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A Review on Genus Lantana

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ABSTRACT: Lantana species (L.camara, L.montevidensis, L.involucrata, L.trifolia, L.urticoides, L.achyranthifolia, L.indica, L.crenulato, L.lilacina, L.sellowiance, L. hispida, ,L. var. acuelata) are considered as a notorious weed and a popular ornamental plant. Lantana is used in traditional medicine system for the treatment of cuts, swellings, ulcers, cataract, bilious fever, itches, eczema, and rheumatism. Various parts of Lantana plant are used in the treatment of cold, headache, whooping cough, asthma, chicken pox, bronchitis, eye injuries, and arterial hypertension. L. camara has scientifically studied for various therapeutic activities like antibacterial, antioxidant, antipyretic, insecticidal, antimicrobial, wound healing, etc. Nowadays this plant Lantana camara is worked in several recent advanced techniques like phytoextraction of heavy metals, phytoremediation of particulate pollution and many others. Various literature has reported the phytoconstituents present in all parts of Lantana camara. In last few decades, scientist and researchers throughout the globe have elaborately examined the chemical composition of the whole plant of L. camara.The present review is an aim to give a complete report of the literature on its phytochemistry and pharmacological activity. The knowledge of traditional medicine and medicinal plants and their study of scientific chemical principles may lead to the discovery of newer and cheaper drugs. The present review gives a overall view on phytochemistry, pharmacology and toxicology of Lantana's species.

KEYWORDS:.: Medicinal plants, Lantana , pharmacology, Herbal drugs, Verbenaceae, Phytochemistry, pharmacological effect.

I. INTRODUCTION

Medicinal plants represent an important source of medically important compounds. Since ancient time, medicinal plants are used to cure several types of health problems. Systemic analysis of these plants provides a variety of bioactive molecules for the development of newer pharmaceutical products. Recently, there is a growing interest in the pharmacological evaluation of various plants used in different traditional system of medicine. In last few decades, many of traditionally known plants have been extensively studied by advanced scientific techniques and reported for various medicinal properties viz, anticancer activity, anti-inflammatory activity, antidiabetic activity, anthelmintic, antibacterial activity, antifungal activity, hepatoprotective activity, antioxidant activity, larvicidal activity etc. 1-10 Lantana camara Linn. is a flowering ornamental plant belonging to family Verbenaceae. L. camara is also known as Lantana, Wild Sage, Surinam Tea Plant, Spanish flag and West Indian lantana. L. camara is a well known medicinal plant in traditional medicinal system and recent scientific studies have emphasized the possible use of L. camara in modern medicines.

Pharmacognastic study:

- **Botanical name:** Lantana
- **Common names :**

➢ English - Common Lantana, Lantana, Lantana weed, Wild sage
➢ Hindi – Raimuniya
➢ Marathi – Ghaneri , tantani [1,2]
➢

Biological sources:

➢ The different parts of Lantana species are having different properties . Especially the leaves, fruits , seed ,flowers,stem are used.

Taxonomical Classification:

➢ Kingdom: Plantae
➢ Subkingdom: Tracheobionta
➢ Superdivision: Spermatophyta
➢ Division: Magnoliopsida
➢ Subclass: Asteridae

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- Order: Lamiales
- Family: Verbenaceae
- Genus: Lantana
- Species: Lantana camara[3]
- Other species : The genus Lantana is composed of about 150 species. Among these some species are as follows :L.montevidensis, L.involucrata, L.trifolia, L.urticoides, L.achyranthifolia, L.indica , L.crenulato, L.lilacina, L.sellowiance, L. hispida, L. camara, L. var. acuelata.[4,5,6]

Geographical sources:

Lantana is a tropical origin plant and native to Central and Northern South America and Caribbean. Lantana is now spreaded to nearly 60 countries.

The plant is spread widely over Uttarakhand, Uttar Pradesh, Himachal Pradesh, and North-Eastern states of India[7].

Morphology:

- Lantana is a low erect, ornamental shrub.
- It has curved prickles on its branches, grows to a height of 2–3 m, and spreads its branches to cover an area of about 1 sq m.
- Leaves are ovate ,oblong, cuneate, rounded at the base and crenate and rugose above, they are 5-9 cm long and 3-6 cm wide, green in colour. Leaves and stem are covered with rough hairs.
- Flowers are small held in cluster, usually they are orange in colour, sometime varying from white to red in various shades.
- Fruits are fleshy drupes, green in colour when young and dark blue or black on ripe. Stemens are four ,2 pairs. Seeds are small and dicot.
- Root system is very strong gives out new fresh shoots even after repeated cuttings.[8]

Figure 1: L.camara L.

Figure 2 : L.camara fruits

Chemical constituents:

- **Chemical constituents of L.camara:**Lantacin, camarin, camarinin,alpha-phellandrene, germacrene D, limonene, beta-caryophyllene, sabinene, elemene, veside, geniposide, 8-epiloganin, lamiridoside.
- **Chemical constituents of L.montevidensis:** Flavonoids, triterpenoids,flavones, gallic acid phenolic acid, flavonoids, caffeic acid, ellogic acid, rutin, kaempferol,luteolin,apigenin,beta-caryophyllene,germacrene and bicyclogermacrene.
- **Chemical constituents of L.radula:** The species L.radula contains tetradecane, E-caryophyllene, alpha-humulene, beta-E-farnesene, germacreneD,bicyclogermacrene, phytol, E-nerolidol.

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- **Chemical constituents of L.involucrata:**LantalucratinsA , B , and C , and lantalucratins D , E , and F , were isolated from this species.
- **Chemical constituents of L.indica:** Trans-caryophyllene , α-selinene , globulol , trans-caryophyllene oxide, valencene , humulene , and β-eudesmene , oleanolic acid , 3- ketooleanolic acid.
- **Chemical constituents of Lantana achyranthifolia:**Penduletin and chrysosplenetin , furano-1,4-naphthoquinone named diodantunezone.

Pharmacological activities

i. **Anthelminthic activity (anti-filarial activity and nematicidalactivity):** Seven compounds from the aerial parts of L. camaraL., and tested them for nematicidal activity against the root-knot nematode Meloidogyne incognita. Extracts of stems and isolated compounds from seedlings of L. camera L. were assessed for anti-filarial activity in vitro and in vivo.[9] The anthelminthic activity of acetone extracts of L. rugosaThunb. leaves against the free-living test nematode Caenorhabditiselegans L. rugosa showed notable antinematode effects at a concentration of 1mg/mL.

ii. **Anti-protozoal activity (anti-plasmodial, antimalarial and leishmanicidal activity):** The ethanolic extract from Lantana sp. has low activity against Plasmodium falciparum.[10] Extracts of the aerial part of L. trifoliaL. for in vitro antiplasmodial activity against wild-type strains of P. falciparum using the nitro-tetrazolium blue-based lactate dehydrogenase assay.[11]

iii. **Antiviral activity:** Essential oil of L. grisebachiivar. grisebachiiL. for cytotoxicity and in vitro inhibitory activity against different virus types.[12]

iv. **Antioxidant activity:** Premature leaves of L. camaraL. on twigs are very active in the biosynthesis and accumulation of secondary metabolites and, hence, exhibit greater potential antioxidant activity. It was also found that older leaves had less antioxidant activity (55%), indicating loss of secondary metabolites as result of leaf senescence. In another study, L. camara L. essential oil showed high antioxidant activity[13,14]

v. **Antibacterial, antifungal activity:** Species of Lantana have been widely evaluated in various works with respect to antimicrobial activity. One study showed inhibitory activity of an ethanolic extract of L. montevidensisBriq. leaves determined by the microdilution test against multiresistant strains of Escherichia coli and Staphylococcusaureus.An investigation of acetone extracts of leaves of L. camara L. and L. rugosaThunb. Showed growth inhibitory effects against two Gram-negative (E. coli and Pseudomonas aeruginosa) and two Gram-positive (Enterococcus faecalis and S. aureus) bacteria,[15,16] The antifungal activity of L. indicaRoxb wasfound to be greater in the leaf essential oil than leaf extracts. The different extracts and essential oil from aerial parts of L.achyranthifolia, leaves of L. camara L.,L. trifolia L, L. fucata Sw. leaves,L. hispida,L. lilacina possess antibacterial and antifungal actities.

vi. **Antiinflammatory, analgesic, sedative and antipyretic activity:** The sedative properties of L. trifoliaL. extracts were demonstrated using the open field method.The antiinflammatory activity of oleanonicacid isolated from L. camaraL. using the carrageenan-induced rat paw edema model.L. trifoliaL. leaves gives antiinflammatory , analgesic activities and antipyretic propertiesWhole plant and ethanolic extracts of fresh leaves of L. camaraL. were investigated for their antiinflammatory properties[17,18,19].

vii. **Antiproliferative (antitumor and anticancer) and cytotoxic activity:** A crude extract of L. camaraL. leaves had a cytotoxic effect on HeLa cells. The compounds raduloside and radulignan , isolated from L. radula Sw. roots, were tested for cytotoxicity against several cell lines.Dichloromethane extracts of leaves from L. camaraL. (colors of flowers: pink and orange) were testedfor in vitro cytotoxicity against human WI-38 fibroblasts.The flavonoid fraction from the leaves of L. montevidensisBriq. showedantiproliferative activityagainst human gastric adenocarcinoma.Extracts of L. camaraL. and L. montevidensisBriq. Leaves

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were very effective in inhibiting tumor cell growth.[20,21,22].

viii. **Antiulcerogenicactivity:**Theantiulcerogenic effect of a methanolic extract of L. camara L. in aspirininduced gastric ulcerogenesis in pylorus-ligated rats and ethanol-induced gastric ulcer, and cysteamine-induced duodenal ulcer models. The extract was administered orally at two different doses, 250 and 500 mg/kg.[23]

ix. **Anti-motility activity:** L. camaraL. var. acuelataleaf powder, methanolic extract, lantadene A (**1**), neostigmine and neostigmine but with methanolic extract were evaluated for antimotility activity in the intestine of treated mice.[24]

x. **Anti-fertility activity:** The effects of the hydroalcoholic extract of the leaves of L. camara var. aculeate on reproduction.[25]

xi. **Anticoagulant activity:** Methanolic extracts prepared from the leaves of L. camaraL. were found to inhibit human R-thrombin.[26]

xii. **Antimutagenic activity:** A study of the compounds lantanilic acid and camarinic acid, which were isolated from L. camara L., showed high antimutagenic activity in the mouse; at 6.75 mg/kg.[27]

Toxicology study :

For toxicity study brine shrimp assay was used. In that study, Brine shrimp eggs, Artemiasalinawere hatched in artificial seawater which was prepared by dissolving 38 g sodium chloride in 1 liter distilled water. After 36-h incubation at room temperature (22-29 °C) under a light source,
the larva (nauplii) were separated from shells and unhatched eggs by siphoning with a plastic tube. This study shows that root extract was the most toxic part followed by leaves, flower, fruits and stem in descending order.

Ayurvedic properties and uses :

Dravya(substance), Rasa (taste), Guna (qualities), Veerya (potency), Vipaka (post digestion effect), Karma (pharmacological studies), Prabhav (therapeutics).

- **Nutritional component present in genus Lantana** :
- ✓ Vitamin-B and C;
- ✓ Saponins;
- ✓ Tannins;
- ✓ Flavonoids;
- ✓ Glycosides;
- ✓ Calcium, Iron, Magnesium, Manganese, Phosphorus, Potassium, Sodium, Zinc[28]
- **Ayurvedic uses in treatment of :** Skin itches, Wounds, Leprosy, Scabies, Tuberculosis, Asthma, Toothache, Headache, Inflammation, Gonorrhoea, Leucorrhoea.

Medicinal uses:

- The leaves of the plant are used in the treatment of tumors, tetanus, rheumatism, malaria, etc. and its antiseptic and carminative properties have also been reported.
- Lantana camara can be used to heal wounds due to its fast-acting antiseptic and antimicrobial properties.
- Lantana camara has been used in folk remedies for cancers and tumors.
- The leaves were made into a poultice to treat sores, chicken pox and measles.
- Fevers, colds, asthma and high blood pressure were treated with preparations from the plant.
- In India the leaves of the plant are boiled for tea and the decoction is a remedy against cough and it is used as a lotion for wounds and Pounded leaves are applied to cuts, ulcers and swellings.

Past, Present and Future studies or researches:

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Past	○ The ancient studies of L.camara include its traditional and folk uses: Skin itches, Wounds, Leprosy, Scabies, Tuberculosis, Asthma, Toothache, Headache, Inflammation, Gonorrhoea, Leucorrhoea ○ It is the natural remedy for vata and kapha as aayurvedic treatment. ○ In last few decades scientist and researchers reveals the phytochemicals present in L.camara,their molecular structure and pharmacological activities like: Anticancer, Antimicrobial , Antiulcerogenic , Hemolytic, Antiurolithiatic, Antifertility, Etc
Present	○ Nowadays this plant Lantana camara is worked in several recent advanced techniques like phyto-extraction of heavy metals, phytoremediation of particulate pollution and many others. ○ Recently the scientific studies emphasized the possible uses of L.camara in modern medicines
Future	○ Future researches need to find more chemicals in plant . ○ Increase the potency or therapeutic efficcy of researched chemicals ○ Research on new species of L.camara and their pharmacological activities. ○ Clinical and preclinical studies require to reveal efficacy and toxicity of this plant .

II. CONCLUSION:

Lantana's species is considered as weed used in folk medicine in many parts of the world. The plant contained alkaloids, glycosides, steroids, saponins, flavanoids, coumarins, tannins, carbohydrates, hydroxyanthraquinones, anthraquinone glycosides, proteins, phytosteroids, fixed oils, fats, and triterpinoids. Previous pharmacological studies revealed that Lantana camara possessed antimicrobial, antiparasitic, gastrointestinal, hypoglycemic, cardiovascular, antioxidant, anticancer, antiinflammatory, analgesic, wound healing, antiurolithiatic, hepatoprotective, reproductive, anti–hemorrhoidal, thrombin inhibition and many other effects. Most of the pharmacological studies were preliminary, carried out in animals and are not sufficient for the development of a pharmaceutical product. Still, intensive preclinical and clinical studies are required to evaluate the efficacy and toxicity of these plant products.

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