

## Pharmacological and Phytochemical properties of *Nyctanthes arbor tristis*: A review

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**Abstract:** The main focus of this article is to identify and mark the classified information available for the plant *Nyctanthes arbor tristis* and its seed. Traditionally the *Nyctanthes arbor tristis* have been using for eradicating and preventing the conditions like inflammation, arthritis, pain, fever, cancer etc. Due to the enormous resources of the classes of elite phytochemicals makes it more pronounced in the modern medicines. Phytochemicals such as alkaloids, flavonoids, steroids, saponins etc. helps to prevent the diseases. This article is based on the role of the *Nyctanthes arbor tristis* seeds in terminating the diseases like anti-helminthic and anti-pyretic more prominently and also does have several other properties like laxative, in rheumatism, and skin ailment.

**Keywords:** *Nyctanthes arbor tristis*, *Nyctanthes arbor tristis* fruit, Anti-inflammatory

Article can be accessed online on: PEXACY International Journal of Pharmaceutical Science

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**Update:** Received on 02/01/2023; Accepted; 03/01/2023, Published on; 07/01/2023

### Introduction

Today, herbalism is becoming more popular all over the globe. This is an important shrub from the subtropical and tropical places of the globe that is more often used to induce menstruation, typical skin conditions and as a hair tonic<sup>1</sup>. Conventional Medicine refers to the treatment or care that is based on

traditional methods of using plants, animals, or their products. It also includes cultural practices and physical manipulations, including those for which affliction is a part. In ancient literature, it has been proven that medicinal plants have been used for centuries<sup>2</sup>. These plants are the treasure of

the enormous phytochemicals which are rare to exhibit in other plants. *Nyctanthes Arbor-tristis* Linn is an important medicinal herb that has many medicinal uses. *Nyctanthus arbortristis* Linn is commonly known as "Night Jasmine" (Hindi) because the flowers emit a strong, pleasing scent throughout the night<sup>3</sup>. After midnight, the flowers begin to fall and the plant becomes duller by daybreak. Its therapeutic value is now an important matter for bio-medical research to explore more precise therapeutic index in terms of active principle that could be the mark compound of the plant<sup>4</sup>. A variety of Ayurvedic literatures describe the broad spectrum medical uses of the plant, as well as its different parts. Many samhitas, nighantus provide detailed information about the nomenclature and morphology of plants. Since ancient Indian traditions, herbs have been the principal form of medicine<sup>5</sup>.

It is a perennial terrestrial woody perennial with a life span of 6-21 years. It can reach a height up to 10 meters. The simple leaves are opposite with a margin of 5-13 cm and 3-7 cm wide. The flowers have a fragrant corolla with five to eight lobed petals and an orange-red center<sup>6</sup>. They are often found in clusters of 2 to 7. The fruit is flat and brown, with a heart-shaped or rounded shape. It measures around 2cm in size, and each section contains a single seed<sup>7</sup>. *Nyctanthes Arbortristis* is found in its natural habitat on dry hillsides and undergrowth in dry deciduous forest. *Nyctanthes Arbortristis* Linn, a native of India, is found in sub-Himalayan areas and southwards to the river Godavari. It can grow at sea level to 1500m above sea level, and it is tolerant of moderate shade. It is usually found in India's outer Himalayas, Jammu and Nepal, as well as Tripura<sup>8</sup>.

## Ecology and Distribution

### *Classification of the Plant*<sup>9</sup>

Class	Eudicots
Division	Angiosperm
Family	Oleaceae
Genus	Nyctanthes

Kingdom	Plantae
Order	Lamiales
Species	Nyctanthes arbortristis

***Vernacular Classification***<sup>10</sup>

Language	Name
Bengali	Harsinghar, Sephalika, Seoli, Sheoli.
English	Coral Jasmine, Night Jasmine.
Filipino	Coral Jasmine.
Gujarati	Jayaparvati, Parijatak.
Hindi	Harsinghar, Harsingur, Seoli, Sheoli, Sihau.
Indonesian	Srigading (Sundanese, Javanese).
Kannada	Goli, Harsing, Parijata.
Konkani	Pardic, Parizatak, Parzonto, Parzot.
Lao (Tibetan)	Salikaa. Malay: Seri Gading.
Malay	Seri Gading.
Malayalam	Mannapu, Pavizhamalli, Parijatakam.
Marathi	Kharbadi, Kharassi, Khurasli, Parijatak.
Oriya	Godokodiko, Gunjoseyoli, Singaraharo.

Punjabi	Harsinghar. Sanskrit: Parijata, Parijatah, Parijataka, Sephalika.
Tamil	Manjhapu, Pavala-Malligai, Pavazha-Malligai.
Telugu	Kapilanagadustu, Pagadamalle, Parijat, Sepali.
Thai	Karanikaa. Urdu: Gulejafari, Harsingar.

### Phytochemical Analysis<sup>11</sup>

Plant Part	Phyto-constituents
Leaves	Ascorbic Acid, Benzoic Acid, Carotene, D-Mannitol, Flavanol Glycosides- Astragaline, Friedeline, Fructose, Glucose, Iridoid Glycosides, Lupeol, Mannitol, Methyl Salicylate
Seeds	3-4 Secotriterpene Acid, a Pale Yellow Brown Oil (15%), Arbortristoside A & B, Glycerides of Linoleic Oleic, Lignoceric, Myristic Acids
Stem	Glycoside-naringenin-4'-O-β-glucopyranosyl-α-Xylopyranoside, β-sitosterol.
Flowers	Apigenin, Anthocyanin, D-Mannitol, Tanninm, Glucose, Carotenoid, Essential Oil, Kaemferol, Nyctanthin, Glycosides, Quercetin,
Flower oil	Anisaldehyde, Phenyl acetaldehyde, p-cymene, 1-deconol, 1- hexanol methyl heptanone, α-pinene

### Pharmacological Activities

#### Anti-oxidant Activity

Haque, M. M., et al., (2020) has identified the antioxidant activity of the plant

*Nyctanthes arbor tristis*. In this study the extract of the flowers were taken in the 4 organic solvents and tested in vitro for its efficacy. The results showed the IC<sub>50</sub> value for 291.92 mg/ml- 3.98 µg/mL<sup>12</sup>.

The another study was done by the Mishra, A. K., et al., (2020), the study showed that nanoparticle from the extract of the *Nyctanthes arbor tristis* does possess the antioxidant properties. Nano particles were assessed for its particle size by TEM and SEM. The test was performed in the *Staphylococcus aureus* and results showed that  $EC_{50}$  activity was  $670.67 \pm 15.70 \mu\text{g/ml}^{13}$ .

Similar study was performed by the Vidhate, B., et al., (2020). The study was performed to compare the different extract of the plant *Nyctanthes arbor tristis*. The methanolic and aqueous extract of the plant was evaluated for its antioxidant activity by DPPH scavenging assay. Ascorbic acid was used as reference and results showed that the methanolic extract showed the maximum inhibitory activity of the plant *Nyctanthes arbor tristis* extract<sup>14</sup>.

### Anti-inflammatory Activity

Mousum, S. A., et al., (2018) has examined the anti-inflammatory activity of the plant *Nyctanthes arbor tristis*. This study was performed in the diabetes induced Sprague–Dawley rats. High fat diet was given to the animals for 15 days in the feed and effect was seen through the blood glucose level

along with the anti-inflammatory responses. Three doses (100, 200 and 400mg/kg) of the plant extract was administered to each animal. The results showed that anti-inflammatory effect was seen in the animals at the dose of 400mg/kg<sup>15</sup>.

Another study was performed by the Soubhagya, K. B., & Anilkumar, M. (2020). The study revealed that anti-inflammatory characteristics occur because of the class of phytochemicals which are presents in this plant. The phytochemicals study reveals that presence of the compound like terpenoids and flavonoids has numerous effects on the inflammation. Ethanolic extract of the leaves and flowers were tested using spectrophotometer against the standard Diclofenac. The results showed that it has protecting effects on the HRBC membrane<sup>16</sup>.

Another study revealed that the *Nyctanthes arbor tristis* could possibly inhibit the inflammation by interfering with the interleukins. This study was performed by the Vijayalakshmi, S., & Ananthi, et al., (2020), they showed that phytochemicals present in the plant bark could be interfering and reducing the inflammation. The phytochemical study revealed that bark of *Nyctanthes arbor tristis* is a good source of

the tannins, flavonoids, saponins and glycosides which does have the effects on the inflammation. Different doses of the extract were exposed to the HRBC membrane and results showed that all the concentrations have effects on inflammation<sup>17</sup>.

### **Antimicrobial Activity**

Antimicrobial activity of the plant *Nyctanthes arbor tristis* was noted by Gond, S. K., et al., (2020). Cost effective nanoparticles was designed to see the efficacy as Antimicrobial drug, the nanoparticle was designed using silver particles incorporated in the *Nyctanthes arbor tristis* extract endophytic fungus and tested for its efficacy. These silver particles were exposed to the *E. coli* and *Pseudomonas aeruginosa* and zone of inhibition was noted. Formulated nano particles were showing the inhibition zone of 10mm and 9mm respectively<sup>18</sup>.

Another study was performed by Ravishankar, K., & Sireesha, A. S. (2021). The anti-microbial properties of the *Nyctanthes arbor tristis* leaves extract was evaluated and tested by the agar diffusion cell method. Three different gelling agents were used to prepare the gel of leaves

extract and applied on to the rabbit wounded skin and noted the results. The results showed that leaf extract has antimicrobial as well as wound healing properties<sup>19</sup>.

Karmakar, P., & Fahim, N. F. (2018) examined the antimicrobial potential of the *Nyctanthes arbor tristis* in the gram negative and gram positive microbes. The experiment was done with the disc diffusion method and LC<sub>50</sub> value was determined. The results are determined that the LC<sub>50</sub> value was 0.11µl/ml. It could be concluded that from the results that methanolic extract of the *Nyctanthes arbor tristis* does have the antimicrobial properties<sup>20</sup>.

### **Anticancer Activity**

Rajamohamed, B. S., et al., (2022) has examined the anticancer activity *Nyctanthes arbor tristis*. Silver nanoparticles were formulated using the extract of the plant. The silver nanoparticles are now days prominently being used to treat the diseases. The extract were prepared and mixed with silver nitrate and particle size was counted using the particle size analyzer. These nanoparticles were at size of 79nm. These particles were exposed to the HeLa cells at 0.5 µg mL<sup>-1</sup>. The result showed that Silver

nanoparticles were active against the cancer cells<sup>21</sup>.

Mathammal, R., et al., (2021) has identified the zinc oxide nanoparticles can decrease the viability of the cancer cell lines. Aqueous extract of leaves was prepared using the zinc oxide and particle size was determined. The results showed that aqueous extract nanoparticles did inhibit the cell proliferation by 90% in the HT-29 cells at the dose of 100µg/mL. The test was performed to evaluate the cytotoxicity in cell lines, the result depicted that the viability of the cells has been decreased in the preliminary assay of toxicity. So, in accordance of the results, it could be concluded that the zinc oxide nanoparticle in the aqueous extract does have the anticancer activity<sup>22</sup>.

### **Antifungal Activity**

Jamdagni, P., et al., (2018) has examined the antifungal activity of *Nyctanthes arbor tristis* incorporated in the silver nanoparticles. These nanoparticles were made with aqueous extract of the flower of *Nyctanthes arbor tristis*. Characterizations of the nanopowder were done using FTIR, X-rays, and TEM. The efficacy of the nanopowder was evaluated against the

phytopathogens and minimum inhibitory concentration was noted. The results showed that MIC was obtained at 16 µg/mL. Hence, it can be concluded that the nanoparticles of the flower extract has the antifungal potential<sup>23</sup>.

Another study was performed by the same scientist Jamdagni, P., et al., (2018). In this study, zinc nano particle were formulated using the common fungicides and pesticides. These particles were formulated at the narrow range of the particles, so that efficacy of the drug can be optimized. Again, these particles were characterized using the FTIR, X-rays, and TEM. The obtained size was between 12-63nm. The zone of inhibition was evaluated of the different microbes. The results showed that zone of inhibition was 7mm at 32 µg/ml. Hence, the nano particle incorporated in the different common pesticides does have the antifungal potential<sup>24</sup>.

### **Hepatoprotective Activity**

Hepatoprotective activity of the plant *Nyctanthes arbor tristis* was examined by the Chaudhary, S., et al., (2018). The extract of the plant administered in the hepatotoxicity induced Wistar rats by isoniazid. The evaluation of the efficacy of

the drug was evaluated by the liver parameters such as ALT, AST, SOD, and GSH. The drug extract was administered at the dose of 120, 250 and 500mg/kg. The results revealed that the drug content was successfully declined the increasing level of the biomarkers of the liver toxicity. Hence, I can be concluding that the extract of the *Nyctanthes arbor tristis* has remarkable effects on the hepatotoxicity and it could be considered as the Hepatoprotective agent<sup>25</sup>.

### **Anthelmintic Activity**

Kore, R., & Kondawar, M. (2019), examined the anthelmintic activity of the plant. The aqueous and ethanolic extract of the plant was used and exposed to the earthworms (*Pheretima postuma* and nematode *Ascaris gallis*). The evaluation was confirmed with two parameters i.e. paralysis and death of the worm. The results suggested that the both the extracts were involved in the paralysis and death of the worm by the immunomodulation. The 100µg/ml dose was considered as highest dose where paralysis time and death time was significantly reduced as compared to other doses<sup>26</sup>.

The similar in vitro study was performed by the Sanjita, D., et al., (2010). The seeds and

flower ethanolic extracts were prepared and exposed to the earthworms at different concentrations. The results revealed that extract were lethal for the parameters i.e. paralysis time and death time. Hence, it can be concluded that the anthelmintic activity is more pronounced in the seed and flower extracts of the *Nyctanthes arbor tristis*<sup>27</sup>.

### **Reference**

1. Rath, S. C., Sen, S., Mishra, S. K., Yadav, P. K., Gupta, A. K., & Panigrahi, J. (2019). Correction to: Genetic homogeneity assessment of in vitro-regenerated plantlets of *Nyctanthes arbor-tristis* L. and comparative evaluation of bioactive metabolites and antioxidant activity. *In Vitro Cellular & Developmental Biology*, 55(6), 733-733.
2. Mishra, A. K., Tiwari, K. N., Mishra, P., Tiwari, S. K., Mishra, S. K., & Saini, R. (2019). Effect of cytokinin and MS medium composition on efficient shoot proliferation of *Nyctanthes arbor-tristis* L. through cotyledonary node explant and evaluation of genetic fidelity and antioxidant capacity of regenerants. *South African Journal of Botany*, 127, 284-292.
3. Joshi, B. C., Chauhan, N., Singh, S., & Uniyal, S. (2018). Pharmacognostic and



- phytochemical evaluation of *Nyctanthes arbor-tristis* stem. *Int J Pharmacogn*, 5, 376-81.
4. Kaur, J., & Kaushal, S. (2020). Chemical Analysis, Antimicrobial and Antioxidant Activities of Harsingar (*Nyctanthes arbor-tristis*) essential oil. *Journal of Essential Oil Bearing Plants*, 23(2), 230-245.
  5. Amadarshanie, D. B. T., Gunathilaka, T. L., Silva, R. M., Navaratne, S. B., & Peiris, L. D. C. (2022). Functional and antiglycation properties of cow milk set yogurt enriched with *Nyctanthes arbor-tristis* L. flower extract. *LWT*, 154, 112910.
  6. Tharakan, S. T., Madhavan, M., Benny, A. C., Anto, A., & Rathnakaran, S. Phytochemical and Pharmacological Studies of *Nyctanthes arbor-tristis* (Linn.).
  7. Talukder, S., Uddin, M. S., Ferdous, M., & Baral, P. K. Phytochemical Screening and Bioactivity Determination of Ethyl Acetate and Methanolic Extracts of Leaf and Bark of the Plant *Nyctanthes arbor-tristis* L.
  8. Chamoli, R. T., Minj, S., & Singh, V. (2019). Phytochemical chemical characters of *Nyctanthes arbor-tristis* Linn.: A promising medicinal plant. *Journal of Medicinal Plants*, 7(6), 141-143.
  9. Bhalakiya, H., & Modi, N. R. (2019). Traditional Medicinal Uses, Phytochemical Profile and Pharmacological Activities of *Nyctanthes Arbor-tris*.
  10. Kumar, P. (2020). PHYTOCHEMICAL ESTIMATION OF NYCTANTHES ARBOR-TRISTIS PLANTS. Editorial Board, 9(10).
  11. Kumar, A., Mishra, S., & Chaudhary, M. (2019). Alleviation of heavy metal stress in *Nyctanthes arbor-tristis* under the treatment of lead. *SN Applied Sciences*, 1(2), 1-8.
  12. Haque, M. M., Sultana, N., Abedin, S. M. T., Hossain, N., & Kabir, S. E. (2020). Fatty acid analysis, cytotoxicity, antimicrobial and antioxidant activities of different extracts of the flowers of *Nyctanthes arbor-tristis* L. *Bangladesh Journal of Scientific and Industrial Research*, 55(3), 207-214.
  13. Mishra, A. K., Tiwari, K. N., Saini, R., Kumar, P., Mishra, S. K., Yadav, V. B., & Nath, G. (2020). Green synthesis of silver nanoparticles from leaf extract of *Nyctanthes arbor-tristis* L. and assessment of its antioxidant, antimicrobial response. *Journal of*

- Inorganic and Organometallic Polymers and Materials, 30(6), 2266-2278.
14. Vidhate, B., Dubey, S. R., Ghag, A., & Gaikwad, M. (2020). Comparative Evaluation of Antioxidant Activity of Aqueous and Methanolic Extract of *Nyctanthes arbor-tristis* Linn. by Using DPPH Assay. *International Journal of Research in Engineering, Science and Management*, 3(7), 68-70.
  15. Mousum, S. A., Ahmed, S., Gawali, B., Kwatra, M., Ahmed, A., & Lahkar, M. (2018). *Nyctanthes arbor-tristis* leaf extract ameliorates hyperlipidemia-and hyperglycemia-associated nephrotoxicity by improving anti-oxidant and anti-inflammatory status in high-fat diet–streptozotocin-induced diabetic rats. *Inflammopharmacology*, 26(6), 1415-1428.
  16. Soubhagya, K. B., & Anilkumar, M. (2020, September). Evaluation of anti-oxidant and anti-inflammatory activity in leaf and flower ethanolic extracts of *Nyctanthes arbor-tristis* Linn. In *AIP Conference Proceedings* (Vol. 2263, No. 1, p. 030003). AIP Publishing LLC.
  17. Vijayalakshmi, S., & Ananthi, T. IN VITRO ANTI-INFLAMMATORY ACTIVITY OF THE STEM BARK OF *Nyctanthes arbor-tristis* (L.).
  18. Gond, S. K., Mishra, A., Verma, S. K., Sharma, V. K., & Kharwar, R. N. (2020). Synthesis and characterization of antimicrobial silver nanoparticles by an endophytic fungus isolated from *Nyctanthes arbor-tristis*. *Proceedings of the National Academy of Sciences, India Section B: Biological Sciences*, 90(3), 641-645.
  19. Ravishankar, K., & Sireesha, A. S. (2021). Exploration of antimicrobial and wound healing activities using ethanolic leaf extract gel of *Nyctanthes arbor-tristis* on rabbits.
  20. Karmakar, P., & Fahim, N. F. (2018). EVALUATION OF PHYTOCHEMICAL, ANIMICROBIAL AND CYTOTOXIC ACTIVITY OF NYCTANTHES ARBORTRISTIS METHANOLIC LEAF EXTRACT. *EVALUATION*, 3, 433-439.
  21. Rajamohamed, B. S., Siddharthan, S., Palanivel, V., Vinayagam, M., Selvaraj, V., Subpiramaniam, S., ... & Subramanian, S. (2022). Facile and Eco-Friendly Fabrication of Silver Nanoparticles Using *Nyctanthes arbor-tristis* Leaf Extract to Study Antibiofilm and Anticancer Properties against

- Candida albicans*. *Advances in Materials Science and Engineering*, 2022.
22. Mathammal, R., Shreema, K., Mekala, R., Kalaiselvi, V., & Vijayakumar, S. (2021). Anticolon Cancer Activity of Zinc Oxide Nanoparticles Using Fresh Leaf Extract *Nyctanthes Arbor-tristis*.
23. Jamdagni, P., Khatri, P., & Rana, J. S. (2018). Green synthesis of zinc oxide nanoparticles using flower extract of *Nyctanthes arbor-tristis* and their antifungal activity. *Journal of King Saud University-Science*, 30(2), 168-175.
24. Jamdagni, P., Rana, J. S., Khatri, P., & Nehra, K. (2018). Comparative account of antifungal activity of green and chemically synthesized zinc oxide nanoparticles in combination with agricultural fungicides. *International Journal of Nano Dimension*, 9(2), 198-208.
25. Chaudhary, S., Gupta, R. K., Kumar, A., & Tarazi, H. (2018). Hepatoprotective and antioxidant potential of *Nyctanthes arbor-tristis* L. leaves against antitubercular drugs induced hepatotoxicity. *Journal of Pharmacy & Pharmacognosy Research*, 6(3), 205-215.
26. Kore, R., & Kondawar, M. (2019). In-vitro anthelmintic activity of *Adina cordifolia*, *Nyctanthes arbor tristis* and *Thevetia peruviana* on *Phertima postuma* and *Ascaris gallis*. *Journal of Pharmacognosy and Phytochemistry*, 8(3), 4431-4434.
27. Sanjita, D., Dinakar, S., & Basu, S. P. (2010). Antispasmodic and anthelmintic activity of *Nyctanthes arbortristis* Linn. *International Journal of Pharmaceutical Sciences and Research (IJPSR)*, 1(2), 51-55.