

# Overview on Lantana Camara Showing Various Pharmacological Benefits

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**Abstract:** Due to the knowledge of medicinal plants and their study of scientific chemical principles it may lead to discovery of newer drugs and can also help to reduce the cost of the existing drugs Lantana camara is a weed found throughout the India. Lantana camara has many therapeutic uses and it is identified as a prospective target for the drug discovery. The various parts of the lantana camara plant are used for the treatment of various diseases. The urolithiatic activity, chemical constituents and the other pharmacological activities of the Lantana camara are reviewed in this paper.

**Keywords:** Antibacterial activity, Wound healing activity, Antiurolithiatic activity and Antifungal

## I. INTRODUCTION

Lantana camara is a flowering ornamental shrub belonging to family Verbenaceae and it is native to central, south America and Caribbean. It is also known as wild sage. Pharmacological investigations indicated that extracts of leaves of Lantana camara exhibit antifungal activity, antibacterial activity, wound healing activity, antiurolithiatic activity and many other effects. Lantana Camara is a highly variable ornamental plant. It has been reported as a extremely weedy and invasive plant in many countries. From many years the flowers of Lantana camara are used as pectoral for children ; the leaves and the fruits of that plant may be used externally in various skin diseases, cuts, and wounds ; the Stems and the roots can be used for gargles and toothaches and for preparing toothbrush.

## II. BIOLOGICAL SOURCE

It is a flowering plant of *L. camara* Linn. belonging to the family – Verbenaceae [1].

### Taxonomic Classification

Kingdom Plantae  
Subkingdom Tracheobionta  
Superdivision Spermatophyta  
Division Magnoliophyta  
Class Magnoliopsida  
Subclass Asteridae  
Order Lamiales  
Family Verbenaceae  
Genus Lantana  
Species camara [1]

## III. MORPHOLOGY

### Colour:

Fruits are green to dark purple in colour.

Colour of the flowers is orange, red, yellow, white, pink and changes after maturation.

Leaves are green in colour.

### Odour:

Odour of flowers is tutti frutti like with peppery undertone.

Leaves are strongly aromatic when crushed.

Taste:

Leaves have a minty taste [2].

Shape and Size :

The plant grows up to 2 meters tall and can spread to 2.5 meter in width.

Leaves : Leaves are acute or subacute, ovate or ovate oblong , rugose above ,scabrid on both sides.

The leaves are approximately 3-6 cm wide and 3-8 cm long .

Flowers: Flowers are small and tubular in shape with four petals

The corolla is tube slender , the calyx is small ,the limb is spreading 6-7mm wide and divided in unequal lobes. Stamen is four in two pairs including ovary two celled,two ovules [2][3][4][5][6][7] .



Fig. 1 *Lantana camara*

#### IV. MICROSCOPY

The microscopy was carried out by preparing a thin section of leaf . A thin section was collected in a watch glass and bleached by using a bleaching agent along with little boiling. Then the thin section of leaf was washed with water and section a section of *Lantana camara* leaf blades was stained with Blue Toluidine.

#### V. GEOGRAPHICAL DISTRIBUTION AND GROWTH

*L. camara* is topical in origin. It is native to central ,south America and Caribbean .Now it is dispersed to nearly 60 tropical and subtropical countries and the distribution is still expanding within many islands and countries that are Galapagos islands, palau, saipan, tinian ,Solomon islands, futuna islands and Yap [8][9].

In India it was introduced before 19<sup>th</sup> century [3].

The Wild sage is found in many states in India such as South India, Tamil Nadu ,Jammu and Kashmir and in Himachal Pradesh and Uttar-Pradesh and also in different parts of Maharashtra [1].

*Lantana Camara* found at disordered areas like railway tracks, roadsides, in degraded lands, watercourses and it is often cultivated indoors or in a conservatory, it can also grow in a garden with sufficient shelter[10][8][2].

It grows abundantly at altitudes upto 2000m in tropical, subtropical , and temperate regions [11].

The flowering occurs from March to August and the mature plants give 2000 seeds throughout the year [12].

*Lantana camara* is susceptible to frosts, low temperature, and saline soils [13][14].

## VI. CHEMICAL CONSTITUENTS

chemical constituents of the leaves, stem, roots, flowers of *L. camara* contained several: alkaloids, glycosides, steroids, saponins, flavonoids, coumarins, tannins, carbohydrates, hydroxy anthraquinones, anthraquinone glycosides, proteins, phytosteroids, fats, fixed oils, triterpinoids, [15][16][17][18][19][20]. Triterpinoids (28-norolean-12,17-diene triterpene lantigidienone oxidized at C-11 and C-22 and camarinin)[15][21] Pentacyclic triterpenoids (camaryolic acid, methylcamaralate, and camangeloyl acid),  $\beta$ -sitosterol 3-O-beta-D-glucopyranoside, octadecanoic acid, docosanoic acid, palmitic acid, oleanolic acid, icterogenin, lantanolic and camaric acid, lantadene A and B and lantadene C [15][22][23][24][25].

essential oils=  $\alpha$ -guaiene,  $\alpha$ -humulene,  $\alpha$ -copaene,  $\alpha$ -cubebene,  $\alpha$ -selinene,  $\beta$ -elemene,  $\beta$ -selinene, delta-cadinene, germacrene D, germacrene B, aromadendrene, caryophyllene oxide, nerolidol, spathulenol [15][26], Bicycloelemene, bicyclo $\alpha$ -guaiene, naphthalene, epi-bicyclosesquiphellandren, 1-hydroxy-1, 7-dimethyl-4-iso,  $\beta$ -cadinene, salvia-4 (14)-en-1-one, veridifloral, 12-oxabicyclo[9.1.0] dodeca-3, naphthalenamine, 4-bromo, (-)-spathulenol, isospathulenol, tetracyclo, 1-naphthalenol, 1, 2, 3, 4, 4a, 7, 1R-2, 2, 4, 8-tetrame, alloaromadendrene oxide-(2), aromadendrene oxide-(2), 6-isopropenyl-4,8-dimethyl-, 4,4-dimethyl-3-(3-methyl but, 1H-cycloprop [e] azulen-7-ol, 6-isopropenyl-4,8a-dimethyl-, phthalic acid, butyl hexyl, and 2-hexadecen-1-ol. Volatile oil= 3,7,11-trimethyl-1,6,10-dodecatriene (28.86%),  $\beta$ -caryophyllene (12.28%), zingiberene (7.63%),  $\gamma$ -curcumene (7.50%), and  $\alpha$ -humulene (3.99%) [15][27].

Germacrene- A, B, D, Valencene (main component), gurjunene, lantanin, lantanoside, linaroside [2], Phenolic compounds, iridoid glycosides, phenyl ethanoid, oligosaccharides, quinine, steroids, triterpenes, sesquiterpenoids [28][29]. Betulonic acid, Betulinic acid, Campesterol, Hispidulin, Pectolarigenin, Pectolarin,  $\beta$ -pinene, 1,8-Cineole, Cinnamic acid, Dipentene, Ferulic acid, Myristic acid, Palmitic acid, Camaraside, Camarinic acid, Camaric acid, Lantanilic acid, Linaroside, Ursonic acid, 8-epiloganin, Geniposide, Icterogenic acid, Isonuomioside A, Isoverbascoside, Lamiridoside, Lantic acid, Theveside, Ursolic acid, Verbascoside,  $\rho$ -Coumaric acid, phydroxybenzoic acid, Vanillic acid [30][31][32][33].

## VII. METHOD OF EXTRACTION

1. The leaves of the plant *lantana camara* were air dried at room temperature after drying the leaves were grinded into powder form by using a mechanical grinder. Powdered plant leaves were extracted with the ethanol in rotary shaker at 100 rpm for 3 days. [34][35] further concentrated to dryness using a rotary evaporator at reduced pressure (in vacuum at 40°C) [34][36][37].

2. First the powder was prepared by drying the leaves of *lantana camara* and the prepared powder was put in four different solvents i.e. water, petroleum ether, chloroform, and ethyl acetate (plant material to solvent ratio was 1:10, w/v) and then extracted for 24hr at room temperature with shaking at 150 rpm. After shaking the extracts were filtered and dried at 40°C. The dried extracts were resuspended in 1 ml of acetone [28][38].

3. The 50g powdered leaves were placed in a container where 250mL of methanol will be added and the container is sealed. After sealing the container it is kept for 24hrs with periodic shaking. Then the mixture was filtered by using filter paper and the filtrate will be collected. The fresh volume of methanol was used and the procedure was repeated three times. The final filtrates were concentrated using rotary vacuum evaporator and evaporated to dryness [28][38].

4. The 22 g powdered leaves were placed in a sealed container where ethanol and distilled water in the ratio of 30:70 are added. Then the treatment is kept for 7-8 days with periodic shaking. Afterwards, the mixture was filtered by using a filter paper and the filtrate was collected. Then the filtrate was kept in the oven at 80°C and evaporated to dryness [28][39].

5. *L. camara* (240 g of the fresh leaves) were placed in a flask containing cold ethanol and left in this position for 72 h at ambient temperature. The ethanol from the extracts was removed by using the rotary vacuum pump extractor (under the reduced pressure). Then the extracts were collected and stored. Hence, Ethanolic extracts were prepared using the cold extraction method [40].

6. The leaves of the plant *lantana camara* were shade dried for five days. Then the dried leaves were finely grinded and powder was prepared. 20gms of powder was extracted using Soxhlet extractor with 250ml of hexane, petroleum ether, chloroform and methanol separately to extract nonpolar and polar compounds. The crude extract was then filtered and concentrated in vacuum at 40°C using a rotary evaporator. The concentrated extract was dried aseptically at room temperature [2].

7. The stems of the plant were collected and shade dried. The dried leaves were then converted to coarse powder by using a mortar and pestle. Then the extraction was done by maceration process. The ethanol is used as solvent for extraction

and it was performed at room temperature .the coarse powdered 100gms drug was macerated with 300ml of ethanol for 24hrs with occasional shaking in a conical flask .After 24hrs the drug was filtered and the extract was collected .The extract was concentrated by heating on the water bath until it became semi solid extract .The extract was then placed in a closed container in a cool and dry place to prevent microbial growth [41] [42].

8. Leaves of the plant *lantana camara* were shade dried for 2-3 days at room temperature. These dried leaves were then powdered in a mixer to get a coarse powder for extraction process . The dried Leaves of *Lantana camara* Linn. were extracted in a soxhlet extractor, successively with Petroleum ether (60°-80°) Chloroform, Acetone and Ethanol (95%) for 36-65 hrs for each solvent [43][44]. The solvent was evaporated and residue was air dried,after extraction with solvent . The residues from each extract were dried in the desiccator and the resultant extract was stored in an air tight container for further use [44][45].

9. Collection of fresh leaves of *lantana camara* was done and washed with tap water first and then for cleaning the surface washed with distilled water until no impurities remained .The leaves were cut into small pieces and weighed 10gms and put into a beaker with 100ml of distilled water. The mixture was then heated for 20mins at 60°C with occasionally stirring and then it was allowed to cool at room temperature .After cooling the mixture was filtered by using the watman 42 filter paper.Then the filtrate was centrifuged at 81 G-force for 20 mins.The obtained extract was refrigerated [2] .

### **VIII. PHARMACOLOGICAL EFFECTS**

#### **A. Anti bacterial activity**

The leaves and flowers of different varieties of *L.camara* were reported for anti bacterial activity. The significant antibacterial activity was exhibited by the solvent extract of the leaves and flowers of the four different varieties of the *L.camara* i.e. *E. coli*, *Bacillus subtilis* and *P. aeruginosa* whereas poor antibacterial activity against *Staphylococcus aureus* [46].

The ethanolic extracts of the leaves and roots of the *L.camara* were reported for the anti bacterial activity. The extracts exhibited antimicrobial activity against *Proteus vulgaris*, *Vibrio cholerae*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli* and two multiresistant strains *E. coli* and *S. aureus*. [47]. The screening of the methanolic extracts of different parts of *L.camara* for anti bacterial activity was performed. The leaves extract of *L. camara* showed highest activity against Gram negative *Bacillus cereus* and Gram positive *Salmonella typhi* [48].

#### **B. Antifungal activity**

The screening of the antifungal potential of *L. camara* was done against *Alternaria sp.* Which causes various plant diseases in the vegetable plants . At three different concentrations i.e. 10mg/ml,15mg/ml,20mg/ml the Antifungal activity was performed by using food poison plate method . Significant antifungal activity against *Alternaria sp.* at 20mg/ml dose *L. camara* was exhibited [49][3].

Ethanol and hot water extract of *L. camara* for the anti fungal activity was screened against wood destroying brown and white rot fungi. Efficient antifungal activity was exhibited by both the extracts against the white and brown rot fungi and the ethanolic extract was highly potential at very low concentration (0.01%) [50][3].

#### **C. Wound healing activity**

Aqueous extract of leaf of *L. camara* was used in rats to determine the wound healing activity. The extract was topically applied on the wound (100 mg/kg/day) significantly enhanced the rate of the wound contraction(98%) and decreased the wound healing time and enhanced the collagen synthesis [3][51].

Ethanol extract of leaf of *L. camara* was reported for wound healing activity in adult male Wister rats.The ethanolic extract of *L.camara* was topically applied on the wound and it significantly increased the wound healing activity. The confirmation of the wound healing activity was done by Histological analysis of the healed wounds [3][52].

#### **D. Anti inflammatory activity**

The Treatment of Aqueous extract of *L.camara* (500mg/kg body weight ) significantly decreased paw volume in carrageenan induced paw oedema test in rats .Hence the extract of *L.camara* was reported for the anti-inflammatory activity [3][53].

#### **E. Antiuro lithiatic activity**

1.Ethanolic extract of the leaves of *L. camara* was used for the antiuro lithiatic activity against ammonium chloride(2% w/v) and ethylene glycol(0.75% v/v) induced calcium oxalate urolithiasis in male albino rats. On treatment

with the extract it significantly reduced the deposition of oxalate, calcium and reduced the urinary excretion of the calcium, creatinine and oxalate indicating its antiurolithiatic activity [3][54].

2. Various extracts of the the *L.camara* leaves was reported for the antiurolithiasis activity of the male albino rats against the ethylene glycol and ammonium chloride induced calcium oxalate urolithiasis which significantly also reduced the deposition of the calcium, oxalate and also reduced the excretion of calcium, oxalate and creatinine [55][56].

3. The ethanolic extract of roots (200 mg/kg) and oleanolic acid (60–100 mg/kg) isolated from roots of *L. camara* was used to study the antiurolithiatic activity in albino male rats using zinc disc implantation induced urolithiatic model.

In one group only zinc disc was implanted without any treatment, the calcium output was increased ( $23 \pm 2.7$  mg/dl). Cystone receiving animals showed significant protection ( $p < 0.01$ ). The other group was treated with oleanolic acid and ethanolic extract of roots. Treatment with oleanolic acid and ethanolic extract of roots significantly reduced the calcium output at dose of oleanolic acid 60 mg/kg ( $p < 0.01$ ), oleanolic acid 80 mg/kg ( $p < 0.01$ ), ethanolic extract of roots 200 mg/kg ( $p < 0.01$ ), and oleanolic acid 100 mg/kg ( $p < 0.001$ ), when compared with zinc disc implanted group. The albino male rats also showed reduced formation of depositions around the zinc disc ( $p < 0.001$ ) [57].

## IX. MEDICINAL APPLICATIONS

1. *Lantana camara* can give urolithiatic activity.
2. It is used for its mosquito repellent activity.
3. The leaves of *L.camara* can display fungicidal, insecticidal and antimicrobial properties.
4. It is used in the traditional herbal medicines for treating skin itches, chicken pox, cancer, ulcer and leprosy.
5. It also has some other uses like source of firewood, mulch, and making hedges.
6. *L.camara* can also show antioxidant, anti-inflammatory, anti-asthmatic, antidiabetic, antimotility, antihypertensive activity.
7. The extract of plant was also used in the folk medicine for the treatment of the headache, asthma, cold, ulcers, tetanus, fistula and skin rashes.
8. It is used as an expectorant.
9. Used as antiseptic for wounds [28][58][59].

## X. CONCLUSION

The Humans beings are dependent on the various plants for their food, shelter, medicines, fragrances, clothing, flavors, fertilizers. The medicinal plants are very useful and there are about half million medicinal plants around the world and most of them are not yet investigated for their medical activities. *L.camara* has a lot of pharmacological benefit and has several medicinal uses in folk and traditional therapeutic system. By observing the medicinal properties of the *L. camara* it represents that it is a valuable plant and can be a good candidate for the future drug development. *L.camara* possesses antifungal activity, anti bacterial activity, wound healing activity, antiurolithiatic activity and many other effects. It has a wide range of pharmacological activities which can be utilised in various medical applications because of its effectiveness. It has a vast potential in the industrial use for preparing insect repellent, medicines, and cosmetics.

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