

**A REVIEW ON ANTI-INFLAMMATORY ACTIVITY OF VITEX NEGUNDO LINN ROOT ON ETHANOLIC EXTRACT**Rohit R. Eklare*¹, Aishwarya D. Bondhare², Sanyuja B. Borkar³ and Prajwal D. Chakole⁴¹Assistant Professor, Department of Pharmaceutical Chemistry, Saraswati Institute of Pharmacy Kurtadi, Hingoli 431701.^{2,3,4}Final Year B. Pharm, Saraswati Institute of Pharmacy Kurtadi, Hingoli.

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Vitex negundo linn is large aromatic shrub distributed throughout India. Herbal medicine, rather than merely curing particular disease, aims at returning the body back to its natural state of health. Many traditionally used plants hold importance in modern days medical regimen as they have been proved scientifically to possess various activities which are desirable. Vitex negundo belonging to the family verbenaceae growing in moist or along with water courses. Phytochemical investigation shows the presence of flavonoids, essential oils, flavonoid glycosides, terpenes, lignans, stilbene derivative and iridoid glycosides and possesses enormous, anti-inflammatory, antioxidant, analgesic, antibacterial, antitumor, anti-arthritis. The ethanolic extract of vitex negundo roots was screened for phytochemical analysis and revealed the presence of all components. The adult rats were divided into four groups of six each and maintained under ideal laboratory conditions. Group I was taken as control and group II treated with the standard drug Indomethacin (10 mg/kg), the ethanolic extract of vitex negundo root 200 mg/kg and 400 mg/kg were fed to group III and IIII. The higher dose group of vitex negundo root extract (400 mg/kg) were revealed more activity than their corresponding lower dose.

KEYWORDS: Medicine, Phytochemicals, Pharmacological, Anti-inflammatory, Extract, Dose.**INTRODUCTION**

Vitex negundo Linn., family Verbenaceae is known to possess several medicinal values so that highly cultivated for commercial purposes. The leaves, roots, fruits, and seeds have been extensively investigated by many scientists and reported that they possess hepatoprotective, antioxidant property, anti-inflammatory, anticancer and antioxidant properties.^[1] The leaves extract are generally used in headache, skin affections, wounds, swelling in joints, asthmatic pains, acute rheumatism, male and female sexual problems, and also used in the inflammation of the epididymis (testicular tube that stores and carries sperm) and orchitis (inflammation of testicles).^[2] Sindhuvaram, Sinduya, Sugandhika, Surasa, Suvaha, Sinduka, Sephalika, Shvetasurasa, Svetapuspa, Shephali, Indrasura, Indranika.^[3] Traditionally it is used as vermifuge, in headache, catarrh, acute rheumatism, expectorant, fever, sinusitis.^[4] Medicinal plants have been a major source of therapeutic agents since ancient times to cure human disease. The revival of interest in natural drugs started in last decade mainly because of the wide spread belief that green medicine is healthier than synthetic products. Nowadays, there is manifold increase in medicinal plant based industries due to the increase in the interest of use

of medicinal plants throughout the world which are growing at a rate of 715% annually. Despite the major advances in the modern medicine, the development of new drugs from natural products is still considered important.^[5] It is found in moist area, often on banks of rivers throughout India, up to an altitude of 1500 meter also grown in Mediterranean countries and Central Asia. Various medicinal properties are attributed to it particularly in the treatment of anti-inflammatory, fungal diseases, antioxidant and hepatoprotective disorders.^[6,7]



Fig. 1&2 Vitex Negundo Linn Leaves & Roots.

Taxonomic / Scientific Classification

Kingdom - Plantae - Plants
 Sub Kingdom - Tracheobionta - Vascular plants
 Super Division - Spermatophyta - Seed plant
 Division - Magnoliophyta - Flowering Plant
 Class - Magnoliopsida - Dicotyledons
 Sub Class - Asteridea
 Order - Lamiales
 Family - Verbenaceae
 Genus - Vitex linn
 Species - *Vitex negundo* Linn. (Chaste tree)

Vernacular Names

Telugu: Vaavili
 Tamil: Nirkundi, Vellai-nochi
 Hindi: Shivari, Nirgundi
 Malayalam: Vellanocchi, Indranee, Karunacci
 Kannada: Nkkilu, Lakkigida, Nekka, Nakkigida
 Punjab: Shwari
 Assam: Aslok
 Bengal: Nirgundi, Nishinda
 English: Five leaved chaste tree
 Gujarati: Nagod
 Marathi: Nirgundi
 Punjabi: Sambhalu, Banna
 Sanskrit: Nirgundi.^[8]

Pharmacological properties of Sinduvara according to Ayurveda

Rasa Katu (pungent),
 Tikta (bitter)
 Guna Laghu (lightness),
 Ruksha (dry)
 Virya Ushna (hot)
 Vipaka Katu (pungent)
 Doshakarma Kapha-Vata Shamaka.^[9]

Morphology: A large shrub or sometimes a small slender tree; bark thin, grey; branchlets quadrangular, whitish with a fine tomentum. Leaves 3-5 foliate; leaflets lanceolate, acute, the terminal leaflet 5-10 by 1.6-3.2 cm. with a petiole 1-1.3 cm. long, the lateral leaflets smaller with a very short petiole, all nearly glabrous above, covered with a fine white tomentum beneath, base

acute.^[12] The root is considered tonic, febrifuge and expectorant. The leaves are aromatic, tonic and vermifuge. A decoction of Nirgundi leaves is given with the addition of long pepper in catarrhal fever with heaviness of head and dullness of hearing. The flowers are useful in diarrhoea, cholera, fever, hemorrhages, hepatopathy and cardiac disorders. Leaves and bark are useful in scorpion stings, seeds are considered useful in eye diseases in form of anjan.^[14]

Taxonomy: The Vitex is derived from the Latin word 'vicio' meaning to tie or bind because of the flexible nature of its stems and twigs.^[9] The taxonomy of the plant is as follows;

Kingdom: Plantae (extinct plants)
 Subkingdom: Tracheobionta (lignified tissues or xylem)
 Superdivision: Spermatophyta (produce seeds)
 Division: Magnoliophyta (flowering plants)
 Class: Magnoliopsida (embryo with paired cotyledons)
 Subclass: Asteridae
 Order: Lamiales
 Family: Verbenaceae
 Genus: Vitex L.
 Species: *Negundo*.^[10]

Distribution: The plant is found throughout India, Ceylon- Afghanistan, tropical Africa, Madagascar, China and Philippines.^[10] The plant occurs in Bengal, Southern India and Burma also.^[11] It is common in waste places around villages, river banks, moist localities and in the deciduous forests.^[12] It is common throughout India from coastal belt to subtropical Western Himalayas and Andaman Islands, abundant in drier zones. It is particularly found in Karnataka and Tamilnadu (Wild as well as cultivated).

Phytochemical constituents: The aqueous extract of *Vitex negundo* leaves contains Aucubinaginaside, Alkaloids: Nishindine, Hydrocotylene, Glyoflavonoids, Orientin, Isoorientin, 5-Hydroxy, 3,6,7,31,41 pentamethoxy flavone. The essential oil of fresh leaves, flowers, and dried fruits δ -guaiene contain guaia 3,7 dienecaryophyllene epoxide; ethyl-hexadecenoate; α -selinene; germacren-4-ol; caryophyllene epoxide; (E)-

nerolidol; β -selinene; α -cedrene; germacrene D; hexadecanoic acid; p-cymene and valencene. The seeds contain hydrocarbons such as n-tritriacontane, n-hentriacontane, n-pentatriacontane and nonacosane.^[9]

Other constituents of the seeds include β - sitosterol, 5 hydroxybenzoic acid and 5 oxyisophthalic acids (Table 1 and 2).^[16]

Table 1: Chemical constituents from different parts of the *Vitex negundo* plant.

Sr. No.	Part of Plant	Chemical Constituents
1.	Leaves	vitamin-C, artemetin, terpinen-4-ol, α -terpineol, sabinene, globulol, spathulenol, β -farnesene, farnesol, carotene, casticin, 5-hydroxy-6,7,8, 4'-tetramethoxy (gardenin B), linalool, stearic acid, 5-hydroxy-3,6,7,3', 4'-pentamethoxy flavone, 5-hydroxy-3,7,3', 4'-tetramethoxy flavones, betulinic acid, ursolic acid.
2.	Seeds	β -sitosterol, p-hydroxybenzoic acid and 5-oxyisophthalic acid, artemetin, vitedoin A, vitedoamine A, vitedoin B, 2 β ,3 α - diacetoxyoleana-5, 12-dien-28-oic acid, 3 β -acetoxyolean-12-en-27-oic acid n-tritriacontane, n-hentriacontane, n-pentatriacontane, β - sitosterol.
3.	Stem and bark	3,6,7,3',4'-Pentamethoxy-5-Oglucopyranosylrhamnoside, vitexin cafeate, 4'-O-methyl myricetin- 3-O-[4'-O- β -D-galactosyl]- β -D-galactopyranoside, β -amyrin, epifriedelinol and oleanolic acid, p-hydroxybenzoic acid, β -sitostero.
4.	Roots	Vitexin and isovitexi, Vitexoside, negundin A, negundin B, 6-hydroxy-4-(4-hydroxy-3-methoxy)-3-hydroxymethyl-7-methoxy-3,4- dihydro-2-naphthaledehyde, 2 β ,3 α -diacetoxyoleana-5,12-dien-28-oic acid.



Fig. 3.4: Vitex negundo plant & flowers with leaves.

Pharmacological evidence: Demands of the scientific community have necessitated experimental evidence to further underline the medicinal importance of *Vitex negundo* Linn. described above. Take cue from these traditional and folk systems of medicine, scientific studies have been designed and conducted in order to pharmacologically validate these claims.

The decoction of leaves is used for treatment of inflammation, eye disease, toothache, leucoderma, enlargement of the spleen, ulcers, cancers, catarrhal fever, rheumatoid arthritis, gonorrhoea, sinuses, scrofulous sores, bronchitis and as tonics. As vermifuge, lactagogue, antibacterial, anti- pyretic, antihistaminic, analgesic, insecticidal, ovicidal, growth inhibition and morphogenetic agents. antigenotoxic, antihistamine, CNS depressant activity and anti-fertility effects were reported from the leaves of *Vitex negundo* Linn.^[17]

1] Anti-inflammatory activity: The sub-effective dose of *Vitex negundo* Linn. potentiated

antiinflammatory activity of phenbutazone and ibuprofen significantly in carrageenin induced hindpaw oedema and cotton pellet granuloma models. The potentiation of anti-inflammatory activities phenbutazone and ibuprofen by *Vitex negundo* Linn. indicates that it may be useful as an adjuvant therapy along with standard anti-inflammatory drugs. Yunos et al. and Jana et al. established antiinflammatory properties of *Vitex negundo* Linn. extracts in acute and sub-acute inflammation which are attributed to prostaglandin synthesis inhibition.^[18,19]

2] CNS depressant activity: A methanolic extract of the leaves of *Vitex negundo* Linn. was found to significantly potentiate the sleeping time induced by pentobarbitone sodium, diazepam and chlorpromazine in mice.^[20]

3] Anticonvulsant activity: Maximal electro shock seizures (MES) in albino rats and pentylenetetrazole (PTZ) induced seizures in albino mice were used to study anticonvulsant activity of *Vitex negundo* Linn. leaf

extract. The test drug dose (1000 mg/kg, p.o) showed 50% protection in clonic seizures and 24-hour mortality against PTZ induced seizures. It also decreased number and duration of convulsions significantly. *Vitex negundo* Linn. Potentiated anticonvulsant activity of valproic acid. The anticonvulsant activity of *Vitex negundo* Linn. Has not been found equally effective with standard drugs. Moreover, the potentiation of diphenylhydantoin and valproic acid by *Vitex negundo* Linn. indicates that it may be useful as an adjuvant therapy along with standard anticonvulsants and can possibly lower the requirement of diphenylhydantoin and valproic acid.^[21]

4] Antifungal activity: Bioactivity guided fractionation of ethanolic extract of leaves of *Vitex negundo* Linn. resulted in the isolation of new flavone glycoside along with five known compounds. All the isolated compounds were evaluated for the antimicrobial activities. The new flavone glycoside and compound 5 were found to have significant antifungal activity against *Trichophyton mentagrophytes* and *Cryptococcus neoformans* at MIC 6.25 µg/ml.^[22]

5] Antioxidant Activity: The antioxidant potency of *Vitex negundo* Linn. was investigated by all the fractions of *Vitex negundo* Linn. exhibited a potent scavenging activity for (2, 2'-azino-bis 3-ethylbenzothiazoline-6-sulfuric acid) ABTS radical cations in a concentration dependent manner, direct role in trapping free radicals. The polar fractions of *Vitex negundo* Linn. possess potent antioxidant properties. Tandon and Gupta have also reported similar antioxidant properties of *Vitex negundo* Linn. in rats, by using ethanol induced oxidative stress model.^[27] The extracts also possess the ability to combat oxidative stress by reducing lipid peroxidation owing to the presence of flavones, vitamin C and carotene. evaluated the antioxidant and therapeutic potential of *Vitex negundo* Linn. flavonoids in modulating solenoid-induced cataract and found it to be effective.^[23]

6] Anti-eosinophilic activity

Egg albumin induced asthma in guinea pig model was used to study the anti-eosinophilic activity of the *Vitex negundo* Linn. The effects of various fractions such as aqueous subfraction, acetone subfraction, chloroform subfraction of the leaves of *Vitex negundo* Linn on the bronchial hyper responsiveness and serum bicarbonate level was evaluated. Aqueous subfraction of the leaves of *Vitex negundo* Linn possessed anti eosinophilic activity.^[24]

7] Anxiolytic activity

The anxiolytic activity of ethanolic extracts of *Vitex negundo* Linn roots was performed using the elevated plus maze (EMP) and light-dark exploration test in maze. *Vitex negundo* Linn extract are diazepam (used as positive control) was orally administered to male mice one hour before the behavioral evaluation. *Vitex negundo* Linn extract has increase the percentage time spent on

and the number of entries to the open arms of EPM. Both the diazepam and *Vitex negundo* Linn treated rates increase the time spent in light-arena reveals that *Vitex negundo* Linn root extract has significantly good anxiolytic activity.^[25]

Medicinal uses in different medication system

Allopathic medication system: Roots are used for fever, cough, urinary problems, dyspepsia, rheumatism, and forboils. The powdered root is consumed as an anthelmintic. Flowers are used in fever, diarrhea and the liver complaints; fruits in headache, catarrh, and coryza.^[26]

Ayurvedic medication system: The white-flowered variety is known as Sindhuvaara and the blue-flowered as Nirgundi or Shephaali. Nirgundi belongs to the Surasaadi group of herbs of Ayurvedic medicine, considered specific for cough, rhinitis, asthma. This group helps in the cleansing of ulcers. The leaf is considered astringent, bitter and pungent in taste (Rasa), pungent after digestion (Vipaka), and is hot in effect (Virya). It is pungent in both the initial and post-digestive tastes (Rasa and Vipaka) and gives relief in increases Vata, Pitta and Kapha.^[27] It is carminative, antiemetic and thermogenic. It is useful in indigestion, low appetite, nausea, and piles.

Rasa (taste on the tongue): Kashaya (Astringent), Katu (Pungent), Tikta (Bitter) Guna (Pharmacological Action): Laghu (Light), Ruksha (Dry) Virya (Action): Ushna (Leaf Heating); Sheet (Fruit, Flowers, Seeds Cooling) Vipaka (transformed state after digestion): Katu (Pungent) Effect on Dosha: Reduces Vata and Kapha Dosha but increases Pitta (in excess) Preparations: Infusion, Decoction, Oil System: Digestive, Circulatory, Tissues: Plasma, Blood, Muscles, Nerves and Marrow, Reproductive.^[27]

CONCLUSION

Vitex negundo Linn plays very vital role in the Ayurveda as we got to known from above study. It has been used from long ago in ancient era and it occupies the very household with his importance in this century too. but it shows the anti-inflammatory activity with much better way. Medicinal plants have been identified and used throughout human history. Plants synthesize a wide range of phytochemical constituents that are used to perform important biological function. Naturally available the resources provide valuable raw material for future modern scientific research and one must use it wisely. Literature recitation revealed that *Vitex negundo* Linn is a popular medicine for human kind. It possesses a variety of phytochemical constituents which makes it very effective antimicrobial, cytotoxic, analgesic, anti-inflammatory, antiarthritic, anxiolytic, anti-amnesic, antidote for snake venom.

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