



**INTERNATIONAL JOURNAL OF
PHARMACEUTICAL SCIENCES**
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: <https://www.ijpsjournal.com>



Review Article

Invitro Study of Anti-Inflammatory, Anti-Oxidant and Anti-Microbial Activities of Nyctanthes Arbor Tristis

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ARTICLE INFO

Published: 10 Jan. 2025

Keywords:

N.arbor tristis- Parijatap,
Anti-oxidant, Anti-
inflammatory, Anti-
microbial activity,
phytoconstituents,
therapeutic activities.

DOI:

10.5281/zenodo.14629354

ABSTRACT

Nyctanthes arbortristis, sometimes referred to as Jasmine with night blooms, Coral Jasmine, and Parijat. One of India's most effective traditional medicinal plants is nyctanthes arbor- tristis, or N. arbortristis. It sprawls over the sub-Himalayan areas and south to the Godavari. Every portion of the plant has some significant medical value and canthus be used for profit. It has been appraised as a source of numerous unique substances for the medications used to treat a variety of ailments as well as for the development of a few commercial products. It has been claimed that phytochemicals such as flavonoids, glycosides, oleanoic acid, essential oils, tannic acid, carotene, friedeline, lupeol, glucose, and benzoic acid have important hepatoprotective, anti-leishmaniasis, antiviral, anti-fungal, anti- pyretic, anti-histaminic, anti- malarial, antibacterial, as well as anti-leishmaniasis characteristics. Night jasmine acts as antioxidant and anti-inflammatory benefits. Nyctanthes arbor tristis L., a member of the Oleaceae family, is commonly used to prepare herbal remedies and has a variety of biological uses. Utilizing artificial medications in the treatment for bacterial infections and inflammation can have serious side effects, and occasionally generate toxicity from drugs. Taking into account the effectiveness and safety of herbal remedies currently. An investigation of Nyctanthes arbortristis has been conducted.

INTRODUCTION

Naturally active compounds can be isolated from natural products, which may also contribute to the production of innovative medicinal agents. There has been an increase in interest in herbal medicines within the preceding decade. genesis and these

medications established a significant illness. On the contrary, modern herbal products stand for sustainability. To the man-made materials that are thought to be hazardous and surrounds^[1]. After midnight, the blossoms begin to fall, and by daybreak, the plant looks lifeless. This prevalent to

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



India is found both in Indian yards as a decorative plant and in the wild across the sub-Himalayan region. It is frequently utilized by the native population of Andhra Pradesh's Chittoor district. The entire plant is used for the treatment of cancer; the root is used to treat fever, sciatica, and anorexia; the bark of the plant is used as an expectorant; the leaf is used to treat fever, diabetes, and to manage diarrhoea, cholagogue, and anthelmintic ailments.^[3,4,5] Various plant extracts have laxative, anti-trypanosomal, anti-inflammatory, antioxidant, and anti-malarial properties and are used to treat intestinal worms, arthritis, and malaria.^[6,7,8] Leaf juice has several uses such as gastrointestinal support, a mild bitter tonic, a diaphoretic, a diuretic, and as a remedy to reptile venoms^[9,10] Through out history, people have relied on *Nyctanthes arbortristis* to treat a variety of physical ailments^[12] Various plant parts have been employed for pain relief, suffering control, and illness prevention since ancient civilization. *N. arbortristis* is the primary source of medicines, having produced the majority of the compounds used in primitive medicine from plants.^[13] Ayurvedic and Unani medicine especially value night jasmine, which is recognized for its fragrant white petals that bloom at night and fall by morning. Apart from its visual appeal and cultural significance, the plant has been praised for its several medicinal properties, which are being confirmed by scientific studies more and more

Traditional significance:

significance is emphasized by its connection to spiritual rituals, especially in Night jasmine has mystical and mythical connotations throughout many cultures. In Hindu mythology, for instance, flowers are employed in religious ceremonies and are venerated. The plant is known poetically as the "sad tree" or "tree of sorrow," signifying ephemeral beauty and loss, due to its unusual

quality of blossoming at night. Its cultural South Asia.^[14]

Taxonomical classification:

Kingdom:Plantae

Class:Eudocots

Division:Angiosperms

Family:Oleaceae

Order :Lamiales

Genus:Nyctanthes

Species:Nyctanthesarbortristes.^[15]

PHYTOCONSTITUENTS:

Leaves: D mannitol, β -sitosterole, Flavanol glycosides: astragaline, nicotiflorin, oleanolic acid, nyctanthic acid, tannic acid, ascorbic acid, methylsalicylate, an amorphous glycoside, an amorphous resin, traces of volatile oil, carotene, friedeline, lupeol, mannitol, glucose, fructose, iridoid glycosides, benzoic acid derivative of kaempferol and carotene.^[16,17,18]

Flowers: The flowers of *Nyctanthes arbortristis* are rich in mannitol. The flowers also contain a modified diterpenoid called nycanthin, flavonoids, anthocyanins, and essential oil. Other components of the flowers include nycanthin, d-mannitol, tannin and glucose, carotenoid, and glycosides, such as β -monogentiobioside ester of α -crocin (or crocin-3), β - monogentiobioside- β -D monoglucoside ester of α -crocin (or crocin-1), and 4-hydroxyhexahydrobenzofuran-7-one, which has also been found in flowers.^[19]

Seeds: comprises 15% pale yellow brown oil, nyctanthic acid, nyctoside A, β -sitosterol, arbortristoside A and B, glycerides of linoleic, oleic, lignoceric, stearic, palmitic, and myristic acids, 3–4 secotriterpene acid, and a polymer with water-soluble properties made up of D glucose and D mannose.^[20]

Bark: contains glycosides and alkaloids. The iridoid and phenyl propanoid type glycosides present in plant bark. Stem of *Nyctanthes arbortristis* contains glycoside-naringenin-4'-O- β -



glucapyranosyl- α xylopyranoside and β -sitosterol.^[21]

Stem: Stem contains Glycoside-naringenin-4-O- β -glucapyranosyl- α xylopyranoside and β -sitosterol

Flower oil : Flower oil contains α -pinene, p-cymene, 1-hexanol methyl heptanone, phenyl acetaldehyde, 1- deconol and anisaldehyde ^[22].

Morphology:

The massive ligneous plant *Nyctanthes arbor-tristis* may reach a height of 7–10 meters and have

polygonal branches. Gray bark is flaky and harsh. They are tough and hairy leaves. In the axils of the leaves or at the tips of branches, flowers are grouped together. The blooms are bell-shaped, sessile, and have a pleasant scent. The center of the white coil is orange. The fruits have a brown color and a heart shape ^[23] The polygonal branches of the noteworthy linear botanical specimen *N. arbor-tristis* reach a vertical height of 7–10 m. When the bark is rough and grainy gray color ^[24].

Plant Features:



Fig:1 Branches



Fig:2 Wholeplant



Fig:3Flowers



Fig:4 Leaves

MATERIALS AND METHOD:

Collection of plant:

The plant *Nyctanthes arbor-tristis* was collected. *Nyctanthes arbor-tristis* (NAT) plants were given a water wash. The leaf, stem, and flower of the plant were shade dried for three days at a temperature between 30 and 32° Celsius. Until extraction, the dried plants had been crushed into a powder using a mortar and pestle and kept in air tight zip- lock bags.

Preparation Of Extract:

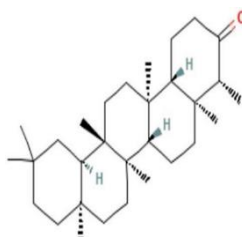
One gram of powdered *Nyctanthes arbor-tristis* plant samples was soaked in ten milliliters of 70% ethanol for five days. During a 20-minute centrifugation at 3000 revolutions per minute, the crude extract was collected, and the supernatant was evaporated at ambient temperature (~ 32 °C). The resulting mass was utilized as stock solution, with a final concentration of 1 mg/5 μ l, and was stored at 0 °C. It was prepared up to 5 ml using

25% DMSO.^{[25][26]} In a Soxhlet device, 50 g of the powdered plant material was extracted for 6–8 hours using a solvent (such as 70% ethanol). If necessary, maceration was an alternative method that involved soaking the powdered material in [solvent] for 48 hours at room temperature while

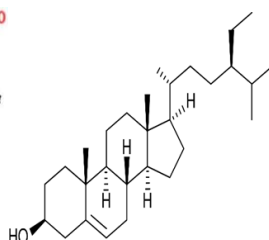
stirring occasionally. Whatman No. 1 filter paper was used to filter the extract. A rotary evaporator was used to concentrate the crude extracts at lower pressure, and they were then kept for later use at 4°C.^[27]

Phytoconstituents

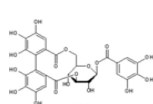
Friedelin:



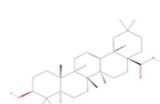
Beta-sitosterol



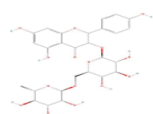
Tannic acid (corilagin)



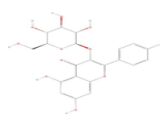
Oleanolic acid



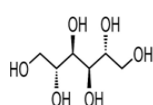
Nicotiflorin



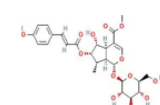
Astragaline



D-Mannitol:



Arbortristoside-c



Pharmacological activities:

1.Anti-oxidant activity:

By using the diphenyl-picryl-hydrazyl (DPPH) test method, the free radical scavenging capacity of the various leaf extracts from *Nyctanthes arborescens* was assessed in vitro. In this study, the antioxidant found in the plant extracts interacted with the stable free radical DPPH to produce 1, 1-diphenyl-1, 2-picryl hydrazine, which was detected at 517 nm. The following is the decrease in the DPPH radical scavenging effect of plant extracts and standard (ascorbic acid and BHT): Ascorbic acid was discovered to have a concentration of 93.88% at a concentration of 10 mg, while the concentrations of BHT, Butanol, Ethyl acetate, and Pet ether were found to be 96.42%, 95.22%, 84.63%, and 82.04% at a concentration of 100mg, respectively. Several *Nyctanthes arborescens* leaf

extracts used in this study have concentration-dependent free radical scavenging activities.^[28]

2.Anti-inflammatory activity:

The aqueous soluble portions of the extracted ethanol, utilizing various phlogistic agents such as carrageenin, formalin, histamine, 5- hydroxy tryptamine, and hyaluronidase, shown considerable anti-inflammatory effect against acute inflammatory puffiness in rats. When rats' knee joints got infected by turpentine oil, the extract drastically lowered acute inflammatory swelling. Furthermore, the leaf and fruit extracts demonstrate more effective anti-inflammatory activity in a mouse model of arthritis induced by immunological implies especially injections of Freund's complete adjuvant into the right hind paw's sub-planter surface over a period of 0 to 12 days and PPD-induced tuberculin reaction. Rats

were given the extract every day for six days preceding the day the pouch formed or for five days following the day the peller was inserted in subacute models of carrageenin-induced granuloma pouch and cotton pellet granuloma. The extract greatly hindered the production of granulation tissue in both models.^{[29][30][31]} Diclofenac sodium, a common medication, and the ethanolic extract of the orange tube of the calyx of *Nyctanthes arbor-tristis* both significantly suppress the rat paw oedema caused by carangenan (200 mg/kg, i.p.)^[32]

3. Anti-microbial activity:

Plant extracts have been confirmed to have broad-spectrum antibacterial effects, including the ability to combat Gram-positive bacteria and fungi. Recent study has also looked into its anti viral properties, specifically in terms of preventing respiratory viruses, which may help manage viral ailments like influenza.^[33] In a conical flask, ten grams of air-dried powder were placed in 100 milliliters of petroleum ether, covered with cotton wool, and then shaken at a speed of 190220 rpm for twenty-four hours. Following a 24-hour period, the petroleum ether was removed from the powder and the supernatant was discarded. This dry powder was placed in a conical flask with 100 ml of solvent (methanol or acetone), sealed with cotton wool, and then centrifuged for 24 hours at 190220 rpm. Following a 24-hour period, the extracts were centrifuged at 5000 g for 10 minutes, the supernatant was gathered, the solvents were extracted, the dry extract was weighed, and it was then kept in four airtight bottles. For every plant, at least three extractions were performed. An initial qualitative phytochemical investigation was conducted on the crude dry powder of specific plants. In another study, revealed that the leaf extract demonstrates the highest level of inhibition against *K. pneumoniae*, *E. coli*, and *L. monocytogenes*. On the other hand, the root extract shows the highest degree of inhibition

against *S. epidermidis*, while the shoot extract shows the highest level of inhibition against *Bacillus subtilis*. *Arbortristoside-A* and *arbortristoside-C*, which were isolated from The Semliki Forest Virus (SFV) and the Encephalomyocarditis Virus (EMCV) have been successfully prevented by *N. arbor-tristis*. Furthermore, the ethanolic extract and n-butanol fractions isolated from *N. arbor-tristis* also demonstrate the inhibitory activity against these viruses.^[34]

Other Therapeutic Activities:

- **Antimalarial Activity:** Indigenous medicine uses the leaves of *N. arbor-tristis* to cure malaria, and research indicates that they have strong antiparasmodial properties.^[35]
- **Immunomodulatory Effects:** The plant's alkaloids and polysaccharides modulate cytokine levels, boosting responses from the immune system.^[36]
- **Antipyretic Action:** The herb has long been used to cure fever, and its antipyretic properties are on par with those of common medications like paracetamol^[37].
- **Hepatoprotective Activity:** Through its anti-inflammatory and antioxidant properties, the leaf extract guards against liver damage brought on by pollutants.^[38]
- **Anti-diabetic Activity:** Plant extracts improve insulin sensitivity in diabetic animals and control blood glucose levels.^[39]
- **Anti-cancer Activity:** *N. arbor-tristis* extracts have demonstrated cytotoxic effects on cancer cell lines, including those from the intestines and mammary.^[40]
- **Analgesic Activity:** Its alkaloids and saponins are responsible for the analgesic actions of *N. arbor-tristis*, which effectively lessen pain.^[41]

Significance:

The night jasmine (*Nyctanthes arbor-tristis*), also known as "Parijat" or "Harsingar" in India, is a plant that is widely used in South Asian medicine,



culture, and the environment. A more thorough examination of its relevance is provided below:

- **Mythological and Cultural Significance:**

Hindu mythology describes the Parijat tree as having a heavenly and divine origin. Gods and devils are claimed to have created it during the Samudra Manthan, when the ocean was being churned, in order to extract the nectar of immortality.

Religious Practices Offerings to Deities: As part of daily rites, flowers are frequently donated in Hindu temples. Despite their sanctity, they are only plucked after they have fallen to the ground since it is considered impolite to pluck them.

Festivals: Parijat flowers are often utilized for ceremonies and decorating during Navaratri and Durga Puja

- **The Value of Medicines:**
Traditional Ayurvedic Use:

Decoctions made from leaves are used to cure fevers, especially malarial fever, from flowers are Used to relieve anxiety and insomnia, they provide a slight sedative effect, from Seeds are Used treatments for skin diseases including ringworm and eczema, from bark is Used to reduce joint discomfort and swelling, it has anti-inflammatory qualities

- **The Significance of the Environment**
Attraction of Pollinators:

In order to facilitate pollination, the tree produces a pleasant scent at night, drawing nocturnal insects such as moths and some types of bees.

Adaptation : before drawing pollinators that are active at night, the tree's unusual habit of flowering at night fall and shedding flowers before daylight assures its survival.

Diversity in Biodiversity : Being a native plant, it helps local ecosystems by giving different insects a place to live and by producing nectar.

- **Symbolism of art, literature and folklore:**

Literature: A recurrent theme in both ancient and contemporary Indian poetry, night jasmine represents the transient quality of beauty and the certainty of deterioration. In order to invoke themes of unmet desires and spiritual transcendence, Rabindranath Tagore frequently referred to the Parijat in his poem and represented as symbolism of literature.

Art: Traditional Indian art, such as Mughal miniatures, include the tree and its blossoms, which stand for purity and exquisite beauty of night jasmine is determined and praised in ancient days .

Folklore : The Parijat tree is shown as a representation of unrequited love and unending hope in several regional folktales.

- **Scientific study and phytochemistry:**

Active compounds and scientific research: The plant's pharmacological qualities are influenced by its alkaloids, flavonoids, glycosides, and essential oils. The compounds that give it its medicinal properties include arbortristoxide and nyctanthin. *Nyctanthes arbor-tristis* has showed potential in the treatment of autoimmune diseases and chronic inflammation, according to therapeutic research. digestive problems, such as constipation and diarrhea. neurological disorders like epilepsy.

- **Cultural Variants and Local Beliefs:** In several regions of India, parijat trees are said to grant wishes. Because of its auspiciousness, it is frequently planted in houses and temples. In Thailand, The plant, sometimes called "Siamese Night Jasmine," is linked to simplicity and purity^{[42][43][44]}

ACKNOWLEDGEMENT:

I would like to thank everyone who assisted me in completing my investigation on the phytoconstituents and pharmacological characteristics of *Nyctanthes arbor tristis*. Their knowledge and help have been invaluable. I am appreciative of the resources provided by the



library and my instructors, as well as the databases and research articles that improved my understanding of *Nyctanthes arbor tristis*' potential medical uses. Finally, I would want to thank my friends for their encouragement.

CONCLUSION:

In light of its enormous potential pharmacological activities, the a fore mentioned study, which was referenced in the article on phytochemicals and promising pharmacological activities, demonstrated the significance of herbal and ayurvedic pathways for the efficient treatment of a variety of diseases. Studies on animals provide insight into the antipyretic, antibacterial, antiviral, anti-inflammatory, hepatoprotective, anti-histaminic, anti-filarial, anti-oxidant, and immune protective properties of phytochemicals. The relationship between the nature of the chemical ingredients and biological activity has been usefully highlighted.

The current botanical and other contemporary literatures studied are very useful for investigating its therapeutic and biomedical value. These materials include chemical ingredients, scientific classification and morphology, habit and environment, medicinal and industrial usage, etc. Given its high tolerance for a wide range of air conditions, the plant may be found in northern Asia, the southern Kingdom of Nepal, northern Bharat, southeast Thailand, and other parts of the earth. It has proven useful in highlighting the relationship between the nature of the chemical ingredients and biological activity. The relationship between the nature of the chemical ingredients and biological activity has been usefully highlighted. We can draw the conclusion that pharmaceutical medications could be developed using the *Nyctanthes arbor- Tristis*.

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HOW TO CITE: Mounika Karinki*, Umalatha Kanupuri, Shanmukh Karanam, Dr. V. Bhaskararaju, Dhabal kumar Sathapathy, Dr. M. Srinivasu, *In vitro Study of Anti-Inflammatory, Anti-Oxidant and Anti-Microbial Activities of Nyctanthes Arbor Tristis*, *Int. J. of Pharm. Sci.*, 2025, Vol 3, Issue 1, 717-725. <https://doi.org/10.5281/zenodo.14629354>

