



MINI REVIEW

A Review on *Leucas aspera* for Phytopharmacological Studies

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Abstract: Herbal medicine is one of the oldest valuable bestowals that was given to mankind. Many plants and herbs hold their prestigious position in the field of medicine. Plants are being used from more than 1000 years to treat diseases. The healing properties of plants have been transferred within the human communities for over the centuries. *Leucas aspera* Linn. most commonly known as “Thumbai,” “Gumma,” and “Thummichittu” and widely distributed in all parts of India. Conventionally, it is also used as an anti-pyretic and insecticide. It also possesses medicinal properties such as antimicrobial, larvicidal, anti-nociceptive, cytotoxic antioxidant, and hepatoprotective activity. The leaves of *Leucas* are used in rheumatism. Various phytochemical constituents are present in all parts of the plant mainly terpenoids, fatty acids, nicotine, ursolic acid, glucoside, beta-sitosterol, sterols, diterpene, and phenolic compounds. *L. aspera* possesses many medicinally active phytochemicals and has various biological and pharmacological effects, and hence this plant could have the constituents as new therapeutic agents.

Keywords: *Leucas aspera*, antioxidant, anti-nociceptive, cytotoxic activity, larvicidal activity.

1. INTRODUCTION

Human beings have used plants as medicine for diverse health issues for thousands of years [1]. In traditional medicine plants are widely used in different countries (mostly in India) and are a source of various potent and powerful drugs [2]. *Leucas aspera* (family: Lamiaceae) is an herb erecting to a height of 15–60 cm widely distributed throughout the plains of India. The taxonomic classification and anatomy of this plant were well documented and discussed by many researchers [1,3,4]. The major phytoconstituents present in the plants are terpenoids, fatty acids, nicotine, ursolic acid, glucoside, beta-sitosterol, sterols, diterpene, and phenolic compounds [5].

Herbal plants are integral parts of traditional medicine worldwide, and most of the rural and urban population uses these plants in many of their regular needs even today. The current researchers are more focused on natural chemicals than synthetic chemicals due to their environmental, economic, and health benefits. Plants produce many chemical compounds for its biological activities including defensive

mechanism against microbes, insects, and herbivorous animals and these chemicals are called phytochemicals. Herbal plants are a natural source of many important phytochemicals and widely used in pharmaceutical, food, and cosmetic industries. A wide variety of herbal plants are available in the Indian subcontinent, and they are the backbone of Indian traditional medicinal system Ayurveda and Siddha [6].

In India, the herbs have always been the prime type of medicine such as Ayurveda, Homeopathy, Siddha, and Unani. Medicinal plants are the native heritage with universal importance. Natural product extracts are very important source of new drugs. In the ancient medical system, various parts of plants, namely bark, roots, buds, leaves, fruits, and latex are used to cure various ailments. Herbs and medicines derived from plants have been extensively used in traditional cultures all over the world and are popular in modern medicine as alternatives to produce new prospective natural therapeutic compounds for aggressive diseases [6,7]. Herbal medicines are natural and are favored over synthetic remedies. Medicinal plants are the sources of a large number of combinations of herbs

and modern medicine. Indian people have an incredible passion for medicinal plants, and they use them for a lot of health-related applications. Approximately 25,000 plant-based formulations are available in the ethnic medical texts. Furthermore, modern medicine contains a minimum 25% of drugs produced from the plants and artificial drugs manufactured on original compounds isolated from the plants. India is one of the richest medicinal herbal granaries in the world that is of remarkable modern application, ensuring health security to millions of people [8-10].

L. aspera is a *Leucas* genus and the family Lamiaceae (illustrated in Table 1). The species are widely distributed and known with different common names based on the region where it grows and known commonly known as “Thumabi” (shown in Table 2). *L. aspera* is found in all parts of India mainly in the Himalayas (Fig. 1). Conventionally, it used as an antipyretic and insecticide. Flowers are known to possess insecticide, stimulant, diaphoretic, emmenagogue, expectorant, and aperient. Leaves of *L. aspera* are also used in psoriasis, rheumatism, and different types of chronic skin eruptions. Bruised leaves are applied externally in snakebites [10,11].

2. BOTANICAL DESCRIPTION

L. aspera is a yearly, stretched, herb raising to a stature of 15–60 cm with forceful and hispid intensely quadrangular stem and branches. The natural product nutlets, 2.5 mm long, elongated, darker, smooth, inward face precise, and external face adjusted. Corolla 1 cm long; tube 5 mm long and pubescent above, annulate in the center; upper lip 3 mm long, thickly white-wooly; and bring down lip about twice as long, the center flap forestall, adjusted, the parallel projections little, subacute. The leaves are sub-sessile or right away petiolate, straight or directly lanceolate, harsh, pubescent up to 8.0 cm long and 1.25 cm expansive, with whole or crenate edge; petiole 2.5–6 mm long; blossoms white, sessile little, in thick terminal or axillary whorls; bracts 6 mm long, straight, intense, bristle-tipped, ciliate with long slim hairs; calyx variable, cylindrical, 8-13 mm long; tube bended, contracted over the nutlets, the lower half normally glabrous



Fig. (1). *Leucas aspera* plant.

and membranous, the upper half ribbed and hispid; mouth little, exceptionally slanted, not villous, the upper part created forward; and teeth little, triangular, bristle-tipped, ciliate, the upper tooth being the biggest [11,12,13].

3. PHYTOCHEMISTRY

Literature survey of phytochemical analysis of *L. aspera* reveals the presence of wide variety of phytoconstituents (Table 3).

Table 1. Other names [7]

Telugu	Thummichittu
Sanskrit	Dronapushpi, chitrapathrika, chitrakshup
Hindi	Goma madhupati
Maharashtra	Bahuphul
Bombay	Tumba
Gujarati	Kulnnphul
Bengali	Darunaphula, hulkasha

Table 2. Taxonomical classification [10]

Kingdom	Plantae, plant
Subkingdom	Tracheobionta, vascular plant
Super division	Spermatophyta, seed plant
Division	Angiosperma
Class	Dicotyledonae
Sub-class	Gamopetalae
Series	Bicarpellatae
Order	Tubiflorae
Family	Labiatae
Genus	<i>Leucas</i>
Species	<i>L. aspera</i>

L. aspera: *Leucas aspera*

Table 3. Phytochemical studies

Tissue	Phytochemicals
Whole plant	Oleanolic acid, ursolic acid, 3-sitosterol [13]
Aerial parts	Nicotine [13], sterols [14,15], reducing sugars, glucoside [16], diterpenes, linifolioside [17], licarin A [18]
Leaf	Volatiles such as u-farnesene, X-thujene [19]
Flower	Amyl propionate, isoamyl propionate [19]
Seed	Stearic acid, linoleic acid, oleic acid, palmitic acid, ceryl alcohol [20,21]
Shoot	Novel phenolic compounds [22], aliphatic ketols [23], long-chain compounds [24], nonatriacontane [25], 5-acetoxytriacontane, β -sitosterol[23] and dotriacontanol [24]
Root	Leucolactone (I) [25]

4. PHARMACOLOGICAL VALUES

L. aspera is a useful medicinal plant which gave benefit in different fields of medicines (illustrated in Table 4). Nearly, all parts of the plant have some pharmacological properties. This review deals with the different pharmacological activity of plant with different extract or solvents.

4.1. Larvicidal Activity

Crude leaf extracts *L. aspera* has reported for their larvicidal activity against *Aedes aegypti* and *Culex quinquefasciatus*. Among extracts, hexane extract has shown the most potent larvicidal activity against the two vectors compared with chloroform and ethanol extracts. The lethal concentration 50 (LC₅₀) values for *C. quinquefasciatus* were found to be 122.5 ppm and against *A. aegypti* the LC₅₀ values were 77.4 ppm, respectively. The hexane extract of *L. aspera* leaf showed good larvicidal activity [26].

4.2. Antifungal Activity

It has been reported that the chloroform and petroleum ether extracts of *L. aspera* have good antifungal activity against the fungi *Trichophyton* and *Microsporum gypseum*. The minimum inhibitory concentration value reported as 5 mg/ml [27].

4.3. Antinociceptive Activity

The antinociceptive activity of *L. aspera* has been reported in whole plants by acetic acid-induced gastric pain models in Swiss albino mice. The methanolic extract of whole plants of *L. aspera* showed higher antinociceptive activity at the doses of 50, 100, 200, and 400 mg. The study also indicates that even at a low dose of *L. aspera* extract has shown the antinociceptive activity which was compared with standard drug aspirin [28].

4.4. Antihyperglycemic Activity

L. aspera (Willd.) (Lamiaceae) is a fairly common medicinal plant used by the folk medicinal practitioner of

Bangladesh. The antihyperglycemic effect of the methanolic extract of leaves and stems of *L. aspera* in oral glucose tolerance test conducted with glucose-challenged Swiss albino mice. The methanolic extracts of leaves and stems of *L. aspera* demonstrated significant and dose-dependent reductions in serum glucose levels in glucose-loaded mice. At the highest dose tested of 400 mg extract per kg body weight, the methanol extract of leaves and stems, respectively, caused 34.01% and 28.39% reductions in serum glucose levels compared to control mice. In comparison with the standard drug like glibenclamide (anti-hyperglycemic drug), when administered at a dose of 10 mg per kg body weight caused a 42.10% reduction in serum glucose levels. Those leaf extract of *L. aspera* was more potent in the reduction of serum glucose levels than stem extract [29].

4.5. Hepatoprotective Activity

The cold methanolic extract of the whole plant of *L. aspera* was showed significant hepatoprotective activity in carbon tetrachloride-induced hepatotoxicity in rats [30].

4.6. Antioxidant Property

Antioxidant property of *L. aspera* was reported by many researchers. The ethanol extract of *L. aspera* showed very potent antioxidant activity. Better antioxidant activity was observed in the petroleum ether extract of *L. aspera* leaf, and the order of the activity is petroleum ether > ethanol > isopropyl alcohol > ethyl acetate > chloroform. They also suggested ethanol or isopropanol (polar solvent selection) and petroleum ether (non-polar solvent selection) for better extraction of phytochemicals and phytoconstituents. Moreover, better antioxidant activity was observed in wild leaf extracts when compared to *in vitro* callus extract [31].

4.7. Antimicrobial Activity

The antimicrobial property was reported that the ethanolic extract contains more active principles than the water for better antimicrobial activity against different bacterial strains [32].

Table 4. Pharmacological value of *L. aspera*

Tissue	Extract	Activity
Aerial parts	Methanol extract	Ulcer protective effect [33]
Leaves	Aqueous suspension	Anabolic effect [34]
Leaf	Hydroalcoholic extract	Hepatoprotective activity [35]
Roots	Methanol and petroleum ether extracts	Analgesic activity [36]
Aerial parts	Hydroalcoholic extract	Arthritis, anti-arthritic activity [37]
Whole plant	Methanol extract	Cytotoxic activities [38]
Leaf	Ethanol extract	Antidiabetic activity [39]
Leaf	Triterpenoid from methanol extract	Anti-venom activity [40]
Whole plants	Ethanol extract	Anthelmintic activity [41]
Root	Ethanol extract	CNS depressant activity [42]

CNS: Central nervous system, *L. aspera*: *Leucas aspera*

The ethnomedicinal use to cure several disorders by a village population in India supports its medicinal value. Several researchers reported the use of *L. aspera* for treating different health issues (illustrated in Table 4). Phytochemicals and trace elements present in this plant are responsible for its use as a medicine for many diseases (illustrated in Table 3).

CONCLUSION

The use of plant extracts to cure many diseased conditions has been the traditional method in many parts of the world. The plant extracts are found to be effective in their mode of action and do not cause any side effects to the patient treated. Many plants and trees are found to have various medicinal values. Among all the plants found all over the world, many plants are found in India. Plant kingdom provides us an abundance of the plant with various medicinal properties, which can be used as remedial agents for various health issues. The wide literature review has discovered the *L. aspera* as a holy and significant medicinal plant used for the treatment of different ailments. The world is blessed with amusing prosperity of medicinal plants. Medicinal plants show a significant role in the lives of poor people, with few medical facilities. *L. aspera* is a common Indian plant found as a weed throughout the Indian subcontinent. The research on the pharmacological value of this plant proves that it has valuable compounds for curing many diseases and thus it is a promising plant for future advanced medicine. The above review reveals that the *L. aspera* is a source of pharmacologically and medicinally bio-active compounds and has wide variety of physiological and pharmacological effects; hence, this drug encourages finding its new therapeutic applications. Future directions will entail studies on its pharmacology using animal models and isolated bioactive compounds. Further studies on this plant must be carried out to explore some other important, necessary, and unknown benefits.

CONFLICT OF INTEREST

The authors declare no conflict of interest in any kind.

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