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## REVIEW ARTICLE

# NYCTANTHES ARBORTRISTIS LINN: A REVIEW OF PHARMACOLOGICAL PROFILE

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**ABSTRACT**

Since ancient ages plants have served human beings as a natural source of treatments and therapies, amongst them medicinal herbs have gained attention because of its wide use and less side effects. More than 15000 plants have been studied during the last 5 years period. Inspite of many synthetic compounds, the most efficient drugs available are directly or indirectly related with the plant kingdom. Many of the plant extracts have proven to possess pharmacological actions. This review highlights some of the phytochemical and pharmacological aspects of *Nyctanthes arbortristis*Linn which is a common wild hardy large shrub or small tree. It is a native of India, distributed wild in sub-Himalayan regions and southwards to Godavari. Its different parts are known to possess different pharmacological activities in Indian systems of medicine. The plant has been extensively used in Ayurvedic system of medicine for various ailments and is shown to possess significant anti-inflammatory, wound healing and antimicrobial properties.



## INTRODUCTION

*Nyctanthes arbortristis* Linn. is a common wild hardy large shrub or small tree growing to 10 m tall, with flaky grey bark. The leaves are opposite, simple, 6-12 cm long and 2-6.5 cm broad, with an entire margin. The flowers are fragrant, with a five to eight lobed whitecorolla with an orange red centre, they are produced in clusters of two to seven together, with individual flowers opening at dusk and finishing at dawn. The fruit is a flat brown heart-shaped to round capsule 2cm diameter, with two sections each containing single seed. It is a native of India, distributed wild in sub-Himalayan regions and southwards to Godavari. It is also found in Indian gardens for ornamental purposes. Its different parts are known to possess different pharmacological activities in Indian systems of medicine. *Nyctanthes*means 'night flowering' and *arbor-tristis* mean 'the sad tree' as it loses its brightness during daytime.

### Plant Profile

*Nyctanthesarbor-tristis* Linn. belongs to Family Oleaceae, is a well-known medicinal plant. It is commonly known as "Harsinghar or Night Jasmine".

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The plant has been extensively used in Ayurveda system of medicine for various ailments and is shown to possess significant anti-inflammatory, wound healing and antimicrobial properties.

### Scientific Classification

- Kingdom: Plantae
- Order: Lamiales
- Family: Oleaceae
- Genus: Nyctanthes
- Species: N. arbor-tristis

**Fig. 1. Leaves of *Nyctanthesarbor-tristis* Linn**

### *Phytochemical Constituents*

**Leaves:** Leaves contain D-mannitol, flavone glycosides, β-sitosterol, astragalin, oleolonic acid, nyctanthic acid, tannic acid, ascorbic acid, methyl salicylate, lupeol, volatile oil, glucose, fructose, carotene and benzoic acid.

**Flowers:** The flowers contain essential oils, nyctanthin, D-mannitol, tannins, glucose, carotenoids, glycosides including β-monogentiobioside ester of α-crocetin(crocin 3) , β-monogentiobioside –β-D-monoglucoside ester of a-crocetin, and β-digentiobioside ester of a-crocetin (crocin 1).

**Seeds:** The seeds contain arbortristosides A and B, glycerides of linoleic, oleic, lignoceric, stearic, palmitic and myristic acids, nyctanthic acid, 3,4-secotriterpene acid, and a water soluble polysaccharide composed of D-glucose and D-mannose.

**Bark:** The bark contains glycosides and alkaloids.

**Stem:** The stems contain the glycoside naringenin-4'-0-β-glucapyranosyl-α-xylopyranoside and B-sitosterol.

**Flower oil:** The flower oil contains a-pinene, p-cymene, 1-hexanol, methylheptanone, phenyl acetaldehyde, 1-decenol and anisaldehyde.

**Plant:** The plant contains 2.3.4.6-tetra-0-methyl-D-glucose; 2, 3, 6 tri-0-methyl-D-glucose; 2,3,6-tir-0-methyl-D-mannose; 2,3,-di-0-methyl-D-mannose; arbortristosides A,B and C and iridoid glycosides.

### *Geographical Distribution*

It is a species of Nyctanthes, native to South Asia and Southeast Asia.

### Pharmacological Properties

***Immune-Bioactivities Study:*** The leaf extracts of *N. arbor-tristis* is used to treat arthritis, lung injury and some painful conditions such as cancer, chronic fever and rheumatism. An ethanolic extract of *N. arbor-tristis* (NAEE) was screened in rats for humoral and cell-mediated immune responses. Oral administration of the NAEE to rats at a dose of 50, 100, 150 and 200 mg/kg significantly enhanced the circulating antibody titre when challenged with sheep red blood cells (SRBC) and heat-killed Salmonella antigens. The chronic administration of NAEE increased the total counts of white blood cells (WBC) and potentiated the delayed-type hypersensitivity (DTH) reactions which confirmed the strong immuno-bioactivities in extracts of *Nyctanthesarbor-tristis* L.

***Immuno-Pharmacological Activity:*** Herbal medicine has become an integral part of standard healthcare, based on a combination of time honoured traditional usage and on-going scientific research. Some of the medicinal plants are believed to enhance the natural resistance of the body to infections. Theimmuno-pharmacological properties of ethanolic extract of *Nyctanthes arbor-tristis* Linn. (NA) have been investigated. After administration of *Nyctanthes arbor-tristi*s in doses of 0.25 and 0.5 g/kg body weight (BW) a significant increase in phagocytic index, leukocyte count and splenic antibody secreting cells were noticed. Stimulation of humoral immune response was further observed with heamagglutination antibody titre. This extract was further submitted to Thin Layer Chromatography (TLC) and High performance liquid chromatography (HPLC) and it confirmed the presence of methoxylated flavonoid quercetin-3,3'-dimethoxy-7-rhamnoglucopyranose. The results suggested that bio active compound flavonol glycoside of *Nyctanthesarbor- tristis* influences both humoral as well as cell mediated immune system.

***Antispasmodic and Anthelmintic Activity:*** Antispasmodic activity of the ethanolic extracts of different parts of *Nyctanthesarbortristis* Linn. was estimated using guinea pig ileum preparation against acetylcholine. Anthelmintic activity was tested following the method described by Kailashraj and Kurup, using earthworm (Pheretimaposthuma). The extracts exhibited antispasmodic activity, which was less than that of piperazine citrate. The ethanolic extracts were found to have concentration-dependent paralytic activity, whereas its seeds and flowers showed lethal effect on the worms. It was also observed that the paralytic and lethal effects of respective ethanolic extracts were potentiated by the presence of atropine. It revealed that the anthelmintic activity of the extracts was due to the inhibition of motility by relaxing and depressing responsiveness to contractile action of acetylcholine.

***In vitro anti-oxidant studies:*** Under most pathological conditions there is generation of reactive oxygen species and other free radicals. An increase in the antioxidant reserves of the organism can reduce oxidative stress and some of the plant-derived agents may help to reduce it. *Nyctanthes arbor-tristis* leaf extracts are extensively used in Indian traditional medicine. In the present study we have examined the in vitro antioxidant activity of leaves and stem of the plant. The antioxidant activities of different concentrations of ethanol extracts of NAT-L and NAT-S were determined by DPPH radical scavenging assay, Reducing power ability, Hydrogen peroxide scavenging assay and Total antioxidant assay. The effective antioxidant activity of NAT-S and NAT-L has found increased with increasing concentration. Comparing NAT-S, there was an increased activity found in NAT-L extract. The results obtained in the present study indicate that the leaves and stems of *Nyctanthes arbor-tristis* are a potential source of natural antioxidants.

***Anti- Inflammatory Activity:*** *Nyctanthes arbortristis* Linn.is widely used as a decoction in the Ayurvedic system of medicine for treatment of sciatica and arthritis, but it has not yet been screened scientifically. The water soluble portion of the alcoholic extract of the leaves of *Nyctanthes arbortristis* (NAT) was screened for the presence of anti-inflammatory activity. NAT inhibited the acute inflammatory oedema produced by different phlogistic agents, viz. carrageenin, formalin, histamine 5-hydroxytryptamine and hyaluronidase in the hindpaw of rats. The acute inflammatory swelling in the knee joint of rats induced by turpentine oil was also significantly reduced.in sub-acute models, NAT was found to check granulation tissue formation significantly in the granuloma pouch and cotton pellet test. Acute and chronic phases of formaldehyde induced arthritis were significantly inhibited. Nat was also found to inhibit the inflammation

produced by immunological methods, viz. Freund's adjuvant arthritis and PPD induced tuberculin reaction. Thus anti-inflammatory activity in leaves of Harsinghar supports its use in various inflammatory conditions by the followers of the Ayurvedic system of medicine.

**Conclusion**

*Nyctanthes arbortristis* Linn is a well-known medicinal plant. It possesses significant anti-inflammatory, wound healing and antimicrobial properties. The major class of biologically active compounds are the iridoidglucosides including arbortristoside A, B and C from the seeds active as anticancer, ant-leishmania, anti-inflammatory, anti-allergic, immunomodulatory and antiviral. Other molecules – calceolarioside A, 4-hydroxyhexahydroenzofuran-7one and B-sitosterol from leaves have been reported to be active as anti-leishmanial, anticancer and anti-inflammatory respectively.

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