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Review Article

A REVIEW: EXPLORING THE DIVERSITY & MEDICINAL POTENTIAL OF LANTANA CAMARA

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Abstract

Lantana camara, a versatile shrub, exhibits a wide range of botanical, pharmacological, and toxicological characteristics. Botanically, it is a low, erect or sub-scandent shrub with ovate leaves emitting a pungent odor when crushed. Its diverse habitat preferences make it adaptable to various environments, from wetlands to urban areas. Ethnopharmacologically, L. camara has a rich history of traditional medicinal uses, treating ailments such as cuts, ulcers, and respiratory conditions like asthma. Its phytochemical composition includes essential oils and bioactive compounds, contributing to its therapeutic potential. However, caution is warranted due to its toxicity, especially in animals like sheep, cattle, and goats, leading to symptoms of photosensitization and jaundice. Proper management and informed usage are essential to mitigate risks associated with its toxicity. Overall, Lantana camara represents an intriguing subject for interdisciplinary research, bridging botany, pharmacology, and toxicology. Further exploration of its medicinal properties and toxicity management strategies could unlock its full potential as a valuable resource for traditional medicine andecological conservation.

Keywords: Lantana camara, Botanical characteristics, Pharmacological properties, Traditional medicine, Phytochemical composition, Toxicity, *Ethnopharmacology*

INTRODUCTION

Lantana camara is a low, erect or sub-scandent, vigorous shrub which can grow upto 2 - 4 meters in height. The leaf is ovate or ovate oblong, 2 - 10 cm long and 2 - 6 cm wide, arranged in opposite pairs. Leaves are bright green, rough, finely hairy, with serrate margins and emit a pungent odour when crushed. The stem in cultivated varieties is often non-thorny.It is woody, square in cross section, hairy when young, cylindrical and upto 15 cm thick as it grows older. Flower heads contain 20 - 40 flowers, usually 2.5 cm across; the colour of flowers varies from white, cream or yellow to orange pink, purple and red [1]. Flowering occurs between August and March, or all around year if adequate moisture and light are available.

LANATANA CAMARA

Kingdom:	Plantae
Clade:	Tracheophytes
Clade:	Angiosperms
Clade:	Eudicots
Clade:	Asterids
Order:	Lamiales
Family:	Verbenaceae
Genus:	*Lantana*
Species:	*L. camara*

Habitat: The wide ecological tolerance of lantana is reflected in its diverse and broad geographic distribution. It can be found in a range of habitats and on a of soil kinds. The ideal growing environments for lantanas are typically open, unshaded areas like wetlands, beachfronts, agricultural areas, grasslands, riparian zones, scrub/shrub lands, urban areas, and forests recovering from logging or fire. The species prefers the banks of canals, railroad tracks, and roadside locations. At room temperature, it cannot grow below 5 °C. [1]

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Fig. 1. Lantana camara Lin

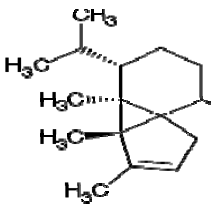
Drug discovery

Discovery involves a number of steps, such as target validation and selection, hit identification, lead generation, lead optimization, and, in the end, the identification of a potential candidate for further development. Conversely, development include refining chemical synthesis and formulation, carrying out research on animal toxicity, running clinical trials, and eventually obtaining regulatory clearance. The industry is currently under pressure because to the very rigorous regulatory requirements, environmental concerns, and lower earnings as a result of patent expiration. Both of these operations are time-consuming and expensive. Drug discovery is the process of finding new therapies for diseases. The phrase Lantana camara derives from Latin ‘lento’, this means that to bend [4,5]. The species became first defined and given its binomial call through Linnaeus in 1753 [6,7]. In drug

development programs, molecular docking is a useful technique for predicting how tiny molecules will interact with a therapeutic target or targets, which helps guide synthesis decisions. Medicinal chemists can save time and money on the drug development process by using this method to predict and synthesis compounds that are likely to display pharmacological action. The development of medications based on natural products has tried to use molecular docking techniques [2,3].

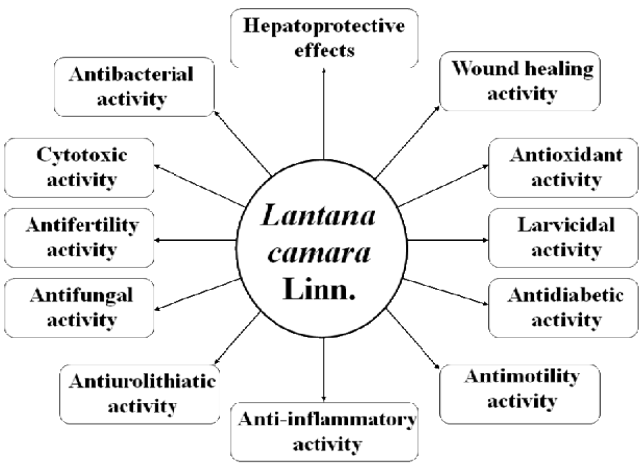
Ethnopharmacology*:* L. camara is a significant medicinal plant that is used in traditional medicine in a variety of ways. In various regions of the world, it has been utilized to treat a variety of medical conditions. Cuts, rheumatisms, ulcers, catarrhal infections, tetanus, rheumatism, asthma, ulcer, swelling, eczema, tumors, high blood pressure, bilious fever, ataxy of abdominal viscera, sores, measles, fevers, colds, and high blood pressure are only a few of the conditions that can be treated with leaves. The whole plant is infused and used to treat bronchitis in Ghana. Children were given powdered root in milk to relieve stomachaches and as a vermifuge. Lantana oil is applied topically to relieve skin rashes and acts as a wound antiseptic. External application of decoctions was used in leprosy and scabies cases [8-10].

Phytochemical composition: Phytochemical composition of the L. camara has been extensively studied in last few decades. Different parts of L. camara are reported to possess essential oils, phenolic compounds, flavonoids, carbohydrates, proteins, alkaloids, glycosides, iridoid glycosides, phenyl ethanoid, oligosaccharides, quinine, saponins, steroids, triterpens, sesquiterpenoides and tannin as major phytochemical groups [11-14].



Leaves from L. camara produced 0.8% of the essential oil. The main constituents of the essential oil of L. camara were α-cubebene, α-selinene, β-elemene, β-selinene, delta-cadinene, α-guaiene, α-humulene, α-copaene, germacrene D, B, aromadendrene, caryophyllene oxide, nerolidol, and spathulenol [15-16].

L.camara Active Phytoconstituent α-cubebene



Pharmacology

Antibacterial activity

L.camara possesses antibacterial potential as a different part i.e., leaves and flowers have shown strong antibacterial activity. It was reported that leaf and flower tissue samples of L.camara in three different kinds of the solvent extract showed noteworthy activity against different bacteria i.e., P. aeruginosa, Bacillus subtilis, and E. coli; however low antibacterial activity was reported against S. aureus. [20]

Antifungal activity

L.camara as a medicinal plant, possesses vital antifungal potential. Its antifungal potential was screened against Alternaria sp. a pathogenic fungus causing diseases, especially in vegetables. The food poison plate technique was used to perform the antifungal activity with three different concentrations of extract [19].

Antiulcerogenic activities

In order to discover the antiulcerogenic potential of L.camara a methanolic extract was prepared and its evaluation was done in aspirin-induced gastric ulcerogenesis in pyloric ligated rats, ethanol-induced gastric ulcer, and cysteamine induced duodenal ulcer models. Two different oral dosages of the extract were given with 250 mg/kg and 500 mg/kg [18].

Antihyperglycemic activities

The antihyperglycemic activity was also performed using methanolic extract prepared from L. camara leaf tissues and subjected to alloxan-induced diabetic rats. The extract was orally administered (400 mg/kg), and the results stated a reduction in glucose level to (121.94 mg/dl) in the blood in alloxan-induced diabetic rats [17].

Insecticidal activities

L.camara exhibits strong activities against different insects. To identify the potential of insecticidal activity an extract was prepared from leaf tissues, and it was noticed that the extract possess fumigant [21].

Larvicidal andwound healing activities

Mosquitoes are a group of insects that affect human beings more than any other organism. Although the loss of blood by Mosquitoes bite from human beings is trivial, but several contagious diseases. Mosquito larvicidal activity of extracts prepared using leaf and flower tissues of L. camara L. in methanol and ethanol have been thoroughly studied [22].

Asthma

All ages are affected by the chronic lung illness known as asthma. Breathing becomes more difficult as a result of inflammation and muscular stiffness around the airways. Coughing, wheezing, shortness of breath, and chest tightness are among symptoms. Symptoms: Asthma symptoms can differ from person to person. Sometimes, symptoms become noticeably worse. An asthma attack is what this is. Symptoms frequently get worse at night or during working out.

Treatment

Asthma cannot be cured but there are several treatments available. The most common treatment is to use an inhaler, which delivers medication directly to the lungs. Inhalers can help control the disease and enable people with asthma to enjoy a normal, active life. There are two main types of inhalers: bronchodilators (such as salbutamol), that open the air passages and relieve symptoms; andsteroids (such as beclomethasone) that reduce inflammation in the air passages, which improves asthma symptoms and reduces the risk of severe asthma attacks and death.

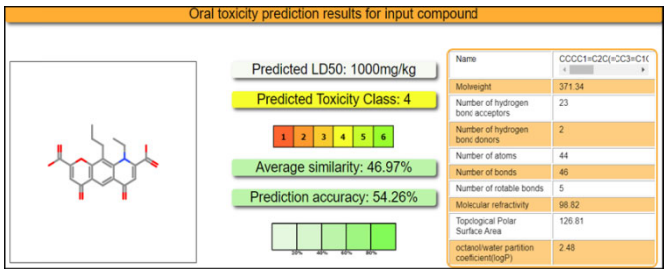
Self-care

To better understand their asthma, people with asthma and their families must get education. This covers their available treatments, triggers to avoid, and at-home symptom management techniques. For those who have asthma, it's critical to understand how to up their medication when their symptoms start to get worse in order to prevent a major attack. Healthcare professionals may provide an asthma action plan to help asthmatic patients take more charge of their care.

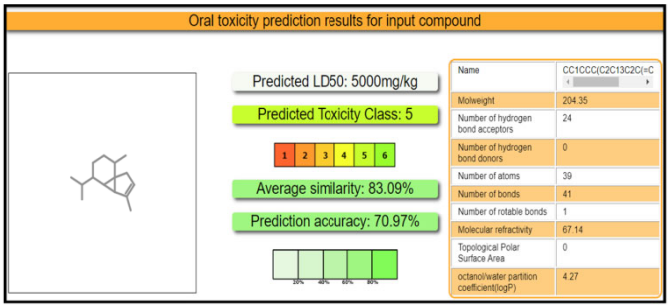
MATERIAL

CHEMSKETCH There is software that enables molecule and molecular models to be displayed in two and three dimensions, allowing one to understand the structure of chemical bonds and the nature of functional groups.

1) NEDOCROMIL



2). Alpha Cubebene α-cubebene (ligand molecule)



DISCUSSION

After conducting a various compounds, such as Lantana camara and its derivative, an anti-asthmatic medication. The modified Alpha-cubebene structure exhibits the maximum binding affinity, (-8.2 kcal/mol.) It has the strongest bonding with the common medication Nedocromil, with a binding affinity of (-8.3 kcal/mol.).

Toxicology: L. camara is one among the most toxic plants known so far, possibly within top ten. Reports of L. camara toxicity have been reported from Australia, India, New Zealand, South Africa and America. However, the toxicity occurs only on the consumption of high amount of plants material. It is reported that sheep, cattle and goats are susceptible to lantadenes A, B, D and icterogenic acid toxicity, where as horses, rats, neonatal calves and lambs are not susceptible to lantadene A. The prominent clinical sign of poisoning includes photosensitisation and jaundice. Loss of appetite in poisoned animals occurs within 24 hours and decrease in appetite also observed. The most severely poisoned animals die within 2 days of poisoning but usually death occurs after 1 -3 weeks after poisoning. The kidneys are swollen and pale in colour, the gall bladder is grossly distended and the liver is enlarged. The oral toxic dose of lantadene A for sheep is 60 mg/kg is toxic and 1–3 mg/kg by intravenous route [23-24].

Conclusion

In conclusion, Lantana camara represents a botanical marvel with rich traditional medicinal uses and promising pharmacological properties. While its diverse botanical features and therapeutic potential offer avenues for exploration, caution is warranted due to its toxicity and invasive nature. Responsible stewardship and interdisciplinary collaboration are essential in harnessing its benefits while mitigating risks, paving the way for a future where L. camara contributes to human health and ecological harmony.

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