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Phytochemical screening of some wild plants from Lamiaceae and their role in traditional medicine in Uriri District - Kenya

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Abstract
This research surveyed and analyzed the phytochemicals of plants of Lamiaceae family commonly used in traditional medicine in the area. Information was gathered from medicinal practitioners (50-60 years old) between November, 2009 and August, 2010. *Becium obovatum* (E. Mey. ex Benth) N.E.Br, *Calamintha nepeta* (L) Savi, *Fuestia africana* T.C.E Fries, *Hyptis pectinata* (L) Poit, *Hoslundia opposita* Vahl, *Leonotis nepetifolia* (R. Br. ex Ait. F), *Leucas calostachys* Oliv, *Ocimum kilimandscharicum* Baker Ex. Gurke, *Plectranthus barbatus* Andrews *Satureja biflora* (Ham Ex. D.Don) Brig were studied. These plants were used to treat gastrointestinal infections, urinary infections, cold and sore throat, rheumatism and skin infection. Phytochemical screening revealed that sterols, terpenoids, tannins, saponins alkaloids, flavonoids and glycosides contributed to the medicinal value of the plants. This research has provided insight on the use of secondary metabolites in traditional medicine in maintaining proper human health.

Keywords: Phytochemical investigation, Lamiaceae, traditional medicine, medicinal plants.

1. Introduction
Herbal medicines have been used for many years dating back as 3000 BC [1, 2]. Despite enormous advances in conventional medicine, traditional medicines have been encouraged by the World Health Organization [3], partly because some conventional drugs have failed to prove their effectiveness, have serious side effects, or cannot cure certain new illnesses such as AIDS and cancer. Medicinal and aromatic plants are reservoirs of certain curative elements used by a large population of Africans in the treatment of various diseases such as malaria, diabetes, mental disorders, cancer, hypertension and HIV/AIDS [4]. Medicinal plants need more attention due to their important role in primary healthcare delivery system for improvement of people's health [5]. It is an essential component of human healthcare especially for the rural communities who solely rely on forest plants for food, shelter, energy and medicine [6].The medicinal values of these plants lie in some chemical substances that produce a definite physiological action on human body. The most important of these bioactive constituents of plants are the alkaloids, tannins, terpenoids, flavonoids and the phenolic compounds [7]. Knowledge of organic components of plants is desirable, not only for the discovery of therapeutic agents but also because such information can be of value in disclosing new sources of such economic materials such as tannins, oils, gums, precursors for synthesis of complex chemical substances. The knowledge of chemical constituents of plants would further be valuable in discovering the actual value of folkloric remedies [8]. Plants of Lamiaceae family are known for their essential oils [9]. Many active essential oils have been isolated from members of this family. This family is also famous for the presence of diterpenoids among its members. The Lamiaceae species are important for their antimicrobial properties which are used in research of antimicrobial activities, for instance, *Salvia argentea* L, *Stachys annua* L, *Ballota nigra* L, *Melisa officinalis* L among others [10]. Lamiaceae species have provided important resources for the old and new world and their use in medicine and as condiment in regional cuisine is of central importance for instance in countries like Turkey, China, Middle East countries, India Brazil, Egypt among others [10-13]. Most parts of Kenya are endowed with a wide variety of indigenous medicinal plants.

These plants are used by the local herbalists for the treatment of various diseases and are distributed in various families: Papilionaceae, Lamiaceae, Verbenaceae, Asteraceae, Myrsinaceae, Polygonaceae, Combretaceae, Rubiaceae among others. Plants in these families are rich in bioactive compounds that include; alkaloids, terpenoids, saponins and even phenols. Plants of Lamiaceae family are known for their essential oils [9]. Many active essential oils have been isolated from members of this family. This family is also famous for the presence of diterpenoids among its members. The Lamiaceae species are important for their antimicrobial properties which are used in research of antimicrobial activities, for instance, *Salvia argentenea* L, *Stachys annua* L, *Ballota nigra* L, *Melisa officinalis* L among others [10]. The Myrsinaceae and the Polygonaceae are the most important ethnomedical anthelminthic and antibacterial with strong cross ethnic usage [14]. *Terminalia brownii,* a member of the Combretaceae family is a multipurpose medicinal plant used by most herbalists in Kenya for various conditions. It can either be used alone or in combination with other plants [15]. In Migori County, research has been conducted on the value of leafy vegetables used by the Luo people living in Uriri, Karungu, Nyatike and Rongo divisions [16]. Among the leafy vegetables studied were: *Solanum nigrum, Cleome gynandra, Vigna unguiculata, Asystasia schimperi, Corchorus* sp*, Amaranthus* sp*,* and *Crotalaria* sp. Further, aspects of ethnomedicine, ethnosystematics and ethnobotany of the Luo community of Migori district (Uriri included) revealed a rich ethnobotanical knowledge and a fascinating relationship between drug use and culture. It was found out that 272 genera of flowering plants were useful in providing medicinal remedy: from this list 4% of the plant species studied were from Lamiaceae family [17]. Phytochemical research conducted in the area has revealed that alkaloids, aurones, chalcones, flavones, anthraquinones, tannins, saponins, sterols and cardiac glycosides were some of the secondary metabolites present in these plants [17]. Terpenoids and flavonoids were not studied. This research study aims at providing information on the phytochemical constituents of selected plants of Lamiaceae family from Uriri District and their role in traditional medicine.

2. Materials and Methods

2.1 Study area: Uriri District: Uriri District covers an area of approximately 379 Km^2. The District comprises of seven locations and fourteen sub- locations (Fig 1). The population density as per the 1999 Population and housing census report was 238 persons/km^2. However, the projected population density by the District Statistics office Migori, 2001, puts the population density at 309 persons/Km^2. The division experiences an annual rainfall of 700 mm-1800 mm annually with short rains between March and May while long rains between October to December periods. The climate is of mild inland equatorial type, modified by relief, altitude and proximity to the lake. It favours the cultivation of sugar cane which is an industrial crop, besides other crops like cassava, maize, sorghum and tobacco. It experiences a minimum temperature of 17 °C and a maximum of 20 °C, with high humidity and a potential evaporation of 1800-2000 mm per year (Migori District Development Plan 2002-2008).

2.2 Data collection: This study was conducted among the Luo and Maragoli communities residing in Uriri District. It emphasized on the usage of herbs and shrubs of Lamiaceae family as remedy to the various ailments and complications encountered. Observation, oral interviews and questionnaires were the tools commonly used for data collection. The oral interviews were conducted with the aid of an interpreter, who was guided by village elders from various areas who were well acquainted with the medicinal practitioners (herbalists). The questionnaires were not directly administered to the respondents instead they were filled later after the interviews. In most cases, they were used as guides. This was so because of the high level of illiteracy among the respondents and also for allaying all forms of suspicion on the respondents operations. Out the 120 medicinal practitioners (50 years and above) targeted, 60 were interviewed, 54 of which gave harmonized information while 6 gave conflicting information that could not be used in this study. The number 60 was arrived at through purposive sampling where a 50% number of the target population was deemed appropriate as a representative sample. The data collection process took 6 months from November, 2009 to August, 2010.

2.3 Preparation of herbarium specimen: Plant collection and the preparation of herbarium specimens were based on the standard taxonomic procedures according to [18-20]. After collection, the plant specimen were processed in the Botany laboratory (Maseno University) where drying was done at 40 ºC for 72 hours. The plant specimens were then pressed, mounted and sprayed with pyrethrin based insecticides and stored as voucher specimens at the University Herbarium, Maseno. The duplicates were deposited at the East African Herbarium. Naming of the specimen was done at The East African Herbarium in The National Museums of Kenya.

2.4 Procedure for phytochemical tests: Phytochemical screening was conducted to test for the presence of compounds such as alkaloids, flavonoids, terpenoids, saponins, tannins, sterols and the cardiac glycosides using stems, leaves and roots of the six plant species of Lamiaceae collected from the study area. The chemical test was carried out on the aqueous extract and on powdered sample from the leaves, stem, and the root using standard procedures to identify the constituents as described by [21-23]. The phytochemical screening of the various plant species was supposed to reveal the presence or absence of the various secondary metabolites to be tested.

3. Results

From the field survey ten plant of Lamiaceae family were collected and identified from different sites within the area of study (See table 1). The information collected from the traditional medical practitioners was summarized in a tabulated form (See table 2). Most of the plants researched on were found to be very effective in the treatment of gastrointestinal infections and complications (See figure 1). It was also noted that a single plant had a capability of providing a vast array of remedy to different ailments (See table 2). *Calamintha nepeta, Hoslundia opposita*, *Hyptis pectinata, Ocimum kilimandscharicum* and *Plectranthus barbatus* were found to be the most commonly used plant species among many practitioners and their role in providing remedy to various ailments was greatly underscored (See table 2). The phytochemical tests conducted involved the ground extract of the whole plant. Six of the ten plant species analysed by qualitative methods showed positive test for all the phytochemicals while four plant species lacked some phytochemicals. The results were represented in a table form (Table 3).

Table 1: Table of Lamiaceae plants from Uriri

Plant Name
Becium Obovatum (E.Mey.Ex. Benth) N.E.Br
Calamintha nepeta (L) Savi
Fuerstia africana T.C.E. Fries
Hoslundia opposita Vahl
Hyptis pectinata (L) Poit
Leonotis nepetifolia (R.Br) Ait F
Leucas calostachys Oliv.
Ocimum Kilimandscharicum Baker Ex. Gurke
Plectranthus barbatus Andrews
Satureja biflora (Ham Ex. D.Don) Brig

Table 2: Plants of Lamiaceae family cited in Uriri District used as medicine

Plant Name	Mode of Drug Preparation	Disease(S) Treated or Managed
Becium Obovatum (E.Mey.Ex. Benth) N.E.Br	Decoction and concoction	Gastrointestinal infections, anthelminthic, swellings/warts, genital stimulant/ depressant.
Calamintha nepeta (L) Savi	Infusion and concoction	Nervous tension, depression, insomnia, fever, cold and painful menstruation.
Fuerstia africana T.C.E. Fries	Maceration, concoction, infusion	Stomachache, urinary infections, ulcers and snake bites.
Hoslundia opposita Vahl	Concoction and infusion	Colds, sore throat, gonorrhea, convulsion, stomach pains, ringworms and parasitic skin infection.
Hyptis pectinata (L) Poit	Infusion, concoction and maceration	Gastrointestinal infection, fever, some skin infections, lung conjestion, rheumatism.
Leonotis nepetifolia (R.Br) Ait F	Decoction and concoction	Resizing distended stomach in young children, fever, wound prolapses, malaria, coughs
Leucas calostachys Oliv.	Concoction, infusion, maceration	Stomachache, diarrhea gastrointestinal diseases and constipation and cold.
Ocimum Kilimandscharicum Baker Ex. Gurke	Decoction, tisane and concoction	Diarrhoea, cold and flu, coughs, abdominal pains, annoxeria and measles.
Plectranthus barbatus Andrews	Concoction, maceration and infusion	Stomachache, dysentery, diarrhea and intestinal infections, abscess.
Satureja biflora (Ham Ex. D.Don) Brig	Infusion, maceration and concoction	Stomachache, rheumatism, chronic diarrhea

Table 3: Results of phytochemical tests/screening

Name of Plant	Sterols	terpenoids	Alkaloids	Saponins	glycosides	Flavonoids	Tannins
Becium obovatum (E.Mey.Ex. Benth) N.E.Br.	√	√	√	√	√	√	√
Calamintha nepeta (L) Savi	√	√	√	√	X	√	√
Fuerstia africana T.C.E. Fries	√	√	√	√	√	√	√
Hoslundia opposita Vahl	√	√	X	√	X	√	√
Hyptis pectinata (L) Poit	√	√	X	√	√	X	√
Leonotis nepetifolia (R.Br) Ait. F	√	√	X	√	X	√	√
Leucas calostachys Oliv.	√	√	√	√	√	√	√
Ocimum kilimandscharicum Baker Ex. Gurke	√	√	√	√	√	√	√
Plectranthus Barbatus Andrews	√	√	√	√	√	√	√
Satureja biflora (Ham Ex. D.Don) Brig	√	√	√	√	√	√	√

KEY: X…….Absence, √…….Presence

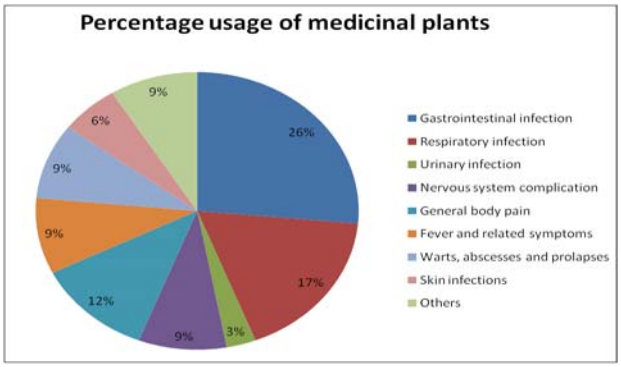

Fig 1: Percentage usage of medicinal plants of Lamiaceae family in Uriri District

Table 4: Table showing properties exhibited by the phytochemicals tested and their relationship with the diseases treated

Medicinal property	Phytochemicals responsible	Diseases and complications	Plant species
Anticatarrhal effect	Tannins and saponins	Cold and flu	*Fuerstia africana* T.C.E. Fries, *Leucas calostachys* Oliv., *Ocimum kilimandscharicum* Baker Ex. Gurke, *Hyptis pectinata* (L) Poit. *Calamintha nepeta* (L) Savi and *Hoslundia opposita* Vahl.
Anti-inflammatory effect	Alkaloids and Tannins	Rheumatism, diarrhoea, muscle tension and painful menstruation	*Leucas colostachys* Oliv., *Ocimum kilimandscharicum* Baker Ex. Gurke, *Hyptis pectinata* (L) Poit. *Calamintha nepeta* (L) Savi and *Hoslundia opposita* Vahl. and *Satureja biflora* (Ham. Ex. D. Don) Brig.
Carminative effect	Terpenoids and glycosides	Constipation, gastrointestinal infection an distended stomach in children	*Leucas calostachys* Oliv., *Plectranthus barbatus* Andrews, *Becium obovatum* (E. Mey. Ex. Benth) and *Leonotis nepetifolia* (R. Br.) Ait. F.
Antispasmodic property	Alkaloids	Painful menstruation and stomach pain	*Calamintha nepeta* (L) Savi and *Hoslundia opposita* Vahl.
Soothing/ demulcent effect	Terpenoids, tannins, sterols and glycosides	Constipation and distended stomach in children	*Leucas colostachys* Oliv. and *Leonotis nepetifolia* (R. Br.) Ait. F.
Expectorant effect	Saponins	Sore throat and lung congestion	*Hyptis pectinata* (L) Poit. and *Hoslundia opposita* Vahl.
Nerve stimulant	Alkaloids	Insomnia, depression, convulsion, anorexia and nervous tension,	*Fuerstia africana* T.C.E. Fries and *Ocimum kilimandscharicum* Baker Ex. Gurke
Antioxidant/ anticarcinogenic effect	Flavonoids	Swollen body organs and warts on the body	*Becium obovatum* (E. Mey. Ex. Benth)
Analgesic property	Alkaloids	Fever, abdominal pain and stomachache	*Fuerstia africana* T.C.E. Fries, *Ocimum kilimandscharicum* Baker Ex. Gurke and *Calamintha nepeta* (L) Savi
Antimicrobial effect	Tannins, sterol glycosides, alkaloids, saponins, flavonoids and terpenoids	Gastrointestinal infection, swellings and wounds, cold and flu, diarrhoea, cough, dysentery, abscess (boils), stomachache, parasitic skin infection, ringworms and gonorrhea.	*Fuerstia africana* T.C.E. Fries, *Becium obovatum* (E. Mey. Ex. Benth), *Leucas calostachys* Oliv., *Leonotis nepetifolia* (R. Br.) Ait. F., *Hoslundia opposita* Vahl., *Calamintha nepeta* (L) Savi *Ocimum kilimandscharicum* Baker Ex. Gurke, *Plectranthus barbatus* Andrews, *Satureja biflora* (Ham. Ex. D. Don) Brig. and *Hyptis pectinata* (L) Poit.

4. Discussion

The plant species collected were identified and assigned names at the East African Herbarium, and were found to be commonly utilized in the treatment of several ailments and complications (See table 2). Most of the plant species in the study have been reported as medicinal plants elsewhere in Africa and even in Kenya through past studies although their uses have differed across various cultures [14, 15, 24-29]. It was found out from the practitioners that the plants administered as decoctions (See table 2) were characterized with tough leaves, bark and even the roots. They therefore had to be boiled longer to soften their parts before being administered. This method however, may not be most appropriate since the subjection of the plant material to high temperature is highly likely to alter the chemical composition of the plant, especially the very volatile ones as reported in past research studies [30,31]. Infusion method was used to administer the herbs that had delicate soft parts (See table 2), where plant leaves or the whole plant were dipped in hot water and left for some time for the active ingredients to be extracted. The plants that were macerated were found also to have highly soluble chemical components that would easily dissolve in cold water when left overnight in a covered container, as has also been reported in the past [22, 25, 30]. All the plants collected were administered as concoction in different cases (See table 2), in this case it was revealed that some plants which were considered to be of lower medicinal value were combined with other plants of the same family or different families to form a powerful mixture that was more effective than would be the case if a plant was used alone. This is also in line with some revelation by some researches on Ethno botany among various communities in Kenya [14, 31-35]. In some cases, concoctions were prepared when a plant was considered useful and had some poisonous ingredients in it, the other plant used alongside was meant to neutralize the effects of the poison. The administration of herbs as tisane involved adding the leaf extracts of a plant especially *Ocimum kilimandscharicum* to tea, porridge or any available beverage. Although there has been substantial research on the phytochemical analysis of Lamiaceae plant species and their composition, most studies conducted have been limited to the locally grown cultivars. It is well known that environmental conditions and agricultural practices may significantly modify productivity, oil content and chemical composition of plant species [22, 36-38]. The phytochemicals tests conducted revealed that all the plant species of Lamiaceae collected tested positive for sterols, terpenoids, tannins and saponins. This is a clear indication that such plant species have a powerful medicinal value especially to their users. The various medicinal properties exhibited by the various phytochemicals are useful in the treatment of most common ailments. The commonly used plant species of Lamiaceae family collected were found to contain all the group of compounds tested in the laboratory (See table 3). Such plants included *Fuerstia africana*, *Becium obovatum*, *Leucas calostachys*, *Ocimum kilimandscharicum*, *Plectranthus barbatus* and *Satureja biflora. Hyptis pectinata* was also commonly used by the practitioners however the phytochemicals revealed that it lacked alkaloids and flavonoids. The other species such as *Leonotis nepetifolia*, *Hoslundia opposita* and *Calamintha nepeta* lacked some phytochemicals however they were still useful

in the treatment of various ailments. The color changes (See table 3) detected after the screening indicating the positive tests conformed to some results obtained from past researches on phytochemical content of different plants from different areas [39-44]. The absence of certain phytochemicals such as alkaloids in *Hoslundia opposita*, and *Leonotis nepetifolia*; glycosides in *Calamintha nepeta, Hoslundia opposita*, and *Leonotis nepetifolia*; and Flavonoids in *Hyptis pectinata* suggest that they could either be present in undetectable amounts or this could be probably due to their low solubility in organic solvents. This is in line with some past studies conducted among some various plant families Apocynaceae, Lamiaceae, Verbenaceae among others [45-48]. Tannins are usually associated with flavonoids which are their monometric precursors [49], however from this study, *Hyptis pectinata*, did not test positive for flavonoids yet it had tannins. It is therefore difficult to reconcile the different results for tannins obtained from the plant species in this research. Most of the Lamiaceae plants collected were found to be commonly used in the treatment of gastrointestinal infection, respiratory tract infections, skin infection and general body pain (See figure 1). Data from recent research conducted reveal that *Fuerstia Africana*, *Leonotis nepetifolia*, *Ocimum kilimandscharicum* and *Plectranthus barbatus* are strong herbs for gastrointestinal infections and stomach disorders [51, 27, 52]. *Ajuga remota, Leucas calostachys, Ocimum kilimandscharicum, Hoslundia opposite, Leonotis mollissima, Plectranthus barbatus, Leucas calostachys, Ocimum latifolium and Plectranthus comosus* have been researched on and it has been documented that they are ethnobotanically important in providing a vast array of remedies on urinary, respiratory, reproductive, nervous and gastrointestinal infections [31, 52]. The remedy provided by the plant species could be attributed to the presence of a vast array of phytochemicals such as alkaloids, flavonoids, sterols, saponins, tannins, terpenoids and glycosides which have a curative activity against pathogens and therefore support their traditional use in various illnesses. Alkaloids have analgesic, antispasmodic and antibacterial properties [55]. The flavonoids are antioxidants, anti-inflammatory, anticarcinogenic and antimicrobial [56]. The properties of the tannins include anti-inflammatory, regeneration, anticatarrhal, antimicrobial and soothing effect [57]. Elsewhere, tannins have been reported to contain antiviral, antitumor, antiinflamatory and wound healing properties among other organs [58, 59], thus plant species from this study found to contain tannins could be highly likely to contain such properties thus, being useful therapeutic aspects to cure various diseases [60]. The actions of saponins include expectorant, anticatarrhal, antimicrobial and cough suppressant properties [61]. The glycosides have a laxative and carminative, effects [61]. The terpenoids possess soothing relief, antimicrobial, carminative effect and antiseptic properties [21]. Lastly, the sterols have a demulcents and antimicrobial effect. The curative properties exhibited by the phytochemicals tested were of a very wide range. Many studies have reported that phenolic compounds possess biological activities such as antiinflamatory, antiulcer, antispasmodic and anticancer properties [62]. The anticatarrhal effect is a property commonly of tannins and saponins which reduces the rate at which mucus is produced by the body. Past researches show that S*ambucus nigra* and *Hydrastis canadensis* are the plant with rich anticatarrhal effect due to their ability to reduce the production of mucus, a function attributed to the presence of tannins. This research further reveals that the action of tannins from these plants is more in the respiratory system [63]. This property is very essential in providing a remedy against cold and flu as evidenced by plants such as *Fuerstia africana*, *Leucas calostachys*, *Ocimum kilimandscharicum*, *Hyptis pectinata, Calamintha nepeta* and *Hoslundia opposita* (See table 4). Saponins also exhibit expectorant effect which aid in the removal of mucus from the lungs, an action brought about by their ability to reduce viscosity and relax bronchial spasm. This is very common in reducing lung congestion and curing sore throat by plants such as *Hyptis pectinata* and *Hoslundia opposita* (See table 4). Research conducted in other plant families has revealed that the expectorant property of medicinal plants is attributed to the presence of saponins due to their ability to produce form, haemolytic effect on red blood cells and also cholesterol binding properties [57, 64]. *Plectranthus barbatus* has been frequently cited as a species used to relieve cold, flu, bronchitis, pneumonia and for general respiratory complication [51, 65, 66], functions attributed to expectorant effects of saponins. Phytochemical screening on the gum of *Spondias mombin* revealed that the plant species is very rich in saponins thus its effectiveness as an expectorant in expelling tapeworms. Other plants that are rich in saponins and have recorded expectorant property include *Alchornea laxifolia, Zingiber officinalis, Saponaria officinalis* and *Glycyrrhiza glabra* [67-69]. From this is highly likely that the presence of saponins in the plants species of Lamiaceae make them effective as expectorants. Tannins, phenols and alkaloids have an antiinflamatory effect which is very useful in reducing inflammations in the body thereby reducing incidences of rheumatoid arthritis and also inhibiting diarrhoea. This could results from the binding effect on mucous membrane due to their action on constituent protein. Consequently, diseases such as rheumatism, chronic diarrhea, muscle tension and painful menstruation could be minimized by the administration of herbs such as *Leucas calostachys*, *Ocimum kilimandscharicum*, *Hyptis pectinata, Calamintha nepeta* and *Hoslundia opposita* and *Satureja biflora* (See table 2). This concurs with Okigbo *et al*., 2009 [4] who asserts on the importance of tannins, phenols and alkaloids in suppressing the incidences of inflammations in the body. Past studies conducted on some plants of Lamiaceae family including species of *Salvia, Satureja, Thymus* and *Ocimum* have have reported their effectiveness as antiinflamatory agents [70-72], a property strongly attributed to the presence of phenolic compounds [70], Tannins and alkaloids [43, 55]. Other studies conducted in other plant families such as Apocynaceae, Verbenaceae, Rutaceae, Rubiaceae and asteraceae on alkaloids and tannins have shown that the presence of such phytochemicals in the respective plants is very essential for their effectiveness in treating diseases whose remedies are related to anti-inflammatory properties [53, 73]. The antispasmodic property relieves spasm in the smooth muscles, thereby reducing muscle tension in the gut and the myometrium of the uterus and it is exhibited by the alkaloids. This property could be attributed to the ability of *Calamintha nepeta* and *Hoslundia opposita* to provide a remedy in relieving stomach pains and painful menstruation (See table 2). This conforms to past research studies conducted on some plant of Lamiaceae family such as *Mentha longifolia, Ocimum vulgaris, Ocimum graticimum, Melissa officinalis, Thymus fallax* among others which revealed that the plants had strong antispasmodic due to the presence of terpenes and alkaloids [55, 71]. Some experimental studies show that species of *Satureja* have in the past been used in traditional medicine as antimicrobial, antispasmolytic, antibacterial and analgesic agents due to the presence of alkaloids and essential oils [74]. The analgesic property exhibited commonly by the alkaloids is a remedy of pain in that it relieves the body of pains associated with fever; abdominal pain and stomach pain. Some of the plant species with analgesic effect included *Fuerstia africana*, *Ocimum*

kilimandscharicum and *Calamintha nepeta* whose activities are attributed to the presence of alkaloids (See table 3). Past studies on some plant species of Lamiaceae family that included *Agastache, sinensis, Leucas aspera, Mentha piperita, Nepeta caesarea, Nepeta italica, Origanum onites, Roylea elegans, Salvia haematode, Sideritis mugronensis* and *Thymus vulgaris* have revealed that such plants exhibit a strong analgesic properties due to their rich alkaloid content [75-79]. This implies that there is a great possibility of the plants from this study that tested positive for the alkaloids and also were used for relieving pain related illness to exhibit analgesic properties. The carminative effect is a property exhibited by the terpenoids and the glycosides [60]. This property is important in relieving build up of trapped wind in the digestive system and it acts as a remedy to constipation, gastrointestinal infections and relieving distended stomach in children. Some of the plants collected that could probably reveal such a property contained either glycosides or terpenoids or both phytochemical and they included; *Leucas colostachys* oliv., *Plectranthus barbatus* Andrews, *Becium obovatum* and *Leonotis nepetifolia* (See table 4). The terpenoids, glycosides, sterols and tannins are phytochemicals with soothing or demulcents effect which initiates the production of mucilage that is useful in the digestive system to ease constipation and relieve distended stomach in children. Important plants that provided such a remedy included *Leucas calostachys* and *Leonotis nepetifolia* which all contained terpenoids, glycosides and tannins except that *Leonotis nepetifolia* lacked glycosides (See table 3). The antimicrobial effect of plant species collected may have resulted from the combination of secondary metabolites present which included; alkaloids, flavonoids, saponins, tannins, terpenoids, sterols and glycosides. Such a property is well correlated to the ability of the plant species to fight microorganisms such as bacteria, viruses, protozoa and fungi. It is therefore an essential property in providing a remedy to most of the ailments and complications which include gastrointestinal infections, swellings and wounds, cold and flu, diarrhea, cough, dysentery, abscess (boils), stomachache, parasitic skin infection, ringworms and gonorrhea. This property could probably be exhibited by all the plant species collected due to their ability to act as a remedy to at least one of the diseases mentioned as being caused by a microbe (See table 2 and 4). The leaves and roots of *Hoslundia opposita* have been reported to be effective in the treatment of gonorrhea, cold, mange and skin diseases all of which are caused by microbes [60, 81]. This is also in line with research conducted in the past relating the antimicrobial properties of *Hoslundia opposita* to the presence of vast array of phytochemicals. It has been reported that many plant species exhibit antimicrobial effect, hence, their usage in the treatment of microbial infections. The presence of flavonoids, phenolic compounds, alkaloids, tannins and diterpenoids in these plants make them potent in providing such roles [21, 67, 82, 83].

Antimicrobial tests conducted on some species from selected genera of Lamiaceae which included *Ajuga, Ballota, Chamaedrys, Lamium, Leucas, Marrubium, Micromeria, Ocimum, Phlomis, Salvia, Satureja and Teucrium* revealed that the herbs had antibacterial activities against several pathogenic bacteria especially the Gram positive bacteria like the Staphylococci hence their usage [10]. Essential oils with high concentration of thymol and cervacrol like *Origanum vulgare* (oregano), *Satureja hortensis* (savory) and *Thymus vulgaris* (thyme) usually inhibit Gram positive more than Gram negative pathogenic bacteria [85]. Strong *in vitro* evidence indicate that plants of Lamiaceae family have essential oils that act as antibacterial agent against a wide spectrum of bacterial strains including *Listeria monocytogenes, L. innocua, salmonella typhimurium, Escherichia coli, Shigella dysenteria, Bacillus aureus, Staphylococcus aureus* and *Salmonella choleraesuis* [86-88]. These further support the use of Labiates in Uriri. Besides, the medicinal properties of *Nepeta* and *Fuerstia* species are related to terpenoids and flavonoids, for example, compounds such as 1-8 Cineole, are very common in *Nepeta* and have expectorant, antiseptic and anthelminthic activities [89] hence their use. Chemical composition and antimicrobial activity of essential oil of *Satureja biflora* has revealed it effectiveness on both gram positive bacteria (*Staphylococcus aureus* and *Bacillus spp.)* and gram negative bacteria (*Salmonella typhi* and *Klebsiella pneumonia*), and pathogenic fungi [90]. The plant was very rich in terpenoids as well as phenolic compounds which made it effective in inhibiting most of the microbes used in the experiment. This can explain that the antimicrobial property exhibited by the plant species from Uriri. The alkaloids present in some of the plants analyzed for instance *Fuerstia africana* and *Ocimum kilimandscharicum* had an effect on the nervous system by relieving nervous tension and providing a remedy in cases of anorexia, insomnia, depression and convulsion (See table 2). This further supports the plant use in this area. Alkaloids [55], triterpenes, tannins, sterols, carotenoids and polysaccharides from *Croton zehntneri, Acorus calamus* and *Aeollanthus* have been reported to possess a strong nerve stimulating property that has made the plants effective as sedatives, hypnotic, hypothermic and anticonvulsant and also in homeopathic treatments such as cardiac complications, flatulence and hyperthyroidism [91, 92]. From this it can be deduced that the effectiveness of the Lamiaceae plant species collected in treatment of complications related to the nervous system is due to the presence tannins, alkaloids terpenoids. Terpenoids were highly likely to exhibit anticarcinogenic and antioxidant property from the plant species considered in this study. The action of such properties was by scavenging on the free radicals to minimize incidences of tumor development that can cause cancer [13]. This property is important in suppressing swollen body parts, warts and abscess and was mainly contributed by *Becium obovatum* (See table 2). Diterpenoids and their aroma components have shown cancer suppressive activity when tested on human cancer cell lines including glioma, colon cancer, gastric cancer, human liver tumour, pulmonary tumours, breast cancer, leukemia among other [93] hence the plants tested and reported herein. The essential oil of *Ocimum basilicum* (basil), *Syzygium aromaticum* (clove), *Myristica fragrans* (nutmeg), *Origanum vulgare* (oregano) and *Thymus vulgaris* (thyme) have proven free radical scavenging and antioxidant properties in the DPPH radical assay at room temperature [94]. *Thymus serpyllum* showed a free radical scavenging activity close to that of synthetic butylated hydroxytoluene (BHT) in a β-carotene/ linoleic acid system [95].

The antioxidant activity was attributed to high content of phenolic thymol and carvacrol [96]. Other Lamiaceae plants that have been reported to possess antioxidant activities include *Salvia cryptantha, Salvia multicaulis, Thymus caespititius Thymus mastichina, Melissa officinalis, Mentha aquatic, Mentha longiflora, and Mentha piperita* whose actions are attributed to the presence of Curcumin acid and ascorbic acid in the *Salvia* genera; 1,8-cineole and linalool in the *Thymus* genera; geranial, citronellal, isomenthone and menthone in genera *Melissa* and 1,8-cineole, menthone and isomenthone in the *Mentha* genera [95, 97-99]. Phenolic compound have shown a strong protective factor against cancer and heart diseases because of their antioxidant potency and their ubiquity in a wide range of plant species [96, 101]. Some of the compounds include flavonoids, isoflavonoids, tannins and

flavonoids. This clearly shows that the presence of terpenoids and flavonoids in the plant species collected for this research could be responsible for their anticarcinogenic or antioxidant properties. The phytochemicals tests conducted revealed that all the plant species of Lamiaceae collected tested positive for sterols, terpenoids, tannins and saponins. This is a clear indication that such plant species have a powerful medicinal value especially to their users. The various medicinal properties exhibited by the various phytochemicals are useful in the treatment of most common ailments.

5. Conclusion

This research study has provided a documentation of ten plants of Lamiaceae family that are of great medicinal value in Uriri District. This is intended to provide information to the residents on the importance of such plant and how well they can use them in treating the common ailments that they encounter. The presence of phytochemicals with various pharmacological and biological properties determines the medicinal value of the plant species of Lamiaceae family as useful sources of drugs in Ethnomedicine. These phytochemicals are the active ingredients present in plants that make them useful in traditional medicine. This study therefore, provides knowledge of phytochemical and phytotherapeutic potential of plants of Lamiaceae family that may be useful to scientists and pharmaceutical industries among others.

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