



## Review

### SOME MEDICINAL PLANTS OF THE FAMILY VERBENACEAE COMMONLY USED IN JOS, NIGERIA - A REVIEW

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#### ABSTRACT

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Verbenaceae represent a very important family of medicinal plants of commonly used especially in Jos, Plateau State, Nigeria. This review was carried out in order to identify and document the reported medicinal and ethnomedicinal uses of some plants of the family Verbenaceae that are used for ethnomedicine in Jos. Twelve (12) common medicinally useful plants of the family Verbenaceae used by the inhabitants of Jos, Plateau State, Nigeria were identified and discussed. They include *Aloysia gratissima* Linn. (Gillies & Hook.), *Clerodendron capitatum* Schum & Thonn., *Clerodendrum thomsonae* Balf., *Duranta repens* Linn., *Gmelina arborea* Roxb., *Lantana camara* Linn., *Lantana involucrata* Linn., *Lippia multiflora* Mold., *Tectona grandis* Linn., *Stachytarpheta cayennensis* (Rich.) Vahl., *Verbena officinalis* Linn., *Vitex doniana* Sweet. Some the plants species possess antimicrobial, antimalarial, antihypertensive, anti-inflammatory, antidiarrhoeal, sedative, ulcerogenic, fungicidal and antitumour activities. Medicinal properties of these plants are attributed to their chemical constituents. Useful information on these plants including parts used, constituents, and medicinal uses of plants are listed. The information contained in this review would be useful for further studies and development of the medicinal plants of this family, especially in drug discovery research.

Key words: Verbenaceae, medicinal plants, Nigeria

#### INTRODUCTION

Medicinal plants are available in abundance especially in the tropics, and are used in the treatment of

illnesses. The success of any healthcare system depends on the availability of suitable drugs on a sustainable basis, and the use of herbal drug product is playing significant roles towards attaining wider

coverage and better access to healthcare in developing countries (Rahman *et al.*, 2008). Verbenaceae species are economic plants and may be grown as ornamentals. They are also popular in traditional medicine thus the need for their study and conservation (Gill, 1988.). Those with medicinally useful properties belong mainly to genera like *Aloysia*, *Clerodendrum*, *Duranta*, *Gmelina*, *Lantana*, *Lippia*, *Premna*, *Stachytapheta*, *Tectona*, *Verbena*, *Vitex*, etc. Members of these genera exist as herbs, climbers, shrubs and trees producing many diterpenes, iridoids and flavonoids (Wiert, 2006). Plants of the family Verbenaceae have been used traditionally as tonic, anticonvulsant and sedative. It has been reported in the treatment of diabetes, cold and dysentery, among other uses (Akanmu *et al.*, 2005).

Herbal medicines have provided one of the early therapeutic agents before the advent of modern scientific medicine and as a result they have been incorporated into modern (orthodox) medicinal practice in many parts of the world (Egharevba *et al.*, 2015). Plants of the family Verbanaceae are widely used in northern and central parts of Nigeria including Plateau State for the treatment of various ailments and diseases. The leaves, stem, bark, fruits, seeds and roots of these plants are used depending on where the activity resides. It is generally necessary for plants growing in a given locality or geographical area to be identified and preserved especially for taxonomic researches (Kunle *et al.*, 2013).

### Verbenaceae Family

Verbenaceae, commonly known as verbena or vervain, is a family of tropical and subtropical flowering plants with few temperate species. The family currently comprises about 41 genera and 950 species of trees, lianas, shrubs and herbs (Mabberley, 1997). The principal genera are *Lantana* L. (approx. 150 species), *Lippia* L. (approx. 200species) and *Verbena* L. (approx. 200spcies). The genera *Clerodendrum*, *Karomia*, *Premna* and *Vitex* have recently been moved from Verbenaceae to Lamiaceae. (Fernandes, 2005). Some members of the Verbenaceae family are cultivated as ornamentals (Gill 1988), while others are medicinally useful. During the last few decades, there has been

increasing interest in the study of medicinal plants and their traditional uses in different parts of the world. Today, according to the World Health Organization, as many as 80% of the world's population depend on traditional medicine for their primary healthcare needs, and about 85% of the world's population are estimated to depend on traditional medicine for the treatment of various ailments (Egharevba *et al.*, 2015). Studies have shown that plants of the Verbenaceae family have been used in traditional medicine for several years as antimalarials, antipsychotics, anticonvulsants, antidiarrhoeal, antimicrobials, antidiabetic, antioxidants, antiasthmatics, antipyretic, antihypertensives, antiulcer (Akanmu *et al.*, 2005). A vast knowledge of how to use these plants against different ailments may be expected to have accumulated in areas like Nigeria where the use of plants is still of great relevance.

### Medicinal Plants of Verbenaceae Family

Medicinal plants are either "wild" or "domesticated" plants species, some of which considered to be harmful to humans, but contain substances that can be used for therapeutic purpose, and are commonly used in treating and preventing specific ailments and diseases (Nwachukwu *et al.*, 2010). The study of medicinal plants is crucial and ethnomedicine has no doubt played a central role in the search for and development of new drugs (Balunas and Kinghorn, 2005). Medicinal plants are so regarded because they are sources of well-known and medically useful secondary products. Generally, drug plants are unique in containing compounds that are end-products of long biosynthetic pathways and are usually not needed in metabolic processes of the plant. Davis and Heywood (1963) reported that these compounds, called secondary metabolites, include alkaloids, glycosides, essential oils and other organic constituents. They are usually produced in different parts of the plant like the roots, leaves, fruits and seeds (Ankanna *et al.*, 2012; Kochhar, 1981). Knowledge about these medicinally active constituents makes their application in therapy possible as contained in the various pharmacopoeias. Some important medicinal plants of Verbenaceae family used in Nigeria and their medicinal properties are listed in the Table 1.

**Table 1: Some medicinal plants of the family Verbenaceae commonly used by Jos settlers**

Plant	Ethnomedicinal uses	Plant parts used	Chemical constituents	Investigated Biological Activities	References
<i>Aloysia gratissima</i> (Gillies & Hook.)	Antimicrobial, Antioxidant,	Leaves	Essential oil rich in 1,8-cineole (13.7%), germacrene (13.4%), $\beta$ -cryophyllene (12.7), $\beta$ -pinene (11.7%).  Ferulic acid, <i>trans</i> -cinnamic acid and <i>p</i> -coumaric acid, <i>trans</i> -b-carotene and lutein	Antimicrobial, antibacterial, antifungi, anti-depressant, neuro-protective, anti-proliferative activities.	Santos <i>et al.</i> , 2015 Bersan <i>et al.</i> , 2014 Zeni <i>et al.</i> , 2013 Hister, 2009
<i>Clerodendron capitatum</i> Schum & Thonn.	Brain disorder, malaria, tuberculosis, epilepsy, fever, asthma, cough, ulcer, snake bite, hernia, bronchitis, wound healing, oedema, tumour	Roots, leaves, seeds	alkaloid, tannins, saponins, flavones saponins, triterpenes, sesquiterpenes, anthraquinone, iridoid glycosides, lupeol clerodendrin, phytosterols, ferulic acid, arabinose, ,	Brain disorder,  Genus known to possess anti-inflammatory, antidiabetic, antimalarial, antiviral, antihypertensive, hypolipidemic and antioxidant activities.	Ngo, 2013 Shrivastava and Patel, 2007a
<i>Clerodendrum thomsonae</i> Balf.	Inflammation, malignant tumor, epilepsy, gonorrhoea, mental illness, constipation, infantile hyperthermia, oedema, expectorant, asthma, pyretic, cataract, malaria, and diseases of blood, skin and lung.		Melittoside, aucubin, 8-O-acetylharpagide, reptoside, ajugoside, $\alpha$ -amyryrin, $\beta$ -amyryrin, caryoptin, 3-epicaryoptin, 16-hydroxy epicaryoptin, clerodendrin A, B and C, clerodin, clerodermic acid, cleroinermin, friedelin, gramisterol, iridoids (inermioside A, B, C and D, melittaside, ugandoside, obtusifoliol, oleanolic acid, royleanone, dehydroroyleanone, sammangaoside A, and B, uncinatone, Mi-saponins-A, friedelanone, lupeol, betulinic acid, royleanone and dehydroroyleanone, and botulin.	Antidiabetic, antimalarial, antiviral, antihypertensive, hypolipidemic and antioxidant activities.	Lammel and Rimpler, 1981 Shrivastava and Patel, 2007a,b
<i>Duranta repens</i> Linn.	Insecticidal, pain, diabetics, vermifuge, antimalaria, stimulant, diuretic, abscesses, febrifuge, antioxidant, antiviral	Fruits, leaves	Durantanin IV and (V), oleanolic acid, 3-[( <i>O</i> - $\beta$ -4C <sub>1</sub> -glucuronopyranosyl)-oxy]olean-12-en-28-oic acid <i>O</i> - $\beta$ -D-4C <sub>1</sub> -glucopyranosyl ester, campenoside I, cistanoside E, <i>E/Z</i> acteoside, acacetin, diosmetin, apigenin, luteolin and quercetin, , cleomisconsin A, hardwickiic acid, oleic acid, acetosides, (-)-3,13-	Antimalarial, thrombin inhibitory, antioxidant, antiviral, insecticidal, larvicidal activities.	Ahmed <i>et al.</i> , 2009 Nikkon <i>et al.</i> , 2009 Iqbal <i>et al.</i> , 2004

			clerodadien-16,15-olid-18-oic acid, (-)-6 $\beta$ -hydroxy-5 $\beta$ ,8 $\beta$ ,9 $\beta$ ,10 $\alpha$ -cleroda-3,13-dien-16,15-olid-18-oic acid		
			Alkaloids		
<i>Gmelina arborea</i> Roxb.	Antihelmintic, piles, hallucination, fevers gastrointestinal disturbances, wounds, leprosy, anaemia, ulcers; headache, hypertension, diarrhea, appetite stimulant, gout, snakebite, scorpion sting, cardiotoxic, laxative, diabetes, aphrodisiac, fungal infections.	Root, bark, fruits, flowers, leaves.	Alkaloids, flavonoids, saponins, steroids, glycosides  Arboreol, isoarboreol, luteolin, gummadiol, methyl arboreol, gmelanone, arborone, 7-oxo-dihydrogmelinol, premnazol, melinol, , Lignans.  Essential oil rich in (Z)-3-hexanol (17.9%) and 1-octen-3-ol (8.6%)	Antipyretic, analgesic, immunomodulatory, antidiabetic, cardioprotective, diuretic, antimicrobial, anthelmintic, anti-hyperlipidemic, antioxidant activity	Kaswala et al., 2012 Moronkola et al., 2012 Munira et al., 2013
<i>Lantana camara</i> Linn.	Yellow fever, mental illness, headache, malaria fever, constipation, diaphoretic, febrifuge, hypertension, asthma, tetanus, skin itches, leprosy, chickenpox, ulcer, measles, swelling, bilious fever, rheumatism, emesis jaundice, dysentery, tuberculosis, tumour	Leaves, fruits, Flowers, Roots, Stem bark	Lantanoside, lantanone, lancomaric acid, lantadene A, B, C, D, betulonic acid, betulinic acid,  22 $\beta$ -acetoxylic acid, 22 $\beta$ -dimethylacryloyloxy-lantanolic acid, 22 $\beta$ -angeloyloxy-3 $\beta$ -hydroxyolean-12-en-28-oic acid, 22 $\beta$ -dimethylacryloyloxy-3 $\beta$ -hydroxyolean-12-en-28-oic acid, 22 $\beta$ -hydroxyoleanonic acid  Essential oil rich in $\beta$ -caryophyllene (27.0%), $\alpha$ -humulene (11.8%), sabinene (9.7%), bicyclogermacrene (8.1%) and davanone (4.7%)  Essential oil rich in bicyclogermacrene (26.1%), $\beta$ -caryophyllene (24.4%), germacrene D (19.2%) and valecene (12.0%).	Antibacterial, anticancer, antiproliferative, hemolytic, antioxidant, antifungi, antihyperglycemic, anti-inflammatory, anti-mutagenic, antiulcerogenic, antimotility, antiurolithiatic, Mosquito larvicidal, antifilarial, anti-fertility, insecticidal, fungicidal, nematocidal, antiseptic, activities.	Anil and Ranjan, 2011 Sausa et al., 2012 Reddy, 2013 Sausa and Costa, 2012

<i>Lantana involucrata</i> Linn.	Colic, vomit, cough, fever, congestion, sedative, heat rashes, mild insect bites.		isopropenylfurano- $\beta$ -naphthoquinones, isoprenyl- $\alpha$ -naphthoquinone, lantalucratins A, B, C, D, E, F.  Essential oil rich in citronellol, geraniol, isopiperitenol, $\gamma$ -ionone, piperitone.	Antibacterial, antitumor	Kalam et al., 2014 Sausa and Costa, 2012 Hussain et al., 2011
<i>Lippia multiflora</i> Mold.	Respiratory and gastrointestinal disorders, bronchial inflammation, malaria fever, conjunctivitis, fatigue-relieving, diuretic, mouth disinfectant, hypertension, venereal diseases, laxative, ear-troubles, rhino-pharyngeal, eye-troubles.	Leaves	Lignins, cellulose, tannins, starch, oxalates, flavonoids, saponin glycosides, peptides, caffeine, terpenes and alkaloids,  Essential oils chemotype include linalool(29%) and germacrene D (28%) rich oil, 1,8-cineole (43-47%) and sabinene (12-15%) rich oil, high farnesol (camphoraceous) rich oil, high sesquiterpenes (45-70%) rich oil and high monoterpenes rich oil ( $\rho$ -cymene 14-19%, thymol 30-40%, thymol acetate 14-17%)	Analgesic, antipyretic, pediculocidal, scabicial, antimicrobial, antioxidant and radical scavenging, hypotensive, antimalarial	Kunle and Egharevba, 2012
<i>Tectona grandis</i> Linn.	Dyspepsia, sore throat, menstrual disorder, hemorrhage, bilious headaches, vermifuge, acute dermatitis, bronchitis, expectorant, anti-inflammatory, hyperacidity, diabetes, leprosy, astringent, and helminthiasis, haemoptysis, diuretic, skin itches, bronchitis, urinary discharges, scabies, antihelmintic,	All parts	Acetovanillone, E-isofuraldehyde, evofolin A, 3-hydroxy-1-(4-hydroxy-3,5-dimethoxyphenyl)propan-1-one, syringaresinol, medioresinol, 1-hydroxypinoresinol, lariciresinol, balaphonin, zhebeiresinol, Tectonoelin A or (7Z)-9'nor-3',4,4'-trihydroxy-3-methoxylign-7-ene-9,7'-lactone, Tectonoelin B or (7Z)-9'nor-3',4,4'-trihydroxy-3,5-dimethoxylign-7-ene-9,7'-lactone, tectoionols A, tectoionols B, gallic acid, ellagic acid, rutin, quercitin  9,10-dimethoxy-2-methyl anthra-1,4-quinone, tectoquinone, lapachol, dehydro-a-lapachone, tecomaquinone I, squalene, polyisoprene, betulinic acid, $\beta$ -sitosterol- $\beta$ -D-[4'-linolenyl-6'-(tridecan-4''-one-1'''-oxy)] glucuranopyranoside, 7'-hydroxy-n-octacosanoyl n-decanoate, 20'-hydroxy eicosanyl linolenate and 18'-hydroxy n-hexacosanyl n-decanoate, n-docosane, lup-20(29)-en-3 $\beta$ -ol, stigmast-5-en-3-O- $\beta$ -D-glucopyranoside,	Antioxidant, anti-inflammatory, analgesic, allelopathic, antimicrobial, cytotoxic, anti-haemolytic anaemia, adverse cutaneous reaction, hair growth, hypoglycemic, antifungi, anthelmintic, diuretic, anti-ulcer, wound healing	Ramesh and Mahalakshmi, 2014

			naphthotectone and anthractone.		
			Resin, phosphoric acid, oleoresin, tannin		
<i>Stachytarpheta cayennensis</i> (Rich.) Vahl.	Chronic liver disease, diarrhea, inflammation, sedative, hypertension, stomachic, varicose ulcers, fever, renal disorders, diabetes.		Verbascoside, isoverbascoside, martynoside, betulinic acid, phenolics, alkaloids	Antioxidant, antimicrobial anti-inflammatory, antinociceptive, gastroprotective, leishmanicidal, anti-ulcerogenic, antimalarial activities.	De Souza <i>et al.</i> , 2010 Okokon <i>et al.</i> , 2008 Edeoga <i>et al.</i> , 2005
<i>Verbena officinalis</i> Linn.	Hemorrhoids, malaria fever, diarrhea, pain, diabetics, antioxidant, ulcer, diaphoretic, gonorrhea, antidepressant, anticonvulsant, jaundice, antifungal, antibacterial, antioxidant, analgesic, anti-rheumatic and nerve growth factor-potentiating activities	Aerial part	Proteins, tannins, caffeoyl derivatives, verbascoside, ursolic acid, lupeol, 3 $\alpha$ , 24-dihydroxy-urs-12-en-28-oic acid, apigenin and luteolin  Essential oil rich in citral	Antioxidant, apoptosis in leukemia	Antal, 2010 De Martino <i>et al.</i> , 2011 Verma and Siddiqui, 2011 Attard and Pacioni, 2012 El Babili <i>et al.</i> , 2013
<i>Vitex doniana</i> Sweet.	Toothache, mouth sore, diarrhea, headache, backaches, febrifuge, inflammations, venomous bites, wounds, infertility, anaemia, jaundice, leprosy, dysentery, gonorrhea, eye troubles, stiffness, measles, rash, chickenpox, hemiplegia, galactagogue, anodyne, ancylostomiasis, rachitis, liver disease, kidney troubles, A and B avitaminosis, sexual passion.	Fruit, leaves, bark	Flavonoids, tannins, saponins, resin, anthraquinone, balsam, alkaloids, sterols, ascorbic acid, sugars, protein	Antimicrobial, Anesthetic, Analgesia, muscle relaxant	Egharevba <i>et al.</i> , 2010 Tijani <i>et al.</i> , 2012 Osuagwu and Eme, 2013



## DISCUSSION

Verbenaceae family appears as a very important plant family for Jos settlers and neighboring communities as members of the family are involved in the management of virtually all ailments in the community. Almost all the plant parts are used as medicine for the treatment of various ailments. These diseases/ailments include malaria, hypertension, diarrhea, microbial infections, skin diseases, stress, inflammation, snake and insect bites, ulcer and respiratory disorders. Other uses include woods for timber, construction work, furniture making and fuel, essential oils used in perfumery, leave used as flavouring agent, and flowers as ornamentals. Leaves, roots and stem bark are used in form of decoction or infusion. Others like *Lantana salvifolia*, *Lantana camara* and *Vitex doniana* produce edible fruits while leaves of *L. salvifolia* are used as spice/flavoring. *Lippia multiflora* produces scented flowers and just like *Lantana camara* can yield essential oil from leaves and flowers. The medicinal properties of these plants are attributed to their chemical constituents especially glycosides, alkaloids, flavonoids, terpenoids, steroids, tannins, carbohydrates, etc., (Jigam 2004).

## CONCLUSION

The review has x-rayed the chemical constituents and pharmacological properties of plants of the family of Verbenaceae, which are commonly used in Jos, Plateau State, Nigeria, with a view to expose the knowledge gaps for further research and development especially in drug discovery research. Some of these medicinal plants with proven pharmacological activities but without much knowledge in their chemical constituents need to be investigated further to identify the molecule(s) responsible for observed activity.

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