INTRODUCTION

Plants have been serving as sources of food and medicine since the beginning of mankind (Wink, 2012). Recently, the knowledge and usage of medicinal plants has increased the ability of pharmacists worldwide in facing the challenges of providing adequate medical solutions to several diseases of mankind (Wink, 2012). The non-nutritive plant chemical substance or compound/bioactive components are often referred to as phytochemicals (from the Greek word meaning ‘plant’) or phyo-constituents which are responsible for protecting plants against microbial and fungal infections or infestations by pests (Casciano et al., 2019). Hypoestes is a flowering plant with a genus comprising of several species and Hypoestes rosea is one of these species. Although a few research have been done on Hypoestes rosea, but not much have been done to find out the actual proximate and phytochemical compositions of this species of Hypoestes (Hypoestes rosea).

However, Hypoestes rosea has been said to be used in different traditional medicine for the treatment of ailments such as skin diseases, respiratory infections, anemia, malaria, scabies, typhoid, hypertension and gonorrhea (Kunle et al., 2011). The ethno-pharmacological studies of other species of the plant belonging to this genus indicated that they possess various bioactivities as cytotoxic, anti-leismanial, anti- malarial, antimicrobial, antioxidant and anti-trypansomal, which is the reason they are being used as medicinal plants.

Traditionally, Hypoestes rosea has also been used in treating several diseases including malaria, typhoid fever, anemia and other related diseases. Also, consumption of vegetable for nutritional values is becoming expensive, and the nutrients in vegetable are necessary for healthy living. Some Leafy vegetables contain plant anti-oxidants and other properties which help in promoting and maintaining good health, as well as prevention of disease (Hanit et al., 2006). It is therefore essential to find out the proximate and some phytochemical compositions of Hypoestes rosea leaves. Vegetables are the edible parts of plants that are consumed widely or in parts, raw or cooked as part of main dish or salad. Vegetables may include leaf, stem, bark, root, flower, seed, fruits, bulb, tuber, and fungi. Vegetables are good sources of carbohydrates, minerals and vitamins depending on the vegetable consumed (Ihekorenye and Ngoddy, 1990). In many developing countries example Nigeria, the supply of minerals is inadequate to meet the mineral requirements of the rapidly growing human population; hence consumption of edible plant as sources of food is beneficial. These vegetables apart from healing provide the necessary nutrients for health and development of the body (Olujobi, 2001).

Vegetables are highly beneficial for maintaining good health and also for the prevention of diseases when consumed or utilized, they help to improve and build up the immune system (Hanit et al., 2006). They may be aromatic, bitter or tasteless, but are the cheapest and most accessible sources of proteins, vitamins, minerals (Fasuyi, 2006). The fresh leaves of Hypoestes rosea is used as traditional medicine for the treating of various illness such as, typhoid, anemia, malaria, hypertension and other disease. Hypoestes rosea has been found to possess varied bioactivities as anti-inflammatory, antibacterial, anti-malarial (Mensah et al., 2008). It becomes necessary to investigate the traditional use of Hypoestes rosea, which lack adequate research and information on the nutritional values of this plant. Therefore it is imperative to find out the phytochemical composition of this plant so as to encourage its consumption as a vegetable.

MATERIALS AND METHODS

Chemicals and Reagents

Wagner's reagent, concentrated sulphuric acid, petroleum ether, 0.5ml chloroform, 10% lead acetate, 5% sodium bicarbonate, methanol, concentrated ammonia, dilute ammonium hydroxide, ethanol, acetic
acid, distilled water, 5% sodium chloride, n-butanol, diethyl ether, perchloric acid.

Equipment and glassware
The following equipment and glassware were used in the course of this research; soxhlet extractor, condenser, flat bottom flask, dropper, hot plate, retort stand, burette, stopper, weighing balance knife, beaker, pipette, test tubes, separating funnel filter paper, glass wool, glass rod, oven, measuring cylinder, volumetric flask pistle and mortar.

Collection and treatment of plant material
Mature leaves of *Hypoesthes rosea* were collected from a garden at 8-miles, Calabar. The leaves were taken to Pure and Applied Chemistry Laboratory, University of Calabar, Calabar. The leaves were plug off from its stem and thereafter dried at room temperature and ground using a grinder and stored for biochemical analysis.

Phytochemical analysis
Phytochemical screening are simple but standard chemical test for detecting terpenoids, alkaloids, flavonoids, and saponins in plant extract.

Extraction procedure
Soxhlet extraction is a piece of laboratory apparatus invented in 1879 by Frank Von Soxhlet. The solvent used in the process was methanol. 50.0g of the ground dried sample was weighed into the soxhlet extractor connected to the neck of the 500ml flask containing the solvent (methanol) 300ml held over the heating mantle. Vapour produced from the heating solvent evaporate to the soxhlet through the side arms and condensed by passing through the condenser. The solvent then condenses and drops on plant powder in the soxhlet dissolving the required substance, the solution is filtered through the downward arm (reflux arm) into the flask holding the solvent, and this process continued until the solvent that passed through the arm became colorless. The extract was distilled to recover solvent and finally evaporated to obtain solid sample for the phytochemical test. Phytochemical screening is divided into two which are; qualitative and quantitative analysis. Qualitative analysis is the presence of a particular phytochemical, while quantitative has to do with amount of phytochemical that was present in a plant extract. Qualitative and quantitative analysis was carried out on the test sample using methods as described by (AOAC, 2005); Trease & Evans (2005) including percentage composition of Alkaloids, Saponins, Terpenoids, and Flavonoids.

Qualitative analysis

**Test for Alkaloid (Trezé & Evans, 2005)**
5ml of the sample extract was measured into a test tube, and few drops of Wagner's reagent was added and the formation of reddish brown precipitate indicates the presence of Alkaloids.

**Test for Flavonoids (AOAC, 2005)**
5ml of the sample extract (Hypoestes rosa) was measured into a test tube with few drops of 10% lead acetate solution was added.

**Observation**
Appearance of yellow color precipitate indicates the presence of Flavonoids.

**Test for Saponins (Trezé & Evans, 2005)**
5ml of the sample extract was measured into a test tube, followed by few drops of 5% sodium bicarbonate solution. The mixture was shaken vigorously and allowed to stand for 3 minutes.

**Observation**
Formation of honey comb-like froth shows the presence of Saponins.

**Test for Terpenoids (AOAC, 2005)**
1ml of the sample extract was measured into a test tube with 0.5ml chloroform been added, followed by a few drops of concentrated sulphuric acid.

**Observation**
Formation of reddish brown precipitate indicates the presence of Terpenoids in the extract.

**Quantitative Analysis**

**Test for alkaloid (AOAC, 2005)**
5g of the sample was weighed into a beaker, 100cm³ of 100% acetic acid in ethanol (1:1 ratio) was measured into the sample container and covered to stand for 4 hours. The extracted sample was filtered after four hours, it was then concentrated using water bath to a quantity of the original volume. Ammonia solution was added to the concentrated sample (extract) drop wise until the precipitate was completed. The precipitate was then allowed to settle, and was filtered and washed with dilute ammonium hydroxide. The residue left was taken as the crude alkaloid.it was then dried in an oven and weighed.

**Test for Flavonoid (AOAC, 2005)**
The sample (5 g) was weighted into a beaker and extracted with 50cm³ of 80% methanol at room temperature for 1 hour. The solution was filtered using weighed washtman filter paper. The filtrate was evaporated to dryness over water bath and put in the oven. The weight of the dried extract was weighed.

**Saponin test (Trezé & Evans 2005)**
The sample (5 g) was dispensed in 50cm³ of 20% ethanol in a beaker. The suspension was heated over a hot water bath for 4hrs with a continuous stirring at about 60°C. The mixture was filtered after four hours and the residue was re-extracted with another 20cm³ of 20% ethanol. The combined extract was concentrated to reduce to 40cm³ over water bath at 90°C. The solution was transferred into a separatory funnel and 20cm³ of diethyl ether was added and shaken thoroughly. The aqueous layer of the extract was recovered, while the ether layer was discarded. The purification process was repeated and 60cm³ of n-butanol was added and the extract was washed twice with 10cm³ of 5% aqueous sodium chloride. The remaining extract was evaporated in a water bath and dried in an oven to a constant weight.

**Test for Terpenoid (Ladan et al., 2014; Ferguson, 1956)**
The crude Terpenoids of *Hypoesters rosea* were obtained by soaking 5g of the powdered leaves in 50ml of 25% ethanol for 24 hours. The extract was filtered and the filtrate extracted with petroleum ether (boiling point 60°C -90°C) and concentrated to dryness.

**Proximate analysis**

**Moisture content determination**
The moisture content of the whole plant was determined by weighing 2.0g of the fresh leaf sample into an empty crucible of known weight. The crucible was placed in a vacuum electrostatic oven at 80°C for 24 hours. The crucible and the content were cooled in a dessicator containing magnesium sulphate as a drying agent. (AOAC, 1984)

**Determination of ash content**
A crucible was thoroughly washed and dried in an oven for 2 hours and cooled to room temperature in dessicator. 2.0g of the sample was accurately weighed and placed in a muffle furnace and ash at 600°C for 3 hours. At the end of the ash period, the ash sample was removed and it was placed in a dessicator to cool at room temperature.

**Fiber content determination**
Free fat sample (5 g) was weighed out into a 250ml beaker and boiled with 100ml of distilled water for 30 minutes with constant stirring. After boiling the sample was filtered and washed with H₂SO₄ solution, followed by washing with distilled water to remove the acid content. The residue was further treated with 100ml of 2% NaOH solution and washed with distilled water. The residue was further treated with ethanol and filtered, followed by washing with distilled water. The residue was ignited in an oven at 550°C.

**Determination of protein content**
Digestion: 5.0g of the ground sample was weighed into 250ml standard kjeldahl flask and 20ml of concentrated H₂SO₄ was introduced into the flask containing the sample and anti-bombing was added. The bottle was placed under a tap and shaken gradually.10g of sodium sulphate (Na₂SO₄) was introduced into the flask followed by 3g of copper sulphate (Cu₂SO₄). The flask was placed in the fume cupboard under low temperature in order to avoid explosion. The flask was allowed to heat for about 3-4 hours, it was brought out and allowed to cool. 100ml of distilled water was added to the sample, the sample changed from milky color to sea blue.

**Distillation**: 10ml of the protein digest was measured and a few gram of anti-bombing was introduced into a 250ml flask. The beaker which was used as a receiver, 10ml of 2% Boric acid was added and a drop of double indicator (methyl red and methyprotein, the boric acid became blue. 30ml of 40% NaOH was introduced into the protein digest when it started boiling. The protein digest started dropping into the boric acid and there was change in color from deep blue to sea blue.
PROXIMATE AND PHYTOCHEMICAL L … Bassey et al

Titration: 0.1m of HCl was prepared and poured into a burette. The sample that entered the receiver was used for titration, there was a change in color from sea blue to purple pink, indicating the presence of protein.

Crude fat extraction and determination
The fat content in the sample extract (Hypoestes rosea) was determined by using 10.0g of the dried ground sample, the sample was placed in a Soxhlet extractor with petroleum ether as extracting solvent. The sample was weighed into a thimble and 150ml of ether was measured into a 250ml flat bottom flask of known weight. Soxhlet extractor which carries one thimble was fitted into the flask followed by a condenser which was connected to a tap. As the ether in the flask begins to boil, it evaporates and drops back into the flask. This is done repeatedly until the fat content is being extracted. Hence, the ether content was evaporated in a water bath. Measurement was made to obtain the weight of the fat.

Determination of total carbohydrate
The calculation was done by the differential method which is; total CHO=100 (\% moisture + fat + protein + fiber). That is carbohydrate=100 subtract all the percentage from 100, the value that was obtained is CHO content.

Determination of vitamins concentration
The vitamin concentration in Hypoestes rosea were determined according to the procedure of Association of Official Analytical Chemist (AOAC, 1990) to determine the various vitamins as detailed below.

Determination of Vitamin A concentration
Vitamin A was determined by soaking 1g of the sample in 5ml of methanol for 2hrs at room temperature under dark condition, in order to get a complete extraction. The vitamin A layer was separated using hexane through separating funnel. The volume was made up to 10ml with hexane and when this layer was passed through sodium sulphonate through a funnel in order to remove any moisture from the layer. The absorbance of the layer was measured at 436 nm using hexane as a blank.

Determination of Vitamin B₁₂ concentration
Vitamin B₁₂ was determined with 30 ml of sodium acetate buffer ph 4.0/ at 100degrees Celsius for 35 minutes in the presence of sodium cyanide, followed by a purification prior to the LC analysis. An enzymatic hydrolysis (pepsin at 37 degrees Celsius and ph 4 to 3 hr) prior to purification step efficiently released the bound vitamin B₁₂ content in food products. Vitamin B₁₂ was monitored by UV at 361 nm after its separation on a reverse phase narrow layer. The absorbance of the layer

Proximate analysis

Titratable acidity

Procedure for potassium determination

Analytical procedures

Titratable acidity

Analysis of the results

Determination of Vitamin E concentration
One gram (1g) of the original sample was weighed, macerated with 20 ml of n hexane in a test tube for 10 minutes. The solution was filtered; 3ml of the filtrate was transferred into a dry test tube in duplicates and evaporated to dryness in a boiling water bath. Following this, 2ml of 0.5% of dehydroascorbic acid was added and boiled for 30 minutes in a water bath. Then 3mls of n hexane was added and was shaken vigorously. The n-hexane was transferred into another set of test tubes and evaporated to dryness. A volume, 2ml of ethanol was added to the residue.

Determination of Vitamin C by titration

Reagents

Determination of Vitamin C by titration

Reagents

Iodine solution: (0.005 mol) weigh 2g of potassium iodide into a 100ml beaker. Weigh 13g of iodine and add it into the same beaker. Add a few ml of distilled water and swirl for a few minutes until iodine is dissolved. Transfer iodine solution to a 1L volumetric flask making sure to rinse all traces of solution into the volumetric flask using distilled water. Make the solution up to the 1L mark with distilled water.

Starch indicator solution (0.5 %): weigh 0.25g of soluble starch and add up to 50 ml of near boiling water in a 100 ml conical flask. Stir to dissolve and cook before using.

Method

Introduce 100g sample into a mortar and pestle and grind, add 10ml portion of distilled water. Several times while grinding the sample, each time decant off the extract into a 100ml volumetric flask. Finally, strain the ground sample pulp through cheese cloth, rinsing the pulp with a few 10 ml portions of water and collecting all filtrate and washing in the volumetric flask, make the extracted solution up to 100ml in a volumetric flask.

Titration

Pipette a 20 ml aliquot of the sample solution into a 250 ml conical flask and add about 150ml of distilled water and add 1ml of starch indicator solution.

Titrant

Prepare a 0.005mol iodine solution. The end point of the titration is identified as the first permanent trace of a dark-blue black colour due to the starch iodine complex.

Calculation

Calculate the average volume of iodine solution used from your concordant titer.

Calculate the moles of iodine reacting.

Using the equation of the titration below, determine the number of moles of ascorbic acid reacting:

Ascorbic acid + I₂ → 2I⁻ + dehydroascorbic acid

Determination of Vitamin E concentration

One gram (1g) of the original sample was weighed, macerated with 20 ml of n hexane in a test tube for 10 minutes. The solution was filtered; 3ml of the filtrate was transferred into a dry test tube in duplicates and evaporated to dryness in a boiling water bath. Following this, 2ml of 0.5% dehydroascorbic acid was added and boiled for 30 minutes in a water bath. Then 3mls of n hexane was added and was shaken vigorously. The n-hexane was transferred into another set of test tubes and evaporated to dryness. A volume, 2ml of ethanol was added to the residue.

Determination process for the minerals

Apparatus:

Beaker

Weighing balance

Volumetric flask

Hot plate

Measuring cylinder

Glass funnel

Filter paper

Reagents

Aqua regia (HNO₃: HCl:1.3 V/V)

Concentrated Perchloric acid (HClO₄)

Method

About 1g portion of crushed leaf sample is accurately weighed into a conical flask. Then 15 ml of aliquot of aqua regia (HNO₃: 1.3 V/V) is to be added followed by 5ml of concentrated Perchloric acid (HClO₄) and it is allowed to stand at room temperature for an hour before the mixture is then emptied into a tefllour vessel were it is properly corked and placed in a hot plate and is heated at 120 degree Celsius for 23 hours until a clear solution is obtained. The mixture is then transferred into 50ml volumetric flask and is allowed to cool and the volume is adjusted to the mark with deionised water. Then the prepared sample is finally transferred into a corked glassy container, labeled and UV analysis is carried out.

Procedure for iron determination

Procedure for zinc determination

To 50 cm³ of acidified H₂O sample, 20 cm³ of phenanthroline solution and 10 cm³ of aminovinil acetate buffer solutions were added and shake vigorously for 2 minute. It was then distilled to 100 cm³ and was allowed to stand for 10 minutes for the colour intensity to develop. The iron content was measured in the spectrophotometer at the wavelength of 510 nm.

Procedure for potassium determination

To 50 cm³ of the sample, 6N sodium hydroxide or hydrochloric acid was used to adjust the ph oh the water to ph 7. To 10cm³ of prepared sample of sodium ascorbate, 5 cm³ buffers, 2 cm³ KCN and 3cm³ of zinc ion reagent was added to the sample and shaken vigorously. 1cm³ of cyclohexane was added to the sample and swirled for few seconds. The zinc concentration was then determined with the spectrophotometer at the wavelength of 620 nm or 535 nm.

Procedure for calcium determination

About 5 ml of sample was pipette into a test tube in duplicate. Then 2mls of cobal nitrite was added, shaken vigorously and allowed to stand for 45 minutes and then centrifuged for 15 minutes. The supernatant was drained off and 2mls of ethanol was added to the residue. The solution was shaken vigorously and centrifuged for...
another 15 minutes. The supernatant was drained off and 2mls of distilled water was added to the residue. The solution was boiled for 10 minutes with frequent shaking to dissolve the precipitate. About 1ml of 1% of choline hydrochloride and 1ml of 2% sodium ferric cyanide was added. Then 2ml of distilled water was also added and the solution was shaken to mix well. The absorbance was taken at 620 nm against the blank.

**Procedure for sodium determination**

A 1g of the leaf sample is placed in 100ml volumetric flask. To this, 10 ml of acid mixture is added and the content of the flask is mixed by swirling. The flask is placed on low heat hot plate in a digestion chamber. Then the flask is heated at higher temperature until the product of red NO2 fume ceases. The contents are further evaporated until the volume is reduced to 35 ml but not to dryness. The complete digestion is confirmed when the liquid becomes colourless. After cooking the flask, add 20 ml of deionized water. Volume is made up by deionized water and the solution is filtered with filter paper. The digest is diluted to a suitable concentration range so that the final concentration lies between 0 to 5 ppm. The sample is then read in a flame photometer at 598nm wavelength.

**Procedure for chloride determination**

Select test, insert an adapter it requires. Fill the sample cell with 10 ml of the sample. Fill another sample cell with 10ml of deionized water. Pipet 0.8ml of mercuric thiocyanate solution into each sample cell. Swirl to mix. Pipet 0.4ml of ferric iron solution into each sample cell. Swirl to mix. An orange colour will develop if chloride is present. Start the instrument timer. A two minute reaction time will begin. Within 5 minutes after the time has expired, wipe the blank and insert it into the holder. Calibrate the instrument. The display will show a 0.0mg/L Cl-. Wipe the prepare sample and insert into the cell holder, and read the results in mg/L Cl-

**Statistical analysis data**

Data are presented as mean ± SEM. Data were analyzed using a one way analysis of variance (ANOVA) with SPSS (version 20) window statistical software programme Student “t” test was used for pair-wise comparison and differences were considered significant at p<0.05.

**RESULTS**

Qualitative phytochemical screening of hypoestes rosea the result of phytochemical screening of hypoestes rosea leaves indicates the presence of saponin, terpenoids, flavonoids, and alkaloids as shown on the table below:

| Phytochemicals | Qualitative screening |
|----------------|-----------------------|
| Terpenoids     | ++                    |
| Flavonoids     | +++                   |
| Saponins       | +++                   |
| Alkaloids      | ++                    |

**Key**

| ++ | Moderate concentration |
| +++| High                    |
| High| High concentration      |

**Quantitative phytochemical composition of Hypoestes rosea**

The quantitative analysis of the extract of *Hypoestes rosea* leaf showed following values; terpenoids 3.3 ± 0.32, saponins 17.86 ± 0.14, Alkaloids 4.34 ± 0.36, Flavonoids 11.935 ± 0.065 (Note; all values are in mg/100g of extract)

| Phytochemicals | Composition (mg/100mg) |
|----------------|------------------------|
| Flavonoids     | 11.935±0.065           |
| Saponins       | 17.86±0.14             |
| Alkaloids      | 4.34±0.36              |
| Terpenoids     | 3.33±0.32              |

**Proximate composition of hypoestes rosea**

The proximate composition of *hypoestes rosea* leaf are as follows; moisture 62.50 ± 2.50, ash 8.50 ± 0.25, Fat 8.60 ± 0.074, crude fiber 12.11 ± 0.154, protein 2.90 ± 0.095, carbohydrates 9.06 ± 1.73.

| Parameters | composition (%) |
|------------|----------------|
| Moisture   | 62.50 ± 2.50   |
| Ash        | 8.50 ± 0.25    |
| Fat        | 8.60 ± 0.074   |
| Crude fiber| 12.11 ± 0.154  |
| Protein    | 2.90 ± 0.095   |
| Carbohydrate| 9.06 ± 1.73   |

**Elemental Composition of Vitamins in Hypoestes Rosea in mg/100g dry matter.**

The result of the vitamins (vitamin A, vitamin B12, vitamin C and vitamin E) composition of *hypoestes rosea* in mg/100g dry matter is as stated in table 6 below.
Result of vitamin composition showed that *hypoestes rosea* sample contains 0.033 ± 0.0001 (mg/100g) of vitamin A, 0.065 ± 0.0005 (mg/100g) of vitamin B₁₂, 0.0455 ± 0.0005 of vitamin C, and 0.1655 ± 0.0005 of vitamin E respectively. It was observed that a 100g of *hypoestes rosea* contains vitamin C (0.0455 ± 0.0005) as the highest followed by vitamin B₁₂ (0.0365±0.0005).

### Table 4: Elemental composition of vitamin A in *Hypoestes rosea* in mg/100g dry matter (Mean ± SD)

| Vitamin | (mg)       |
|---------|------------|
| Vitamin A | 0.033 ± 0.0001 |
| Vitamin B₁₂ | 0.0365 ± 0.0005 |
| Vitamin C | 0.0455 ± 0.0005 |
| Vitamin E | 0.1655 ± 0.0005 |

**Elemental Composition of Minerals in *Hypoestes Rosea* in mg/100g dry matter**

The result of mineral composition showed that *Hypoestes rosea* contains 0.035 ± 0.00495 of Fe, 0.225 ± 0.0005 of Zn, 1.045 ± 0.00495 of K, 2.12 ± 0.0 Of Na, 0.26 ± 0.01 of CL- respectively. It was observed that a 100g sample of *Hypoestes* contained the highest amount of sodium (2.12 ± 0.01), followed by potassium (1.045 ± 0.00495) and Iron (0.035 ± 0.00495).

### Table 5: Elemental Composition of Minerals in *Hypoestes rosea* in mg/100g dry matter Mean ± SD

| Minerals | (mg)       |
|----------|------------|
| Iron (Fe) | 0.035 ± 0.00495 |
| Zinc (Zn) | 0.225 ± 0.0005 |
| Potassium (K) | 1.045 ± 0.00495 |
| Sodium (Na) | 2.12 ± 0.00 |
| Chloride (Cl⁻) | 0.26 ± 0.01 |

Table 5 shows the elemental composition of minerals in *hypoestes rosea* after the standard deviation has been calculated.

**DISCUSSION**

Relatively few studies have mentioned the phytochemical constituents of *hypoestes rosea* leaves. The present study carried out on *hypoestes rosea* leaves revealed the presence of active medicinal constituents. This study on *hypoestes rosea* leaves revealed the presence of terpenoids, saponins, alkaloids, and flavonoids. The phytochemical composition found in the literature showed abundance of saponin, flavonoid compositions for leaves. Potassium is involved in the regulation of body tissue fluids, They also help complete the absorption of vitamin C. The bioactive components of the medicinal plant indicate it has therapeutic importance to human health. Therefore, the nutrient

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contained in this medicinal plant if consumed as food could help in maintaining good health and replace death cells. Hence, the plant might also contribute greatly to human nutritional requirement for normal growth and development against some molecular disorders and complications.

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CONFLICT OF INTEREST
The authors declare no conflict of interest.

REFERENCES
A.O. A. C. (2005). Association of official Analytical Chemists. Official methods of analysis of the AOAC, 5th Edn, Washington, D. C.

AOAC, 1984. Official Method of Analysis. Association of Official Analytical Chemists, Washington, DC

Batra, J. and Seth, P. K. (2002). Effect of Iron deficiency on developing rat brain. Indian Journal Clinical Biochemistry. 17(2): 108-114.

Berend, K., Hulsteijn, L. H. and Gans, R. O. (2012 ). Chloride: the queen of electrolytes 23(3): 203-11.

Casciaro, B., Calcaterra, A., Cappiello, F., Mori, M., Loffredo, M. R., Ghirga, F., Mangoni, M. L., Botta, B. and Quaglio, D. (2019). Nigritanine as a New Potential Antimicrobial Alkaloid for the Treatment of Staphylococcus aureus-Induced Infections, Toxins, 11(4): 511

Elizabeth, K. (1994). Textbook of Immense help from Natures Workshop, (1st ed.) Elikad Acaath Services.

Fasuyi, A. O. (2006). Nutritional potential of some tropical vegetable leaf Meals: Chemical characterization and functional properties. African Journal Biotechnology, 5(1): 49-53.

Hanit, R. Z., Igabal, M., Iqba, S., Hanit, L. and Rasheed, M. (2006). Use of vegetable as nutritional food role in human health. Journal of Agricultural and Biological Science. 1(1): 18-28.

Hsu, C.L., Chen, W., Weng, Y.M. and Tseng, C.Y. (2003). Chemical composition, physical properties, and antioxidant activities of yam flours as affected by different drying methods. Food Chem. 83(3): 85–92.

Hussain, J., Khan, A.L., Rehman, N., Hamayun, M., Shinwari, Z.K., Ullah, W. and Lee, I.J. (2009). Assessment of herbal products and their composite medicinal plants through proximate and micronutrients analysis. Journal Medicinal. Plants Research, 3(1): 1072-1093.

Ihekonye, A. I. and Ngoddy, P. O. (1990). Tropical fruits and vegetables in Integrated Food Science and Technology for the tropics. Macmillan Publishers, London, pp. 293-304.

Kittakoop, P., Mahidol, C. and Ruchirawat, S. (2014). "Alkaloids as important scaffolds in therapeutics drugs for the treatments of cancer, tuberculosis, and smoking cessation". Curr Top Med Chem. 14(2): 239-252. doi:10.2174/1568026613666131216105049. PMID 24359196.

Kunle, O. F., Agbo, M. B., Okhale, S. E., Jegede, I. A. and Okogun J. I. (2011) Phytochemical and Pharmacognostic Standardization of the Leaf of Hypoestes rosea P. Beauv Acanthaceae International Research Journal of Plant Science. 2(11): 323-327

Lim, A. A., Kim, J. A., Sung, M. K. and Kim, M. K. (2006). Genistein induces glucose-regulated protein 78 in mammary tumor cells. Journal of medicinal food. 9(2):28-32.

Lukaski, C. H. (2004). Vitamins and minerals status: Effect on physical performance Nutrient Research Centre. Grand Forkes, North Dakota, USA 20(4): 632-644.

Mensah, J. K., Okoli, R. I., Ohagu-Obodo, J. O. and Lifiediyi, K. (2008). Phytochemical nutritional and medicinal properties of some leafy Vegetables consumed by Edo people of Nigeria. African Journal of Biotechnology, 7(3): 2304-2309.

Ojo-Amaize, E. A., Howard, B. C., Olusola, A. O., Okogun, J. I. and Emeka, J. N. (2007). Hypoestes inhibits tumor growth in the mouse CT26 colon tumor model. World Journal of Gastroenterology. 13(34): 4586-4588.

Olujobi, O. J. (2001). Medicinal plant used for traditional medicine in Ekiti State, Nigeria. Researches in Agricultural Science. 1(2):66-72.

Rwaida, A. and Al-Haidari, G. (2018). A renew of traditional uses, phytochemical and bioactive of the genus hypoestes. African Journal Traditional Complement Alternative Medicine, 15(3): 1-17.

SACN, (2008). Draft SACN position statement on dietary fibre and health and the dietary definition-August 2008. SACN/08/20.

Soetan, C. O., Johnson, B. E. and Wolf, G. (1960). Vitamin Hormone:18, 457. K. O. Olayia and O. C. Oyewole (2010). The importance of mineral elements for humans, domestic animals and lants. A review. African Journal of Food Science, 4 (5): 200-222.

Wink, M. (2012). A Source of Anti-Parasitic Secondary Metabolites. Molecules. 17(6): 12771–12791

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