

A Critical interpretation on Anti - Sciatica (Gradhasi) Plant i.e. *Nyctanthes arbortristis* Linn.

Rekha Karveti¹, Shiromani Mishra²

1.PG Scholar, PG Dept. of Dravyaguna, Govt. Auto. Dhanwantari Ayurveda College Ujjain Madhya Pradesh, India

2.Guide & Associate Professor, PG Dept. of Dravyaguna, Govt.Auto. Dhanwantari Ayurveda College Ujjain, Madhya Pradesh, India

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ABSTRACT

Ayurveda is an ancient system of medicine that relies on plants and their extracts to cure and manage a variety of diseases. *Nyctanthes arbortristis* Linn (Oleaceae) is a large flowering shrub native to tropical and subtropical regions of the world that has traditionally been used to induce menstruation, treat scabies and other skin infections, as a hair tonic, chalogogue, laxative, diaphoretic, diuretic, arthritis, malaria, bronchitis, and as an anthelmintic. In India, *Nyctanthes arbortristis* is one of the most helpful traditional plants. The many components of the plant, including as the fruits, leaves, seeds, flowers, barks, and stems, contain significant phytochemicals and can be used to treat and manage a variety of diseases. Phytochemicals found in various parts of the plant, such as flavanol glycoside, oleanic acid, essential oils, tannic acid, carotene, fried line, lupeol, glucose, and benzoic acid, have significant hepatoprotective, antiviral, antifungal, antipyretic, antihistamine, anti-malarial, antibacterial, anti-inflammatory, and antioxidant activities. Chemical constituents, environment and distribution, the biological behavior of key chemicals, pharmacological activity, and medicinal use are all covered in this study. This review will be useful for future research projects and their development.

KEYWORDS – Gradhasi, *Nyctanthes arbortristis*, Anti sciatica plant, etc.

I. INTRODUCTION

Due to the fact that its blossoms produce a very strong and pleasant smell throughout the night, *Nyctanthes arbortristis* Linn (Oleaceae) (Fig. 1) is commonly known as "Night Jasmine" (English) or "Harsingar" (Hindi) (Siddiqui et al., 2006; Rout et al., 2007). After midnight, the blossoms begin to fall, and by daybreak, the plant has become bland. The name "Nyctanthes" was created by combining two Greek words: "Nykhta"

(night) and "anther" (flower) (Vats et al., 2009; Meshram et al., 2012). The particular name "arbortristis," which means "sad tree," is said to be derived from the tree's dreary appearance throughout the day (Suresh et al., 2010)¹.

One of the most well-known medicinal plants is *Nyctanthes arbortristis* Linn. It's a common hardy big shrub or small tree in the wild. It is a native of India, where it may be found in the wild in the sub-Himalayan areas and as far south as Godavari and Lalitpur in Nepal. Night Jasmine or Parijata is the popular name for *Nyctanthes arbortristis* Linn (Sandhar et al., 2011).² Different portions of this plant are utilised in Indian systems of medicine for diverse pharmacological activities and are recognised to treat a variety of diseases by tribal peoples in India, particularly in Orissa and Bihar, as well as in Ayurveda, Sidha, and Unani systems of medicine. Sciatica, rheumatism, gout, and other joint problems are among the conditions for which it is prescribed (Sah and Verma, 2012).³

Collection & Cultivation

Traditionally, powdered stem bark has been used to alleviate rheumatic joint discomfort, malaria, and as an expectorant (Rouf, 2003).⁴ The leaves of *Nyctanthes arbortristis* Linn are widely used in Ayurvedic medicine to treat a variety of ailments, including sciatica, chronic fever, rheumatism, and internal worm infections, as well as to act as a laxative, diaphoretic, and diuretic (Tuntiwachwuttiku et al., 2003).⁵

Due to its pleasant and irregular perfume, it is frequently planted in gardens. Cuttings and seeds can both be used to propagate the shrub. Because of the phenolic chemicals seeping out of the ingested seeds, the seeds have a low germination rate.⁶ The seed coat helped to preserve these inhibitory phenolic chemicals in each carp. The seed coat helped to preserve these inhibitory phenolic chemicals in each carp. By

eliminating both or treating seeds with an antioxidant solution such as polyvinylpyrrolidone (PVPP) prior to germination, the speed of germination can be increased (Abhishek Kumar Sah and Vinod Kumar Verma, 2012).⁷

Classification

Kingdom: Plantae

Order: Lamiales

Family: Oleaceae

Genus: Nyctanthes

Species: *N. arbortristis*

Leaves

Leaves are opposite, oblong, acute or acuminate, whole or with a few big distant teeth, short bulbous hairs rounded or slightcuneate, main nerves few, noticeable underneath; petiole 6 cm long, hairy (Abhishek Kumar Sah and Vinod Kumar Verma, 2012). Simple, etiolate, and estipulate leaves (Bhosale et al., 2009). The lamina is oblong with an acute or acuminate apex, a serrated or whole edge, undulated towards the base, the top surface dark green with dotted glands, and the bottom surface pale green and gently pubescent. The venation of the NAT is unicostate and reticulate, with 12 lateral veins on average leaving the midrib. Petioles are 5– 7.7–10 mm long and have an ad axial concavity (Biswas and Mukherjee, 2011)

Flower

Peduncles are 4-angled, slender, hairy, auxiliary and solitary, and in terminal short dichotomous chimes; flowers are small, delightfully fragrant, sessile in pedunculate bracteates fascicles of 3 5; flowers are small, delightfully fragrant, sessile in pedunculate bracteates fascicles of 3 5; peduncles are 4-angled, slender, hairy, auxiliary and s Broadly oval or suborbicular bracts, 6- 10 mm long, acuminate, hairy on both sides; 6-8 mm long, narrowly campanulate, hairy on the exterior, glabrous on the inside, truncate or obscurely toothed or lobed, ciliated calyx. Corolla glabrous, about 13 mm long; tube 6- 8 mm long, orange in colour, about the same length as the limb; lobes white, unequally obcordate, a film buff (Bhosale et al., 2009)⁸

Fruit

The NAT fruit is a 1-2 cm diameter capsule that is long and broad, obcordate orbicular, compressed, 2-celled, and splits into two flat 1-seeded carpals. It is reticularly veined and glabrous (Bhosale et al., 2009). The fruit is flat, brown, and

heart-shaped to rounded-capsule-shaped, measuring roughly 2 cm in diameter with two-celled openings transversely from the apex, each carrying a single seed. The fruit had typical fruit characteristics when examined under a microscope. Epidermal cells were compactly packed in the epicarp, with polygonal cells with somewhat anticlinal walls covered by a thin cuticle, followed by 1,3 layers of collenchymas, Spongyparenchymatous tissue, sclerenchymatous fibers, and oil glands (Shinde et al., 2014)⁹

Seed

The seed is compacted into a single cell (Abhishek Kumar Sah and Vinod Kumar Verma, 2012) Phytosterols, phenolic substances, tannins, flavonoids, cardiac glycosides, saponins, and alkaloids are all detected in the seeds of *N. arbortristis*; the outer layer of big transparent cells and strongly vascularised (Bhosale et al., 2009). (Shibani Basu et al., 2016).

Bark

The bark of the *N. arbortristis* plant is rough and hard, with a dark grey or brown colour. Due to scaling off of circular barks, the bark surface is dip pled and patchy, with grey brown colour patches. Circular flakes are used to scale off the bark. The inner bark is creamy white, soft, and collapsed, with the non-collapsed phloem zone clearly visible (Bhosale et al., 2009). Circular flakes are used to scale off the bark. The inner bark is creamy white, soft, and collapsed, with a discernible non-collapsed phloem zone (Bhosale et al., 2009)¹⁰

TRADITIONAL USES

Seeds, leaves, and flower extracts of the plant demonstrated CNS depressive action (advance).

Nyctanthes arbortristis was shown to have antiviral action against the Encephalomyocarditis Virus (EMCV) and the Semliki Forest Virus (Semliki Forest Virus) (SFV).

Phytochemical And Pharmacological

The leaves of *Nyctanthes arbortristis* L (Oleaceae) are employed in Ayurveda medicine to treat a variety of ailments, although there aren't enough data on its phytochemicals and pharmacological activities. The purification of an antioxidative polysaccharide (F2) isolated from its leaves by water is described here. Chemical, chromatographic, and spectroscopic investigations confirmed the existence of a highly branched

polysaccharide (75 kDa) containing esterified phenolic acids.¹¹ ESMS analysis of per acetylated oligomeric fragments obtained by Smith degradation, in particular, gives structural information on a range of glycerol tagged oligosaccharides. The DPPH and Ferric reducing power assays revealed that this polysaccharide has dose-dependent free radical scavenging activity.

As a result, the typical aqueous extraction procedure generates a molecular entity that has a pharmacological effect: this may be an example of a clever phototherapeutic management strategy (Ghosh et al., 2015). Altersolanol A, a cytotoxic anthraquinone derivative, was discovered from *Nyctanthes arbortristis* fungus PM0409092 (family Oleaceae). DNA amplification and sequencing of the ITS region identified it as a *Phomopsis* sp. Altersolanol A's chemical structure was determined using physicochemical parameters, 2D NMR spectroscopy, and other spectroscopic data.¹²

Altersolanol A, a kinase inhibitor, causes apoptosis in cells via inducing Caspase-3 and -9 cleavage and decreasing anti-apoptotic protein production. There have been multiple prior reports of Altersolanol A's anticancer activity, but we provide here the results of a large research that included 36 cell lines and yielded a broader range of results. The chemical is cytotoxic to 34 human cancer cell lines in vitro, having an IC₅₀ (IC₇₀) value of 0.005 g ml⁻¹ (0.024 g ml⁻¹). This study compares Altersolanol A to a panel of 34 human cancer cell lines and builds on prior findings that suggest Altersolanol A might be employed in the development of chemotherapeutics.

In 94 percent of nodal explants of one-year-old *Nyctanthes arbortristis* L. plants, rapid differentiation of numerous shoots was observed. Murashige and Skoog (MS) media supplemented with two cytokines, Benzyl adenine (BA) or Kinetin (KN), either alone or in conjunction with various auxins, indole-3-butyric acid (IBA), indole-3-acetic acid (IAA), or -naphthalene acetic acid, were used to induce and multiply shoot buds (NAA). The ideal setting for greatest regeneration response was found by experimenting with various medium, pH levels, and growth regulators. Multiple buds were formed from nodal explants, according to histological sections. Ex vitro rooting was accomplished by soaking the basal ends of micro shoots in 200 M IBA for 30 minutes before transplanting them into sterile soil rite.¹³

With an 80% survival rate, the plantlets with well-developed shoot and root systems were successfully planted in garden soil and cultivated outside in a greenhouse (Jahan et al., 2011). The orange-colored tubular calyx of *Nyctanthes arbortristis* flowers yielded the carotenoid aglycone Ag-NY1. Crocetin, the main aglycone contained in the stigma of *Crocus sativus*, was identified as the carotenoid molecule after a comprehensive spectroscopic investigation showed its structure. When compared to the equivalent glycoside crocin, the molecule had a strong membrane stabilising action (Gadgoli and Shelke, 2010).

ANTI-MICROBIAL ACTIVITY

The purpose of this study was to look into the immunomodulatory activity of aqueous extract of *Nyctanthes arbortristis* flowers (NAFE), with a focus on splenocyte proliferation and cytokine production. After immunisation with *Salmonella* antigen, antibody titers were determined by tube agglutination and indirect ELISA assay in four groups of mice: control, antigen alone, and NAFE-treated (400 and 800 mg/kg for 21 days), while cellular immunity was studied in three groups of rats (control and NAFE-treated - 400 and 800 mg/kg for 21 days). Concanavalin-A (Con-A) was used to stimulate splenocytes from untreated and NAFE-treated rats, and the optical density (OD) and stimulation index were measured.¹⁴

Nyctanthes arbortristis Linn (Oleaceae) is a well-known traditional medicinal plant used to cure a variety of infectious and non-infectious ailments throughout India. To test the antioxidative activity of a floral hydro-alcoholic extract in lymphocytes that had been subjected to oxidative stress caused by H₂O₂. The amount of reduced glutathione (GSH), as well as the activity of glutathione-S-transferase (GST) and lactate dehydrogenase (LDH), were evaluated in isolated cells treated in vitro with extract or extract+H₂O₂. Flower extract treatment of lymphocytes (50, 100, and 200 g/ ml) substantially enhanced GSH levels while decreasing GST activity. In the cell-free media, the LDH activity reduced considerably.

LDH activity in cell-free media is linked to membrane damage; lower levels of LDH activity reflect lower levels of H₂O₂-induced membrane damage. The current findings point to a protective effect for hydro-alcoholic extracts of *Nyctanthes arbortristis* flower against H₂O₂-induced membrane damage. The findings also imply that

the extract contains phytochemicals with antioxidant and radical-scavenging properties, which might be useful in antioxidant treatment (Hussain and Ramtek, 2012). The larvicidal activity of crude chloroform, dichloromethane, and methanol extracts of the leaves and roots of six Indian plants, *Eagle marvellous* L., *Balanites aegyptica* L., *Caltrops gigantic* L., *Murraya koenigii* L., *Nyctanthes arbortristis* L., and *Plumbago zeylanica* L., was tested against *Aedes aegypti* larvae in the early fourth. The flowers of *Nyctanthes arbortristis* have remarkable antibacterial activity (chloroform and ethyl acetate extracts) and considerable cytotoxic activity (petroleum ether, chloroform, and ethyl acetate extracts) against various gram-positive and gram-negative pathogens (Khatune et al., 2001). *Nyctanthes arbortristis* L. (Oleaceae), a plant commonly used in Indian traditional medicine, has been found to have hepatoprotective, antileishmanial, antiviral, and antifungal properties. Strong antigen-specific and non-specific immunity was demonstrated in mice fed with a 50 percent ethanolic extract of this plant's seeds, flowers, and leaves, as evidenced by increases in humoral and delayed type hypersensitivity (DTH) responses to sheep red blood cells (SRBC) and the macrophage migration index (MMI).

The leaves of *Nyctanthes arbortristis* are recommended by Ayurvedic physicians for a variety of fevers and painful diseases, in addition to treating sciatica and arthritis. The extract has antinociceptive efficacy similar to aspirin but did not cause morphine-like analgesia. In rats, it was also discovered to have antipyretic effect against brewer's yeast-induced pyrexia. Following oral administration of the extract for six days in rats, the extract caused stomach ulcers. The findings of this study support Ayurvedic physicians' use of this herb to treat fevers and uncomfortable illnesses (Saxena et al., 1987).

Anti-Sciatica Activity

Nyctanthes arbortristis (Harshringar, Night Jasmine) has been employed in Ayurveda, Unani, and other Indian medical systems for centuries. Various tribal communities in India have utilised the juice of its leaves to cure fevers that resemble malaria. The Anti-Sciatica activity of Harshringar leaves extract was used to guide fractionation in this study. The Anti-Sciatica activity potency of crude ethanolic Harshringar leaves extract and its HPLC purified fractions was tested and then subjected to bioassay-guided

fractionation using reverse phase chromatography to isolate active fractions. The Anti-Sciatica activity effectiveness of Harshringar crude leaves extract and some of its HPLC purified fractions was promising.¹⁵

The impact of the water-soluble fraction of the ethanol extract of *Nyctanthes arbortristis* (NAT) on tumour necrosis factor-alpha (TNF-alpha) levels in the plasma of arthritic and SpA-treated Balb/c mice was investigated.¹⁶ TNF-alpha was consistently depleted from the host plasma after oral treatment of this fraction to arthritic animals. TNF-alpha was shown to be depleted in the plasma of SpA-treated animals in a similar way. Plasma interferon-gamma levels are likewise reduced by the extract, while plasma IgM and IgG levels are unaffected. The ramifications of these findings are examined in the context of TNF-alpha treatment in clinical illnesses (Paul and Saxena, 1997).

II. CONCLUSION

Various research incorporating its pharmacological and clinical assessments support *Nyctanthes arbortristis* (Harsingar), which is commonly used in traditional medicine for a variety of diseases. The research of phytochemicals, antimicrobial, antioxidant, tissue culture, inflammatory, ethnomedicine, botanical, clinical, bioactivity, and pharmacological properties of plants was acknowledged and discovered in the aforementioned article. *Nyctanthes arbortristis* is a single source of metabolites such as alkaloids, phytosterols, phenolics, tannins, flavonoids, glycosides, and saponins that are derived from basic extracts of various portions of the plant and have shown to be effective in treating a variety of disorders. This review concludes that the time has arrived to put millennia of *Nyctanthes arbortristis* knowledge to good use through current drug development methodologies. This will encourage scientists to learn more about the Harsingar plant's great therapeutic potential, allowing the old Ayurvedic system to be established as authentic as possible.

Conflict of Interest -Nil

Source of Support -None

REFERENCES

- [1]. Agrawal, J., Pal, A. 2013. *Nyctanthes arbortristis* Linn--a critical ethnopharmacological review. J. Ethnopharmacol., 146(3): 645-58.

- [2]. Agrawal, J., Shanker, K., Chanda, D., Pal, A. 2013. *Nyctanthes arbortristis* positively affects immunopathology of malaria-infected mice prolonging its survival. *Parasitol. Res.*, 112(7): 2601-9.
- [3]. Abhishek Kumar Sah and Vinod Kumar Verma. 2012. Phytochemical and Pharmacological Potential of *Nyctanthes arbortristis*: A Comprehensive Review, *Int. J. Res. Pharmaceutical Biomed. Sci.*, Vol. 3 (1)
- [4]. Ananda Rao, T. 1947. On the occurrence of sclerosed palisade cells in the leaf of *Nyctanthes arbortristis* L. *Curr. Sci.*, 16(4):122.
- [5]. Bhosale, A.V., M.M. Abhyankar, S.J. Pawar, Khan Shoeb, Naresh patil. 2009. *Nyctanthes arbortristis*: A Pharmacognostic Review, *Res. J. Pharmacognosy Phytochem.*, 2: 91-97.
- [6]. Bharshiv, C.K., Garg, S.K., Bhatia, A.K. 2016. Immunomodulatory activity of aqueous extract of *Nyctanthes arbortristis* flowers with particular reference to splenocytes proliferation and cytokines induction. *Indian J. Pharmacol.*, 48(4): 412-417.
- [7]. Biswas, I., Ukil, S., Mukherjee, A. 2014. Determination of n-alkane constituents and their phenological variation in the epicuticular wax of mature leaves of *Nyctanthes arbortristis* L. *Nat. Prod. Res.*, 8(5): 330-2.
- [8]. Gadgoli, C., Shelke, S. 2010. Crocetin from the tubular calyx of *Nyctanthes arbortristis*. *Nat. Prod. Res.*, 24(17): 1610-5.
- [9]. Ghosh, K., Nosalova, G., Ray, S., Sivova, V., Nosal, S., Ray, B. 2015. Extracted polysaccharide from *Nyctanthes arbortristis* leaves: chemical and antitussive properties. *Int. J. Biol. Macromol.*, 75: 128-32.
- [10]. Ghosh, K., Ray, S., Bera, K., Ray, B. 2015. Isolation and structural elements of a water-soluble free radical scavenger from *Nyctanthes arbortristis* leaves. *Phytochem.*, 115: 20-6.
- [11]. Godse, C.S., Tathed, P.S., Talwalkar, S.S., Vaidya, R.A., Amonkar, A.J., Vaidya, A.B., Vaidya, A.D. 2016. Antiparasitic and disease-modifying activity of *Nyctanthes arbortristis* Linn. in malaria: An exploratory clinical study. *J. Ayurveda Integr. Med.*, 7(4): 238-248.
- [12]. Hussain, A., Ramteke, A. 2012. Flower extract of *Nyctanthes arbortristis* modulates glutathione level in hydrogen peroxide treated lymphocytes. *Pharmacognosy Res.*, 4: 230-3.
- [13]. Biswas, I.A. 2011. Mukherjee, Pharmacognostic Studies on the Leaf of *Nyctanthes arbortristis*, *Acta Botanica Hungarica*, 53(3-4): 225-234.
- [14]. Jahan, A.A., Anis, M., Aref, I.M. 2011. Assessment of factors affecting micropropagation and ex vitro acclimatization of *Nyctanthes arbortristis* L. *Acta Biol. Hung.*, 62(1): 45-56.
- [15]. Jahan, A.A., Anis, M., Aref, I.M. 2011. Preconditioning of axillary buds in thidiazuron-supplemented liquid media improves in vitro multiplication in *Nyctanthes arbortristis* L. *Appl. Biochem. Biotechnol.*, 163(7): 851-9.
- [16]. Ashwani Kumar, Beenu Rathi, Vani Tyagi, Priyanka and Manisha. 2017. Systemic Review on Anti-Sciatica Plant "Night Jasmine" (*Nyctanthes arbortristis* Linn.). *Int. J. Curr. Microbiol. App. Sci.* 6(6):1018-1035.