ABSTRACT
The stems, leaves and petals (flowers) of Ipomoea involucrata P. Beauv. were screened for their phytochemical constituents, nutrients and anti-nutrient properties. The phytochemical analysis of the leaves, stem and petals (flowers) revealed that, saponins, tannins, flavonoids, alkaloids, anthraquinones were present in all the plant parts. This suggests the anti-malarial, antifungal, antibacterial and antiasthmatic properties of the plant. Ipomoea involucrata was assessed for its nutritional and anti-nutritional values and it revealed that the content of carbohydrate was high for the leaves (71.9%) and low for the petals (flowers) (46.50%), which implies that the plant may have potential for providing energy. The crude protein indicated that the leaves had 10.5% and the petals (flowers) had 2.02% which is required for the maintenance of tissues.

KEYWORDS: Ipomoea involucrata, phytochemical, nutrients, antinutrients, Convolvulaceae, leaves, stems and petals.

INTRODUCTION
The practice of traditional medicine using medicinal plants has a long history in many cultures. This type of health care can be described as herbalism or botanical medicine. The growing sophistication in lifestyle among world population makes it imperative to refer to herbal practice as alternative or complementary medicine, to appeal to a cross section of people irrespective of their cultural affiliation.[1,2] Medicinal plants are the richest bio-resource of drugs of traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicine, pharmaceutical intermediates and chemical entities for synthetic drugs.[3]

The use of traditional medicine is important for the treatment and management of a number of diseases on the African continent, as a lack of basic health care and medical personnel makes it difficult to treat rural populations. Medicinal plants will be the best source to contribute useful information to the users. The significance of this study is to justify and ascertain that Ipomoea involucrata has various therapeutic uses for the synthesis of drugs and medicinal plants.

MATERIALS AND METHODS
Plant Collection
The fresh leaves, stems and petals of Ipomoea involucrata were collected from the main campus and town campus of the University of Uyo, Uyo Local Government Area of Akwa Ibom State on 15th September, 2014. The plant was authenticated by Dr. (Mrs.) U. A. Essiett, a taxonomist in the Department of Botany and Ecological Studies, University of Uyo, Uyo.
Figure 1: Ipomoea involucrata showing leaves and folded petals.

Phytochemical Screening
The fresh stems, leaves and petals (flowers) were air dried and reduced to powder with the aid of a mortar and pestle. The powdered samples were accurately weighed and macerated cold in 50% ethanol and distilled water for 72 hours at room temperature following the method suggested by Sofowora. The liquid extract were recovered by filtration using cotton wool and glass funnel. The filtrate obtained was concentrated in a vacuo at 40°C to yield semi-solid mass. The extract obtained was accurately weighed and then used for phytochemical screening. Basic screening was performed using suitable reagent to detect the presence or absence of secondary plant metabolites such as Alkaloids, tannins, saponins, anthraquinones, flavonoids, phlobatannins and cardiac glycosides in the extract. Nutrient and anti-nutrient quantitative evaluation of the plant was also carried out. The method of Trease and Evans and Sofowora was used.

Quantitative Microscopy/Proximate Analysis
The moisture content of the powdered leaves was determined loss on drying method. The ash value, acid insoluble ash, water-soluble ash and sulphated ash were determined as described by British Pharmacopoeia, African Pharmacopoeia. The water and alcohol extractive values were obtained using the method outlined by Brain and Tuner. British Pharmacopoeia. The fat (lipids), crude protein, crude fibre and carbohydrate were obtained using the method outlined by Pearson, Okon and AOAC.

RESULTS
The results of the phytochemical screening of the leaves, stems and petals (flowers) of Ipomoea involucrata shows the presence of alkaloids, tannins, terpenes and anthraquinones in all the plant parts. Saponins were present in the leaves and stems of the plant but absent in the petals (flowers). Flavonoids was present in the stems and petals (flowers) of the same plant. Salkowski’s test and Keller Killiani’s test revealed the presence of cardiac glycosides while Lieberman’s test revealed absence of cardiac glycosides in any of the plant parts.

The result of the quantitative evaluation of I. involucrata shows moisture content of the leaves, petals (flowers) and stems at 3.11%, 1.5%, 2.10% respectively, total ash content at 1.90%, 1.02%, 2.00% respectively, crude protein at 10.05%, 2.02%, 3.90% respectively, lipids at 8.00%, 4.20%, 3.43%, crude fibre at 1.90%, 5.50%, 8.04% and carbohydrate at 71.9%, 46.50% and 55.5% respectively.

The anti-nutritional evaluation results for the plant I. involucrata revealed that the leaves, petals (flowers) and stems for hydrogen cyanide 50.20%, 62.10%, 0.146% respectively, total Oxalate 102.01%, 42.01%, 88.00% respectively, tannic acid 20.50%, 85.00%, 0.215% respectively, phytate acid 40.50%, 15.0%, 0.0004% respectively. Nitrogen 18.05%, 15.01%, 19.21% respectively.

Table 1: Result of Phytochemical screening of leaves, stems and petals of Ipomoea involucrata.

<table>
<thead>
<tr>
<th>Metabolites</th>
<th>Inferences</th>
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<tbody>
<tr>
<td></td>
<td>Stem</td>
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<tr>
<td>Alkaloids</td>
<td>+</td>
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<tr>
<td>Tannins</td>
<td>+++</td>
</tr>
<tr>
<td>Saponins</td>
<td>+</td>
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<tr>
<td>Terpenes</td>
<td>+</td>
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<td>Flavonoids</td>
<td>++</td>
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<td><strong>Cardiac glycosides</strong></td>
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<tr>
<td>(a) Salkowski test</td>
<td>+</td>
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<tr>
<td>(b) Keller Killiani test</td>
<td>+++</td>
</tr>
<tr>
<td>(c) Lieberman’s test</td>
<td>+</td>
</tr>
<tr>
<td>Anthraquinones free</td>
<td>+</td>
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<tr>
<td>Anthraquinones combined</td>
<td>+</td>
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</tbody>
</table>

Legend: + = Trace, ++ = Moderate, +++ = Abundance.
DISCUSSION
Extraction (as the term is pharmaceutically used) is the separation of medically active portions of plant tissues using selective solvents through standard procedures. Phytochemical screening of the leaves, stems and petals of *Ipomoea involucrata* revealed the presence of the following secondary metabolites, alkaloids, tannins, saponins, terpenes, flavonoids and cardiac glycosides.

Tannins which is abundant in the leaves and stem of *Ipomoea involucrata* is basically an astringent that means it tightens the pores and pulls out liquids from plants. When tannin is applied on the skin, it shrinks the skin and when applied on the face, wrinkles are noticed. These properties impart medicinal qualities to tannin which is applied on the skin to pull out poisons from bee stings or poison oak bringing instant relief. Plant extracts containing tannins as their major constituents are also applied as medicinal agents for the treatment of burns. \[18\] The presence of tannin in the present study could be attributed to its use in treating burns. Tannins can also be effective in curbing hemorrhages as well as restrict bare swelling. While tannins are proved haemostatic, they are also beneficial when applied on mucosal coating in mouth. Hence, herbs possessing tannins such as *Ipomoea involucrata* are widely used as mouthwashes, eyewashes, when applied internally, tannins affects the walls of the stomach and other digestive parts. They sour the mucus secretions and contract or squeeze the membranes in such a manner that secretions from the cells are restricted. The good thing is that tannins anti-inflammatory effect helps to control or curb all indications of gastritis, enteritis, esophagus and irritating bowel disorders. Conventionally, tannins have also been used to cure diarrhea. Cardiac glycosides are used basically for the treatment of cardiac failures. Its role here is to correct heart disorders as well as the slowing and strengthening effect it possess on failing hearts has
been well documented. Cardiac glycosides was observed on the leaf extract of *Ipomoea involucrata* in an abundant amount which could be useful in the treatment of asthma.\[11\] Alkaloids have a wide range of pharmacological activities including anti-malarial (e.g. quinine), antiasthma (e.g. morphine). Antibacterial (e.g. chelerythine). The availability of alkaloids in the petals (flowers), leaves and stems of *Ipomoea involucrata* in moderate and trace quantities further unveils the effectiveness of the plant.\[10\]

In plants, saponin serve as anti-feedants and protects the plant against micro-organisms and fungi. This compound was observed in trace amounts in the stems and leaves of the plant. Terpenes which was observed in all the plant parts protects the plant that produce them by deterring herbivores and by attracting predators and parasites of herbivores. Research into terpenes has found that many of them possess qualities that make them ideal active ingredients as parts of natural agricultural pesticides.\[13\]

According to Akindahunsi and Salawu\[19\] flavonoids show tumour inhibiting activity on animals. The leaves of plants can equally be applied on such cases. It also suggest that the plant might have diuretic properties.\[20\] Sofowora\[18\] reported that saponins exhibit a wide range of biological activities like anti-fungal, anti-inflammatory, anti-parasitic, anti-viral and anti-tumor activities. He further confirmed that these properties authenticates its usefulness in traditional medicine practice. The presence of saponins in the plant stems and petals (flower) suggest that it can be used as anti-fungal and antiviral drugs. Moisture content determines the perishability and the rate of microbial spoilage. With the permissible unit of 14% according to the British pharmacopedia. The plant is considered to make a good drug material.

Total ash shows the rate of contamination, adulteration and carelessness in the preparation of plant sample. For this plant, its total ash are significantly low thereby showing its less rate of adulteration and contamination. The essential nutrients carbohydrates, crude protein and fibre, lipids which are needed in our diet are present in the plant. The plant is highly rich in carbohydrate which gives energy and is necessary in the digestion and assimilation of other food. Protein which is important for addressing deficiency, diseases and colon disease and also wound healing acceleration.\[19\]

The anti-nutrient contents include hydrogen cyanide, total oxalate, soluble oxalate, tannins, phytic acid. Oxalate reduces assimilation of calcium, favouring the formation of renal calculi.\[21\] Phytate acid has complicated effect in human system including indigestion of food and flatulence.\[22\] Oxalate has been reported to act as a chelating agent which binds calcium effectively and in high concentrations they produce an acute metabolic calcium deficiency syndrome (hypocalcaemia) when fed as main feed to livestock.\[23\] Tannin is known to cause a growth depressing effect in living system.\[24\] Hydrogen cyanide is toxic to human when found in greater quantity. The hydrogen cyanide contents in *I. involucrata* stem 0.146mg/100g show low level of toxicants and consumption of this plant would not result in any deleterious effect on the health of man and the consumption of leaves and petals (flowers) should be done with care. This confirms with the findings of Essiett and Ukpong\[25\] and Essiett and Obioboho\[26\] on the phytochemical properties, nutrient and anti-nutrient values of *Ipomoea involucrata*.

**CONCLUSION**

The observations from this work uncovers the essential nutritional constituents of the *Ipomoea involucrata* plant. The carbohydrate, protein, fibre, lipid have low level of toxic (anti-nutrient) elements, its consumption by man will not lead to a harmful effect to the general well being of man. Also considering its extractive value constituent, the plant secondary metabolites possess element which when harnessed can aid in boosting the immune system. The traditional usage of this plant shows its potential effectiveness in the health, agriculture and agro-allied industries. Therefore, the plant parts not only serve as an ornamental plant but also a raw material for the pharmaceutical industry and the health sector at large.

**REFERENCES**


