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Qualitative and Quantitative Phytochemical Screening of Some Species of Lamiaceae in Rivers State, Nigeria

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ABSTRACT

This research work was carried out to qualitatively and quantitatively screen the phytochemicals present in some species of Lamiaceae used for ethno medicine in Rivers State, Nigeria. The plants studied were Ocimum canum Sim (curryleaf), Mentha x piperita Linn. (peppermint) and Ocimum gratissimum Linn. (scent leaf). The Lamiaceae family can also be referred to as the mint family. Dicotyledonous are very significant as ethnobotanical plant in Nigeria. Qualitative and quantitative screening of phytochemicals was done using standard and current methodologies. The extract of the plant species studied were screened for the presence of Alkaloid, Tannin, Flavonoid, Saponin and Phenol. The result for qualitative screening revealed that there was presence of phytochemicals in both the ethanolic and aqueous extract through their color changes for each of the plant species under study. The quantitative screening highly revealed that Mentha x piperita has the highest quantity of Alkaloid (4.82 ± 0.02%) and Saponin (3.8 ± 0.01%), however scent leaf has the highest quantity of tannin (2.82 ± 0.01%) and phenol (2.14 ± 0.01%) while curry leaf had the highest quantity of flavonoid (4.2 ± 0.01%). The presence of these phytochemicals has thrown more light on why these plants are medically useful to man. Further studies should be carried out in order to isolate and identify the type of alkaloid, tannin, flavonoid, saponin and phenol and their usefulness as pharmaceutical raw materials in the production of drugs.

Keywords: *Phytochemicals, Ocimum gratissimum, Ocimum canum, Mentha x piperita, Ethanolic plant extract, Aqueous extract.*

INTRODUCTION

Lamiaceae are commonly referred to as the mint family. They are Dicotyledons and members of the flowering plants (Angiosperms). There are about 3,200 species and 236 genera in this family. It was named after the most common shape of their flowers which has petals that are fused together to form a lower and upper lip (Labia in Latin). Most of the Lamiaceae are annual or perennial shrubs or herbs (Green, 2015; Okoli and Ajuru, 2014). The Lamiaceae can be found around the world and are highly concentrated in the Mediterranean region. They prefer a Mediterranean climate and open scrublands. It has been demonstrated that the active compounds present in plants from the Lamiaceae family have natural antibacterial (Stanojević et al; 2010; Pop et al; 2013), antioxidant (Kamdem et al; 2013; Lin et al; 2012), anti- fungal (Stevic et al; 2014) and antitumor effects (de Sousa et al; 2004; De et al; 2012) which suggests that they may be viable alternatives to synthetic products in the therapy of various diseases.

Ocimum canum commonly known as curryleaf is an annual plant native to the African continent and grows to a height of 2 feet. It is also known as the Africa basil with a distinct mint flavor, hairy leaves and scented flowers. The leaves are fuzzy with beautiful violet or white flowers having a sweet scent resembling that of the clove. The leaves of the O. canum are opposite and toothed in shape with small flowers, it is irregular and occurs in crowded whorls. The O.canum has a small corolla. These plants have intense flora fruity aromas. It flourishes in condition of lots of sun, well drained soils and access to heat. The plant grows quickly and the seeds sprout easily when placed in warm soil especially indoors and takes about 8 weeks to grow. (Germplasm,2004).Medicinally,O. canum is used in lowering blood glucose, treating fever,

cold, headache, inflammation of joints, dysentery and tooth problems. It is also used as an insect repellant to counter insect damages. Nutritionally, the leaves are used as flavors in foods, shampoo, soaps etc (Germplasm, 2004).Menthe x piperita commonly known as peppermint was described in 1696 by an English botanist named John Ray. In general, the mint plant is sterile producing no seeds (Saller,2004). It is a natural hybrid, a cross between water mint (Menthe aquatica) and spearmint (Mentha spicata) (Branley et al; 2009). Peppermint is a herbaceous rhizomatous perennial plant that grows to be 80-90cm (12-35in) tall with smooth stems squared in cross section. The leaves can be dark green with reddish veins and they have an acute apex and coarsely toothed margins. The leaves and stems are usually slightly fuzzy, the flowers are purple.

Peppermint is a fast growing plant, once it spronts it spreads very quickly. This plant grows best in a moist shaded location and expands by underground rhizomes (APG, 2009). Nutritionally, peppermint is used as flavor in chewing gums chocolates, cakes, soft drinks and its volatile oil has medicinal values. Dried peppermint leaves can be used in salads and sauces, and the chopped leaves makes an excellent garnish (Brandley et al; 2009)

Medicinally, peppermint aids in digestion, stomach upset, heart burn, headache diarrhea. Simply put a drop or two of peppermint essential oil in a glass of water and drink. Peppermint also aids to open air ways which can actually help those that suffer from Asthma and Allergies (Ryding, 2010).Ocimum gratissimum commonly known as scent leaf is native to the Africa, Southern Asian. Africa and Asia are however, the two continents where most variants of the plant exists (Nwaeze and Eze, 2009; Matasyoh et al; 2007; Mann, 2012).It is also found in the tropical and warm temperature regions such as India and Nigeria (Okigbo and Ogbonnanya, 2006; Nwinyi et al; 2009).

It is a tropical plant species, it is a common culinary shrub used mainly for cooking delicacies due to its unique aromatic taste. The plant has clusters of flowers with fragrance leaves that have serrated margins. It is a perennial plant that is woody at the base which is common in West Africa (Pandey, 2004) and is used by some in the Caribbean. Scent leaf is popularly known by some local names in Nigeria below: Yoruba – Efinrin, Hausa – daidoya, Igbo – Nchanwu. These plants are aromatic, perennial herbs which go through several variations in cultivation to attain improved growth. The plant requires a well-drained soil and also grows well in full exposure of sunlight.

Nutritionally, the scent leaf can be used to spin up various kinds of soup (pepper soup inclusive and other delicious meals like yam porridge). To some people, the sticks of scent leaf is used as chewing sticks and it has a strong antibacterial and antiviral property which is used in preparing our local meals and indeed is saving us from contacting some infections such as cold, cataarh etc.It also contains good amount of important minerals such as potassium, iron, magnesium and is also rich in vitamin K which is an important nutrient required for blood – clotting and the extract of these plant has also been used to lower blood pressure (Illori, et al; 1996).

Medicinally, scent leaf is used in the treatment of diarrhea, gonorrhea infection, cough and catarrh, it is also used by the Igbo's to keep a baby's cord sterile, further proof and indication of the antimicrobial properties of scent leaf. Comprehensive biological activities of O.gratissimun has been review (Prabhu et al; 2009) and it is associated with antibacterial, antifungal, antioxidant, anti-inflammatory. O. gratissimum has proved to be useful in the medication for people living with Human Immunodeficiency Virus (HIV), and Acquired Immuno Deficiency Syndrome virus AIDs (Elujoba, 2000).

Pure natural compounds or different types of plant extracts have been studied over a long period of time for a large range of therapeutic effects (Danciu et al; 2015; Nacsa‐ Farkas, 2014). Alkaloids are groups of naturally occurring chemicals compounds that mostly contain basic nitrogen atoms. This group also includes some related compounds with neutral and even weakly acidic properties alkaloids are produced by a large variety of organisms including bacteria, fungi, plants and animals. Alkaloids have a wide range of pharmacological properties as quinine (for anti malarial), ephetrine (for antiasthma) vincamine (for vasodilatoral) (Russo, et al 2013). Although alkaloids act on a diversity of metabolic systems in humans and other animals, they almost uniformly evoke a bitter taste (Cushnie et al; 2014). Tannins are polyphenols that are obtained from various parts of different plants

belonging to multiple species. It is found in abundance in the free bark wood, fruits, fruitwood, leaves and roots and also in plant gall. Tannins are found as shapeless yellowish or light brown masses like powder flakes or sponge.

Interestingly tannins are found almost in all plants and all climates all over the world.

As tannins often lower the absorption of some materials into the body, tannins are also often known as ant nutrients. For example, tannins are found in tea and coffee and consuming too much of these beverage without milk may lead to calcium and iron deficiency in the body and often lead to osteoporosis (a disease where bones become ragile) and anemia.

Tannins help to draw not all irritants from the skin. These properties impact medicinal qualities to tannin which is applied on the skin to pull out poisons from bee strings or poison oak bringing in instant relief. The other remedial Natures of tannins include application on burns to heal the refuring and on cuts to stop bleeding. While to stops infections from above internally tannin continues to heal the wound. In case of third degree burns using strong tannin source will not only prevent septicemia, but also help to save life. This tradition method has been practiced by most medicos in all countries.

Tannins can also be effective in curbing hemorrhages as well as restrict bare swellings. While tannins are proved haemostatic's, they are also beneficial when applied on mucosal coating in mouth. Hence, herbs possessing tannins are widely used as mouthwashes, eye washes, snuff and even as vaginal douches and also freat rectal disorders (www.herbs2000/cp,/j/tanns.htm).

Flavonoids are polypenotic compounds found in plants, they have antioxidant powers that may provide important health benefits. Diets rich in flavonoids have been associated with reduced risk of a variety of diseases. However, further research is needed to determine whether flavonoids alone are responsible for these benefits rather than the whole foods that contain flavonoids. Flavonid rich foods include cocoa. Apples, onions, cranberries tea and red wine

Flavoniods have an antioxidant effects which may protect the body's cell from harmful free radicals from cigarette smoke and other environmental contaminants, according to the Cleveland clinic free radicals damage can increase low-density lipoprotein LDL or bad cholesterol, increasing the risk for heart disease. Also flavoniod may reduce dangerous inflammation in the arteries. A 2009 study in the American journal of clinical Nutrition" found that daily consumption of skin milk with 40g of unsweetened cocoa powder reduced levels of adhesion molecules in human subjects.

Adhesion molecules can cause plaque buildup in the arteries, increasing the risk of heart disease especially atherosclerosis, the hardening of the arteries. Flavones in cocoa may help lower blood pressure and cholesterol helping to reduce Cleveland clinic. Cocoa and dark chocolate may also have positive effects on blood clotting, coronary artery function and insulin sensitivity, according to Harvard Health publication of the Harvard Medical School. Other flavonoid rich foods that may help reduce heart disease risk includes apples, onions and black tea.

However, some studies have found that increased flavonoid intake did not significantly reduce coronary heart disease risk or stroke risk, notes the Linus Pauling institute.

Studies have found that flavonoids inhibit a variety of cancers in animals, but insufficient evidence exists to show that high flavoniod intake can reduce human cancer risk, according to the Linus Pauling Institute (www.livestrong.com/healthbenefitsofflavoniods).

Saponins are phytochemicals which can be found in most vegetables, beans and herbs. The best known sources of saponin are peas, soybeans and some herbs with names indicating foaming properties such as soapwort, soaproot, soapbark and soapberry commercial saponins are extracted mainly from Yucca schidigera and quillaja saponaria. Saponins have many health benefits studies that have illustrated the beneficial effect on blood cholesterol levels, cancer, bone health and stimulation of the immune system. Most scientific studies investigate effect of saponins from specific plant sources and the results cannot be applied to other saponins. Saponins bind with bile salt and cholesterol in the intestinal tract. Bile salts form small micelles with cholesterol facilitating its absorption. Saponins cause a reduction of blood cholesterol by preventing its re-absorption.

Studies have shown that saponins have anti-tumor and anti-mutagenic activities and can lower the risk of human cancers, by preventing cancer cells from growing saponins seem to react with the cholesterol rich membranes of

cancer cells, thereby limiting their growth and viability. Some studies have shown that saponins can cause apopotosis of leukemia cells by inducing mitotic arrest. Plants produce saponins to fight infection by parasites. When ingested by humans, saponins also seem to help our immune system and to protect against viruses and bacteria. Studies with ovarie-etomized induced rats have shown that some saponins such as the steroidal saponins from anemarrhena asphodel ides, a Chinese herb have a protective role on bone loss. The men-sugar part of saponins has also a direct antioxidant activity which may result in other benefits such as reduced risk of cancer and heart disease (www.phytochemicals.info/phytochemicals/saponins.Php).

Much research work has been done with the screening of different plant extracts for antioxidant capacity and total phenol content (Katalinic et al; 2006; Xu et al; 2014; Abbas et al; 2015).

Phenolic compound constitute a group of secondary metabolites which have important functions in plants. Besides the benefitical effects on the plant host phenolic metabolites (polypenols) exhibit as series of biological properties that influence the human in a health – promoting manner. Evidence suggests that people can benefit from plant phenolics obtained either by the diet or through skin application because they cha alleviate symptoms and inhibit the development ofg various skin disorders.

Phenolic compounds are promised tools in eliminating the causes and effects of skin aging, skin diseases and skin damage including wounds and burns. Polypenol also act protectively and help prevent the progression of certain skin disorders both embarrassing minor problems (e.g. acne, Wrinkles) or serious potentially life – threatening diseases such as cancer (Brohem, et al; 2011).

Furthermore, the usage of herbal extracts or active compounds (such as chlorogenic acid, ferulic acid, cinnamic, rosmarinic acids) in food, cosmetic and pharmaceutical industries have being increased in the last years, so that the biological and phytochemical study of medicinal plants is essential and an interesting area of research (Gohari et al; 2011; Bonarska-Kujawa et al; 2011; Sytar et al; 2012; Maria John et al; 2015). The aim of this research work was to qualitatively and quantitatively screen phytochemicals present in some species of Lamiaceae used for ethnomedicine in Nigeria.

MATERIALS AND METHODS

Collection and Identification of Plant Materials

Fresh and healthy parts of the plant species studied: O. canum, Mentha x piperita and O. gratissimum were collected from different sites in Rivers State, as shown in Table 1 below.

Table 1

Taxa	Site of collection
O. canum	*Slaughter market at MTN, Elelenwo – Port Harcourt*
Mentha x piperita	*Fruit Market at Kaduna Street, D/line Port Harcourt.*
O. gratissimum	*Department of Plant Science and Biotechnology, Rivers State University, Port Harcourt.*

Phytochemical Determination

The leaf extracts of the plant species studied were analyzed for the presence of alkaloid, tannins, flavonoids, saponins and phenol using standard methods (Odebiyi and Sofowora, 1978, Ngbede, et al; 2008).

Preparation and Analysis

The leaves of the three plants studied were detached from the stalk, washed and dried at room temperature for seven days and the dried leaves were blended into homogenous powder.

The plant materials were stored in well-labeled specimen containers. Two different solvents (ethanol and distilled water) were used for extraction. Thirty (30) grams of the plant materials were soaked in 200ml of ethanol and distilled water separately in a 250ml conical flask and were left for 48 hours. After 48 hours, the mixtures were filtered using filter paper and the extracts being the filtrate was evaporated to dryness using a water bath and were stored in the refrigerator till when they were used.

Qualitative Analysis of the Chemical Constituent

The ethanolic and distilled water extracts were chemically tested for the presence of chemical constituents using standard method (Trease and Evans, 1989, Harborne, 1973, Boham and Kocipai, 1994; Obadoni and Ochuko, 2001).

Test for Alkaloid

One (1) ml of the plant extract was shaken with five (5) ml of two percent (2%) Hcl on water Bath and filtered. One (1) ml of the filtrate was treated with Wagner's reagent. The formation of a reddish-brown precipitate indicated the presence of alkaloids.

Table2. *Ethno botanical uses of the plant species studied*

S/N	Plant Taxa	Ailment Treated
1.	*O. canum*	Curryleaf is used to lower blood glucose level and is also use to treat colds, fever, parasitic infestation on the body and inflammation of the joints. (Germplasm USA, 2004) It is also use in the treatment of dysentry, headache and tooth problems. Consumption of curryleaves after child birth increases lactation; it is a mild laxative. Curryleaves have antibacterial, antiviral and antifungal properties. (Germplasm USA, 2004).
2.	*Mentha x Piperita*	The antibacterial property in peppermint inhibits the growth of bacteria in the mouth thus preventing tooth decay, gum disease and other oral problems. Menthol is the active ingredient in peppermint and is the reason. (Iscan, *et al* 2002). Peppermint oil with water can be used as a wash capable of alleviating skin problems such as rashes, dry skin, itchiness, and bacterial infection all these can be remedied with peppermint herbal supplement. It is also useful in treating heartburn, diarrhea, nausea, indigestion, cold and flu. Peppermint helps in relief of headache by rubbing a little peppermint oil, peppermint acts as a muscle relaxer and therefore reduces the pain caused by a woman's cramps. Peppermint is useful in the treatment of asthma and allergy. It has antimicrobial, antioxidant and anti-inflammatory properties. (Ryding, 2010).
3.	*O. gratissimum*	Scent leaf aids in digestion and can be used to treat stomache ache, diarrhea, chronic dysentery and vomiting. (Chukwuka *et al;* 2011). Scient leaf can be used to treat bad breath and tooth decay due to its antibacterial properties. Also used to treat fungal infections, fever cold and catarrh. Squeezed scent leaf and applied on the skin for the treatment of skin diseases e.g. ringworms. The seeds of scent leaf can be infused for the treatment of urinary infections, gonorrhea infection, and vaginal douches for vaginitis. The essential oil of scent leaf contains engenol which acts as antibacterial, antifungal, antioxidant and antiseptics properties. (Illori, *et al*., 1996).

Test for Tannin

One (1) ml of the plant extract was added to an equal volume of bromine water. The formation of a greenish to red precipitate indicated the presence of tannins.

Test for Flavonoid

One (1) ml of the plant extract was added to one (1) ml of ten percent (10%) lead acetate. The formation of a yellow precipitate indicated the presence of flavonoid.

Test for Saponin

One (1) ml of the plant extract was boiled with five (5) ml of distilled water for five (5) minutes and was poured out while still hot. The extract was filtered and one (1) ml of the filtrate was diluted with four (4) ml of distilled water and was shaken very well. The formation of a stable froth indicated the presence of saponin.

Test for Phenols

One (1) ml of the plant extract was added to one (1) ml of ten percent (10%) ferric chloride. The formation of a greenish-brown or black precipitate color indicated the presence of phenolic compounds.

Quantitative Analysis of the Chemical Constituents

Alkaloid Determination

Four (4) g of the sample were weighted into a two hundred and fifty (250) ml beaker and one hundred and sixty (160) ml of twenty percent (20%) acetic acid in ethanol was added and covered to stand for four (4) hours. This was filtered and the extract was concentrated using a water bath to one-quarter of the original volume. Concentrated ammonium hydroxide was then added drop wise to the extract until the preparation was complete. The whole solution

was allowed to settle down and the precipitate was collected by filtration and was weighed.

Tannin determination

Four (4) g of the sample was weighed into forty (40) ml plastic bottle. Four (4) ml of distilled water was shaken for one hour, and was filtered. Then four (4) ml of the filtrate was pipette out into a tube and mixed with three (3) ml of 0.1m Fecl3 in 0.1N Hcl and 0.008M potassium ferrocyanide. The absorbance was measured in a spectrophotometer at 120nm wavelengths within 10 minutes. A blank sample was prepared and the color was developed and read at the same wavelength. A standard was prepared using tannin acid to get 100ppm and measured.

Flavonoid determination

Four (4) g of the plant sample were extracted repeatedly with forty (40) ml of eighty percent (80%) aqueous methanol at room temperature. The whole solution was filtered. The filtrate was later transferred into a crucible and evaporated to dryness over a water bath and was weighed.

Saponin Determination

Four (4) g of each plant specimen were dispersed into forty (40) ml of twenty percent (20%) ethanol. The suspension was heated over a water bath for 4 hours with continuous stirring at about 550C. The mixture was filtered and the residue re-extracted with another forty (40) ml of twenty percent (20%) ethanol. The combined extracts were reduced to two (2) ml over a water bath at 900C. The concentrate was transferred into a two hundred and fifty (250) ml separator funnel and four (4) ml of di-ethyl ether was added and shaken vigorously. The aqueous layer was recovered while the ether layer was discarded. The purification process was repeated; twelve (12) ml of n-butanol was added. The combined n-butanol extracts were washed twice with two (2) ml of five percent (5%) aqueous sodium chloride. The remaining solution was heated in a water bath; after evaporation, the samples were dried and weighed.

Phenol Determination

For the extraction of the phenolic component, the fat free sample was boiled with fifty (50) ml of ether for fifteen (15) minutes five (5) ml of the plant extract was pipette into a fifty (50) ml flask and then ten (10) ml of distilled water was added, two (2) ml of ammonium hydroxide solution and five (5) ml of concentration amyl alcohol where also added. The samples were left to react for thirty (30) Minutes for color development. The absorbance of the solution was read using a spectrophotometer of five hundred and five (505) nm wavelengths.

RESULTS

Qualitative Screening of the Phytochemicals in the Plant Species

The ethanolic Extracts of O. canum, mentha x piperita, and O. gratissimum showed the presence of alkaloid, flavonoid, and saponin while tannin and phenol were highly in present, as shown in Table 3.

Table3. *Ethanolic Extracts of the Plant Species Studied*

Plant extracts	Alkaloid	Tannin	Flavonoid	Saponin	Phenol
Ocimum canum	+	++	+	+	++
Mentha x piperita	+	++	+	+	++
Ocimum gratissimum	+	++	+	+	++

Key: *++ = Highly present*
+ = Present
- = Absent

The aqueous extracts of O. canum showed the presence of alkaloid and saponin while tannin and flavonoid were absent. Mentha x piperita showed the presence of phenol, absence of tannin, flavonoid, saponin and high presence of alkaloid, while O. gratissimum: showed the presence of phenol, absence of tannin, flavonoid, saponin and high presence of alkaloid, as shown in Table 4.2

Table 4.*Aqueous Extracts of the Plant Species Studied.*

Plant extracts	Alkaloid	Tannin	Flavonoid	Saponin	Phenol
O. canum	++	-	-	+	+
Mentha x piperita	++	-	-	-	+
O. gratissimum	++	-	-	-	+

Key: *++ = Highly present*
+ = Present
- = Absent

Quantitative Screening of the Plant Specie Studied

Mentha x piperita had the highest quantity of alkaloids (4.8±0.02%) and Saponin (3.8±0.01%) and the lowest quantity in flavonoid (1.9±0.03%);O.canum Had the highest quantity of flavonoid (4.2±0.01%) and the lowest quantity in phenol (0.78±0.01%) and tannin (1.67±0.03%), while O. gratissimum: Had the highest quantity of tannin (2.82±0.01%) and phenol (2.14±0.01%) and the lowest quantity of saponin(0.3±0.01%), as shown in Table5 and Figures1-3.

Table5. *Quantitative screening and percentage of the phytochemicals in the plant species studies.*

Plant extracts	**Alkaloid** (%)	**Tannin** (%)	**Flavonoid** (%)	**Saponin** (%)	**Phenol** (%)
Ocimum canum	4.5±0.01.	1.67±0.03	4.2±0.01	2.9±0.01	0.78±0.01
Mentha x piperita	4.8±0.02.	2.02±0.02	1.9±0.03	3.8±0.01	0.89±0.16
Ocimum gratissimum	4.1±0.01	2.82±0.01	2.7 ± 0.02	0.3± 0.01	2.14±0.01

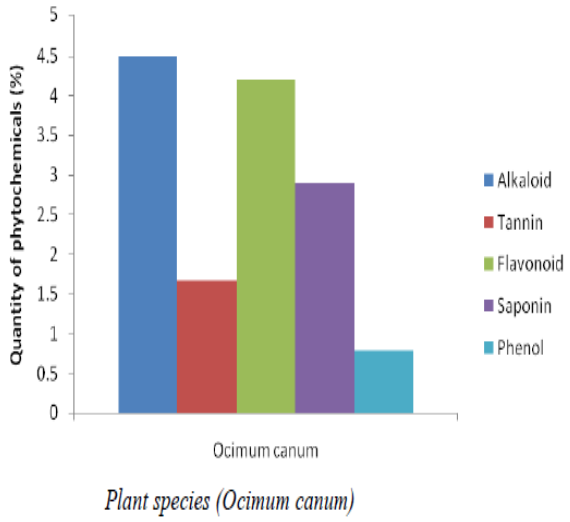

Figure1.*Showing the quantity of the different phytochemicals in O.canum*

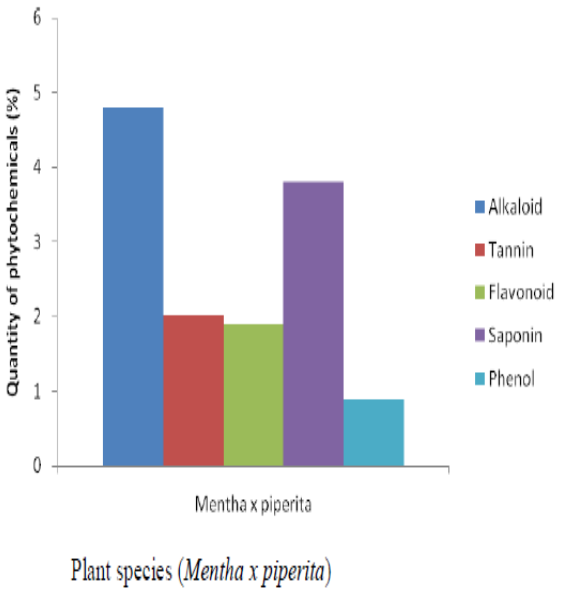

Figure 2.*Showing the quantity of the different phytochemicals in Mentha x piperita*

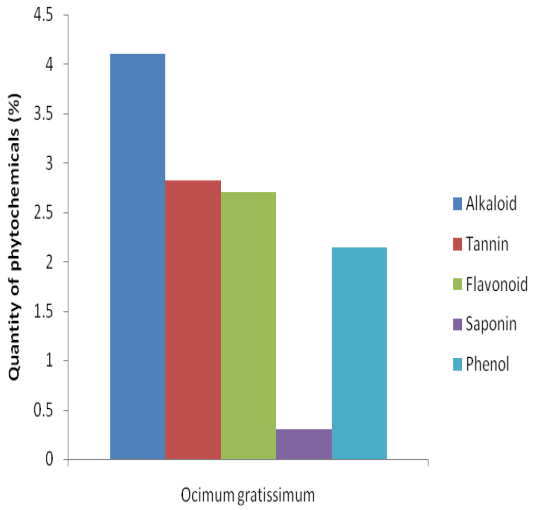

Figure 3.*Showing the quantity of the different phytochemicals in O. gratissimum*

DISCUSSION

Phytochemicals are non-nutritive plant chemicals that have protective properties from diseases which are considered to be beneficial to human health. Alkaloids have a wide range of pharmacological activities including antimalarial, antiasthma, anticancer properties as reported by Kittakoop, et al., 2014. It was also reported to have vasodilatory, analgesic and antibacterial properties (Russo, et al; 2013; Raymond et al; 2010, and Cushnie, et al; 2014). Studies have shown that all the plants studied have the tendency to treat these ailments and they all contain alkaloids.

Flavonoids have antioxidant effects and are able to inhibit the initiation, promotion, and progression of tumors, reduce coronary heart disease (Kim et al; 1994; Hertog et al; 1993). This work showed that all the plant species studied contain appreciable quantity of

flavonoid. Other biological functions possessed by flavonoids include protection against platelet aggregation, microorganisms, hepato toxins, viruses, tumors, ulcers, free radicals, inflammation, and allergies (Barakat et al; 1993).

Phenols are antioxidants in humans and plants (Dillard and German, 2000). Current interest is on the potential of antioxidants for amelioration of diseases. This can be gotten by simply improving the dietary intake of nutrients with antioxidant properties, such as vitamin E, vitamin C, β-carotene, and carotenoids, and plant phenolics such as tannins and flavonoids (Haslam, 1998).

According to Sodipo et al; (2000) most phytochemicals serve as natural antibiotics, which assist the body in fighting microbial invasion and infections. Saponins for instance protects against microbial attack in plants; it is also useful in treating yeast and fungal infections (Sheikh et al; 2013).

Based on the present study, the phytochemical content of the plant species is an indication that they are of medicinal values as reported by other researchers. The result for qualitative screening revealed the presence of the phytochemicals studied. The work was done using two extracts, ethanolic and aqueous extracts for a comparative purpose, and it was revealed that ethanolic extraction was more effective as it showed more positive results than the aqueous extracts.

CONCLUSION

This study has shown that the three species of medicinal plants studied contained the bioactive constituents which are Alkaloids, Tannins, Flavonoid, Saponin and Phenol. These phytochemicals enabled these plants to be of high medicinal importance to humans as they are used in the treatment of many health conditions. Further studies should be carried out on extraction, purification and application of the type of alkaloid, tannin, flavonoid, saponin and phenol and their usefulness as pharmaceutical raw materials in the production of drugs.

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