



## *Nyctanthes arbortristis* an Important Medicinal Plant of Madhya Pradesh State - A Review

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### Abstract

Medicinal plants are being widely used either as single drug or in combination for health care system. *Nyctanthes arbortristis* commonly known as night jasmine or Harshringar is an important medicinal plant mainly used in Ayurveda. It is one of the oldest system of medicines uses plants and their extracts for the treatment and management of various diseases. It has been reported as useful in sciatica, arthritis, fever, asthma, diabetes, cancer, etc. Plants contain various phytoconstituents belonging to the categories of glycosides, alkaloids, essential oils, tannins etc. Several studies are being carried towards its activities like antibacterial, antifungal, immunomodulatory, antipyretic, antioxidant and hepatoprotective properties. With all these potential benefits, this review is carried out to explore the hidden potential and its uses. This review explores the published scientific literature to compile all the traditional and scientific data of *Nyctanthes arbortristis*.

### 1 Introduction

*Nyctanthes arbortristis* is commonly known as Harshringar belonging to the family Oleaceae. The name *Nyctanthes* means "Night Flowering" is a shrub or small tree growing to 10 m tall flaky grey bark. Also known as Parijata, Shefali, Harshringar, Kannika, Coral Jasmine and Night Jasmine. The flowers start falling after midnight and by the day break, the plant appears dull. The generic name 'Nyctanthus' has been coined from two Greek words 'Nykhta' (Night) and 'anthos' (flower).

The specific name 'arbortristis' meaning 'the sad tree' is supposedly derived from dull looks of the tree during daytime<sup>1,2</sup>. It is mainly distributed to India, Bangladesh, Indo pak subcontinent and south east, grows naturally in Indo Malayan region and Burma, Thailand and Celon. The plant is native to India, widely distributed from sub Himalayan regions to Gogavari, and commonly grown as a garden boundary plant in Madhya Pradesh (M.P.) state<sup>3</sup>.

Various parts of the plant like seeds, leaves, flowers, bark and fruits have been investigated for their significant pharmacological activity. Phytochemicals like flavanoid,

glycoside, oleanic acid, essential oils, tannic acid, carotene, friedelene, lupeol, glucose, benzoic acid have been reported for significant hair tonic, hepatoprotective, anti-leishmaniasis, antiviral, antifungal, anti-pyretic, anti-histaminic, anti-malarial, antibacterial, anti-inflammatory and anti-oxidant activities<sup>4,5</sup>. The various parts of *Nyctanthes arbortristis* are illustrated in Fig 1.

### 2 Scientific classification

Kingdom :	Plantae
Class :	Eudicots
Division :	Angiosperm
Order :	Lamiales
Family :	Oleaceae
Genus :	<i>Nyctanthes</i>
Species :	<i>N. arbortristis</i>

### 3 Vernacular classification

Bengali :	Harsinghar, Sephalika, Seoli, Sheoli.
English :	Coral Jasmine, Night Jasmine.

Gujarati :	Jayaparvati, Parijatak.
Hindi :	Harsinghar, Harsingur, Seoli, Sheoli, Sihau.
Kannada :	Goli, Harsing, Parijata.
Konkani :	Pardic, Parizatak, Parzonto, Parzot.
Malayalam:	Mannapu, Pavizhamalli, Parijatakam.
Marathi :	Kharbadi, Kharassi, Khurasli, Parijatak.
Sanskrit :	Parijata, Parijatah, Parijataka, Sephalika.
Tamil :	Manjhapu, Pavala-Malligai.
Telugu :	Kaplanagadustu, Pagadamalle, Parijat.

#### 4 Geographical distribution

*N. arbortristis*, native to Indo pak subcontinent, grows naturally in Indo Malayan region, Burma, Thailand, Celon, South Asia and Southeast Asia.

In India, it grows in the outer Himalayas and is found in tracts of Jammu and Kashmir, Nepal to East of Assam, Bengal, Tripura extended through the Central region up to Godavari in the South.

#### 5 Botanical description

*N. arbortristis* is a deciduous tree grows up to 10 m tall, with quadrangular branches and grey or greenish-white rough bark<sup>6</sup>.

**Leaves** are simple petiolate and exstipulate, opposite, 3-10 by 4-6.3 cm ovate, acute or acuminate, bears distant teeth on entire, short bulbous hairs rounded or slight cuneate, petiole 6cm long hairy.

**The flowers** are originated at the tips of branches in the axils of leaves and are small in clusters of 5-7 7 fragrant delightfully, peduncles of 4 angled, slender, calyx are 6-8 mm long, narrow campanulate, hairy glabrous inside, truncatate toothed or lobed, ciliated and Corolla are glabrous more than 13mm long, 6-8 mm long tube, orange colour, equaling limb, white lobes corolla with an orange red center, unequally obcordate<sup>7</sup>.

Fruits are flat brown heart shaped to round capsule with two sections each containing a single seed. It grows well in loamy soils. The plant requires conditions varying from full sunlight to partial shade and needs to be watered regularly Flowering usually occurs from July to October.



Fig 1: Parts of *Nyctanthes arbortristis*; 1) Shoots and leaves, 2) Matured Plant, 3) Flowers

#### 6 Phytoconstituents

The plant *Nyctanthes arbortristis* contains high amount of alkaloids specially in leaves and roots. The important active principle of this plant is iridoid arbortristoside. The whole plant and leaves also contains many important useful phytochemicals like  $\beta$ - sitosterol, nyctanthic acid, olenic acid, ascorbic acid, saponins, flavanoids, anntannins and also many glycosides like D-mannitol, Astragaline, Nicotiflorine, flavonoglycosides.

##### 6.1 Leaves

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

##### 6.2 Flowers

The flowers contain essential oils, nyctanthin, Dmannitol, tannins, glucose, carotenoids, glycosides including  $\beta$ -monogentiobioside ester of  $\alpha$ -crocetin (crocin 3),  $\beta$ monogentiobioside  $-\beta$ -D-monoglucoside ester of  $\alpha$ -crocetin, and  $\beta$ -digenitiobioside ester of a-crocetin (crocin 1).

##### 6.3 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 Dmannose.

##### 6.4 Bark

The bark contains glycosides and alkaloids.

### 6.5 Stem

The stems contain the glycoside naringenin-4'-O- $\beta$ glucopyranosyl- $\alpha$ -xylopyranoside and B-sitosterol. Flower oil: The flower oil contains  $\alpha$ -pinene,  $p$ -cymene, 1-hexanol, methylheptanone, phenyl acetaldehyde, 1-decenol and anisaldehyde<sup>3, 8-9</sup>.

## 7 Medicinal properties

*Nyctanthes arbortristis* is an identified and commonly used plant in medicinal field. *Nyctanthes* plant has known for various CNS (viz., hypnotic, local anesthetic, tranquillizing) and antihistaminic, anti-inflammatory, antidepressant, immunodulatory activities. *Nyctanthes arbortristis* used in various ailments like fever, enlargement of the spleen, malaria, blood dysentery, cough and gastritis. Juices of leaves is used as digestives, antidote to reptiles venome.

Seeds are used to cure scurfy infection of scalp, piles and skin diseases. Powdered stem bark is given in rheumatic joint pain, oil is used for pain in the eyes and with Arjuna bark it is rubbed on the body in internal injury. Flowers are bitter, astringent, carminative, stomachic and used in ophthalmic purposes. Barks are traditionally used as anti-dysenteric and antidiarrhoeals<sup>9-12</sup>.

## 8 Pharmacologic activities

### 8.1 Anti allergy activity

The alcoholic extract of *N. arbortristis* leaves offered significant protection against the development of asphyxia. Arbortristoside A and arbortristoside C are present in *N. arbortristis* were reported to be anti allergic<sup>13</sup>.

### 8.2 Antianxiety

Hydroalcoholic extracts of *N. arbortristis* have anxiolytic potential<sup>14</sup>.

### 8.3 Anti-inflammatory activity

The aqueous extract of the whole plant, alcoholic extract of stem and seeds and water soluble portion of the alcoholic extract of leaves of *N. arbortristis* were reported to have acute and sub-acute anti-inflammatory activity.

In the sub-acute models, *N. arbortristis* was found to check granulation tissue formation significantly in the granuloma pouch and cotton pellet test. *N. arbortristis* is also found to inhibit the inflammation produced by immunological methods that are Freund's adjuvant arthritis and purified tuberculin reaction<sup>15</sup>.

### 8.4 Antifilarial activity

The chloroform extract of the flowers and a pure compound isolated from *N. arbortristis* plant exhibit larvicidal activity against *Culex quinquefasciatus*, a common filarial vector<sup>16</sup>.

### 8.5 Antibacterial activity

Methanolic extract of leaves of *N. arbortristis* exhibited significant antibacterial activity against *Staphylococcus aureus*, *Staphylococcus epidermis*, *Salmonella typhi*, *Salmonella paratyphi* A with MIC value ranging between 1-8 mg/ml<sup>17</sup>. The zone of inhibition and minimum inhibitory concentration (MIC) of the extracts were determined and compared with the standard drugs ciprofloxacin and fluconazole. The chloroform extract was found to have both antibacterial and antifungal activity<sup>18</sup>.

### 8.6 Antioxidant activity

The free radical scavenging potential of the different extracts of leaves of *N. arbortristis* was evaluated. The scavenging effect of plant extracts and standard on the DPPH radical decreases in the following manner: Ascorbic acid > Butanol > Ethyl acetate > BHT > Pet ether, and it was found to be 93.88% for ascorbic acid at concentration of 10 mg, for BHT, Butanol, Ethyl acetate and Pet ether was found to be 97.42 %, 95.22%, 84.63% and 82.04% at concentration of 100 mg respectively. In this investigation different extract of *N. arbortristis* leaves possess concentration dependant free radical scavenging activity<sup>19</sup>.

### 8.7 Anticancer activity

Moderate activity was observed at 30mg/ml conc. with 71% inhibition of dried *N. arbortristis* leaf methanol extract and least inhibitory activity was observed at 10mg/ml conc. With 86% inhibition of breast cancer cell lines free of pathogens. A high degree of against human breast cancer cell lines was observed with *N. arbortristis* dried fruit methanol. The phytochemicals isolated from *N. arbortristis* dried fruit methanol are glycosides, tannins, phenols and steroids and are predicted to be responsible for this anticancer activity<sup>20</sup>.

### 8.8 Antidiabetic activity

Methanol extract of root of *N. arbortristis* poses safe and strong anti-diabetic activity. It reduces blood glucose level after seven days at the 500 mg/Kg in rats compare with standard drug. It was found that methanolic extract of *N. arbortristis* roots were more effective in reducing the blood glucose level compare to the standard drug<sup>21</sup>.

### 8.9 Antimalarial activity

The clinical study of *N. arbortristis* of malaria was performed on 120 patients. Administration of fresh paste of medium sized 5 leaves of *N. arbortristis* thrice a day for 7-10 days has cured the disease in 92 (76.7%) patients within 7 days. Other 20 patients were cured by 10 days while the remaining 8 patients did not respond to the treatment<sup>22</sup>.

### 8.10 Antileishmanial Activity

The antileishmanial activity of *N. arbortristis* has been attributed to iridoid glucosides, arbortristosides A, B, and C and 6-b-hydroxyloganin. The arbortristosides A, B, C, and 6- beta-hydroxy-loganin exhibited both in vitro and in vivo

antileishmanial activity against amastigotes in macrophage cultures and hamster test systems, respectively<sup>23</sup>.

#### 8.11 Antihistaminic and Antitryptaminergic activity

The alcoholic extract of *N. arbortristis* leaves significantly protect against histamine aerosol - induced asphyxia in guinea pigs. The arbortristosid A and arbortristosid C present in *N. arbortristis* was reported to be antiallergic<sup>24</sup>.

#### 8.12 Anticholinesterase activity

The aqueous extract of *N. arbortristis* stimulated the activity of acetylcholine esterase in mice, it antagonize the inhibition of this enzyme by malathion. The low anti muscarinic activity against acetylcholine induced contractions of isolated rabbit ileum was already reported<sup>25</sup>.

#### 8.13 Antinociceptive and Antipyretic activity

The extract exhibited antipyretic effect against brewer's yeast-induced pyrexias in rats. The aqueous soluble fraction of ethanolic extract of the leaves exhibited significant aspirin-like anti-nociceptive activity which was evidenced by inhibition of acetic acid-induced writhing in albino mice but fails to elicit morphine like analgesia<sup>26</sup>.

#### 8.14 Antianemic activity

Hematological study on the ethanolic extracts of the flowers, barks, seeds and leaves of *N. arbortristis*, noticed the dose dependent rise in hemoglobin content and red blood cells count in rats. The extracts also protect the decline of hemogram profile in anemic rats<sup>27</sup>.

#### 8.15 CNS depressant activity

*N. arbortristis* exhibited significant and dose dependent prolongation of onset and duration of sleep and found to cause decrease in dopamine and increase serotonin level from which it can be resolved that the CNS depressant activity of the ethanol extracts of seeds, leaves and flowers may be due to the decrease in dopamine and increase in serotonin level<sup>28</sup>.

#### 8.16 Hepatoprotective activity

The aqueous extracts of the leaves and seeds of *N. arbortristis* were found to have hepatoprotective activity against carbon tetrachloride (CCl<sub>4</sub>) induced hepatotoxicity<sup>29</sup>.

The alcoholic and aqueous extracts showed significant hepatoprotective activity by reducing the levels of SGPT (serum glutamic pyruvic transaminase), SGOT (serum glutamic oxaloacetic transaminase) and serum bilirubin (total and direct). The results were supported by histopathological studies of liver samples which showed regeneration of hepatocytes by the extracts<sup>30</sup>.

#### 8.17 Sedative Activity

Sedative potential of a hot infusion of the flowers was examined in rats. Male rats exhibited a dose dependent conscious sedative activity while female rats remained unaffected. Glucose absorption from the small intestine was significantly reduced. The sedation was attributed, in part, to the antioxidant and membrane stabilizing activity of the extract<sup>31</sup>.

#### 8.18 Toxicity

*N. arbortristis* showed toxic effect of ethanolic extract of leaves in rats. The median lethal dose (LD) 16 gm/kg was observed in rats. No mortality was at 2.0 gm/kg while 75% mortality was seen at a 32 gm/kg dose. When extract instilled into the rabbit's eye produced conjunctival congestion with oedema, while the person who grounded the dried leaves developed vesicles on both palms<sup>26</sup>.

### 9 Conclusions

The plant *Nyctanthes arbortristis* is one of the most important source of medicinally important constituents widely experimented by scientists. Most of the scientific works have been conducted on the leaves and seeds of *Nyctanthes arbortristis* plant although there are reports about using bark powder and root extract in folk medicines. The main thrust of this review is to compile a number of uses of all the parts of plants. So far the major uses have been found on the leaf extract of *Nyctanthes arbortristis* including from bitter tonic to digestive, laxative, diuretic, in spleen enlargement, as anti-oxidant, anthelmintic, expectorant, bronchiodilatory, even as anti-dote to reptiles venome. The powdered seeds have been used to cure scalp and in piles and skin diseases. Flowers are used as astringents and carminatives. From the above study, it is revealed that the leaves of plant *Nyctanthes arbortristis* are extensively exhausted for the study purpose but there is a need to pay attention on the flowers and stem also.

### 10 Conflict of Interest

Nil

### 11 Author's contributions

RS and AKB collected the data and drafted the manuscript. Both authors have read and approved the final manuscript.

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