anthraquinones.

3. Results and Discussion

The results of the phytochemical Screening of the Plant Samples were studied, analyzed and presented in Table 1 which shows all the metabolites that were tested for in each sample. Negative indicates the absence of while positive indicates the presence of particular constituents or metabolites. Both samples tested positive to Flavonoids, Alkaloids, Steroids, Anthraquinones Saponins, and Tannins, however, they both tested negative to Resins. *Telfaria occidentalis* tested positive to Terpenes while *Ocimum gratissimum* tested negative.

Table 1. *Phytochemical screening of plant samples.*

Parameters tested	*Telfaria Occidentalis*	*Ocimum Gratissimum*
Tannins	+	+
Saponins	+	+
Alkaloids	+	+
Flavonoids	+	+
Glycosides	-	+
Terpenes	+	-
Steroids	+	+
Phenols	+	+
Resins	-	-
Anthraquinones	+	+

Key: + Positive, - Negative

Table 1 shows all the metabolites that were tested for in each sample. Negative indicates the absence of while positive indicates the presence of particular constituents or metabolites. Both samples tested positive to Flavonoids, Alkaloids, Anthraquinones, Saponins, and Tannins, however, they both tested negative to Resins. *Telfaria occidentalis* tested positive to Terpenes while *Ocimum gratissimum* tested negative.

4. Conclusion

Focus on plant research has increased in recent times with a lot of evidence showing immense potential of medicinal plants in the field of pharmacology. The result of the phytochemical screening of the plant samples analyzed was found to contain notable phytochemicals of medicinal importance such as Saponins, Alkaloids, Tannins, Phenols, Flavonoids, Steroids, Phenols, Anthraquinones, and Terpenes. The presence of secondary metabolites in plants has been proven to have protective and therapeutic effects, which is important in disease prevention and maintenance of health. These metabolites have very good antioxidant properties which can be used as effective natural antioxidants sources in nutraceuticals. The search for new plant-derived chemicals to replace synthetic drugs should thus be a priority in future efforts towards sustainable development.

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