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A Brief Overview on the Health Benefits of *Nyctanthes arbor-tristis* Linn.- A Wonder of Mother Nature

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ABSTRACT: Ayurveda is one of the oldest systems of drugs. It principally uses plants and their extracts for treatment and management of assorted diseases. *Nyctanthes arbor-tristis* Linn.(NAT) is documented Indian ancient plant that has high medicative worth in Ayurveda. It's popularly called Parijat or Harsingar principally found in southern elements of Asian nation & Nepal etc. Phytochemicals like flavanol organic compound, oleanic acid, essential oils, phenol, carotene, friedeline, lupeol, glucose, benzoic acid have been reported for vital hepatoprotective, anti-allergy, antianxiety, anti-filarial, antianemia, antidiabetic, antimalarial, antibacterial, anti-inflammatory, anticancer activities. Each a district of the plant has some specific healthful price and is so commercially exploitable. Thus, it's thought of as a valuable supply of some distinctive medicative, merchandise formation against numerous diseases. The descriptions of scientific classification, family and genus characters, vernacular names, habitat, morphology, ancient medicine, therapeutic use etc. are richly mentioned throughout this criticism.

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INTRODUCTION

Nyctanthes arbor-tristis Linn. (*Oleaceae*) is popularly known as 'Night Jasmine' (English) or 'Harsinghar' (Hindi) due to the fact that its flowers emit a very strong and pleasant fragrance during the whole night [1,2]. The flowers start falling after midnight and by the day break, the plant appears dull. The generic name 'Nyctanthes' has been coined from two Greek words 'Nykhta' (Night) and 'anthos' (flower) [3,4]. The specific name 'arbor-tristis' meaning 'the sad tree' is supposedly derived from dull looks of the tree during daytime [5]. It is a traditional ethno-medicinal plant found not only in India but also in Asia [6]. Night Jasmine is the official flower of the state of **West Bengal**, **India**, and for **Kanchanaburi province**, **Thailand.** The plant lives for 5-20 years. The leaves, flowers, bark, fruits and seeds of the plant all have diverse pharmacological qualities and are employed in alternative systems of medicine like ayurveda, siddha and unani. The entire plant as well as individual sections are utilized as herbal medicine for arthritis, malaria, spleen enlargement, sciatica and blood purification. **In China**, the leaf parts are used for **quadriplegia gall, dysentery, and bellyache.** So, most of the drugs used in primitive medicine were obtained from plants and are the earliest and principle *N. arbor-tristis* source of medicines [7,8]. The current review study will provide basic information on the chemical ingredients of this plant as well as its pharmacological activity. *N. arbor-tristis* is a sub Himalayan plant that grows wild from Nepal to Chenabs, Burma Assam, Central India, Bengal, Rajasthan, Madhya Pradesh, Chhotonagpur and south to Godavari [9].

PHARMACOGNOSTIC DETAILS

Taxonomic details

The genus *Nyctanthes* belongs to the species of *arbor tristis* linn. is a flowering plant lies under the family of Oleaceae, kingdom of Plantae, Division of Magnoliophyta, Class of Magnoliopsida and Order of Lamiales [5].

Common name

Coral Jasmine, Night Jasmine, Harsingar, Tree of Sorrow [5].

VERNACULAR NAMES

The plant is named in different languages as below:

Like in Sanskrit it's called as Parijatha, in Hindi as Harsingar, in Ayurvedic sastra as Paarijaata, Shephaali, Shephaalikaa, Mandaara, in many English literature it's mentioned as Tree of Sorrow, Night Jasmine, Coral Jasmine, in Bengali called as Harsingar, Sephalika, Seoli, Sheoli, Parjatamu in Telegu, ManjatpuPavelam in Tamil and so on [10].

SYNONYMS OF PARIJAT

Parijat is known by several names in several classics. It's totally different synonyms are indicative of it's physical properties like color, fragrance likewise as use of flower and leaves. Different synonyms are Parajataa, hara-singhara, sephali, raga-pushpi, kahrapatrak, sephalika, pushpaka, nala-kumkuma, prajakta, rakta-kesara [11].

SIGNIFICANCES OF SYNONYMS

Raaga-pushpi : Its flowers have very beautiful and attractive colours.
Shephalika : Many honey bees reside on this tree.
Khara-patraka : Its leaves are rough texture.
Naala-kukuma : Corolla tube is orange in color.
Hara-singhaara : Lord Hari is decorated by Parijat pushpa.
Rakta-kesara : Red color corolla [12].

1. DISTRIBUTION

It thrives well in dry hill slides and deciduous forest. It's native to southern Asia, it grows at sea level up to 1500 m altitude among wide range of rainfall patterns and seasons. In Asian country it grows in Himalayas, Jammu and geographical area, East Assam, state, Tripura and Godavari [5].

2. MORPHOLOGY

- *Nyctanthes arbor-tristis* might be a huge ligneous plant growing 7-10 meters tall, with polygon branches.
- Bark is rough & flaky gray in color.
- The leaves area unit rough and furry.
- Flowers area unit organized in clusters at the ideas of branches or within the axils of the leaves.
- The flowers area unit sweet-smelling, sessile, having bell formed coil.
- White coil with an orange centre. Fruits area unit brown and heart formed [13].

3. CLIMATIC FACTORS

The plant well thrives in loamy soils and semi-shady areas, requiring the pH scale 5.6-7.5 [6].

4. FLOWERING SEASON

September-October [5].

5. SIGNIFICANCE OF PLANT IN MYTHOLOGY

Historically the flowers area unit gathered for religious offerings and to make garlands. Mythological story reveals that, the drug Parijat might be a heavenly tree delivered to earth by Lord Krishna. A quarrel over it ensued between Satyabhama and Rukmini, Krishna's wives. But Krishna planted the tree in Satyabhama's courtyard in the only way, that when the tree patterned, the flowers fell in Rukmini's grounds. The orange heart is used for coloring silk and cotton, this observation was started with Buddhist monks whose orange robes got their color by this flower. The Parijat is regarded in Hindu mythology together of the five wish-granting trees of Devaloka [14,15].

6. PHILOLOGY

Philology of Parijat is "Paarinaha Samudrath jaatho va parijatah":- it's referred to as Parijata or Parijat, due to it's origin from samudra (Ocean) as a results of (parinaha) thorough looking [16].

7. BOTANICAL SYNONYMS

- *Bruschia macrocarpa* Bertol.
- *Nyctanthes dentata* Blume,
- *Nyctanthes tristis* Salisb.
- *Parilium arbor-tristis* (L.) Gaertn.
- *Scabrita scabra* (L.),
- *Scabrita triflora* (L.) [5]

USES OF *Nyctanthes arbor-tristis* Linn.

A. Different medical uses represented in modern literatures

- **Flowers**

The flowers are used as stomachic, carminative, astringent to bowel, antibilious, expectorant, hair tonic and in the treatment of piles and various skin diseases and in the treatment of ophthalmic purposes. The bright orange corolla tubes of the flowers contain a coloring substance nyctanthin, which is identical with ά-Crocetin from Saffron. The corolla tubes were formerly used for dyeing silk, sometimes together with Safflower or turmeric.

- **Stems**

Traditionally the powdered stem bark is given in rheumatic joint pain, in treatment of malaria and also used as an expectorant. The bark is used for the treatment of snakebite and bronchitis. The stem bark pounded with Zingiber officinale and Piper longum is boiled in water and the resultant liquid is taken for two days for the treatment of malaria. The resulting paste on mixing with Arjuna bark is rubbed on the body to treat internal injury and for joint broken bones.

- **Leaves**

The leaves of *Nyctanthes arbor-tristis* Linn are used extensively in Ayurvedic medicine for the treatment of various

diseases such as sciatica, chronic fever, rheumatism, and internal worm infections, and as a laxative, diaphoretic and diuretic. Leaves are used in cough reduction. Leaf juice is mixed in honey and given thrice daily for the treatment of cough. Paste of leaves is given with honey for the treatment of fever, high blood pressure and diabetes. Juice of the leaves is used as digestives, antidote to reptile venoms, mild bitter tonic, laxative, diaphoretic and diuretic. Leaves are also used in the enlargement of spleen. The leaf juice is used to treat loss of appetite, piles, liver disorders, biliary disorders, intestinal worms, chronic fever, obstinate sciatica, rheumatism and fever with rigors. The extracted juice of leaves acts as a cholagogue, laxative and mild bitter tonic. It is given with little sugar to children as a remedy for intestinal ailments.

- **Seeds**

The seeds are used as anthelmintics and in alopecia. It is antibilious and an expectorant, and is also useful in bilious fevers. The powdered seeds are used to cure scurfy affections of scalp, piles and skin diseases [17].

B. Different alternative industrial uses of the Plant

- **Essential oil:** The essential oil in fragrant flowers, which are similar to the oil in jasmine, is used as perfume.
- **Dyestuff:** domestically the dye is additionally used for coloring fabric and as an inexpensive substitute for saffron in coloring the robes of Buddhist clergymen.
- **Timber:** The wood is sometime used for boarding and creating basket.
- **The bark** used as a tanning material and also **the Leaves** sometime used for polishing wood and the ivory.
- **Fuel:** The wood is typically used as fuel.
- **Boundary/Barrier/Support:** it's additionally -planted in hedges [18,19].

CHEMICAL CONSTITUENTS

Following chemical constituents are found in Parijat-

- **Leaves**

Leaves contain D-mannitol, β-sitosterol, Flavanol glycosides, Astragaline, Nicotiflorin, Oleanolic acid, Nyctanthic acid, Tannic acid, Ascorbic acid, Methyl salicylate, Amorphous glycoside, Amorphous resin, Trace of volatile oil, Carotene, Friedeline, Lupeol, Mannitol, Glucose, Fructose, Iridoid glycosides, Benzoic acid.

- **Flowers**

Flowers contain Essential oil, Nyctanthin, d-mannitol, Tannin, Glucose, Carotenoid, Glycosides, β-monogentiobioside ester of α-crocetin (or crocin-3), β-monogentiobioside, β-D monoglucoside ester of α-crocetin, β-digentiobioside ester of α-crocetin (or crocin-1).

- **Seeds**

Seeds contain arbortristoside A & B, glycerides of linoleic acid, oleic acid, lignoceric acid, stearic, palmitic & myristic, nyctanthic acid, 3-4 secotriterpene acid a water soluble polysaccharide made up of D Glucose & D Mannose.

- **Bark**

Bark contains Glycosides and alkaloids.

- **Stem**

Stem contains Glycoside-naringenin-4-0-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 [20].

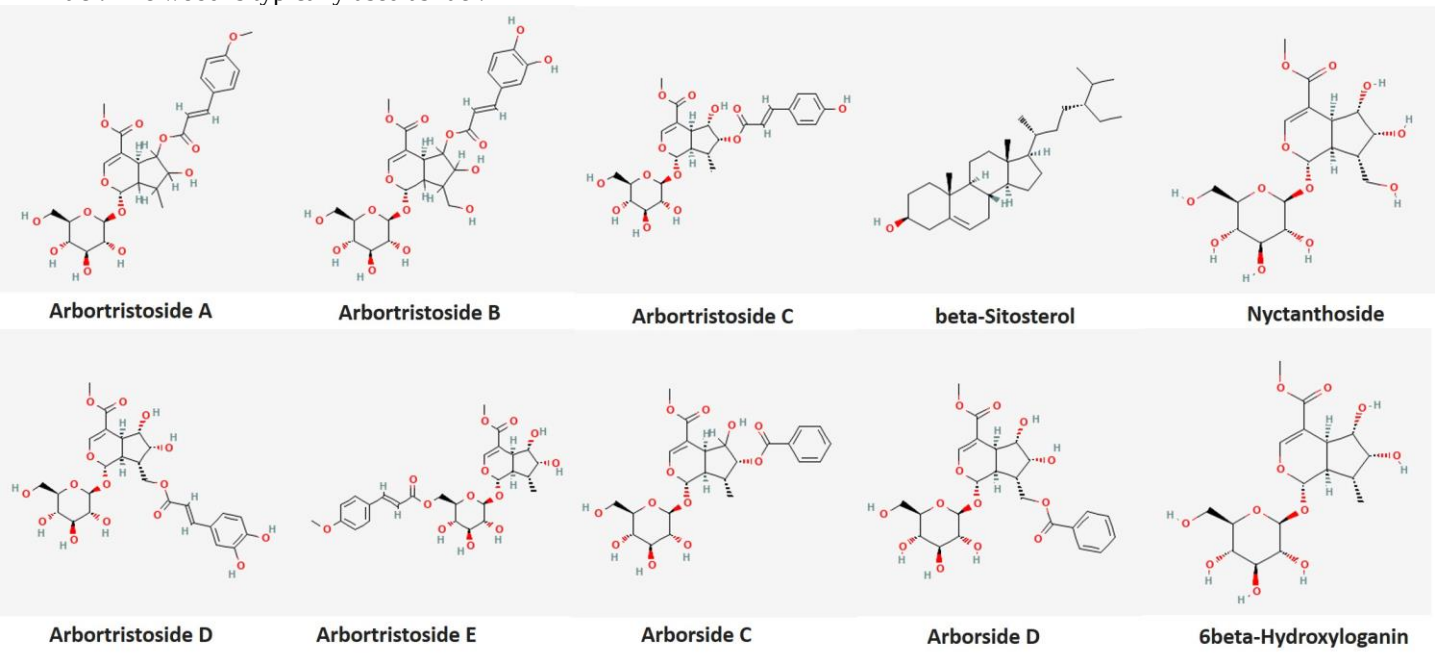

Fig 1: Structures of different phytochemicals of *Nyctanthes arbor-tristis* linn.(Structure source from PubChem)

THERAPEUTIC USE

Totally different Acharyas have delineated different use of Parijat, conjointly it's used as associate degree ingredient of the many compound formulations. The details of it's use in keeping with totally different texts are given below-

Used part, dose and dosaghnata

Sometimes leaf, root, flower and seed of Parijat are utilized in totally different dose kind, like juice, powder, stewing etc. for numerous diseases conditions. It's specifically wont to pacify the diseases occurring thanks to nullification of vata and kapha [11].

Dose of Parijat is totally different as per the various dose kind like

- For swarasa (juice):- 10-20 ml
- For churna (powder):- 1-3 g
- For kwatha (decoction):- 50-100 ml [21]

Use of specific dose sort of Parijat in numerous disease

There are some specific use of various dose sort of Parijat with modification in anupana (vehicle), are mentioned below-

- Patra swarasa (leaf juice) with madhu (honey) is employed in Jeerna jwara (chronic fever) and with loha-bhasma utilized in pandu (anemia), yakrit & pleeha vriddhi (hepatobilliary diseases).
- A stewing of the leaves is usually recommended specifically for obstinate neuralgy.
- In Susrutha Vedic literature the panchanga kwatha of this drug is mentioned within the context of udaka-meha (chyluria).
- In Sushruta Vedic literature, Parijat, Ikshuraka and Apamarga at the side of Kshara-taila is mentioned within the context of Pleehodara treatment.
- In Sushruta Vedic literature, the taila ready out of Parijat twak (bark) is mixed with kanji (rice gruel) and saindhava (rock salt) to prepare a particular sort of anjana (a dose form wont to apply in sclerotic coat a part of eye). This anjana is useful just in case of various netrarogas and shoola (pain in eye and in numerous eye diseases).
- The tender leaves of Parijat, Ardraka swarasa (ginger juice) and madhu (honey) along with loha bhasma is useful is case of Pandu (anemia).
- In Bhava prakasha nighantu the intake of ksheera (cow's milk), ghrita (cow's ghee) and sharkara (sugar) ar used as anupana (vehicle) throughout the intake of bound preparations created from Parijat.
- In Bhavaprakasha nighantu, patra swarasa (leaf juice) and sharkara (sugar) is indicated in context of krimi (worm infestations).
- In Bhavaprakasha nighantu the churna prepared out of bark at the side of pepper vine leaves, 3 to four times in a very day, is indicated just in case of kasa (cough) and swasha (breathless ness/bronchial tree diseases) [22].

Different Biological & Nutritional Components of Night Jasmine Leaves[Table 1][Fig 2]

Table 1 Biological & Nutritional components with its value

SL. No	Biological & Nutritional components	Result
1.	Color	Dark green
2.	Appearance	Viscous semi solid substance
3.	Moisture	50.01%
4.	Ash	13.98%
5.	Lignin	15.87%
6.	Crude fiber	9.41%
7.	Fat	2.10%
8	Protein	15.02%
9.	Carbohydrate	9.48%
10.	Acid value	76.27
11.	Iodine value	134.44 [23]

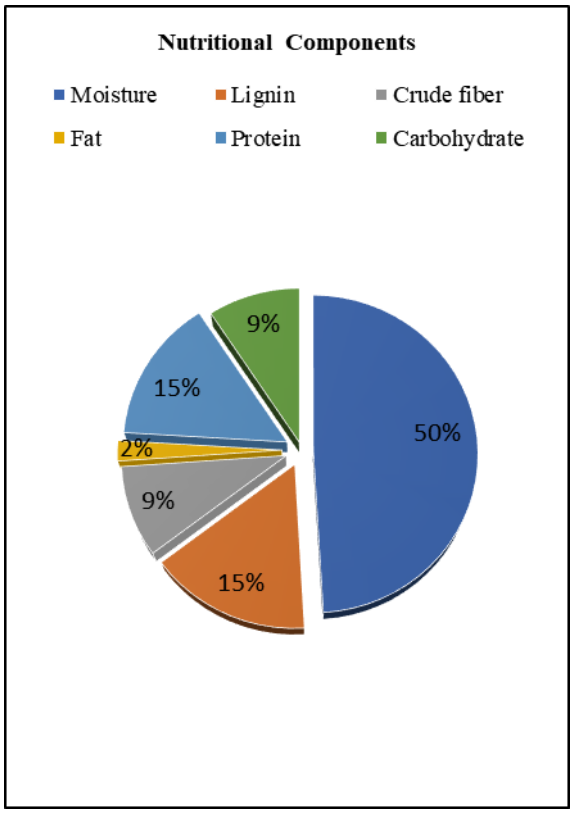

Fig 2: Nutritional components of *Nyctanthes arbor-tristis* Linn.

MODERN PHARMACOLOGICAL PROPERTIES

Due to presence of several chemicals and phytochemicals, it's a several pharmacologic actions like opposing allergic, medication, opposing Anxiety, Sedative, Anti-filarial, bactericide,

Antioxidant, opposing cancer, opposing diabetic, opposing Ane mic, Hepatoprotective and Anti-malarial etc.

1. Anti-Allergy activity

The pretreatment of guinea pigs exposed to amino-alkane aerosol with a water soluble portion of the alcoholic extract of *N. arbor-tristis* leaves offered important protection against the event of physiological condition. Arbortristoside A and arbortristoside C square measure gift in *N. arbor-tristis* were reported to be anti-allergic [24].

2. Anti-anxiety

Hydroalcoholic extracts of *N. arbor-tristis* (NAT) have anxiolytic potential. Victimization hydro-alcoholic mixture, dried plant elements of *N. arbor-tristis* was extracted, targeted by distilling off the solvent and so gaseous to condition on the water bathtub and so hold on in an exceedingly air tight instrumentality in refrigerator until used [25].

3. Anti-Inflammatory activity

The extracts of the *Nyctanthes arbor-tristis* contains important quantity of flavonoids that vie an honest judge parameter in the reduction of the inflammation and so reducing leg gait. The water soluble fraction of the grain alcohol extract considerably reduced acute inflammation within the genu of rats evoked by the turpentine oil gift within the flowers [26].

4. Sedative activity

Sedative potential of flowers was examined in rats. Male rats exhibited dose- dependent aware whereas the feminine rats stay unaffected [27].

5. Anti-Filarial activity

The chloroform extract of the flowers and a pure compound isolated from *N. arbor-tristis* plant exhibit larvicidal activity against mosquito, a standard nematode vector [28].

6. Anti-Bacterial activity

Infectious diseases square measure world's leading explanation for premature death. Resistance to antimicrobial agents is conferring in an exceedingly wide range of pathogens and multiple drug resistance is turning into common in various organisms like *Staphylococcus aureus, Staphylococcus epidermis, Salmonella typhi, Salmonella paratyphi A*. In a study, it had been reported that methanolic extract of leaves of *N. arbor-tristis* exhibited important bactericide activity against *Staphylococcus aureus, Staphylococcus epidermis, Salmonella typhi, Salmonella paratyphi A* with MIC worth move between 1-8 mg/ml . The zone of inhibition and Minimum repressive Concentration (MIC) of the extracts were determined and compared with the quality medication antibiotic drug and fluconazole. The chloroform extract was found to own each bactericide and antifungal activity whereas the fossil fuel ether and grain alcohol extracts hold solely bactericide activity [29].

7. Anti-Cancer activity

Fruit, leaf and stem methyl alcohol extracts of N. arbort-ristis were tested for in vitro malignant neoplasm activities. Moderate activity was determined at 30mg/ml conc. with seventy one inhibition of dried *N. arbor-tristis* leaf methyl alcohol extract and least repressive activity was determined at 10mg/ml conc. With eighty six inhibition of carcinoma cell lines freed from pathogens. A high degree of against human carcinoma cell lines (MDA-MB 231) was determined with *N. arbor-tristis* edible fruit methyl alcohol and therefore the IC50 values were calculated to be 9.72mg and 13.8mg. The phyto-chemicals isolated from *N. arbor-tristis* edible fruit methyl alcohol square measure glycosides, tannins, phenols and steroids and square measure expected to be chargeable for this malignant neoplasm activity [30].

8. Anti-Diabetic activity

The anti-diabetic activity of methyl alcohol extract of root of *N. arbor-tristis* is admired that of diabetic management animals. The extract poses safe and powerful anti-diabetic activity. The extract was ready by extracting 50g root powders with 400µl of methyl alcohol for eighteen hours by hot continuous extraction methodology. The methanolic extract was filtered and divided by victimization fossil fuel ether to get rid of impurities. The solvent was gaseous besieged and dried in vacuum. The dried extract *N. arbor-tristis* so obtained was used for the assessment of hypoglycemic activity. It reduces glucose level once seven days at the 500mg/kg in rats compare with normal drug. It had been found that methanolic extract of *N. arbor-tristis* roots were more practical in reducing the glucose level compare to the quality drug [31].

9. Anti-Malarial activity

Clinical study on one hundred twenty patients of protozoal infection. Administration of contemporary paste of medium sized five leaves of *N. arbor-tristis* thrice daily for 7-10d has cured the unwellness in ninety two (76.7%) patients at intervals seven days. Alternative twenty patients were cured by ten days whereas the remaining eight patients failed to reply to the treatment. The paste was well tolerated and no severe aspect effects were reported. Screening of methyl alcohol and chloroform extract of leaves for dipteron larvicidal activity against three major dipteron vectors *Aedes aegypti*, mosquito and genus *Anopheles stephensi* has found the 2 extracts to kill larvae of *A. stephensi* with LC50 values of 244.4 and 747.7ppm, severally [32,33].

10. Anti-Anemic activity

A research was performed as hematological study on the ethanolic extracts of the flowers, barks, seeds and leaves of the plant and detected the dose dependent rise in hemoglobin content and red blood cells count in rats. The extracts conjointly shield the decline of hemogram profile in anemic rats [34].

11. Hepato-protective activity

The liquid extracts of the leaves and seeds of *N. arbor-tristis* were found to own anti-hepatotoxic activity against perchloromethane (CCl4) evoked hepatotoxicity. Further, it had been established that the alcoholic and liquid extracts showed vital hepatoprotective activity by reducing the degree of SGPT (serum glutamic pyruvic transaminase), SGOT (serum glutamic oxaloacetic transaminase) and blood serum animal pigment (total and direct). The results were supported by histopathological studies of liver samples that showed regeneration of hepatocytes by the extracts [35].

12. Anti-Oxidant activity

The radical scavenging potential of the various extracts of leaves of *N. arbor-tristis* was evaluated in-vitro by using diphenyl-picryl-hydrazyl (DPPH) assay methodology. The plant extracts reacted with DPPH, that could be a stable radical and regenerate it to 1,1-diphenyl -1,2-picryl, reducer that was measured at 517 nm. The scavenging result of plant extracts and normal (ascorbic acid and BHT) on the DPPH radical decreases within the following manner: antioxidant > alcohol > ester > BHT > Pet ether, and it had been found to be 93.88% for antioxidant at concentration of 10 mg, for BHT, Butanol, ester and Pet ether was found to be 97.42 %, 95.22%, 84.63% and 82.04% at concentration of a 100mg severally. During this investigation completely different extract of *N. arbor-tristis* leaves possess concentration dependant radical scavenging activity [36,37].

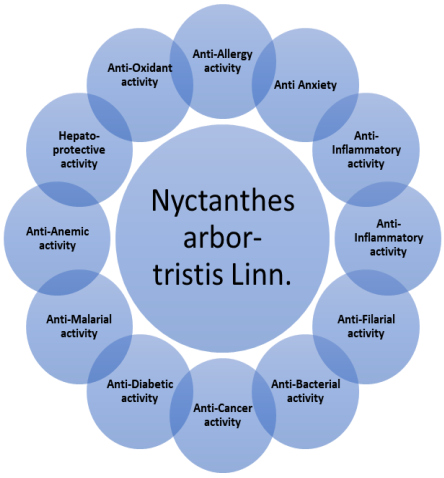

Fig 3: Pharmacological properties of *Nyctanthes arbor-tristis* Linn.

TOXICITY

Nyctanthes arbor-tristis has shown cytotoxic result of ethanolic extract of leaves in rats. The median dose (LD) 16 g/kg was discovered in rats. No mortality was at a pair of 2.0 g/kg whereas seventy fifth mortality was seen at a 32 g/kg dose. Associate degree administration of plant product extract of the leaves (1, a pair of and 4 g/kg/d) orally for six consecutive days is created stomachic ulcers in rats. This extract conjointly showed thorn effects because it, dose-dependently, the formation of unformed semi-fluid collagenic pasty stools in unusual person mice as a result of a purgative result. Once extract instilled into the rabbit's eye created lump, whereas the one who grounded the dried leaves developed vesicles on each palms [13].

PROPAGATION & MANAGEMENT

Night Jasmine is definitely propagated by seeds or semi-hardwood cuttings. It coppices promptly & isn't browsed by goats or cows. Seedlings raised in April are transplanted in May/June. It grows to a height of 2m by August and flowering starts in September/October of an equivalent year. The frozen cutting grow in pots conjointly provide flowers. Being propagate-on by cutting/grafting becomes necessary to bear on the fascinating variations hand-picked from an oversized plant population [38]. For propagation through seeds, the seed heads have to be compelled to dried on plants to get rid of and collect seeds. Propagation from seed is unreliable because of poor germination and death of the many young seedlings underneath natural conditions [19]. Thus efforts have to be compelled to be directed to propagate this plant mistreatment different approaches, like tissue culture techniques.

CONCLUSION & FUTURE PROSPECTS

Night Jasmine has been used for various medical additionally as domestic functions since a lot of than hundred years, because of it's broad spectrum use in health management. It's delineate altogether most all ancient literatures relating to it's identification, morphology, sources, handiness, dose and therapeutic use. For exploring it's therapeutic and bio medical utility the present botanic and different modern literatures reviewed and really helpful materials are found like chemical constituents, scientific classification and morphology, habit and environment, therapeutic and industrial use etc. The plant is well tolerated in giant vary of atmospheric condition thus the plant extends from northern Asian nation and southern Kingdom of Nepal through northern Bharat and south east to Thailand and conjointly in different components of the planet. As per the traditional materia medica, because of tikta rasa, ushna virya and laghu guna it's employed in kapa vitiated diseases, because of ushna virya it's employed in vata diseases, conjointly because of tikta rasa it causes assuasive of the amadosa and excess jathara-pitta (gastric acids), successively vital sign is reduced. Curlicue is generally used for industrial functions compared to different components of the plant. On chemical and phytochemical analysis it's found that, the plant contains several active principles additionally as completely different bio-markers. B-Sitosterol, nyctanthic acid, tannin, lenoliec acid, D-mannitol and oleic acids square measure richly found in leaves, is also answerable for it's high effectivity. Multi active ingredients gift in several components of the plant is

also the reason behind it's broad spectrum therapeutic use. It's established that lenoleic acid which is an essential fatty acid have medicament result. Over all Night Jasmine (*Nyctanthes arbor-tristis* Linn.) may be a vital flavored drugs currently and so.

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CONFLICTS OF INTEREST

There is no conflict of interest.

DATA AVAILABILITY

Nil

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