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Review Article

Lantana Camara Linn. Chemical Constituents and Medicinal Properties: A Review

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Abstract: India has a rich tradition of plant based knowledge in health care. Among the large number of herbal drugs existing in India, very few have been studied systematically so far. *Lantana camara* is an evergreen plant found throughout India. Traditionally it has been used in treating various ailments and they were supported by scientific data's. Various literatures have reported the phytoconstituents present in all parts of *Lantana camara*. In last few decades, scientist and researchers around the globe have elaborately studied the chemical composition of whole plant of *L. camara* as well as biological pharmacological activities. These studies established the therapeutic potential of Lantana camara in modern medicines and a possible candidate for the drug discovery. This article reviews the pharmacological activities and toxicology of *Lantana camara*.
Keywords: Medicinal plants, *Lantana camara* Linn, pharmacology, Herbal drugs.

INTRODUCTION

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. In India, *L. camara* was probably introduced before 19th century. Currently *L. camara* is distributed throughout India where there is a moderate to high summer rainfall and well-drained sloping sites. Most variants have a preference for fertile organic soils, but some or all can survive on siliceous sands and sandstone-derived soils where these are of moderate depth and other conditions, especially year-round moisture, are suitable. It is a native to tropical regions and exists as dozens of strains and varieties that are highly variable in appearance. *L. camara* is known by different name in various different languages in India viz, Raimuniya (Hindi), Chaturangi and Vanacehdi (Sanskrit), Arippu and Unnichedi (Tamil), Aripoov, Poochedi, Konginipoo and Nattachedi (Malayalam), Thirei, Samballei and Nongballei (Manipuri), Tantani and Ghaneri (Marathi), Pulikampa (Telegu), Kakke and Natahu (Kanada) [1, 2].

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 medicine**.** The present review aims to document the medicinal properties of *L. camara* and its future prospects for the further scientific investigation for the development of effective therapeutic compounds.

Medicinal Properties of *Lantana Camara*

L. camara is an important medicinal plant andin recent history this plant is reported for various medicinal properties.

Anticancer and antiproliferative activity

Different varieties of *L. camara* plant parts were reported for anticancer and antiproliferative activity. Leaves of *L. camara* were reported for antiproliferative activity against HEp-2 (laryngeal cancer) and NCI-H292 (lung cancer) cell lines. In vitro antiproliferative test was performed by MTT assay. Methanol extract of *L. camara* leaves exhibited antiproliferative activity against NCI-H292 cells (% living cells= 25.8±0.19). Leaves of *L. camara* were reported to exhibit cytotoxicity effect on Vero cell line. *In vitro* cytotoxicity test was performed by MTT assay. The methanol extract (500 µg/ml) concentration inhibited the growth of cells 2.5 times less than did Triton 100 × 1% [3, 4]**.**

Oleanonic acid isolated from *L. camara* was screened for anticancer activity against a murine tumour (Ehrlich ascites carcinoma), and three human cancer cell lines, namely A375 (malignant skin melanoma), Hep2 (epidermoid laryngeal carcinoma) and U937 (lymphoma). Oleanonic acid exhibited promising cytotoxicity against A375 cells [5].

Antibacterial activity

Ethanolic extracts of *L. camara* leaves and roots were reported for antibacterial activity. The *in vitro* antibacterial activity was performed by microdilution method. The extracts exhibited antimicrobial activity against *Staphylococcus aureus, Proteus vulgaris,*

Pseudomonas aeruginosa, *Víbrio cholareae*, *Escherichia coli* and two multiresistant strains *E. coli* and *S. aureus* [6]. Three different solvent extract of leaves and flowers of four different varities of *L. camara* exhibited significant antibacterial activity *E. coli*, *Bacillus subtilis* and *P. aeruginosa* whereas poor antibacterial activity against *Staphylococcus aureus* [7]. Methanolic extracts of different parts of *L. camara* were screened for antimicrobial activity against 10 bacteria and 5 fungi by disk diffusion method and broth microdilution method. The leaves extract of *L. camara* showed highest activity against Gram positive *Bacillus cereus* and Gram negative *Salmonella typhi* [8]**.**

Hemolytic activity

The hemolytic activity of *L. camara* aqueous extract and its solvent fractions was performed by modified spectroscopic method at four different concentrations (125, 250, 500, 1000 µg/ml). The aqueous extract and its solvent fractions exhibited very low hemolytic activity towards the human erythrocytes. The hemolytic activity of the different extracts was found in the following order: chloroform fraction > hexane and ethyl acetate fraction (50:50) > aqueous extract > ethanol fraction >methanol fraction [9].

Antifungal activity

Antifungal activity of ethanol and hot water extract of *L. camara* was screened against wood destroying white and brown rot fungi. Both extracts exhibited efficient antifungal activity against white and brown rot fungi, however ethanol extract was highly potential at very low concentration (0.01%) and also *L. camara* was screened against *Alternaria* sp. which causes different plant diseases especially in vegetable plants. The antifungal activity was performed by food poison plate method at three different concentrations of extract viz, 10 mg/ml, 15 mg/ml and 20 mg/ml. At 20mg/ml dose *L. camara* exhibited significant antifungal activity against *Alternaria* sp [10, 11].

Anti mutagenic activity

22β-acetoxylantic acid and 22β-dimethylacryloyloxylantanolic acid from *L. camara* showed antimutagenic activity. The anti mutagenicity test was performed by micronucleus test in Swiss mice. Both compounds exhibited high antimutagenic activity in Mitomycin C induced mutagenesis in mice [12].

Antiulcerogenic activity

Antiulcerogenic activity of the methanol extract of leaves of *L. camara* was reported on asprin, ethanol and cold resistant stress induced gastric lesions in rats. Pre-treatment of the effected rats with the extract (200 and 400 mg/kg body weight) showed significant protective effect in aspirin induced, ethanol induced and cold restraint stress induced ulcers in rats. The extract resulted in dose dependent antiulcerogenic activity in all models [13].

Antioxidant activity

Antioxidant activity of the leaves of *L. camara* was reported by reducing power activity and 1, 1- diphenyl-2- picrylhydrazyl (DPPH) radical scavenging assay. Leaves extracts exhibited high antioxidant effect, however younger leaves exhibited strong antioxidant activity than the older or matured leaves. Ethanolic extract of *L. camara* exhibited significant antioxidant activity in *in vivo* studies. The extract treatment decreased the extent of lipid peroxidation in the kidneys of urolithic rats. *In vitro* studied were carried out by DPPH radical scavenging assay and Nitric oxide free radical scavenging assay. Extract exhibited high antioxidant properties in both the assays [14, 15].

Antihyperglycemic activity

Hypoglycemic activity of methanol extract of *L. camara* Linn fruits was screened in streptozotocin induced diabeticrats (Wistar albino rats). Extract treatment at doses of 100and 200 mg/kg body weight resulted in dose dependentdecrease in serum glucose level in streptozotocin induced diabetic rats. Extract treatment also showed improvement inbody weight, HbA1c profile as well as regeneration of liver cells. Antihyperglycemic activity of methanol extract of leaves *L.camara* was reported in alloxan induced diabetic rats. Oral administration of the methanol extract of *L. camara* (400mg/kg body weight) leaves resulted in decrease in blood glucose level to 121.94 mg/dl in alloxan induced diabetic rats [16, 17].

Antiinflammatory activity

Aqueous extract of *L. camara* was reported for anti-inflammatory activity in albino rats. Extract treatment (500mg/kg body weight) significantly decreased paw volume in carrageenan induced paw oedema test in rats [18].

Wound healing activity

Wound healing property of ethanol extract of leaf of *L. camara* was reported in adult male Wister rats. Topical application of the extract over the wound significantly increased the wound healing activity. Histological analyses of healed wounds confirmed the role of extract in healing. In another study aqueous extract of leaf of *L. camara* was stated for wound healing activity in rats. Topical application of the extract on the wound (100 mg/kg/day) significantly enhanced the rate of wound contraction (98%), synthesis of collagen and decreased wound healing time [19, 20].

Antimotility activity

Methanol extract of *L. camara* leaves was reported to possess antimotility activity in mice. Intestinal motility was assayed by charcoal meal test in mice. At a dose of 1 g/kg body weight, the extract completely inhibited the transit of charcoal in normal mice. Intra peritoneal administration of 125 and 250 mg/kg body weight the

extracts significantly reduced the fecal output in castor oil induced diarrhoea in mice [21].

Antiurolithiatic activity

Ethanolic extract of the leaves of *L. camara* was reported for antiurolithiatic activity against ethylene glycol and ammonium chloride induced calcium oxalate urolithiasis in male albino rats. Extract treatment significantly reduced the deposition of calcium, oxalate and also reduced urinary excretion of calcium, oxalate and creatinine [15].

Mosquito controlling activity

Mosquito larvicidal activity of methanol and ethanol extracts of leaves and flowers of *L. camara* were reported against 3rd and 4th instar larvae of *Ae. aegypti* and *Cx. quinquefasciatus* mosquito. Both extracts exhibited significant larvicidal activity against both species of mosquitoes; however, at low concentrations (1mg/ml) extracts were highly active against *Ae. aegypti*than that of *Cx. quinquefasciatus*. Essential oil from the leaves of *L. camara* was reported to possess adulticidal activity against *Aedes aegypti*, *Culex quinquefasciatus*, *Anopheles culicifacies*, *An. fluvialitis* and *An. stephensi* mosquitoes with LD50 values 0.06, 0.05, 0.05, 0.05 and 0.06 mg/cm(2) while LD90 values were 0.10, 0.10, 0.09, 0.09 and 0.10 mg/cm(2) against *Ae. aegypti, Cx. quinquefasciatus, An. culicifacies, An. fluvialitis and An. Stephensi* respectively [22, 23].

Antifilarial activity

Antifilerial activity of crude extract of *L. camara* stem was reported. The extract and its chloroform fraction resulted in the death of adult *Brugia malayi* and sterilised most of the surviving female worms in the rodent model *Mastomyscoucha* [24].

Anti fertility activity (Embryo toxicity)

Effects of hydroalcoholic extract *of L. camara* leaves was studied on fertility, general reproductive performance and teratology in female albino Wistar rats. The extract interfered in the frequency of fetal skeleton anomalies from dams treated with the extract and induced embryo toxicity as indicated by post-implantation loss, without any signs of maternal toxicity [25].

Effect on red blood cells

The effects of an aqueous extract of *Lantana camara* on the osmotic fragility and on the morphology of RBC were carried out. In the presence of the extract, the data obtained indicated a significant ($p < 0.05$) increase of hemolysis and modifications on the morphology of RBC. These effects of the *Lantana camara* may be associated with some pharmacological properties of the chemical compounds of aqueous extract [26].

CONCLUSION

Lantana camara is considered as weed used in folk medicine in many parts of the world. Phytochemical studies showed that the plant is free from diterpenoids and rich in essential oils. Monoterpenes, triterpenes, flavones coumarin, steroids, iridoid glycosides, are reported from *Lantana camara*. Triterpenes and flavones are the more common secondary metabolites in *Lantana camara*. Leaf extracts of lantana exhibit antimicrobial, fungicidal, insecticidal and nematicidal properties. Which possess antimicrobial, immunosuppressive and anti tumoractivity. Lantana oil is sometimes used for the treatment of skin itches, as an antiseptic for wounds and externally for leprosy and scabies. 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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