



Selected Medicinal Plants of Order Lamiales Used in Traditional Medicine

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ABSTRACT

Among the medicinal plants, out of 30,000 species estimated to be used by the indigenous and ethnic societies of world, around 10,000 have been used by traditional systems of medicines of respective countries such as in Ayurveda, Siddha, Unani and Homeopathy medicines in India. Natural products are the important source of bioactive compounds and have potential for the development of novel therapeutic agents. Over the last decade there has been a growing interest in drugs of plant origin. A wide range of products can be obtained from plants i.e., perfumes, insecticides, flavoring agents, coloring agents, medicines etc. Lamiales order has two important family Lamiaceae and Acanthaceae among others and both the families are pan tropical in distribution. The Acanthaceae is a large (ca, 4000 species in some 230 genera) pantropical family. The present paper reviews some of the important plants of these families having medicinal value.

Keywords: Acanthaceae, Lamiaceae, Ocimum, Justicia, Traditional medicines.

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INTRODUCTION

Herbal medicines

World population is nearing 5 billion today and with this rate of growth it is likely to touch 7.5 billion by the year 2020. Global estimates indicate that over 3/4 of the 5 billion world population can not afford the products of the western pharmaceutical industry and have to rely upon the use of traditional medicines mainly derived from plants. This fact is well compiled by WHO¹ in an inventory of medicinal plants list is over 20,000 species. Modern pharmacopoeia still contains at least 25% drugs derived from plants and many others which are synthetic analogues built on prototype compounds isolated from plants. Out of the total 4,20,000 flowering plants reported from the world², more than 50,000 are used for medicinal purposes. The World Bank has recently put a strong case for herbal healthcare and recognized vital values of medicinal plants. These values have medicinal, ecological, income generating, cultural, social and religious roles. Among the medicinal plants, out of 30,000 species estimated to be used by the indigenous and ethnic societies of world, around 10,000 have been used by traditional systems of medicines of respective countries such as in Ayurveda, Siddha, Unani and Homeopathy medicines in India and about 150 species have entered into the global market to be used in modern medicine. In India, 20 percent of the total flowering plants are reported to be of medicinal importance³. The old traditional Indian system of medicine derives maximum formation from plants using their different parts. 29% of preparations are derived from roots, 14% bark, 16% whole plants, 5% flowers, 10% fruits, 6% leaves, 7% seeds, 3% wood, 4% rhizomes and 6% stems.

Different ailments cured by herbal medicines

Once science discovered some valuable chemical compounds of significant biological action in them. According to Ayurvedic system of medicines a large number of plants are employed in the traditional medicines for the treatment of several diseases like cancer, urinary stone track disease, depression and other nervous disorder, diabetes and urinary stones⁴⁻¹². The object of the review paper is to outline the important plants of order Lamiales which have almost common properties and fall under two important families of this order.

Order Lamiales

Phylogenetic position

Tripp and McDade¹³ studied phylogenetic relationships within the large (> 4000 species) plant family Acanthaceae using fossils as calibration points. Remarkably, if minimum age estimates

approximate true history, these 11 events occurred within the last ~ 20 myr even though Acanthaceae is over 3 times as old. Finally, they reviewed reports of fossils that have been assigned to Acanthaceae that are substantially older than the lower Cretaceous estimate for Angiosperms as a whole i.e., the general consensus that has resulted from several recent dating and fossil-based studies in plants.

Lamiaceae

***Ocimum sanctum*:-**

Botanically known as *Ocimum sanctum* Linn. and commonly as Tulsi, is the sacred plant of India. The plant is known in English as Holy Basil. *Ocimum sanctum* is perhaps the most common and most revered of all household plants in India. The plant is commonly cultivated in garden and also grown near temple. Medicinal properties attributed to the plant are not only mentioned in Ayurveda and Siddha but also in Greek, Roman and Unani system of medicine¹⁴ (Gupta *et al.*, 2002). Tulsi has been described as vanya (wild type) and gramya (grown in homes). Properties of both types are almost similar and the main difference is the former has lighter leaves. Tulsi grows widely in tropics and warm regions. The plant is native to tropical Asia, likely having originated in India. Robust Tulsi varieties readily grow wild in many areas of Asia and Africa. It is also abundantly found in Malaysia, Australia and some of the Arab countries. The plant is distributed and cultivated throughout India.

Phytochemical constituents:

The unique aromatic odour of *O. sanctum* is due to the presence of essential or volatile oils. The aromatic volatile oil mainly constitutes phenols, terpenes and aldehydes. Various studies proved that chemical constituents vary due to edaphic and geographic factors. Besides oil, the plant also contains alkaloids, glycosides, saponines and tannins. The volatile oils are mainly concentrated in the leaf. The leaf of *O. sanctum* contains 0.7% volatile oil comprising about 71% eugenol and 20% methyl eugenol¹⁵⁻¹⁷.

Family Acanthaceae

Acanthaceae is a large family comprising, according to Mabberley²⁴, 4300 species in 346 genera. *Adhathoda vasica* Nees is a synonym of *Justicia adhathoda* L. according to plant list given out by Kew latest version 1.1 in 2013 *Justicia adhathoda* is valid name of *Adhathoda vasica* Nees¹⁸ They are bitter-tasting. Some other *Justicia acuminata* (Nees) Lindau; *Justicia acutangula* H.S. LO and D. Fangl; *Justicia acutifolia* Herden; *Justicia adhaerens* Wassh and J.R.I Wood *Justicia gendarussa* Burm F., are other common species found in different parts of the world

***Acanthus mollis*:**

The genus *Acanthus* as perennials grows wild in the grasslands, woods, scrub and rocky hills. *Acanthus mollis*, commonly known as Bear's Breeches, is an herbaceous perennial plant, native to the Mediterranean region from Portugal and northwest Africa to Balkan, and is one of the earliest cultivated species of garden plants. The leaves of this plant are generally considered by historians to have been the design inspiration for the Corinthian column capitals of Roman architecture.

Chemical composition:

Plant contains lignans. The more common subclasses of lignans are the aryltetralins and aryl-naphthalenes. There are many common variations in the substitution pattern on the aryl rings that occur in nature, including methylenedioxy, methoxy and hydroxy groups as reported by Rezanka¹⁹.

Justicia procumbens: Won et al.²⁰ reported that justicidin A (JA), a novel and pure aryl-naphthalidelignan isolated from *Justicia procumbens*, induces apoptosis of human colorectal cancer cells and hepatocellular carcinoma cells, leading to the suppression of both tumor cell growth in NOD-SCID mice. Jin et al.²¹ reported three new lignans, Pronaphthalide A, Procumbiene, and Procumbenoside J along with a novel natural product Juspurpudin and twelve other known lignans were isolated from *Justiciaprocumbens*.

Justicia hypocrateriformis Vahl:

Justicia hypocrateriformis (Acanthaceae) is used as an herbal remedy for diarrhea in Cameroon folk medicine. *Justicia hypocrateriformis* extract possesses antidiarrheal activity supported by its antioxidant potential and phytochemical constituents.

***Justicia adhatoda*:-**

Justicia adhatoda of the Acanthaceae family is a well-known plant drug in Ayurvedic and Unani medicine, and the plant has been used in the indigenous system of medicine in India for more than 2000 years. *Adhatodavasica* is a small, evergreen, perennial shrub, which reaches an average height of three meters. Its branches are opposite and ascending. The broad, leathery leaves, which are sometimes used as an insecticide, measure from 10 to 15 centimeters in length, and are about 4 centimeters in width^{22, 23}. It is used as an herbal remedy for treating cold, cough, whooping cough and chronic bronchitis and asthma, as sedative expectorant, antispasmodic and anthelmintic. It is an official drug and is mentioned in the Pharmacopoeia of India. The leaves, roots, flowers and bark of *Adhatoda* are all used for medicinal purposes. It is well known for preparation of medicine for bronchitis, asthma and other pulmonary infections. Glycodin®, a famous product used for the cure of bronchitis is extracted from the leaves of this plant. It has

been used by European herbal practitioners as an antispasmodic, expectorant and febrifuge²³ (Singh et al., 2011). The phytochemical studies of the various parts of *Adhatodavasica* revealed the presence of alkaloids, phytosterols, polyphenolics and glycosides as a major class of compounds. Its principal constituents are quinazoline alkaloids with vasicine as its chief alkaloid.

***Ruellia tuberosa* Minnie:-**

It is a small biennial plant with thick fusiform tuberous roots and striking funnel-shaped violet-coloured flowers. It reaches an average height of about 25 cm in moist and shady environment. Antinociceptive and anti-inflammatory properties. In folk medicine and Ayurvedic medicine, it has been used as a diuretic, anti-diabetic, antipyretic, analgesic, antihypertensive, gastroprotective, and to treat gonorrhoea.

***Blepharis maderaspatensis*:-**

It is used for headache. Seeds are used as dysuria, diseases of nervous system, diuretic, aphrodisiac. In spite of its use in herbal formulation no systematic pharmacognostic studies have been reported and hence our efforts were devoted in this direction.

***Barleriaprinoitis* L.:-**

It is commonly known as Vajradanti. It is erect armed shrub, spines ca. 1.2 cm long. Leaves to 5-9 x 2.5-4 cm, elliptic, acute, mucronate, base cuneate, sparsely puberulus, ciliate on the margins, gland dotted beneath; petiole to 2 cm. Cymes axillary; bracts 2, 1.5 cm, oblong mucronate; outer calyx lobes 1.3 x 0.4 cm, inner 1.1x 0.2 cm, mucronate, hirsute; corolla tube 2.5 cm, lobes 2 cm obovate; filaments 1.3 cm, staminodes 2, included at the base of the corolla tube; ovary 2.5 mm, style 2.5 cm.

***Andrographis paniculata* (Burm.f.) wall. exNees:-**

It is commonly known as Kalmegh. It is an important medicinal plant finding uses in many Ayurvedic formulations. The leaf and underground stem are used to make medicine. *Andrographis* is frequently used for preventing and treating the common cold and flu (influenza). It is used for digestive complaints including diarrhea, constipation, intestinal gas, colic, and stomach pain; for liver conditions including an enlarged liver, jaundice, and liver damage due to medications; for infections including rabies, and HIV/AIDS; and Diterpenoid compounds and rographolides (APs) are the main bioactive phytochemicals present in leaves and herbage of *A. paniculata*. Recently Kumar et al.²⁵ reported three biologically active compounds, AP, neoandrographolide and andrograpanin, in the extracts of *A. paniculata*.

***Thunbergia laurifolia* Lindl. (Acanthaceae):-**

Thunbergia laurifolia, Laurel clock vine or Blue trumpet vine, is native to India. *Thunbergia laurifolia* is a popular ornamental plant in tropical gardens. *T. laurifolia*, native to India, is an aggressive vine that is commonly cultivated and sometimes escaped. "Similar to *T. grandiflora* except: leaves broadly elliptic to narrowly ovate, 8-15 cm long, 2.5-5.5 cm wide, margins entire. Corolla pale blue with a white or pale yellow throat. In Malaysia, juice from crushed leaves of *T. laurifolia* are taken for menorrhagia, placed into the ear for deafness, and applied for poulticing cuts and boils. In Thailand, leaves are used as an antipyretic, as well as an antidote for detoxifying poisons. Iridoidglucosides have been isolated from *T. laurifolia*²⁶. Microwave-dried leaves displayed stronger antioxidant properties (AOP) than fresh leaves.

Malaria control:

Crude extracts of *Ruelliatuberosa* L. (Acanthaceae) is reported to have larvicidal activity on *Culex quinquefasciatus* as target species and Rawani *et al.*,²⁷. The plant extract would provide potential bioactive compounds to control mosquito.

CONCLUSION

Order Lamiales has some important families out of which Lamiaceae and Acanthaceae having valuable alkaloids and saponins provide plant species which can cure most of the diseases of modern world. The paper provides preliminary details on such plants.

REFERENCES

1. WHO. WHO monograph medicinal plants commonly used in the Newly Independent States (NIS). WHO, New York; 2010: 1-452.
2. Govaerts R. How many species of seed plants are there? *Taxon* 2001; 50:1085–1090.
3. Pushpangadan P. *Ethnobiology of India: A Status Report*, GOI; New Delhi; 1995.
4. Kirtikar KR and Basu. *Indian Medicinal Plants*, LM Basu, Allahabad; 1935: 4.
5. Chopra RN, Chopra IC, Verma BS. *Supplement to Glossary of Indian Medicinal Plants*. CSIR, New Delhi; 1969.
6. Nadakarni AK, *Indian Material Medica*, vols. I-II, 3rd ed. Popular Book Depot, Bombay; 1954.
7. Jain SK. *Dictionary of Indian Folk Medicine and Ethnobotany*. Deep Publication, New Delhi. 1991
8. Sharma LK and Kumar A. Traditional medicinal practices of Rajasthan. *Indian Journal of Traditional Knowledge*; 2007.6: 531-533.
9. Mishra A and Kumar A. Studies on Ayurvedic Crude Drugs for the cure urinary tract Stones. *Int J Mendel*; 2001.18(1-2): 41-42.

10. Mishra A, Kumar A, Medicinally important trees of Rajasthan. International Journal of Mendel; 20001; 8: 37–38.
11. Raghunandan K and Mitra R. Pharmacognosy of Indigenous Drugs, Central Council for research in Ayurveda and Siddha, New Delhi 1982. Vol. II : 1-129.
12. Chitme HR, Akok S, Jain S and Sabharwal M. Herbal Treatment for Urinary Stones. International Journal of Pharmaceutical Sciences and Research; 2010; 1: 0975-8232.
13. Tripp EA and McDade LA. A rich fossil record yields calibrated phylogeny for Acanthaceae (Lamiales) and evidence for marked biases in timing and directionality of intercontinental disjunctions. Syst Biol 2014;63(5):660-84.
14. Gupta SK, Prakash J, Srivastava S. Validation of traditional claim of Tulsi, *Ocimum sanctum* Linn. as a medicinal plant. Indian J Exp Biol 2002;40:765–773.
15. Bakkali F, Averbeck S, Averbeck D, Idaomar M. Biological effects of essential oils-A review. Food Chem Toxic 2008;46:446–475.
16. Patil KS, Bhardwaj LK, Juvatkar PV, Shukla VK, Manvi FK. Plant products potential as anti-angiogenic and in cancer management. IJRAP 2010;1(2):339- 349.
17. Joseph B, and Nair VM. Ethanopharmacological and Phytochemical Aspects of *Ocimum sanctum* Linn. The Elixir of Life. 2013;3(2): 273–292.
18. <http://www.theplantlist.org/tpl1.1/record/kew-2330223>.
19. Rezanka T, Rezanka P, and Sigler K. Glycosides of aryl naphthalenelignans from *Acanthus mollis* having axial chirality. *Phytochemistry*; 2009;70(8): 1049–54.
20. Won SJ, Yen CH, Liu HS, Wu SY, Lan SH, Jiang-Shieh YF, Lin CN, Su CL. Justicidin A-Induced Autophagy Flux Enhances Apoptosis of Human Colorectal Cancer Cells via Class III PI3K and Atg5 Pathway. J Cell Physiol 2014.
21. Jin H, Yin HL, Liu SJ, Chen L, Tian Y, Li B, Wang Q, Dong JX. Cytotoxic activity of lignans from *Justicia procumbens*. *Fitoterapia* 2014; 94:70-6.
22. Jha DK, Panda L, Ramaiah S, Anbarasu A. Evaluation and Comparison of Radical Scavenging Properties of Solvent Extracts from *Justicia adhatoda* Leaf Using DPPH Assay. *Appl Biochem Biotechnol* 2014; 174(7):2413-25.
23. Singh TP, Singh OM, Singh HB, Rea G, Giardi MT. *Adhatodasica* Nees: Phytochemical and Pharmacological Profile. *The Natural Products Journal* 2011; 1(1): 29–39.
24. Mabberley DJ. *The Plant-Book. A Portable Dictionary of the Higher Plants*. Cambridge University Press, Cambridge; UK 1987.

25. Kumar S, Dhanani T and Shah S. Extraction of three bioactive diterpenoids from *Andrographis paniculata*: effect of the extraction techniques on extract composition and quantification of three andrographolides using high-performance liquid chromatography. *J Chromatogr Sci* 2014; 52(9):1043-1050.
26. Kanchanapoom T, Kasai R, Yamasaki K. Iridoidglucosides from *Thunbergia laurifolia*, 2002; 60: 769–771.
27. Rawani A, Ghosh A, Chandra G. Mosquitolarvicidal potential of four common medicinal plants of India. *Indian J Med Res* 2014; 140: 102–108.



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