



Review Article

PHARMACOLOGICAL PROPERTIES OF *LEONOTIS NEPETIFOLIA* (L) R.Br - A SHORT REVIEW**K.Vasuki^{1*}, S. Kokila priya², P. Nandhini², U. Pavithra², G.Kiruthika²**¹Assistant professor, Swamy Vivekanandha College of Pharmacy, Tiruchengode, Tamilnadu, India.²U.G Students, Swamy Vivekanandha College of Pharmacy, Tiruchengode, Tamilnadu, India.**Article info****Article History:**

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Department of Pharmacognosy,
Swamy Vivekanandha College of
Pharmacy, Tiruchengode, Tamil
nadu, India.Email: 007vasuki@gmail.com

Mobile: +919003889250

ABSTRACT

Leonotis nepetifolia (L) R.Br commonly known as Lion's ear, has number of therapeutic properties and is also known as Christmas candlestick. The genus *Leonotis* has 12 species widely distributed in Pan Tropics and is represented by one species, *Leonotis nepetifolia* in India. It belongs to family Lamiaceae. *Leonotis nepetifolia* is an economically important medicinal plant of repute in Indian traditional systems of medicine such as Ayurveda, Unani and Siddha. The Ayurvedic name of the plant is *Granthiparni*, while the trade name is *Barchi Buti*. It has many therapeutic properties and proved in Madagascar, Brazil, Canada, Kenya and many African Countries to treat diseases, rheumatism, dysmenorrhoea, bronchial asthma, fever, diarrhoea influenza and malaria and is also an analgesic. The decoction of the leaves is used to treat coughs, burns and skin ailments. The whole plant is used for menstrual pain and unspecified female complaints. This plant exhibited various pharmacological activities such as antioxidant activity, antidiabetic, anticancer, anti-inflammatory, anticonvulsant, wound healing, hepatoprotective activity and antimicrobial activities. Phytochemical examination of this plant indicated the presence of alkaloids (leonurine and stachydrone), iridoid glycoside (leonuride), iridoid glycosides (leonurine and leonuridine), diterpenoids (leocardin), flavonoids (rutin, quercetin, hyperoside, apigenin), volatile oil, tannins and vitamin A. *Leonotis nepetifolia* is highly therapeutic and is used in various Ayurvedic formulations. This article briefly reviews the pharmacological and various therapeutic aspect of *Leonotis nepetifolia*.

INTRODUCTION

Since the dawn of human civilization mankind has used plant material not only as a source of nutrition but also for numerous purposes including medicines. Nature has gifted India with immense edaphic and climatic resources for agricultural productivity. Primary health care needs of the majority of world population are being fulfilled by traditional medicine. The use of medicinal plants is still a living tradition in the hands of traditional healers such as traditional birth attendants, bone setters, herbal healers and wandering monks. The indigenous system of medicine practiced in India is based mainly on the use of medicinal plants in addition to that of animals, metallic and mineral substances. According to the classical texts a plant or any other drug source that has not been adequately understood in terms of its nomenclature, identity, properties and applications has a great chance of being wrongly used and hence leading to untoward effects^[1]. The Indian system of medicine, both codified

and folk varieties today use around 8000 species of plants.^[2]

Leonotis nepetifolia whole plant contains labdane diterpenoid characterized as 8 β ,17:9,13-diepoxy labdane-16,15:19, 6 β dilactone. Coumarin characterized as 4,6,7-trimethoxy-5-methyl chromen-2-one, nepetaefolinol and leonotinine. Leaves contain labdane diterpene - nepetaefolin, methoxynepetaefolin.^[3] *Leonotis nepetifolia* may contain morin, apigenin, 3, 6 -dihydroxy flavones, *p*-Coumaric acid, Caffeic acid, Kaempferol, 3, 7-Dihydroxyflavone, Galangin, Naringenin, 6-Hydroxyflavone, *O*-Coumaric acid and Flavone.^[4] Medicinal uses of the plant are used in Madagascar, Brazil, Canada, Kenya and many African countries to treat kidney disease, rheumatism, dysmenorrhoea, bronchial asthma, fever and diarrhoea.^[5] The drug is reported to have wound healing,^[6] antibacterial,^[7] antirheumatic,^[8] anti-inflammatory,^[9] analgesic and anticancer activities.^[10]

In India, the medicinal uses of the selected plant are reported for burns, breast swelling, ring worm, scalds, skin afflictions, malaria and rheumatic pain. Roots of *Leonotis nepetifolia* is considered as the botanical sources of *Granthiparna* (An Ayurvedic herb) which is included in the formulations such as *Brihat Guduchi taila*, *Himasagar taila*, *Nakula taila* and *Mritasanjivani sur*.^[11]

Plant description

Leonotis nepetifolia, also known as klip dagga, Christmas candlestick, or lion's ear, is a species of plant in the genus *Leonotis* and the family Lamiaceae (mint).



It is native to tropical Africa and southern India. It can also be found growing abundantly in much of Latin America and the West Indies^[12]. It grows to a height of 3 metres and has whorls of striking lipped flowers, that are most commonly orange, but can vary to red, white, and purple. It has very soft serrated leaves that can grow up to 4 inches wide. *Leonotis nepetifolia* generally grows in patches along roadside or barren unused agriculture waste land during rainy season. The mature plant attains the height up to 2 meter. The orange yellow coroneted verticilaster inflorescence and distinct odour are amongst the unique characters of this plant.^[13]



Figure: *Leonotis nepetifolia* (L) R.Br

Table 1: Botanical classification of *Leonotis nepetifolia*^[1]

Kingdom	:	Plantae
unranked	:	Angiosperms
unranked	:	Eudicots
unranked	:	Asterids
Order	:	Lamiales
Family	:	Lamiaceae
Genus	:	<i>Leonotis</i>
Species	:	<i>L. nepetifolia</i>

Table 2: Synonyms^[15]

Sanskrit	:	<i>Granthi, granthika, Granthiparna, Granthiparni</i>
English	:	Lion's Ear, Annual lion's ear, Christmas candlestick
Gujrati	:	Matijer
Hindi	:	Bara guma, Lal guma
Marathi	:	Deepmal
Telugu	:	Hanumantabira, Mulagolimedi
Tamil	:	Then thumbai
Kanada	:	Goa gadde, Kaaduthumbe, Ranabheri, Deepa Shoole
Oriya	:	Barcha

Origin place^[16]

Native: Tropical Africa, India, Malaysia, Brazil

Ecology of *Leonotis nepetifolia*

Historical View

Leonotis nepetifolia was first described by Linnaeus (in the genus *Phlomis*) based on an illustration and description of plants growing in the Leiden botanic garden thought to have originated in Surinam. In India, it was collected on the Coromandel Coast by the Tranquebar Missionaries and it may have been one of these, J.G.Konig, who sent it to Sir Joseph's Banks, whom it was introduced to Kew Gardens in 1778^[11].

Natural Habitat

A pan tropical weed, often found at roadsides and in abandoned cultivations at altitudes of up to 2,000 metres.^[16]

Useful Parts of *Leonotis nepetifolia*

Leaves, flowers, seeds.

Important Formulations

Brihat Guduchi taila, Himasagar taila, Nakula taila and *Mritasanjivani sur*.^[11]

Therapeutic Uses

Swasa, Kandu, Visa.^[17]

Table 3: Phytochemical studies

Phytochemicals	PE	Ch	Ac	Me
Alkaloids	-	+	-	-
Phenolics	-	+	-	+
Glycosides	-	+	-	+
Flavonoids	-	+	-	+
Tannins	+	-	-	-
Steroids	+	-	+	-
Saponins	+	-	-	-

Pharmacological activity**Antioxidant activity**

The DPPH assay showed methanol extract of *L. nepetifolia* leaves to be more significant in scavenging free radicals with inhibition percentage of 60.57%. From the data obtained, the methanol extract proved to be significant in all anti-oxidant assays and this effect was well comparable with the standard used in the study. The radical scavenging activity of the three solvent extracts of *L. nepetifolia* was studied using DPPH method as proposed by Harini *et al.* with minor modifications. Varying concentrations of the leaf extracts (dissolved in DMSO) was added to 5 mL of methanolic solution of DPPH (0.1 mmol/L), shaken vigorously and allowed to stand for 20 min at 27°C, and the absorbance was measured at 517 nm. Pure DPPH solution served as control.^[18]

Antidiabetic activity

Ethanollic whole plant extracts of *L. nepetifolia* at high dose (500mg/kg) exhibited significant anti-diabetic activity than ethanollic whole plant extracts at low dose (250mg/kg) in alloxan induced diabetic rats.^[19]

Anticancer activity

Ethanollic extract of *L. nepetaefolia* R. Br (EELN) was administered at the dose level of 100, 200 & 300 mg/kg.bw./day for 14 days to the experimental animals after 24h of Tumor inoculation. The antitumor effect of EELN was assessed by studying the parameters such as Tumor volume, PCV, viable and non-viable cell counts, life span, Hematological and antioxidant profiles. Administration of EELN decreased the body weight, Ascites fluid volume, PCV and Viable cell counts and increased the mean survival time of tumor bearing animals. The EELN brought back the altered levels of hematological parameters and antioxidant enzyme levels in dose dependent manner in EAC bearing mice. The results obtained were comparable with that of the standard drug 5-Flurouracil (20mg/kg.bw.).^[20]

Anti-inflammatory activity

Several extracts of aerial parts of *L. nepetifolia* showed anti-inflammatory activity on TPA-induced edema test in mice. It is a screening to evaluate the ability of test compounds or extracts to prevent an

inflammatory reaction in response to the edemogen 12-O-tetradecanoylphorbol-13-acetate (TPA).^[9]

Anticonvulsant activity

Anticonvulsant studies on the crude methanol extract of *L. nepetifolia* capitulum were carried out at doses of 150, 300 and 600 mg/kg using Maximal Electroshock Test (MEST) in chicks, Pentelinetrazole (PTZ), Strychnine (STN) and 4-Aminopyridine (4-AP) induced seizure tests in mice. The extract (150 mg/kg) exhibited 66.67% protection against PTZ-induced seizure and significantly ($P < 0.05$) increased the mean onset of seizure. The extract also showed anticonvulsant activity against STN induced seizures by protecting 66.67% of the mice against seizure and increased significantly the latency of seizure onset. The extract showed no activity against MEST and 4-AP induced seizures. The results suggest that the crude methanol extract of *L. nepetifolia* capitulum contains bioactive compounds which possess anticonvulsant activity, thus giving credence to the traditional use of this plant in the treatment of epilepsy.^[21]

Antimicrobial Activity

The essential oil of *L. nepetaefolia* (Family - Labiatae) was tested for its antibacterial activity against both Gram positive and Gram negative bacteria and found to be moderately active excepting *Pseudomonas aeruginosa*. The essential oil also was found to be inhibitory to dermatophytic fungi and suppressive to other aerial fungi. Hence the oil may be quite useful in skin infection due to dermatophytes even with secondary bacterial infections.^[22]

Wound healing activity

Topical administration of ethanollic extract of the *L. nepetifolia* R.Br., on the healing of burn wounds. The burn wound was created by using a rod of 2.5 cm diameter, which was heated to 80-85°C for 20 seconds. The control rats were undressed and the standard drug treated rats were dressed with Soframycin, while experimental rats were dressed with plant extract ointment. The plant extract treated wound healed much faster as indicated by improved rate of contraction and a decreased period of epithelialization. Biochemical studies revealed a significantly increase in Hydroxy proline, Hexosamine, Super Oxide Dismutase and also reduced the Lipid Per Oxide in the granulation tissues of plant extract treated wounds when compared with control and standard drug. From the result, it has been concluded that, the ethanollic extract of *L. nepetifolia* R.Br., has greater wound healing activity.^[23]

Hepatoprotective activity

L. nepetifolia provided protection against Acetaminophen induced - hepatic damage in this animal model with maintained liver enzyme and architecture. *L. nepetifolia* used as prophylaxis and therapeutic interventions in Acetaminophen induced hepatotoxicity.^[24]

Antidiarrheal Activity

The antidiarrheal effect of ethanolic leaf extract of *L. nepetifolia* revealed a decrease in transit distances covered by the charcoal meal at all doses of the extract which were statistically significant ($p < 0.05$) when compared with both positive and negative controls.^[25]

CONCLUSION

The various experimental studies on *L. nepetifolia* has shown its different activities such as Antioxidant, Antidiabetic, Anti-cancer, Anti-inflammatory, Anticonvulsant, Antimicrobial, Wound healing effect, Hepatoprotective, Antihypertensive and Antidiarrheal activities. All this proved that *L. nepetifolia* is very beneficial medicine. However most of the therapeutic properties are proved in animal experiment model, therefore it is very necessary to conduct controlled clinical studies so that more clinical data in support of effectiveness of medicine can be collected.

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