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Qualitative and Quantitative Estimation of Bioactive Compounds in Leaves of Touch and Dye Plant (*Mimisa hamata*)

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Finding the qualitative and quantitative bioactive components in the touch and dye plant's leaf (Mimisa hamata) is the study's goal. The leaves gathered from Oko were cleaned, let to dry, and then milled into a powder. For a whole day, the ground sample was submerged in ethanol. The solvent was boiled and filtered to produce a crude extract once the contact period ended. The extract underwent qualitative analysis, whilst the raw sample underwent quantitative analysis. The outcome demonstrated that the ethanolic extract included all seven of the phytochemicals examined in the study (saponin, flavonoid, alkaloid, steroids, glycosides, phenol, and tannin), based on the amount of precipitate generated and the degree of colour change. Flavonoids (243 ± 41 mg/dl), alkaloids (1021 ± 13.2 mg/dl), steroids (1.01 ± 0.0 mg/100g), phenol (674.23 ± 00 mg/100g),

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saponin (1.6 ± 0.1 mg/100g), tannin (14.34 ± 0.4 mg/100g), and glycoside (0.01 ± 0.4 mg/100g) were found in the leaves of the touch and dye plant (Mimisa pigra). According to phytochemical screening, the leaf's therapeutic qualities are caused by a variety of phytochemicals that are present in it. Increased home use of the touch and dye plant (Mimisa hamata) as well as industrial usage of the leaf in the creation of novel culinary items are recommended by the research.

Keywords: Qualitative; quantitative bioactive compounds; plant extracts; antioxidant effect plant; antibacterial.

1. INTRODUCTION

1.1 Background of the Study

The enormous sensitive plant, Mimosa hamata, is an annual or perennial herb that creeps. Its antidepressant, analgesic, aphrodisiac, and antiasthmatic qualities have all been noted. Due to its well-known sedative, emetic, and tonic qualities, M. pudica has been traditionally used to treat a wide range of illnesses, including as urogenital infections, tumours, alopecia, diarrhoea, and dysentery. Alkaloids, the non-protein amino acid mimosine, flavonoids C-glycosides, sterols, terpenoids, tannins, and fatty acids have all been found in phytochemical research on Mimosa pigra [1]. Mimosa pigra L., also known as uke in Igbo, exhibits two well-known movements: first, a very quick movement of the leaves in response to contact, heating, etc., and second, a very slow, periodic movement of the leaves known as nyctinastic movement which is controlled by a biological clock [2]. When repeatedly stimulated, the leaves of the sensitive plant M. pudica can adjust their closing reaction to electrical and mechanical stimulation, allowing them to open again. It takes longer to adjust the more strong the stimuli and the longer the intertribal gap. According to Ejimofor et al. [2] Mimosa pigra plants are excellent providers of therapeutic chemicals that have been crucial in preserving human health since ancient times. About 80% of the world's population uses plant extracts or their active ingredients in traditional therapies as folk medicine, and more than 50% of all current clinical medications have natural product origins. The World Health Organization states that the greatest place to get a wide range of medications is from medicinal plants.

Numerous researchers from all over the world have examined the impact of plant extracts on microorganisms, and the application of a range of plant extracts and phytochemicals—both of which have established antimicrobial qualities—can be very important in therapeutic treatments (WHO, 2012). Biologically active, naturally-occurring plant substances with the potential to prevent illness are known as phytochemicals. Because of their antioxidant properties, phytochemicals are thought to provide potential benefits in the treatment or prevention of illness. These plants' constituent phytochemicals, which have specific physiological effects on humans, are what give them their therapeutic qualities. Among these plant phytochemicals, alkaloids, saponins, tannins, glycosides, flavonoids, and phenolic components are the most significant.

When it comes to the possible pharmacological effects of these active principles, finding them in medicinal plants is crucial for the phytochemical analysis of crude plant extracts (Nweze, 2010). Phytochemistry, on the other hand, is the study of natural products. It focuses on the vast array of organic substances (Primary and Secondary metabolites) that are developed and accumulated by plants. It also addresses these substances' chemical structures, biosynthesis, turnover, metabolism, natural distribution, and biological function [3]. It is important to remember that primary metabolic products, such as proteins, sugars, lipids, and so on, are often safe, with the exception of a few rare hazardous proteins, and are thus not very interesting to those studying pharmacological action in plants.

The study's aim is to identify the bioactive substances, both qualitative and quantitative, that are found in the touch and dye plant's leaves (*Mimisa hamata*) while objectives are to identify the ethanol extract's (*Mimisa hamata*) qualitative phytochemical components, ascertain Mimisa hamata's quantitative phytochemical composition and to examine the differences in (*Mimisa hamata*) phytochemical compositions.

2. MATERIALS AND METHODS

2.1 Plant Materials

The plant materials used for this study was leaf of touch and dye plant were harvested from Oko,

in Anambra State Nigeria. The leaves was dried under room temperature, ground into powder and then extracted with 80% ethanol. The leaf of touch and dye plant was authenticated by a taxonomist in the, Department of Botany, Nnamdi Azikiwe University Awka.

2.2 Extraction of Active Principles of Touch and Dye Plant

The touch and dye plant's (Mimisa pigra) leaves were picked, dried, and then ground into powder using a Creston high-speed milling machine at room temperature (29 to 35 0C) for three weeks. One kilogramme of powdered leaves was then macerated for twenty-four hours at room temperature in five volumes (w/v) of 80% methanol. The extracts were then filtered through muslin cloth on a wool plug in a glass column. In order to avoid denaturing the active components, the resultant methanol extracts were finely filtered using Whatman filter paper No. 1, concentrated, and evaporated to dryness using a rotary evaporator at an ideal temperature of between 40 and 45 0C. The concentrated extracts were weighed and kept in clean bottles at 0°C or below until subsequently used.

2.3 Phytochemical Analysis

The qualitative and quantitative phytochemical analyses was carried out according to the method described by Harborn (1973) and Trease and Evans (1989).

2.4 Qualitative Phytochemical Analysis

Test for Alkaloids: One millilitre of 1% HCl was combined with one gramme of the extracts (1 g), heated, and then filtered. A separate two millilitres (2 ml) of the filtrate were subjected to Mayer's reagent treatment. Green precipitation or turbidity was noted to signify the presence of alkaloids. When alkaloid is present, a crimson precipitate produced by Dragendorff's reagent confirms it.

Test for Glycosides: Three milliters (3 ml) of chloroform, two milliters (2 ml) of the aqueous extracts, and one milliter (1 ml) of 10% ammonium solution were added. The development of a pink hue signifies the existence of glycosides.

Test for saponins: In a test tube, the extracts were dissolved in two millilitres of boiling water and then allowed to cool. To fully combine, the cooled ingredients were shaken. The presence of saponin was shown by the development of foam.

Tannin detection using the ferric chloride technique: After boiling one gramme (1 g) of the powdered extracts in fifty millilitres of water, it was filtered. A few drops of ferric chloride were added to 3 millilitres of the filtrates. The presence of tannin was indicated by a brownish green tint.

Test for Flavonoids: After being dissolved in 5 millilitres (950) of ethanol, two grammes (2 g) of the extracts were filtered. In a test tube, 3 ml of the rhizome filtrates and 4 ml of 1N NaOH were combined. The solution began to take on a dark yellow hue, which suggested the presence of flavonoids.

2.5 Test for Steroids

One gramme of the extracts was combined with nine millilitres of ethanol, refluxed for a short while, and then filtered. Two millilitres of chloroform and one millilitre of sulfuric acid were added to one millilitre of the extract filtrates; the creation of a reddish-brown ring at the interface suggested the presence of steroids.

Test for Phenols: In a test tube containing 0.2 g of the extract, 10 ml of methanol was added and well shaken. After letting the mixture stand for five minutes, Whatman filter paper No. 1 was used to filter it. After adding 2 millilitres of distilled water, 0.5 millilitres of sodium carbonate, and 0.5 millilitres of Folin-Ciocalteau's reagent to 1 millilitre of the filtrate, a blue-green hue developed, signifying the presence of phenols.

2.6 Quantitative Phytochemical Determination

2.6.1 Steroids

Twenty millilitres of ethanol were macerated with one gramme (1 g) of the extract. After adding two millilitres (2 ml) of chromagen solution to two millilitres of filtrate, the mixture was let to stand for thirty minutes. At 550 nm, absorbance was measured. The same process was used to create a standard utilising steroid hormone at various concentrations. An absorbance vs. concentration standard curve was then created, and the amount of steroid in the extract was inferred from the standard curve.

2.6.2 Saponins

Ten millilitres of petroleum ether were used to macerate each extract (1 g), which was then decanted into a beaker. After adding an additional 10 millilitres of petroleum ether to the beaker, the filter was heated until it evaporated completely. Six millilitres of ethanol were used to dissolve the leftovers. After that, 2 ml of the solution was added to test tubes along with 2 ml of chromagen solution. After the mixture was let to stand for thirty minutes, the absorbance at 550 nm was measured. Ursolic acid was used in the same manner and at various concentrations to create a standard. Plotting an absorbance vs. concentration standard curve allowed for the extrapolation of the extracts' saponin concentration from the standard curve.

2.6.3 Alkaloids

After dissolving an aliquot of the extract (0.5 g) in 96% ethanol and 20% H2SO4, the filtrate (1 ml) was added to 5 ml of 60% tetraoxosulphate (VI) acid and let to stand for three hours. A spectrophotometric reading was then obtained at a wavelength of 565 nm. Using caffeine, the same process was used to create a standard at various concentrations. An absorbance vs. concentration standard curve was then constructed, and the alkaloids' content in the extracts was extrapolated from the standard curve.

2.6.4 Glycosides

One gramme of the extracts was macerated in fifty millilitres of distilled water before being filtered. Four millilitres of pirate solution were added to one millilitre of filtrates, and the mixture was allowed to cool after boiling for five minutes. At 490 nm, absorbance was measured. Digitoxin was used to create a standard using the same method at various doses. An absorbance vs. concentration standard curve was then constructed, and the amount of glycosides in the extracts was calculated based on the standard curve.

3. RESULTS

The results of the phytochemical analysis of the leaf of touch and dye plant is presented in the tables below.

4. DISCUSSION

Table 1 displays the results of a phytochemical study of a touch and dye plant (*Mimisa pigra*) leaf. A phytochemical study is a valuable tool for assessing the active biological compounds found in some therapeutic plants. The plant's therapeutic qualities may be related to the bioactive chemicals found in the ethanol extracts being examined. All seven of the criteria that were examined—flavonoids, alkaloids, tannins, phenol, steroids, glycosides, and saponins—were present in the extracts. Alkaloids (1021 ± 13.2 mg/dl) were found to be the most abundant phytochemical in the leaf of the touch and dye plant (Mimisa pigra), followed by flavonoids (243 ± 41 mg/dl), phenol (674.23 ± 00 mg/100g), tannin (14.34 ± 0.4 mg/100g), saponin (1.6 ± 0.1 mg/100g), steroids (1.01 ± 0.0 mg/100g), and glycoside (0.01 ± 0.4 mg/100g) is the least. The leaf's high concentration of phenol and alkaloids demonstrated their biological effects, which included improvement of endothelial function, cardiovascular protection, anti-aging, anti-carcinogen, anti-inflammation, anti-atherosclerosis, and inhibition of angiogenesis and cell proliferation [4]. Red blood has the ability to precipitate and coagulate due to saponins. These herbs are used to heal wounds and to halt bleeding [5]. They have the ability to permeabilize cell membranes and produce foam. Their surfactant qualities give them a soapy feel [6]. According to Nwakoby et al., [7] tannins have astringent qualities and speed up the healing of wounds and irritated mucous membranes. Tannins have the ability to act as biological antioxidants, proton precipitating agents, and metal ion chelators. Ellagitannins have the ability to scavenge free radicals.

Table 1. Qualitative phytochemical composition

Phytochemicals	
Alkaloids	+
Glycoside	+
Saponins	++
Tanins	+
Flavonoids	+
Steroids	+
Phenols	+

+ = Moderately present, ++ = Abundantly present

As antibacterial substances, phytochemicals have greatly aided in the prompt and efficient treatment of microbial contamination and plant diseases under various agricultural circumstances the outcomes.

This result is in line with a publication by Haristoy et al. [8] that revealed comparable compounds to have antibacterial and antiprotozoal properties.

Additionally, it has been shown that flavonoids may be more beneficial to human health [9]. Triterpenes, glycosides, and fatty acids were found in watermelon fruits according to a phytochemical examination conducted by Ejmofor et al. [9] utilising a variety of solvents, including petroleum ether, chloroform, and methanol. All of the leaf extracts examined in this investigation lacked the other phytochemicals.

Table 2. Quantitative phytochemical composition

Phytochemicals	Quantities
Alkaloids	1021 ± 13.2 mg/dl
Glycoside	0.01 ± 0.4 mg/100g
Saponins	1.6 ± 0.1 mg/100g
Tanins	14.34 ± 0.4 mg/100g
Flavonoids	243 ± 41 mg/dl
Steroids	1.01 ± 0.0 mg/100g
Phenols	674.23 ± 00 mg/100g

Flavonoids: possess anti-inflammatory, anti-oxidant, antiviral, and anti-carcinogenic qualities that contribute to their protective benefits. Typically, they may be found in a range of oranges, tangerines, berries, apples and onions *Citrullus lanatus* can be a good dietary source of flavonoids. It has been demonstrated that several phytochemicals, including alkaloids, steroids, flavonoids, and saponins, have anti-inflammatory properties. The presence of alkaloids, flavonoids, and saponins in the touch and dye plant (*Mimisa pigra*) supports the use of this plant in the treatment of several disorders, including birth defects and stomach issues, even if terpenoids were lacking. The application of touch and dye plant (*Mimisa pigra*) leaf extract in ethnomedicine for the treatment of different illnesses is explained by the presence of these phytochemicals, particularly the phenols and flavonoids.

5. CONCLUSION

Touch and dye plant (Mimisa pigra) leaves are rich in phytochemicals, including steroids, alkaloids, tannins, glycosides, and flavonoids. These plants demonstrate that they are extremely therapeutic and suitable for ingestion by humans by carrying all of these compounds. The information on the phytochemical components and their ethno-medical qualities is intended to be helpful in agriculture as a food supplement and for assessing the plant's potential as a medicinal tool, which might result in the creation of new drugs.

6. RECOMMENDATIONS

1. it is very desirable to do additional screening of these plant extracts in order to identify all of their active components by the identification and separation of their phytochemical constituents as well as additional pharmacological analyses.
2. Because it contains a bioactive component, the touch and dye plant (Mimisa pigra) leaf is advised for use in herbal therapy.
3. I suggested that additional study be done for suitable application in the pharmaceutical industry, given the leaves' enormous phytochemical content.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Ejimofor CF, Nwakoby NE, Oledibe JO, Afam-Ezeaku Eziamaka. Determination of proximate and phytochemical composition of three species of Beans sold in Uli. Asian Journal of Food Research and Nutrition. 2023;2(4):125-134.
2. Ejimofor CF, Nwakoby NE, Oledibe JO, Afam-Ezeaku Eziamaka. Isolation and identification of fungi associated with Avocado pear (Persea Americana Mill). International Journal of Pathogen Research. 2022;11(3):1-13.
3. Ejimofor CF, Nwakoby NE, Oledibe JO, Afam-Ezeaku Eziamaka and Mbaukwu Onyinye. Proximate analysis of pear and green mango. Evaluation of macro and micro nutrient content of peels, fruit and seed. Asian Journal of Research in Crop Science. 2023;8(4):125-134.
4. Ejimofor CF, Nwakoby NE, Oledibe JO, Afam-Ezeaku Eziamaka and Mbaukwu Onyinye. Proximate, Mineral and Microbial analysis of locally produced juice (Kunu, Soymilk and Tigernut). Asian Journal of of Food Research and Nutrition. 2023; 2(3):36-47.
5. Ejimofor CF, Nwakoby NE, Oledibe JO, Afam-Ezeaku Eziamaka and Mbaukwu Onyinye. Comparative analysis of nutritional and vitamin content of sweet orange, watermelon and pineapple fruits. Asian Journal of Research in Crop Science. 2023;8(3):138-145.

6. Ejimofor CF, Nwakoby NE, Oledibe JO, Afam-Ezeaku Eziamaka and Mbaukwu Onyinye. The phytochemical and antifungal efficiency of bean leaf and root against some pathogenic fungi isolated from some spoilt vegetables sold within Anambra Metropolis.. Asian Journal of Biochemistry, Genetics and Molecular Biology. 2023;13 (3):23-36.
7. Nwakoby NE, Ejimofor CF, Oledibe JO, Afam-Ezeaku Eziamaka. Proximate analysis and mineral composition of peels of three varieties of sweet cassava. Asian Journal of Microbiology and Biotechnology. 2022;7(2):35-41
8. Haristoy X, JW Fahey I, Scholtus A, Lozniewski. Evaluation of antimicrobial effect of several isothiocyanates on Helicobacter pylori. Planta Medica. 2015; 71:326-330.
9. Ejimofor CF, Nwakoby NE, Oledibe JO, Afam-Ezeaku Eziamaka and Mbaukwu Onyinye. Estimation of caffeine and Vitamin B-complex (Vitamin B2, B3, B5 and B6) constituents of selected energy drinks. Journal of App. Chem. Int. 2023; 1413):42-48.

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