

LEUCAS INDICA: UNRAVELING THE THERAPEUTIC POTENTIAL OF A TRADITIONAL MEDICINAL MARVEL

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ABSTRACT

Leucas indica (L.Vatke) a member of the Lamiaceae family, is an annual herb widely distributed in India and known for its diverse medicinal applications. The plant has a rich traditional use, with its leaves employed to treat ailments such as coughs, colds, serpent bites, and stomach pain. The study focuses on a comparative analysis of methanolic extracts from leaves and flowers, highlighting their phytochemical content and antioxidant activities. Pharmacognostical studies, including microscopy and powder microscopy, offer a closer look at the plant's structural features. Additionally, the article discusses the preparation of Dronapushpi Ghrita, emphasizing its properties and functions in Ayurvedic medicine.

KEYWORD: *Leucas indica*; Phytochemistry; Pharmacology.

INTRODUCTION

A complete storehouse of remedies has been provided by nature to cure ailment of mankind one of which includes medicinal plant. *Leucas indica* (family- Lamiaceae) is an annual herb found throughout India as a weed in cultivated fields and roadsides. The flowers are given with honey to treat cough and cold in children. The leaves are applied to the bites of serpents, poisonous insects and scorpion sting. *L. indica* leaves are also used as insecticides and mosquito repellent in rural area. The plant extract with honey is a good remedy for stomach pain and indigestion (Madhava Chetty et al., 2008). In the underway effort a comparative cram was conceded out in between, methanolic leave and flower extracts of *Leucas indica* for their phytochemicals and antioxidant activities. Plant-based medications are readily available, less costly, safe, effective and have fewer adverse effects. Higher plant natural products may provide a fresh supply of antibacterial compounds with potentially unique modes of action. They effectively treat infectious infections while also reducing a number of the negative

effects that are frequently connected to synthetic antimicrobials (Chandra K et al., 2007) Approximately 21,000 plant species have the potential to be used as restorative plants, according to a 2012 WHO assessment. Thus, scientists look for powerful phytochemicals from various plant species. When it comes to treating a variety of illnesses, plant-based medications are always a safer option than chemically manufactured medications, which have a number of negative health impacts. Researchers are searching for natural substances that can serve as alternative anticancer agents due to the side effects of chemotherapy medicines (Karpinski TM 2018 et at.,) Recent research has shown a great deal of interest in the anticancer capabilities of plants, as these traits are thought to play a major role in curing cancer. Reactive oxygen species (ROS) are a class of free radicals that are produced during regular metabolic reactions. They include superoxide, singlet oxygen, peroxides, nitric oxide radicals, and hydroxyl radicals. The notion of polyherbalism in the Ayurvedic medicinal system was first highlighted in history around 1300 A.D. by the

"Sarangdhar Samhita," which was founded up on therapeutic herbs either single or in the combination (Parasuraman S et al., 2014)

2. BOTANICAL DESCRIPTION

Leucas indica is an annual herb that grows 16–60 cm tall and is upright or spreading. This plant's leaves have a 0.5–1.0 cm long petiole with a lamina that measures 6.0–9.0 x 0.5–2.5 cm and is either linear, narrowly oblong-lanceolate, or elliptic-lanceolate. The leaves have an acute form with a small base, fully or partially pubescent edge, and somewhat pubescent on both surfaces. This herb has terminal and axillary whorls, which are frequently the whorls of the succeeding. A cylindrical spike is formed when nodes unite. Bract 0.6 cm in

length, tip nearly matching the calyx pubescent and spinulose. Usually has a calyx that is 0.8 cm long, tubular, bent, and constricted above the nutlets, formed on the smooth and glabrous below, ribbed and scabrid above, mouth quite oblique. Teeth on the upper side are small, triangular, spinulose, with the longest one being pubescent only above the nutlets. Nutlets: 0.3 x 0.1 cm, smooth, brownish-black, oblong-oblong, angular on the inside, rounded on the outside. Teeth on the upper side are small, triangular, spinulose, with the longest one being pubescent only above the nutlets. Nutlets: 0.3 x 0.1 cm, smooth, brownish-black, oblong-oblong, angular on the inside, rounded on the outside (Khanam M et al., 2005) (Pranoothi et al. 2005)



Fig no. 1: Showing the plant *Dronapushpi* (*Leucas indica* (L.)Vatke)

3. PHYTOCHEMISTRY

Literature survey of phytochemical analysis of *L. indica* reveals the presence of wide variety of phytoconstituents (Table 1)

Table 1: Other names (Rai V et al., 2005)

Telugu	Thummichittu
Sanskrit	<i>Dronapushpi, chitrapathrika, chitrakshup</i>
Hindi	<i>Goma madhupati</i>
Gujrati	<i>Kulnnphul</i>
Bengali	<i>Darunaphula, hulkasha</i>
Marathi	<i>Bahuphul</i>

Table 2: Taxonomical classification (Ramani R et al., 2012)

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. indica</i>

Table 3: Phytochemical studies.

Tissue	Phytochemicals
Whole plant	3-sitosterol (<i>R Ramalingam et al.,2010</i>)
Aerial part	Nicotine, sterols, reducing sugars, glucoside (<i>Mostafa M et al.,2007</i>)

Classical Categorization

In the *Bhavaprakasha Nighantu*, *Leucas indica* finds its place in the *Guduchyadi Varga* and *Shaka Varga*. In the *Kaiyadeva Nighantu*, *Leucas indica* is categorized under *ausadhi Varga*, emphasizing its role as a medicinal herb. This classification underscores its significance as a therapeutic agent, aligning with the broader category of herbs used for medicinal purposes. The *Raja Nighantu* places *Leucas indica* in the *Parpatadi Varga*. This category likely denotes its diverse medicinal uses and applications in formulations with various herbs, highlighting its versatility in traditional medicine.

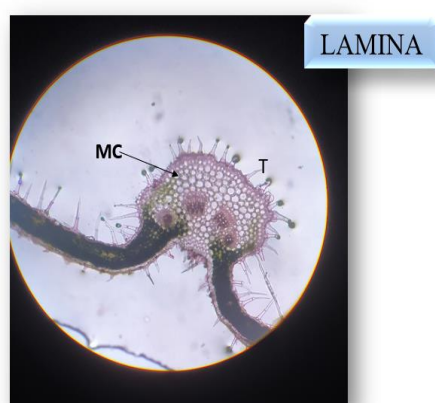
Pharmacognostical study

The shape of the leaves is acute having a narrow base, margin entire or obscurely crenate, more or less

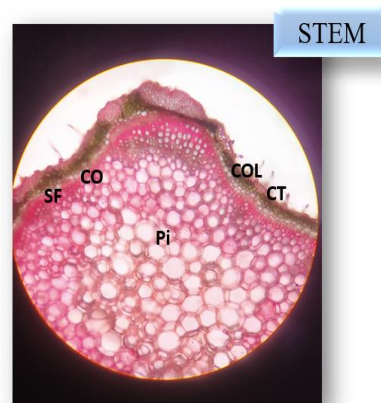
pubescent on both surfaces. Inflorescence whorls of this herb are terminal and axillary, often the whorls of the successive nodes join to form a cylindrical spike. Bract 0.6 cm long, almost equalling the calyx, tip spinulose, pubescent. Calyx 0.8 cm long, tubular, curved, constricted above the nutlets, usually smooth and glabrous below, ribbed and scabrid above, mouth very oblique, produced on the upper side, teeth short, triangular, spinulose, the upper one longest, pubescent within only above the nutlets. Nutlets 0.3 x 0.1 cm, obovoid-oblong, angular on the inner face, rounded on outer, smooth, brownish black.



Fig no. 6: Macroscopic features of *Leucas indica* (L) Vatke: A-Plant- *leucas indica*, B- Root-thin, flattened and straight, C-Aerial part-Verticillaster, White flower, D-Leaves-oblong- lanceolate.

Microscopy of *Leucas indica*

T.S of midrib showing
Mesophyll cortex (MC)
Few Glandular trichomes(T)



C.S of stem showing
Pockets of collenchyma (CO) ridges interspaced by
scleroidal fibres (SF) Pith region (Pi) and
covering trichomes (CT) are seen in the epidermal layer.

Fig no. 2: Microscopy of Lamina and Stem of *Leucas indica*.

Powder microscopy of *Leucas indica*

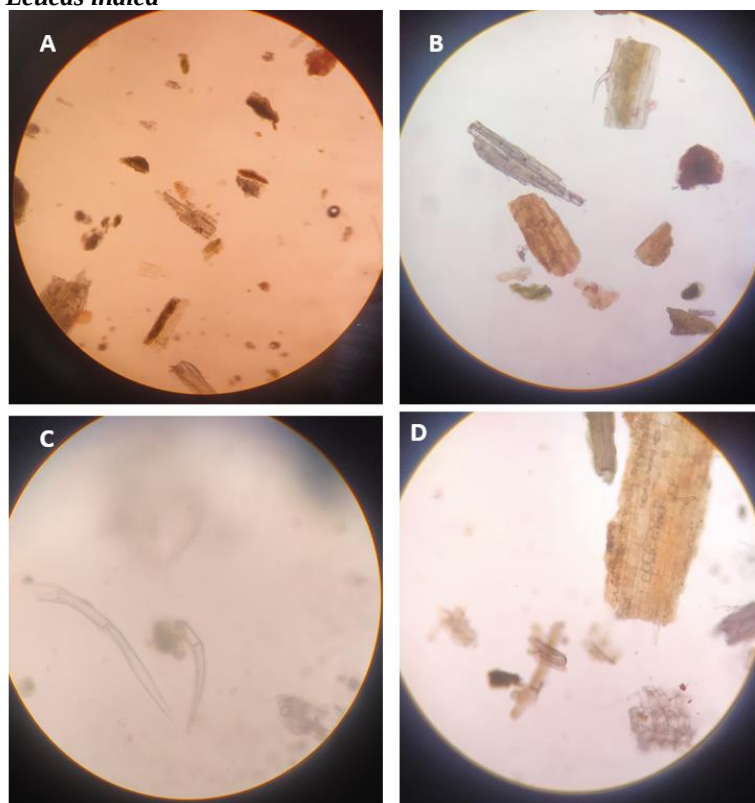
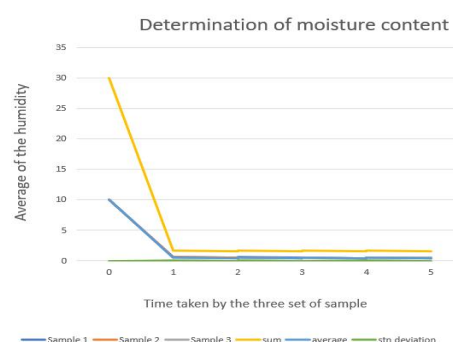


Fig no. 4: Powder microscopy of the *Leucas indica* where; A-Sessile glandular trichome B-Epidermal cells of petals C-Trichome with multicellular base D- Papillate cells of stem with prismatic crystal of calcium oxalate. The *panchanga churna* (whole plant) powder is slightly smooth, fibrous and colour is pale greenish with faint distinctive odour and moderately bitter and sweet in taste. Bundle of trichomes, trichome with striation, multicellular covering trichomes, glandular trichome, fragment of simple trichome, parenchyma, pitted parenchyma, epidermal fragments in surface view, sclereids, fragment of vessels, bundle of pitted fibres, thin-walled fibres, pitted tracheids were observed in powder microscopy.

Determination of moisture content (loss on drying)



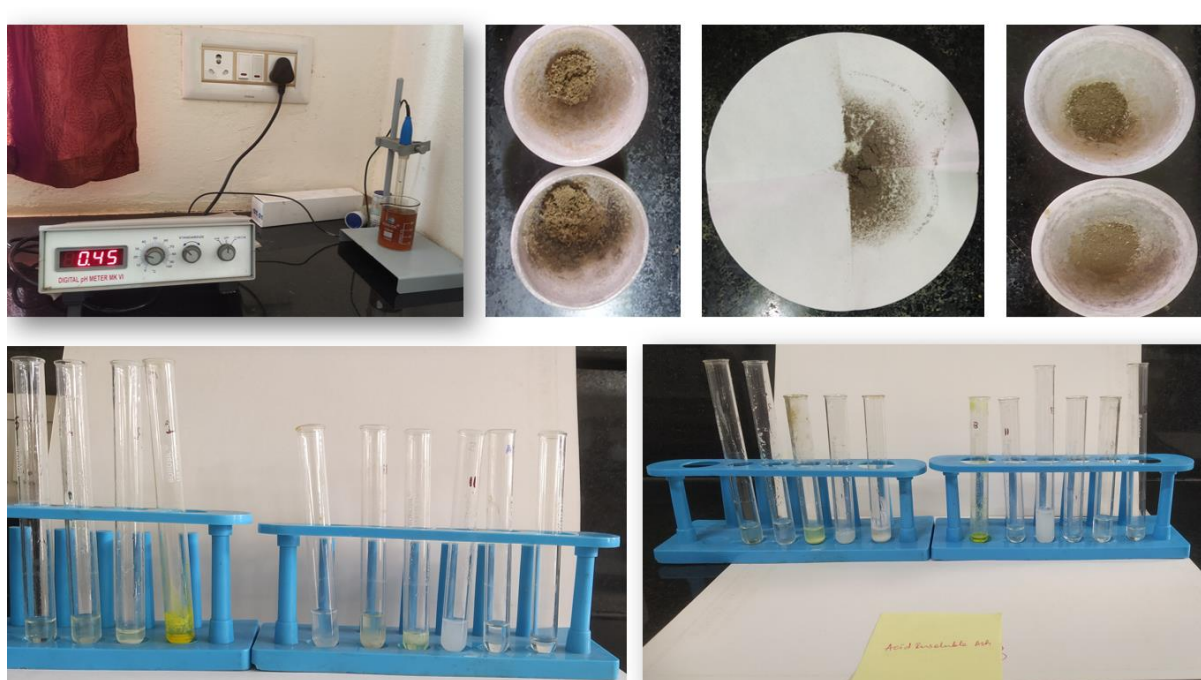


Fig no. 9: Representing the loss on drying of plant *Leucas indica*.

Table no. 9: Average percentage of parts of plant *Leucas indica*.

Parts of <i>Leucas indica</i>	Weight of the plant	Percentage wise distribution
Root	6gms	11%
Aerial part	1.022gms	17%
Leaf	1.440gms	24%
Stem part	2.840gms	48%

Dronapushpi ghrita preparation

It is believed that *Ghrita* (or ghee) is one of the *Ajasrika Rasayana*, meaning that it possesses the *Medhya* quality when used regularly. This means that it nourishes all the *Dhatus* and enriches the body with nutrients. Optimal *Dhi*, *Dhriti*, and *Smriti*, *Ghrita* can only be improved by oneself absorbs the qualities of the medications that are taken with it. It contains the active ingredients in medications, increases the compound's effectiveness thousands of times, and generates several applications. Medication administered as *ghee* is quickly absorbed and dispersed throughout the intended body regions.

Properties and functions of *Goghrita* (Bhavamishra *et al.*, 2018)

- *Rasa*: Madhura Rasa
- *Guna*: Guru
- *Virya*: Sheeta Virya
- *Vipaka*: Madhura
- *Karma*: Rochaka, Chakshushya, Vrushya, Agnivardhaka, Tridosahara, Medha, Varnya, Kanta and Tejo Vruddhikara, Balya, Vayasthapaka, Pavitrya, Ayushya, Mangalakara and Rasayana.

Procedure: *Dronapushpi Ghrita* was prepared according to the classical method which is the *Kalka* was taken One part, followed by *Sneha dravya* four times that of *kalka* and *drava dravya* four times that of *Sneha* was taken and *Ghrita* was prepared.

4. PHARMACOLOGICAL VALUES

L. indicus 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. Anthelmintic property

Ramalingam et al studied antihelmintic properties of *Leucas indica* on earthworms. Antihelmintic activity was evaluated for petroleum ether, chloroform, methanol and isolated tannins extract. They found that methanolic extract had paralysed earthworms at different concentrations.

4.2 Anti-inflammatory activity

Oral administration of *Leucas indica* ethanolic leaf extract at 75, 150, and 300 mg/ml was used to induce carrageenin-induced paw oedema in Wistar Albino rats, given to check for anti-inflammatory activity screening. The administration of 300 mg and 150 mg/ml demonstrated substantial action. Isolated flavones glycoside (chrysoeriol-4'-O- α -L-rhamnopyranosyl (1>2) β - D-glucopyranoside) from ethanolic extract and tested on carrageenin induced paw oedema in albino rats at the dose of 300mg/ml. They found that 62.5% of oedema was inhibited within 3 hours (Chandrashekar K *et al.*, 2010)

4.3 Antimicrobial activity

While the aqueous fraction significantly inhibited the growth of *Staphylococcus aureus*, *Bacillus subtilis*, and *Salmonella typhi*, the crude aerial part extract of *Leucas indica* in chloroform and methanolic fraction demonstrated positive results against these microorganisms along with *Pseudomonas aeruginosa* and *Escherichia coli*. Its antimicrobial property is due to the presence of flavonoids, total phenolic compounds, saponins and tannins (Sarkar MA et al., 2010)

4.4 Antioxidant activity

Vinayagam and Sudha performed the experiment for the DPPH radical scavenging assay, nitric oxide scavenging assay and superoxide scavenging assay from the methanolic leaves extract of *Leucas indica*. The results showed excellent antioxidant activity due to the presence of phenolic components (Vinayagam A et al., 2011) Ramani et al performed several tests to study the antioxidant potential of petroleum ether and ethanolic extracts of whole plant and found that the reducing power of the antioxidants of the extracts was somehow equal to the ascorbic acid. Free radical scavenging activities were also found but significantly less than the standard curcumin, whereas superoxide radical scavenging activities of both extracts were concentration dependent.

4.5 Antiulcer properties

The oral suspension of indomethacine in male Wistar Albino rats and Swiss Albino mice resulted in stomach ulcers. They were categorised as extract 100, standard, and control. 200 mg/ml of extract is added. The treatment group received using the ulcerogenic medication for three days in a row and regular group using misoprostol, an ulcer-prevention medication. Likewise, rest administered 100 mg/ml and 200 mg/ml to each group. plant's methanolic extract. Findings indicated that when compared to standard, methanolic extract exhibits dose-dependent antiulcer activity (Gupta JK et al., 2010)

4.6 Wound healing activity

Recent study on *Leucas indica*'s capacity to heal wounds. The experiment was conducted using Wistar albino rats. Six groups of six animals each were anaesthetized, and the incision was removed by chopping off a complete 500 mm² thickness and exposing it to the outside. 200 mg/ml and 400 mg/ml of the plant's methanolic extract, 0.2% nitrofurazone ointment, and plain ointment were given to each group. They discovered that the 400 mg/ml extract's 16±2 wound closure time was superior to that of the 200 mg/ml extract, nitrofurazone ointment, and plain ointment, which were all 18±2. Similar results were found in another experiment conducted by Shankar et al., demonstrating the plant's excellent capacity for wound healing (Saha et al., 1997)

4.7 Thrombolytic activity

For the assessment of thrombolytic activity 5ml venous blood was collected from 3 different healthy individuals and transferred to 5 sterilized and pre-weighed centrifuge tubes (1ml each). The tubes were incubated at 37 °C for 45 minutes. After the formation of clot, serum was completely sucked out without hampering the clot. Tubes were again weighed to know the amount of clot formed. 100µl of methanolic extract of different concentrations (2, 4, 6, 8 and 10mg/ml) were inoculated in the tubes and the tubes were kept for incubation for 90 minutes at the same temperature to observe the clot lysis and again weighed after incubation. Results showed that all the five concentrations (2, 4, 6, 8 and 10mg/ml) lysed clot at the rate of 23.57%, 25.65%, 31.03% 39.93% and 47.77% (Islam A, et al., 2017)

4.8 Hepatoprotective activity

Ethyl acetate extract of aerial part of the *Leucas indica* with 5% gum acacia was used to study the hepatoprotective activity of the plant on CCl₄ treated albino male rats. It was observed that the extract decreased the CCl₄ induced elevated enzymes level which indicated the regeneration of the hepatic cells which were earlier damaged by the CCl₄ treatment (Chandrashekar KS et al., 2010)

5. DISCUSSION

The adverse effects of synthetic items have led to a global surge in the popularity of natural products and their derivatives due to their reduced side effects and increased efficiency. Present article consists of qualities of herb *Leucas indica* which includes its chemistry and medical importance based on the data provided by a number of studies. Qualitative screening of the crude extract indicated the presence of a wide range of phytochemicals, including tannins, flavonoids, terpenoids, steroids, and saponins. There has been extensive reporting on their use as an active ingredient in medications intended to treat a number of fatal illnesses. In many regions of the world, the conventional approach has been to employ plant extracts to treat various diseases. It has been discovered that the plant extracts work well in their intended mode of action and have no negative effects on the patient. It is discovered that many plants and trees have a variety of medical uses. India is home to a large number of plants among all the plants found worldwide. The kingdom of plants offers us a wealth of plants with a variety of therapeutic qualities that can be applied as cures for a range of illnesses. Ghrita absorbs the qualities of the medications that are taken with it. It contains the active ingredients in medications, increases the compound's effectiveness thousands of times, and generates several applications. Medication administered as ghee is quickly absorbed and dispersed throughout the intended body regions. Probable mode of action of *Ghrita*. *Vata Dosha* governs general outlook on life, upbeat mood and enthusiasm for life. According to *Kashyapa Samhita* equilibrium of *Vata Dosha* yields in *Medha Vruddi* and its imbalance results

in its deterioration (Vagbhata et al., 2017) Researches have shown the Lipid-soluble substances can cross blood brain barrier easily, whereas non lipid soluble substances and proteins reach the brain much more slowly. Ghee being a fat can cross blood brain barrier which acts on the brain cells and increases the receptive power, cognitive power and memory. Different pharmacological actions like *Shophā*, *Kamala*, *Tamakashwasa* and *Kasajit* are mentioned in *Bhavaparkasha Nighantu* and *Kaiyadeva Nighantu*. *Dronapushpi* have not been described by *Brhatrayi*. But in *Astanga hrdaya* a plant *Mahadrone* is described. But its identity with *Dronapushpi* is doubtful. About 80% of the world populations residing in rural areas of developing and under developed countries rely on traditional medicine which is predominantly based on plant material. Traditionally the plant is commonly used for antipyretic and insecticidal activity. Phytochemical and pharmacological reviews on plant will give valuable information which will assist in getting advanced knowledge about a plant.

6. CONCLUSION

The wide literature review has discovered the *L. indica* as a holy and significant medicinal plant used for the treatment of different ailments. Traditionally the plant is commonly used for antipyretic and insecticidal activity. 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.indica* 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.indica* 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.

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