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Lantana Camara: A Review on its Medicinal and Pharmacological Properties

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Abstract: *Lantana camara is a hardy, perennial shrub that belongs to the family verbenaceae. It is commonly found in tropical and sub tropical regions of India and other parts of the world. The plant is easily recognizable of its colorful flower cluster and a strong characteristic smell. Although often regarded as a weed due to its invasive nature, lantana camara hold significant medicinal importance in traditional system of medicine. Different plant of plant such as leaves, flowers, stems and roots are known to posse's therapeutic properties. The leaves are used in folk medicines for healing wound, reducing swelling, and treating skin diseases. Extract from the flowers and roots are used for fever, cough, and stomach disorder. Scientific studies have confirmed the presence of various phytochemicals such as alkaloids, Flavonoids, glycosides, Saponins, and tannins that contribute to its pharmacological effects. These compounds show anti microbial, anti oxidant, anti inflammatory, insecticidal, and hepato protective activities. However, despite its medicinal value, lantana camara also poses environmental challenges. Its spreads rapidly and competes with native plants, causing bio diversity loss and soil toxicity. Therefore understanding both its beneficial and harmful aspects is important. This project aims to study the morphology, phytochemical constituents, and medicinal properties of lantana camara, along with its ecological impact. The findings may help in promoting the plants controlled and sustainable use for medicinal and economical purposes.*

Keywords: *Lantana camara*

I. INTRODUCTION

The pan-tropical weed species Lantana camara is indigenous to the tropical and subtropical regions of central or South America. It was initially brought to India in the early 18th century, and since then, it has spread to nearly every tropical region, including Himachal Pradesh. The state forest department reports that a survey conducted in 2010–2011 and in 2015–2016 to determine the scope and degree of invasion revealed that forest areas totaling approximately 2,35,491 hectares were severely infested in seven territorial circles: Dharmashala, Nahan, Hamirpur, Chamba, Bilaspur, Mandi, and Shimla. It is a highly versatile plant species that can live in many different types of environments [1]. The lantana plant has been utilized as a ornamental shrub and border plant in lawns and other locations because it is a lovely decorative shrub with stunning flowers in a variety of hues. The flower has a peppery undertone and a tutti-frutti smell .The flower's color changes from yellow to orange, pink, or red after pollination, signaling to pollinators that the pre-change color includes a reward and is sexually viable, which increases pollination efficiency. When the soil is moist and the climate is free of frost, the plant can bloom all year round. Lantana can spread both sexually and asexually. Each plant will yield 12,000 fruits, and ornithophily is used to spread the seeds. It can spread quickly over land and become an issue. Lantana camara, on the other hand, has been restricted to natural and semi-natural forest environments due to its incapacity to tolerate higher temperatures. However, it can withstand a variety of climatic circumstances, including drought, temperature, humidity, salinity, and various soil types, and it will flourish along the forest border. Additionally, it may swiftly establish itself in newly burned forest regions and is fire tolerant [2]. Lantana

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camara is widely recognized as a serious invasive weed in many agricultural regions of India due to its rapid spread and formation of dense thickets. It competes aggressively with pasture plants and negatively impacts local plants and animals. Toxicity cases are mainly reported in young animals that is either newly introduced to areas infested with Lantana camara or deprived of adequate fodder. In contrast, ripe fruits of the plant are commonly eaten by children and adults in several countries without producing noticeable harmful effects. However, consumption of green fruit has proved to be fatal in some parts of India. Apart from causing death of livestock, sub lethal doses of Lantana camara toxin causes reduction in potential production, manifested abortion, loss of milk production in dairy cows, and chronic wasting in beef cattle [3].

It has both positive and negative roles which are given below:

Positive roles:

Ornamental plants in landscaping

Due to its attractive flower colors easy to maintain and cultivate drought resistant, salt tolerant and can more suitable and makes a good choices for landscaping .Also used as a border crop or ground cover, sometimes act as a live fence to demarks the lands.[4]

Helps in cross pollination

The multicolor flowers attract the pollination agents of butterflies, bees and some birds. They help in cross pollination of other plants which present in the Lantana grow garden.

Medicinal uses

Lantana camara have exciting medicinal values, which are recorded in lot of medical review papers the reports describes that leaves are used for treating malaria, chickenpox, asthma, ulcer, tumor, blood pressure, sores, fevers, and cold.

Source of essential oil

From lantana leaves, essential oil is extracted by steam distillation method. The oil aroma is like scent of basil, it externally used for treating skin diseases leprosy and scabies also used for antiseptic of wounds. [4]

Negative roles:

Even though lantana camara offers tremendous benefits, it also considered being a notorious weed in agriculture and secondary forests due to its ability to form dense thickets and it can become the dominant shrub, crowding out other native species and reducing biodiversity. The dense thickets formation can significantly reduce the regeneration of forests by preventing the growth of new trees, reduces the productivity of pastures, reduce growth of crops and hinders the harvest operations.[5]

Wide dispersal of seeds(birds and animals eat it drupes and spread it)

Due to its toxicity, animal consumption was prone.

Tolerance to wide range of environmental conditions.

Productionofallelochemicalswhichinhibitthenearbyplantspopulation

Burning can encourage lantana regeneration. Chemical control was cheaper and cause less disturbance resulting in higher bio diversity then mechanical control.[6]

Plant profile:

Botanical name: *lantana camara*

Family: *verbenaceae*

Common name: wild sage, red sage, raimuniya

Genus: lantana

Species: lantana camara

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Ethnopharmacology

Lantana camara has been traditionally used in various parts of the world for the treatment of several disorders. The plant has been utilized in folk medicine for managing cancers and tumors. Herbal tea prepared from its leaves and flowers has been traditionally consumed to relieve fever, influenza, and stomach pain. In Central and South America, the leaves were commonly applied as poultices for the treatment of sores, chickenpox, and measles. Preparations made from the plant have also been used in the management of colds, rheumatism, asthma, fever, and hypertension. [7]

Phytochemical properties of lantana camara by plant part:

Leaves:

Triterpenoids: Lantana A, lantana B (main toxic components)

Flavonoids: oleanolic acid, ursolic acid, luteolic, luteolin, Quercetin.

Alkaloids: camarinic acid, lantanine.

Essential oils: caryophyllene, germacrene- D

Stem \ bark:

Triterpenoids: betulinic acid, lantadene derivatives.

Saponins.

Sterols: beta- sitosterol, stigmasterol.

Phenolic compounds.

Roots:

Triterpenoids: oleanoic acid, ursolic acid.

Alkaloids.

Coumarins.

Steroids: beta- setosterol.

Glycosides.

Flowers:

Flavonoids: luteolin, apigenin, Qucercetin.

Carotenoids: lutein, beta- carotene (responsible for color)

Seeds:

Alkaloids.

Sterols.

Proteins and oil.[8]

Traditional uses:

Lantana camara is commonly cultivated as an ornamental garden plant and, in some regions, is planted as a boundary hedge to prevent the entry of animals. In addition to its decorative value, the plant possesses several medicinal properties and is widely used in traditional herbal medicine. The leaves of *Lantana camara* exhibit various biological activities such as biocidal, fungicidal, antimicrobial, and nematicidal effects.[9]

Pharmacological activities

Lantana camara is an important medicinal plant belonging to the family Verbenaceae. In recent years, the plant has gained attention due to its various pharmacological properties.[10]

Anti microbial activities:

Different varieties of *Lantana camara* leaves and flowers have been reported to possess significant antibacterial activity. Extracts prepared using different solvents demonstrated strong activity against bacteria such as *Escherichia coli* and *Bacillus subtilis*, while comparatively lower activity was observed against *Staphylococcus aureus*.

Ethanolic extracts of the leaves and roots of *Lantana camara* have also shown antibacterial potential. In vitro antibacterial studies performed using the microdilution method revealed antimicrobial activity against *Staphylococcus aureus*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, and multidrug-resistant strains of *E. coli*.[11]

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Anti fungal activities

Lantana camara has also been reported to possess significant antifungal activity. The antifungal potential of the plant was evaluated against *Alternaria* species, which are known to cause various plant diseases, particularly in vegetable crops. The activity was assessed using the food poison plate method at different extract concentrations of 10 mg/mL, 15 mg/mL, and 20 mg/mL. Among these concentrations, the extract showed maximum antifungal activity at 20 mg/mL against *Alternaria* species.

In another study, ethanolic and hot water extracts of *Lantana camara* were screened against wood-destroying white rot and brown rot fungi. Both extracts demonstrated effective antifungal activity against these fungal strains. However, the ethanolic extract showed greater potency even at a very low concentration of 0.01%.[12]

Hemolytic activity:

Lantana camara aqueous extract and its solvent fractions were evaluated for hemolytic activity using a modified spectroscopic method at different concentrations of 125, 250, 500, and 1000 µg/mL. The aqueous extract and its solvent fractions exhibited very low hemolytic activity against human erythrocytes, indicating comparatively lower toxicity toward red blood cells.[13]

Wound healing activity:

Lantana camara leaf extract has been reported to possess antiseptic and anti-leprosy properties. Studies have shown that the ethanolic extract of *Lantana camara* significantly enhanced wound healing activity in experimental animals. In burn wound models, the extract increased the rate of wound contraction up to 87% compared to the control group. The reduction in wound area may be attributed to the antimicrobial activity of the extract against *Staphylococcus aureus*.

A significant improvement in wound healing was observed in Sprague Dawley rats between the 1st and 19th day of treatment. Topical application of the extract at a dose of 100 mg/kg/day enhanced wound contraction up to 98%, promoted collagen synthesis, and reduced the overall wound healing time.

Similarly, ethanolic extract of *Lantana camara* demonstrated effective wound healing activity in adult male Wistar rats. Histological analysis of healed tissues further confirmed the role of the extract in accelerating the wound healing process.[14]

Anti-inflammatory Activity

Lantana camara aqueous extract has been reported to possess significant anti-inflammatory activity in albino rats. The anti-inflammatory effect was evaluated using the carrageenan-induced paw edema model. Treatment with the extract at a dose of 500 mg/kg body weight significantly reduced paw swelling and inflammation compared to the control group.[15]

Topical Activity Against Dermatophilosis

Lantana camara has shown promising topical activity against dermatophilosis. An ointment prepared from the ethanolic extract of *Lantana camara* leaves along with *Senna alata* and *Mitracarpus scaber* was used in the treatment of acute and chronic dermatophilosis lesions. No recurrence of the condition was observed over a period of three years after treatment, and regrowth of hair was also reported in the affected areas.

The anti-inflammatory activity of *Lantana camara* extract and its fractions was further evaluated using red blood cell membrane stabilization techniques. Phytochemical screening of the whole plant extract showed the presence of tannins, Flavonoids, and Saponins, which may contribute to its therapeutic and anti-inflammatory properties.[16]

Toxicology

Lantana camara toxicity is mainly observed in animals such as sheep, goats, cattle, pigs, horses, and rats due to excessive consumption of the plant. In humans, poisoning is comparatively rare, although consumption of unripe fruits

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may occasionally produce acute toxic effects. In several countries, ripe fruits of the plant are consumed without significant harmful effects.

The toxic effects of *Lantana camara* are primarily attributed to the presence of active toxic constituents such as lantadene A, lantadene B, lantadene D, and icterogenin acids. Clinical signs of poisoning include photosensitization, jaundice, anorexia, liver enlargement, kidney swelling, skin irritation, and in severe cases, death.[17]

A case study involving a Sirohi goat kid reported that ingestion of the plant caused phototoxicity along with symptoms such as anorexia, depression, swelling of eyelids, itching, and sloughing of the superficial skin layer. Treatment included administration of purgatives, liver tonics, electrolytes, vitamin B complex, antihistamines, and activated charcoal.

Studies have also shown that reduced lantadene A may induce liver injury in female rats, whereas lantana extracts containing multiple toxic compounds produced photodermatitis and impaired liver function in both male and female rats. Experimental findings indicated that photodermatitis and liver dysfunction are common manifestations of lantana poisoning in rats and ruminants, although liver damage is generally more severe in ruminant animals.

Research further demonstrated that even some non-toxic green leafy plants, when consumed in large quantities, may induce mild photodermatitis. However, *Lantana camara* extracts showed more severe and prolonged toxic effects, particularly affecting liver function.[18]

II. CONCLUSION

In conclusion, Lantana camara is a medicinal plant with both beneficial and harmful effects. It contains various phytochemicals that are responsible for activities such as antibacterial, antifungal, anti-inflammatory, antioxidant, wound healing, and insecticidal effects. Different parts of the plant are traditionally used for treating wounds, fever, skin diseases, asthma, and stomach disorders. However, the plant is also an invasive weed that spreads rapidly, reduces biodiversity, and can cause toxicity in animals. Therefore, proper management and controlled use of Lantana camara are important. Overall, the plant has great potential in herbal medicine and pharmaceutical research despite its environmental challenges.

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