COMPARATIVE PHYTOCHEMICAL ANALYSIS OF FOUR COMMON HERBS USED TRADITIONALLY IN THE TREATMENT OF ALIMENTS AT UKANA UWA IN ESSIEN UDIM LOCAL GOVERNMENT AREA OF AKWA IBOM STATE

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ABSTRACT

The results obtained in four different herbsused in the treatment of various ailments were showed and the presence of phytochemicals in various plant leaves with their calculated concentrations in 100 mg/100. Using standard analytical procedure, it was revealed that in *Lanneaacida* leaf, saponnins was the highest with 27.25 $\pm$0.354, followed by 12.75 $\pm$ 1.061, the content of tannins was 9.40 $\pm$ 0.568, while cyanogenic glycoside content was 4.15 $\pm$ 0.138 and the least was flavonoid with the lowest

concentration of 0.09 ± 0.412 respectively. Then in *Setariamegaphylla* concentration were as follow; the highest concentration in flavonoids with 19.55 ± 0.283, saponins 5.82 ± 0.262, alkaloids 4.65 ± 0.283 and tannin 3.63 ± 0.325 while cyanogenic glycoside was 2.72 ± 0.163. That of *Aloe vera* leaf with the highest were alkaloid with 12.40 ± 1.230, saponin 8.20 ± 0.460, flavonoids 5.60 ± 0.620 and tannin with 4.20 ± 0.250 while cyanogenicglycoside was Nil.

The last plant that undergo the analysis also showed that flavonoids has the highest concentration with 26.75 ± 0.354, followed by saponins 15.75 ± 0.136, cyanogenic glycoside 5.32 ± 0.253 while tannins was 3.077 ± 0.186 while alkaloid content were 2.75 ± 0.354 which was the lowest respectively. When comparing the results obtained in all the plants to the WHO standard or Daily allow dietary. There all fail within the recommendation and can be allow to be used for treatment because their toxicity to human's body are below the required standard. As such there can be used and other comprehensive research should be carried out to know the microbial status.

INTRODUCTION

The study of phytochemical compounds in plant should be given maximum attention in orthodox medication because these substances play a vital role in maintaining our body system, there checkmate the activities of the imbalance of metabolism and also promote or enhance the growth of white blood capsule that increases the immune system and fight against germs in human's body. Plant which is the natural source has been the major supplier of both the primary and secondary phytochemicals which is also known as metabolites.

However, before the introduction of conventional drugs, our ancient parents or our fore fathers, especially here in Africa, they maintained their body system using plants or herbs for treatment of all kinds of diseases and ailments. These sustained and kept them strong and healthy with longlife.

Thus, when dealing with orthodox medication dosage intake is very important, because when not properly handle can cause a great damage resulting in the termination of one's life.

Here in Nigeria as a case study; conventional drugs has brings much challenges than solving the problems. In Nigerian market today, fake drugs has been pre dominantly flooded everywhere and has cause a menace and had sent many to t heir early grave.

However, the government has been equally finding a way on how to roof out the fake drugs from the Nigerian market and by so doing, the government had established; the National Agency for Drug Administration and Control (NAFDAC) which their effort is to fight against fake and other related matters have not been unnoticed. Recently paracetamal factory was discovered in one uncompleted building in Lagos state and their products has already been in the market for many years.

However, nature has blessed us with many plants that has much physiologicals benefits when consumed. Natural products, especially those derived from plants, have been used to help humans and other animals to sustain their health since the drawn of medicine (WHO, 2001).

Human begins have utilized different kind of plants as a source of food due to the nutritional and bioactive components. High p0lants are sources of food and drugs and have made important contributions to the welfare and quality of life in both urban and the rural communities, especially in tropics and subtropics – region (Fortnann*et al*., 2013).

Knowledge on the nutritional composition such as vitamins and minerals content of these plants become necessary in order to encourage the increased cultivation and consumption of those that are higher nutritive and rich source of phytochemicals are biologically active, naturally occurring chemical compounds found in plants which provide health benefits for humans far thanthose attributed to macronutrients and micronutrients (Blumberg *et al*., 2016). They protect plants from disease and damage and contribute to the plant's colour, aroma, and flavor. In general, the plant chemicals that protect plant cells from environment hazard such as pollution, stress, drought, pathogenic attack are called phytochemicals.

Recently it is clearly stated that they have roles in the protection of human's health, when their dietary intake is significant, more than 4,000 phytochemicals have been discovered and are classified by protective function, physical characteristics and chemical characteristics. It is also suggested that about 150 phytochemicals have been studied in detail and a wide range dietary phytochemical are found in fruits, vegetables, legumes, whole grain, nuts, seeds, fungi, herbs and spices (Marthai*et al*., 2017)cabbage, carrots, onions, garlic, whole wheat bread, tomatoes, grapes, cherries strawberries, beans and legumes foods are common sources.

Phytochemical accumulated in different part of the plants; such as in the roots, stems, leaves, flowers, fruits or seeds.

Phytochemicals partially the pigment molecules are often concentrated in the outer layers of the various plant tissues.

***Lanneaacida*or Nsukakara**plant is a native to tropical Africa and has been distributed to many parts of the world. It has been cultivated in Nigeria where it is commonly used as livestock feed and as herbal remedies to certain disease such as gastric ulcer and diarrhea (Moyer, 2014). In the South-south region of Nigeria such as AkwaIbom and

Cross River State, *Lanneaacida*is commonly called Nsukakara and it is of different varieties. It is used locally for various purposes in indigenous medicines. The roots and the leaves are used against paralysis, epilepsy and insanity rachitic in children and strained muscles (Blander, 2006). In some parts of Africa such as Mal and Cote d'ivore, *Lanneaacida*is used in treatment of chest pain, respiratory tract diseases. In Nigeria, it has been recorded that the leaf of the plant is used in the treatment of fever, skin diseases and cultind healing (Fortmann, 2013). It is a rich source of vitamins and antioxidant (Mosbys, 2015), Anti-inflammatory agents, antimicrobial agent (Moyar, 2014).

Setariamegaphylla, big-leaf bristle grass, broad leaf bush buffalo grass, forest buffalo among other names, like corn of horses, fine sword grass, macopo grass, palm grass, (USDA, 2019; Hyde *et al*., 2019; Quattrochi, 2006).

Setariamegaphylla is a robust perennial tufted grass large growing up to 2.5-3m in height and often forming large clumps. The plant can root from the nodes and is often rhizomatous (Quattrochi, 2006). Leaf blades are linear to linear lenceolate. Leaf sheaths are hairy to densely pubescent. The inflorescence is loose open cylindrical inconspicuously bristled panicle. Setariamegaphylla, big-leaf bristle grass is used as forage and fodder grass and it has been eaten by all stock animals, it is valuable for ground cover and soil rehabilitation in stream bank stabilization and the leaves can be used for thatching hut building, the ashes provides a vegetable salt (Quattrochi, 2006).

In Eastern Democratic Republic of Congo, Setariamegaphylla leaves are used for mashing bananas in order to make beer and bunches of leaves are to wash dishes (Terashima*et al*., 1992).

***Aloe vera*leaves;** Aloes are perennial succulents or xcrophytes, they can adapt to habitats with low or erratic water availability and are

characterized by their capacity to store large volumes of water in their tissue, and are able to use Crassulacean acidmetabolism, an adaptation to the photosynthetic pathway that involves the formation of malic acid. Aloe plants such as *Aloe vera,* all have green fleshy leaves covered by a thick cuticle or rind, under which is a thin vascular layer covering an inner clear pulp (Boudreau *et al*., 2013). The leaves are 30-50 cm in length and 10 cm in width at the base pea-green in colour and with bright yellow tubular flowers 25-35 cm in length arranged in a slender loose spike (WHO, 1999).

Aloe vera plants contain two major liquid materials; first, a bitter yellow latex located under the strongly cutinized epidermis of the leaves in the vascular layer and containing a high concentration of anthraquinonecompounds, which has been used throughout the centuries as a cathartic and for medicinal purges: thin-walled tubular cells in the inner central zone that has been used since ancient times to treat burns and other wounds, where it is thought to increase the rate of healing and reduce the risk of infection (Joseph and Raj, 2010). While a third liquid may be obtained by macerating the whole leaf. The inner leaf liquid material should be referred as gel (WHO, 1999), the gel are inner pulp, mucilage tissue, mucilaginous gel, mucilaginous jelly and leaf parenchyma tissue (Hamman, 2008).

The physical and chemical constituents of the products derived from *Aloe vera* plants differ depending on the source (part of the plant),the species of the plant, the climate conditions, seasonal and grower influences, and processing techniques (Boundreau, 2013 and Waller, 2004). The exact origin of *Aloe vera* is uncertain, as the species has been widely cultivated throughout the world, so it is difficult to discern where it originated. *Aloe vera* leaves contained vitamins, A, C and F, vitamins B, B_2 and vitamins B_{12}, choline and folic acid and the phytochemicals Aloe vera has been one of the most important plants used in folk medicine for more than 2000 years and it remains an

important component of traditional medicine in many contemporary cultures such as China, India, Egypt, the Caribbean, USA, Japan etc.

***Stachytarphelacayenennsis*,** it is a perennial herbs or shrub growing up to 2 – 2.5 mm tall, it has an upright branching stem sometime with a woody base, and the leaves are oppositely arrayed. The blades are u to 8-10 cm long, oval in shape with sharply toothed edges and rough textured or wrinkly on upper surface. The inflorescence is a very narrow spike up to 40-45 cm long, covered in pointed bracts, occasional flower corollas bloom between the bracts. The flowers are deep purple blue to lavender with pale centres, the flowers last a single day before willing. In some places, it is simple naturalized, it may be a casual weed, garden thug, a crop pest, or an invasive species with effects on the local ecosystem. It propagate rapidly, in rainy areas it can form thick beds, but it is easily persists in dry areas. The plant can commonly spreads either by seed, rainwater, foddes, vehicles, wind, etc. (Wagner *et al*., 1999). *S. cayenennis* is widely known for its high medicinal importance both in traditional and folk medicinal system in various countries. It has been reported to posses pharmacological effect due to the presence of various bioactive components (Sulaiman, 2009).

In herbal medicine, *S. cayenennis* has been known to demonstrate antacia, analgesic, anti-inflammatory, hypetensive, anti-helminthic, laxative, duretic, purgative, sedative, spasmogenic, vasodilator etc. and it has been extensively used by the elderly as a cooling tonic for stomach. Both the leaves and the stem extract has been used as tea.
The cooling tonic is consumed to stimulate the function of the gastro testinal tract or to aid in digestive problems such as indigestion, acid reflux ulcers, constipation, dyspepsia and slow digestion, it is sometime used to treat avergics and respiratory conditions such as asthma, cold, the flu bronchitis, cough, as well arrhosis and hepatitis (Ramakrishnam, 2014).

Alkaloid substance:
These are classes of natural occurring organic substance in plants that contained nitrogen base compound. It has psychological effect on human's and others (Trane *et al*., 2000). There are synthesized naturally in a large amount, it has a bitter taste, and there are functioning in protection of plant against preditors. It has also discovered that alkaloids has been found to be effective in medicine, for instance morphines are classes of alkaloids and it is used as pain relief, codeline in opium is an excellent analgesic, cocaine is used as a cardiac or respiratory stimulants while quinine from cinchon tree is a powerful anti malaria agent.

Flavonoids
These are polyphenolicsubstance that are so many more than 4,000 flavonoids has been known of which so many of them are found in vegetables, beverages, fruits etc. (Pridham, 2000).

There played a very powerful role in many medical treatment in both traditional and folk medicine even up till this generation.

Flavonoids stand out among many vascular plants in form of glucosides and methylated derivatives, aglycones etc. More than 4,000 types of these substances found in plant naturally taken by human and almost 650 flavones and 1030 flavonoids are known. These bioactive compounds has show a wide range of biological and pharmacological properties like; anti-allergic, anti-inflammatory, antioxidant, anti-bacterial, anti-fungal, anti-viral, anti-diarrheal activities. The most powerful of all, which is to protect human body from free redicals and reactive oxygen species (Latay and Gillzquierdo, 2008; Tapes *et al*., 2008).

Saponins
Saponins are chemical substances found in certain abundance in different parts of plant species, having soap-like foaming when shaken

in a aqueous solution saponins function in the body as anti-feedant and it also protect plant against microorganism and fungi. Some of the biological functioned are nutrient absorption and digestion, it also help in controlling of blood cholesterol level, bone health, cancer and building up of the immune system of the body (Tapes *et al*., 2008).

Saponins play a vital role in mining and ore separation as well as in preparation of emulsion for photographic films and it is an additive in cosmetics industries (Serrano *et al*., 2009).

Tannin

Tannin is a type of phytochemical compound found in plant; it has an astringent aromas, a bitter taste and a polythenolic compound that binds to and precipitates proteins and other organic compounds including amino acids (Schofield *et al*., 2001).

These compounds are heterogeneous group with high molecular weight. There have the capacity to form reversible and irreversible complexes with protein compounds and other polysaccharides, such as cellulose, hemicelluloses, alkaloids, nucleic acids and other minerals. These compounds spread widely and are distrusted in many different plants. There also play a role on protection of plant from inserts, pests, predator, and also regulating the growth of the plant (MacAllan, 2000). Tannin is used against diarrhea, as diuretics against stomach and as anti-inflammatory, antiseptic, antioxidant, pharmaceuticals in medicine. The industrial uses of Tannins includes production of inks (iron gallate ink, caustic for cation dyes (Tannins dyes) textile and in food industries, in wine, beer, fruit juices as anti-oxidant.

Cyanogenic glycosides

It belong to the group of secondary metabolites that is naturally produced by plant. These substances are comprises of an α-hydroxynitrile hype aglycones and a sugar moiety (mostly D-glucose). These compounds are gotten from the five protein amino acids which

from the non proteinogenic amino acid and cyclopentenyl, glycine. The content are very small amount of hydrogen cyanide (HCN) and there are derived from six different block.

The cyanogens are glycosides of sugar, glucose which combined with cyanide containing aglycone. The substances are classified as phyto anticipants. There releases toxic volatile HCN as well as a ketones or aldehydes to tend off herbivore and pathogen attack (Gibson *et al*., 2002).

Materials and Methods

The apparatus and reagent used in this research work are; distilled water, stop watch, whatman filter paper, volumetric flask, conical flask, beaker test tube, incubator, desicator, photo meter, measuring cylinder, syringe, droper, separating funnel, water bath, tannic acid, hydrochroic acid, Na_2CO_3 diethyl ether, NaOH, butanol, ethylacetate, acetol, acetic acid, ethanol, NH_4OH and alkaline picrate.

Collection of samples

The leaves of *Lanneaacida*, *Setariamegaphylla*, *Aloevera*and *Stachytarphetacayenennis*were collected at different locations in the same community (UkanaUwa East). There was stored in different polythene bags and brought to department of chemical sciences.

Those plants were identified by a botanist from environmental department in person of Dr. Dominic Uboh. The samples were then taken to the chemistry laboratory for proper analysis.

Each of the samples were washed or rinsed using distilled water and cutted into tiny pieces and air dry separately for two weeks.

The samples were all ground using electric grinding machine and stored in an air tight container for their separate analysis using the sample standard procedures as explain below.

Phytochemical analysis

The phytochemical to be extracted from each of the samples are Alkaloids, saponins, flavonoids, tannis and cyanogenic glycoside.

Determination of Alkaloids

Determination of Alkaloids was done using Harbone (1973) procedure. 5 g of the sample was weighted into 250 ml beaker 200 ml of 100% acetic acid was added, then ethanol was also added and corked, it was allowed to stand for 4 hours, then the heat mixture to a quarter of the original volume (50 ml) concentrated Ammonium hydroxide (NH_4OH) was added drop by drop to the extract until the precipitation was formed. Then allow to the solution of settle down and the precipitate was collected and wash with diluted ammonium hydroxide (NH_4OH) then filtered. The alkaloids which is the residue was dried and weight.

Determination of Tannins

5 g of the ground sample was weighted into 100 volumetric flask and 50 ml of distilled water was added and be shaking and allowed to stand for about 7 hours. It was then filtered using whatman filter paper into another 50 ml volumetric flask. The 1 ml of the filtrate was pipette into a test-tube and mixed with 1 ml of 10 % Fe and made up to 5 ml with distilled water. The incubation of the mixture was carried out at 37^0C using water bath. The reading of the absorbance was done using spectrophotometer at 72 mm wavelength.

Determination of Flavonoids

Bohama and Kocipi of 1994 method was used, which 5 g of the ground sample extract was repeatedly done in 100 ml of 80% aqueous methanol at room temperature. Whatman filter paper was used in filtering crucible and was evapoured into dryness over water and the weigh was recorded.

Determination of Cyanogenic glycosides

Titrimetric method of Voyed (1875) was used by weighing 5 g of the ground sample, it was dissolved in 50 ml of water in a corked flask then filtered, and 1 ml of the filtrate was measured into a test-tube and 4 ml of picrate was added, a prepared blank solution was incubated in the water bath for 5 minutes, after the development of the colour, the absorbance was read using spectrophotometer at 490 mm of wavelength.

Determination of Saponnin

Abadomin and Ochuko (2001) method was used in determination of saponnins were weighted into a conical flask and 20 % of 100 ml of ethanol was added into the flask of the ground sample and was heated over a hot water bath for 4 hours and stirred continuously at 55^0C. Then the mixture was filtered, while the residue was re-extracted where the combined extract was reduced to 4 ml over water bath at about 90^0C. 20 ml of diethyl-ether was added in a 5 ml separating funnel of the transferred concentrate and was vigorously shaken, and the aqueous layer was discovered while others was discarded.

Results and Discussion

Table 1.0

***Lanneaacida* (Nsukakara leaf)**

Parameters	**Concentration (%)**	**WHO standard mg/100**
Alkaloid	12.75 $\pm$ 1.061	0.1-15
Saponins	27.25 $\pm$ 0.354	250 – 275
Flavonoids	0.09 $\pm$ 0.412	28
Tannins	9.40 $\pm$ 0.568	1.8
Cyanogenic glycoside	4.15 $\pm$ 0.138	10 mg/kg

Mean of 2 determination $\pm$ S.D

Table 2.0
***Setariamegaphylla* (Nkwongo leaves)**

Parameters	**Concentration (%)**	**WHO standard mg/100**
Alkaloid	4.65 ± 0.283	0.1-15
Saponins	5.82 ± 0.262	250 – 275
Flavonoids	19.55 ± 0.283	28
Tannins	3.63 ± 0.325	1.8
Cyanogenic glycoside	2.72 ± 0.163	10 mg/kg

Mean of 2 determination ± S.D

Table 3.0
***Aloe vera*(Aloe barbadensis miller)**

Parameters	**Concentration (%)**	**WHO standard mg/100**
Alkaloid	12.40 ± 1.230	0.1-15
Saponins	8.20 ± 0.460	250 – 275
Flavonoids	5.60 ± 0.620	28
Tannins	4.20 ± 0.250	1.8
Cyanogenic glycoside	Nil	10 mg/kg

Mean of 2 determination ± S.D

Table 4.0
***Stachytarphetacayenennis*(Aranumon leaves)**

Parameters	**Concentration (%)**	**WHO standard mg/100**
Alkaloid	2.75 ± 0.354	0.1-15
Saponins	15.25 ± 0.186	250 – 275
Flavonoids	26.75 ± 0.354	28
Tannins	3.077 ± 0.186	1.8

Cyanogenic glycoside	5.32 ± 0.253	10 mg/kg

Mean of 2 determination ± S.D

Discussion

The study revealed the presence of phytochemicals in the leaf of *Lanneaacida* which reaffirmed the biological properties of the plant. The results of the metabolites concentration was found be similar to that obtained by Evans, (2005), Sun *et al*. (2009), but with a slight different from the present results.

The present result shows that the concentration of alkaloid in the leaf of the plant is 12.75 ± 1.061 mg/100, then saponins content were 27.25 ± 0.354 while (WHO) for alkaloid is 0.1 – 15 mg/100 and saponins is 250 – 275 mg/100 respectively. When comparing the two metabolites with the World Health Organization (WHO), the recommended dosages is not out of proportion.

The content concentration of flavonoids in the plant leaf was 0.09 ± 0.412 while WHO recommendation is 28 mg/100, still very low. The tannin concentration was 9.402 ± 0.568 and the recommended portion is 1.8 mg/100, the leaf have higher concentration than that of recommended dosage.

Cyanogenic glycoside contents in the leaf was 4.15 ± 0.138 mg/100 while the WHO recommended is 10 mg/kg which far below the contain in the leaf of *Lanneaacida*.

In table 2.0: the result obtained revealed that the leaf of *Setariamegaphylla* (Nkwongo leaves) alkaloid is 4.65 ± 0.283 when compared to WHO standard which is 0.1-15 mg/100, saponins content was 5.82 ± 0.262 while WHO standard is 250 – 275, flavonoid content was 19.55 ± 0.283 and WHO standard is 28 mg/100. Tannin content was 3.63 ± 0.325 and the WHO standard is 1.8 mg/100 its contain a

higher quantity when compared to WHO standard. Cyanogenic2.72 ± 0.163 and WHO standard is 10 mg/kg.

Table 3.0, The obtained results shows that *Aloe vera* leaf contained 12.40 ± 1.230 of alkaloid, while WHO approval is 0.1-15 mg/100. It's still within the recommended range, saponins content were 8.20 ± 0.460 and recommended range by WHO is 250-275, still below the recommended range, flavonoids content were 5.60 ± 0.620, and WHO recommendation is 28, still within the recommended dosages.

Tannin content were 4.20 ± 0.250, while WHO range is 1.8, thus, a little higher than the recommended range, cyanogenic glycoside is Nil in the leaves of *Aloe vera*, and the WHO recommendation is 10 mg/kg, this shows why *Aloe vera* is very useful in the maintenance of the body metabolism, and also be used in treatment in various diseases and sickness.

In the table 4.0, we observed that the result does not change but shows a little adjustment in their concentration per 100 mg. Alkaloids content in the *Stachytarphetacayenennis* were 2.75 ± 0.354, and WHO recommendation is 0.1-15, saponins content were 15.25 ± 0.186 and WHO recommendation is 250 – 275, which is far below the recommendation, while flavonoids content were 26.75 ± 0.354 and the recommended range by WHO is 28, this is one of the main reasons why *Stachytarphetacayenennis* is very active in disease treatment, especially bacteria and fungi diseases. Tannins content were 3.077 ± 0.186, while WHO range is 1.8, it has been on the high side and Cyanogenic glycoside content were 5.32 ± 0.253, and WHO recommendation is 10mg/kg, which the concentration in the leaf of the plant is below the recommended range.

However, facts has been established about these selected plants for their phytochemicals, there all contained concern percentage of these bioactive compounds which enable them to be used traditionally for the

treatment of ailments in human's body. Also being found out that, their percentage content is not dangerous or harmful to the body because the ranges are far below the recommended range from WHO.

CONCLUSION

In all the results, it has been observed that the plants content of each concentration of the phytochemical has a lower range when compared to the World Health Organization (WHO) and their concentration is not harmful to the body when used.

Some of the parameters such as flavonoid is low which the body need it in higher quantity, while Alkaloid is being higher in almost all the selected plant, and it play a vital role in the treatment of fever/malaria, stimulant, pain relief etc. Tannins is very much higher in all the plant, and even higher than the recommended range while saponins is not left out, is equally higher in all the plants and cyanogenic glycoside is not present in all the plant, but still below the recommended range.

RECOMMENDATION

The plants under review are good source of phytochemical bioactive compounds and more research such as complete isolation and Characterization of each of these plants should be carried out and since there contained the essential phytochemicals, there should be introduced to pharmaceutical company for drug analysis and development.

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