



A REVIEW ON *CLERODENDRUM INERME(L) GAERTN*

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ABSTRACT

Wild Jasmine is an evergreen mangrove plant which belongs to the family Verbenaceae (Lamiaceae). It is widely distributed in tropical and subtropical regions of the countries, grown as small trees, Sprawling shrubs and herbs in costal India. It is as a versatile plant and can be grown as a topiary or as a bonsai in India. These plant include parts like leaves, Flowers, Stems, Fruits and Barks are used for the medicinal purpose in ancient times. The researches on Clerodendrum inerme provide the proof that it contains chemical constituents like Triterpenoids, Tannins, diterpenoids, Alkaloids, glycosides, phenols, flavonoids, and, volatile oils and steroids. However, the researches also prove that it is used as anti-diabetic, anti-microbial anti-inflammatory, anti-hepatotoxic activity, anti-malarial, anti-oxidant. These plant mainly used for the traditional purpose like febrifugal and uterine stimulant. So these article describe about the phytochemicals and pharmacological activities of Clerodendrum inerme.

KEY WORDS

Clerodendrum inerme, Phyto chemicals, Pharmacological activities, Traditional uses.

INTRODUCTION:

Mangroves are woody trees or bushes and the salt swamp halophytes are herbs and sledges. The mangrove plants are disseminated in 121 countries and Pichavaram mangrove woodland is one of the seaside environments of Tamilnadu.^[1] *Clerodendrum* is the one of the evergreen mangrove plants belonging to the family Verbenaceae (Lamiaceae). The genus *Clerodendrum* includes over 452 species of tropical regions. These plants widely distributed tropical and subtropical plant, it is mainly found in Bangladesh, Nepal, India, and srilanka and southest Asia. It is a versatile plant mainly grown as small trees, sprawlings hrubs and herbs in coastal India. Sometimes it can be grown as a topiary or as a bonsai in India^{[2][3]}. These wild jasmines have the many pharmacological activities. Methanolic extract of the plant shows anti-inflammatory activity. It was reported that the *Clerodendrum inerme* possessing anti-microbial, anti-diabetic, anti-hepatotoxic activity, anti-malarial, anti-oxidant activity, and anti-hypotensive activity.

Clerodendrum inerme has many chemical constituents in fruits, leaves, flowers, and stems. Verbinoside, camneoside, melitoside, Stigmasterol, 6-hydroxysalvinolone, Betulic acid are isolated from the aerial parts of the *Clerodendrum inerme*. It also constitutes the other chemical compounds like tannins, alkaloids, phenols, glycosides, triterpenoids etc.^{[2][6]}. Traditionally it is used as uterine stimulant, pest controlling agent etc.

Botanical classification:^[3]

Kingdom: Plantae
Subkingdom: Tracheobionta
Superdivision: Spermatophyta
Division: Magnoliophyta
Class: Magnoliopsida
Order: Lamiales
Family: Verbenaceae
Genus: *Clerodendrum* L.
Species: *Clerodendrum inerme*

Vernacular Names: These plant is known by various names in various territories by individuals. It is normally called as wild jasmine. ⁽²⁻⁴⁾

Synonyms: Garden quinine, wild Jasmine, Indian privet.

Language	Name
Hindi	Lanjai/sangakupi
English	Garden quinine
Kanada	Kundali
Tamil	Anjali
Telugu	Takkolarkamu / Pishinita
Bengali	Banjai
Marati	Vanajari
Gujarathi	Dariajai

Botanical description: *Clerodendrum inerme* is evergreen mangrove sprawling and much expanded bush, it becomes here and there scandent upto 1-1.8 m tall. **Leaves** are inverse once in a while interchange upto 5*3.8 cm, elliptic or obovate, Green, smooth, slight sparkling upper surface whole, acute or emarginated at optimum and glabrous. **Flowers** are joined at basic base point, Corella white combined with five lobes. **Fruits** are drupes obovoid. The **stems** are smooth and are without thistles. **Seeds** are Cotyledons thick and beefy, around 12-20 x 6-9 mm, bit by bit decreasing into the petioles **Bark** grayish dark coloured, branches and branchlets slim, harshly quadrangular, lenticellate, marginally pubescent, terminal branches frequently twining. ^{[4][5]}



FIG.1: *Clerodendrum Inerme* found In Telangana In Its Habitat

DISTRIBUTION: ^{[4][6]}

Global Distribution:

Coastal India, Sri Lanka; now naturalized on the shores of Myanmar, Australia, China

Indian distribution:

In Kerala, Kottayam, Alappuzha, Kasaragode, Kollam, Palakkad, Kannur, Thiruvananthapuram, Malappuram, Kozhikode, Wayanad, Thrissur, Ernakulam.

It ordinarily develops in nearness to the ocean and is regularly found close edges or on the edges of shoreline woodland. Additionally, happens in Asia, Malesia and the Pacific islands.

Climate:

Clerodendrum requires clammy tropical and subtropical atmosphere, which ought to be free from ice amid winters and dry warmth in summers. It is additionally conceivable to develop the species in the dry areas under incomplete shade. The plant is influenced by ice in northern India, which causes consuming of leaves, defoliation, and going away of youthful shoots, and the plants at last pass on. ^[5]

PHYTOCHEMICAL PROPERTIES:

Phytochemistry is the heart of herbal therapy. *Clerodendrum* was reported in various indigenous system of medicine throughout the world for treatment of various diseases. Research reports on the genus denote that the major class of chemical compounds were isolated from *Clerodendrum* genus are steroids like Stigmasterol, Betulinic acid, clerosterol, acetoside, β -sitosterol etc. ^{[3][8]}.

Joshi et.al isolated terpenes like α - amyrin, β -amyrin, Clerodin, clerodendrin A, B&C. Vendhantham et.al isolated Flavanoids, glycoside from the aerial parts of *Clerodendrum inerme*. The Methanolic extract of roots contain the Verbinoside which exhibits analgesic and anti-microbial properties. A watery soluble bitter principle, alkaloidal was also isolated from the leaves of *Clerodendrum inerme*. Unstable constituents, for example, 5-O-ethylcleroindicin D, linalool, benzyl acetic acid derivation and benzyl benzoate, have been separated from *C. inerme* ^{[2][5] [8]}

Table 1: Phytochemical constituents reported in different parts of plant *C.inerme* by various authors.

SNO	PLANT PART	CHEMICAL CONSTITUENTS	AUTHOR AND YEAR.
1	Leaves	Triterpenoids, dtierpenoids	Achari et al., 1992 ^[10]
2	Aerial parts	Iroid glycosides and carbohydrates	Sudo et al., 2000 ^[11]
3.	Whole plant	Volatile oils, Verbinoside, clerosterol	Nan et.al-2005 ^[8]
4	Stem	Steroids. Flavanoids, phenols	Chethana G.S et.al- 2013 ^[5]
5.	Roots	Monoterpenes, flavonoids, anthraquinones	JTCM journal-2017 ^[12]

PHARMACOLOGICAL ACTIVITIES:

The genus *Clerodendrum* contain many plant species that are being used in various health care systems for the treatment of various disorders including life threatening diseases. The following pharmacological actions are reported for *Clerodendrum* species.

Anti-Diabetic activity: The counter diabetic action of *Clerodendrum inerme* was assessed utilizing in vivo streptozotocin-actuated diabetes in mice, and in vitro thinks about. The leaves of *C. inerme* were separated in oil ether, methanol pursued by fluid dissolvable. Methanolic concentrate of leaves of *Clerodendrum inerme* at 200 mg/kg demonstrated an extremely progressive and potent decrease in glucose level.^[2]

Anti-oxidant activity: The reducing power assay was dictated by following strategy, 0.5ml of concentrates (200 to 1000µg/ml) was blended with 0.5ml of 0.2 M phosphate support (pH 6.6) and 0.5ml potassium ferrocyanide (1%). after incubating the blend at 50°C for 20 min., 0.5ml of 10% trichloroacetic corrosive was included, centrifugation was completed at 3000 rpm for 10 min. 1ml of supernatant was blended with 1ml of refined water and 0.2ml FeCl₃ (0.1%) and the absorbance was estimated at 700nm.^[9]

Anti-Carcinogenic activity: *Clerodendrum inerme* is employed by Indian ancient practitioners for the treatment of various ailments, as well as cancer. The *Clerodendrum inerme* exerts its chemo preventive action by modulating macromolecule peroxidation and inhibitor defence mechanisms. Oral administration of liquid leaf extract of *Clerodendrum inerme* at a dose of five hundred mg/kg body weight considerably prevented the tumour formation and histopathological abnormalities. Oral administration of *Clerodendrum inerme* protected the amount of blood and tissue lipids, cell surface glycoconjugates, and red corpuscle diffusion fragility and membrane sure accelerate or activity throughout DMBA induced oral carcinogenesis.^[3]

Anti-microbial activity: Hamid et.al reported that the specific media plates were vaccinated with inoculums of 106 sizes, a sterile swab is dipped into weakened culture inoculums, the agar surface of the plates is spread utilizing spreader. Cups are created by utilizing borer. The glasses were loaded up with 500µg/ml, plant separates, which were put in mugs with the assistance of a sterile pipette. The plates were permitted to remain at room temperature for 30 minutes. (Pre-dissemination time) and afterward brooded at 37°C for 24 hrs if there should be an occurrence of microscopic organisms and 48 hrs for parasites. The zones of restraint were recorded after indicated time. The trials were rehashed thrice.^[13]

Anti-inflammatory activity: Hind paw puffiness was induced by injection of four dimensional formalin (20L) answer into the sub planter region of the left hind paw of adult male albino rats (80–100 g). The inflamed animals were divided every which way into 5 teams (6 for each): inflamed management cluster, inflamed treated with indomethacin (at a dose of eight mg/kg subcutaneously), 3 teams of inflamed animals were treated with the TME on an individual basis at doses of 50, 100, and 200 mg/kg subcutaneously (the plant extract was dissolved in sterile distilled water. The amendment in Paw thickness all told tested animals was measured with Plethysmometer 7150 (UGO, Basil, Italy) at zero, 1, 2, 4, and half dozen h when solution answer injection. The medicine result of the tested extract was calculated as compared to inflamed management cluster. The percentage of edema (inflammation) was calculated according to the following equation: [6]

$$\text{Inhibition (\%)} = \frac{V_c - V_t}{V_c} \times 100$$

V_c = Volume of paw edema in control animals.

V_t = Volume of paw edema

Anti-malarial activity: (Gayar and Shazll, 1968, Kalyanasundaram and Das 1985) studied that *C. inerme* inhibit the growth of larvae of *Aedes aegypti*, *Culex quinquefasciatus* and *Culex pipiens* at 80 and 100 ppm

concentration of petroleum ether and ether extracts and was found to have antimalarial activities. [7]

Table 2: Pharmacological Activities reported in *Clerodendrum inerme* by various authors.

SNO	EXTRACT	PLANT PART	ACTIVITY	AUTHOR AND YEAR
1	Hexane and ethyl acetate extracts	Leaves and stems	Anti-fungal activity	Rajasekaran ANITHA, Ponnusamy KANNAN et.al -2006 [17]
2	Ethanolic extract	Leaves	Hepato protective activity.	M.George&joseph et.al-2008 [14]
3	Alcohol & chloroform extract	Leaves	Anti-Microbial activity	Hamid <i>et al</i> , -2008 [13] [19]
4	Chloroform & Ethanolic extract	Leaves	Anti-diuretic activity by flame spectrophotometry	Garima Upmanyu et al -2011 [16]
5	Methanol extract	Aerial parts	Anti-oxidant activityby reducing power assay.	Prasad M.P., Sushant S. and Chikkaswamy B.K., et.al -2012 [9]
5	Pet ether and ether extract	Leaves	Anti-malarial activity	P. Verma <i>et al</i> . 2013 [7]
6	Methanol extract	Leaves	Anti-spasmodic activity.	S P Gupta, et.al -2013 [3]
7	Aqueous extract	Leaves	Anti-proliferative action	S P Gupta, et.al. 2013 [3]
9	Aqueous extract	Leaves	Analgesic and anti-pyretic activity	M. Thirumal et al-2013 [18]
11	Methanol extract	Aerial parts	Anti-inflammatory activity.	S.R.M. Ibrahim et.al. -2014 [6]
12	Petroleum ether	Leaves	Anti-Diabetic action	Ali Esmail Al-Snafi, et.al, 2016 [2]
13	Methanol & Aqueous	Leaves	Anti-anxiety activity.	Laila Anwar et.al -2016 [15]

Traditional Uses: *Clerodendrum inerme* was used as a febrifugal and uterine stimulant, a pest control agent and antiseptic, to arrest bleeding, treatment of asthma, hepatitis, ringworm and stomach pains, the roots are boiled in oil and used in rheumatic affections [2]-it is an important medicinal plant used in various skin diseases. In siddha medicine it is used under the names of chankankuppi and pechagnan. In various literature related to healthcare.

C. inerme have been accounted for its antimalarial exercises in view of the nearness of unpleasant taste (Srinath G., 2009). Natural products are like fruits used in food poisoning [3]

CONCLUSION:

Clerodendrum inerme is promising medicinal flowering plant that is historically used as antidiabetic drug, antimicrobial, etc. Researches on this plant square measure increasing day by day as a result of its potent

medicine uses. The assorted phytochemical researches resulted in isolation of various potent chemical compounds that square measure basis for its specific medicine activities. As this plant is wide unfold across tropical and sub-tropical regions like Asian country, Myanmar, Srilanka, and costal India, more analysis work remains continued. The moto of this review was to collate the analysis work undertaken by numerous scientists at completely different places until date so as to supply a base line for future works.

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CONFLICT OF INTERST:

None of the authors of this paper has a financial or personal relationship with other people or organizations that could inappropriately influence or bias the content of the paper.

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