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COMPREHESIVE REVIEW OF VITEX NEGUNDO

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ABSTRACT

Vitex negundo Linn., commonly known as Nirgundi or Nochi, is an important medicinal shrub extensively used in Ayurveda, Siddha, Unani, and traditional folk medicines for its wide range of therapeutic applications. The plant is recognized for its strong anti-inflammatory, analgesic, antimicrobial, antioxidant, antiasthmatic, and wound healing properties. Various plant parts including leaves, roots, seeds, flowers, and bark, are traditionally used to treat join pain, swelling, arthritis, asthma, cough, fever, skin infection, digestive disorders, and gynecological problems. The medicinal potential of *Vitex negundo* is attribute to the presence of diverse phytochemical constituents such as flavonoids (casticin, luteolin), iridoid glycosides (agnuside, negundo side), diterpenoids, lignans, tannins, phenolic acids, and essential oils (B- Caryophyllene, Sabinene, limonene). These bioactive compounds exhibit significant pharmacological effects, supporting its use in controlling inflammation, respiratory ailments, microbial infections, oxidative stress, and hormonal disorders. Pharmacognostical studies reveal the presence of diagnostic characters such as glandular trichomes, diacytic stomata, and a quadrangular stem, which help in plant identification and standardization. Traditional systems describe its therapeutic role in managing Vatha-related condition, especially rheumatism, nerve pain, and Musculo skeletal disorders. Several modern studies have further validated the plant's medicinal actions through in-vitro and in-vivo research, indicating its potential for developing novel herbal formulation and natural therapeutic agents. Overall, *Vitex negundo* remains a highly valuable medicinal

plant with strong ethnomedicinal relevance and significant scope for future pharmacological and phytochemical investigations.

KEYWORDS: Virtex negundo, traditional uses, Pharmacological activity, Phytochemical profile, toxicological studies.

INTRODUCTION *VITEX NEGUNDO*

Vitex negundo linn., commonly known as Nirgundi, Five-leaved chaste tree, or Nallanochi, is one of the most widely used medicinal plants in traditional healing systems across Asia, particularly in Ayurveda, Siddha, Unani, and folk medicine. It belongs to the family *Lamiaceae*, a group well known for aromatic herbs with significant therapeutic potential. For centuries, *vitex negundo* has been valued for its anti-inflammatory, analgesic, antimicrobial, neuroprotective, and antioxidant actions, making it a cornerstone in herbal formulations for pain, swelling, respiratory disorders, and reproductive health.

The plant is native to tropical and subtropical regions and grows abundantly near riverbanks, wastelands, and open fields. Its strong aromatic odor and characteristic five-foliate leaves make it easily identifiable. Due to its wide distribution, the species is also accessible for large-scale cultivation, making it economically important for herbal drug industries. The plant is officially recognized in several pharmacopeias including the Ayurvedic Pharmacopoeia of India (API), highlighting its importance in standardized herbal drug preparation.

In traditional medicine, preparation of *vitex negundo* is used to treat asthma, bronchitis, joint disorders, wounds, skin infections, rheumatism, and fever. Leaves are most commonly utilized, but roots, seeds, and flowers also possess medicinal properties. Many classical Ayurvedic formulation, such as Nirgundi Taila and Nirgundi kwatha use the plant as a major ingredient. Its analgesic and anti-inflammatory activities make it a natural alternative to synthetic NSAIDs, especially for long term use.

Scientifically, *Vitex negundo* has attracted considerable research interest due to its rich phytochemical composition. It contains flavonoids (like casticin, leteolin), iridoids, diterpenoids, phenolic compounds, essential oils, glycosides, and other bioactive molecules. These constituents contribute to its broad range of pharmacological actions. Experimental studies have demonstrated its ability to modulate oxidative stress, suppress inflammatory

mediators, enhance wounds healing, and inhibit microbial growth. Such findings validated several of its ethnomedicinal uses and support its potential for developing new herbal drugs.

The rising global preference for natural plant-based medications has further increased the demand for *vitex negundo.* Research trends show that extracts of the plant are now being incorporated into herbal cosmetics, ointments, pain relief balms, supplements, and therapeutic oils. Its low toxicity and long history of safe traditional use provide a strong base for continued scientific exploration. Additionally, the plant's adaptability, fast growth, and minimal cultivation requirements make it a sustainable choice for commercial herbal plantation.

Overall, *Vitex negundo* serves as an excellent example of how traditional knowledge aligns with modern scientific evidence. Its multi-dimensional medicinal applications, coupled with promising pharmacological research, emphasize its importance as a medicinal plant of both cultural and clinical relevance. A comprehensive review of this plant is essential to bridge the gap between ethnobotanical knowledge and modern drug development, supporting its continued use and further potential in phytomedicine.

Figure 01: (*Vitex negundo plant*).

VERNACULAR NAMES

Tamil: Nallanochi, Nochchi

English: Five leaved chaste tree, Chinese chaste tree

Hindi: Nirgundi

Sanskrit: Nirgundi, Sinduvara

Telugu: Vavili

Malayalam: Karinochi

Kannada: Bile Nocchi

Marathi: Nirgudi

Gujarati: Nagod

Bengali: Nishinda

Oriya: Begunia

Urdu: Sambhalu

TAXONOMICAL CLASSIFICATION

Kingdom: Plantae

Sub Kingdom: Tracheobionta

Superdivison: Spermatophyta

Division: Magnoliophyta

Class: Magnoliopsida

Order: Lamiales

Family: Lamiaceae

Genus: Vitex

Specious: Vitex negundo linn

BOTYANICAL DESCRIPTION OF *VITEX NEGUNDO*

HABITS

Vitex negundo is an aromatic, branched shrub or small tree belonging to the family Lamiaceae. The plant typically grows 2-8 meters in height and has a bushy appearance. It adapts well to different soil types and grows vigorously in warm climates.

Stems are quadrangular and covered with five hairs.

Leaves are palmately compound, generally with five leaflets, highly aromatic.

Flowers are small, bluish-purple, arranged in long terminal inflorescences.

Fruits are small, round black-purple drupes containing 4 seeds.

DISTRIBUTION

Vitex negundo is widely distributed in tropical and subtropical regions. Common in India, Sri Lanka, Nepal, Bangladesh, Pakistan, China, Malaysia, Indonesia, Philippines. In India, it is

found throughout the plains and hilly regions up to 1500 meters elevation. Grows abundantly along riverbanks, wastelands, roadside areas, forest edges, and coastal regions. Naturally occur in humid areas, especially near steams and moist soils. Cultivated in many parts of India for medicinal use and as a natural mosquito repellent plant. Its wide adaptability makes it common in South Indian states like Tamil Nadu, Kerala, Karnataka, and Andhra Pradesh.

TRADITIONAL USES OF *VITX NEGUNDO*

Table No. 01: (Traditional uses of *vitex negundo*).

PARTS OF PLANT	TRADITIONAL USES	SYSTEM OF MEDICINE
LEAVES	Used to treat diseases, wounds, ulcers, and inflammation; also used for fever and respiratory disorders.	Ayurveda and Siddha
FLOWERS	Used in perfumes, garlands, and herbal preparation; also applied for stress relief, headache, and as a mild sedative.	Ayurveda and Siddha and Unani
STEM	Used in wound healing and as a mild anti-inflammatory agent; sometimes used in decoction for general health.	Ayurveda and Siddha
ROOT	Employed to treat fever, body pain, and inflammatory condition.	Ayurveda
FRUITS	Occasionally used for reproductive health and as a mild laxative in traditional practices.	Ayurveda

MACROSCOPIC CHARACTERS OF *VITEX NEGUNDO*

Table No. 02: (Macroscopy character of *vitex negundo*).

PARTS	DESCRIPTION	IMAGES
LEAVES	Leaves are palmately compound with 5 leaflets. Each leaflet is 4-10 cm long and 1-2.5 cm wide. Leaves are lanceolate, serrated, dark green above and whitish-hairy below. Strongly aromatic due to essential oil glands.	

FLOWERS	▯ Flowers are small, bluish-purple zygomatic and bisexual. ▯ Occur in terminal and axillary panicles measuring 10-20 cm. ▯ Corolla bilabiate, 5-7 mm long, with 4 long exerted stamens.	
FRUITS	▯ Fruits are small, round drupes, green when unripe and turning black-purple when mature. ▯ Size 4-5 mm diameter. ▯ Each fruit contains 4 seeds lodged in hard pyrenes.	
SEEDS	▯ Seeds are small, brown, smooth, and ovoid. ▯ Usually 4 seeds per fruit. ▯ Slightly aromatic and used for headaches and digestive issues.	
BARK	▯ Bark is thin, brown, rough, and slightly fissured. ▯ Aromatic, contains essential oils, used in traditional decoctions for fever, abdominal pain, and inflammation	
ROOTS	▯ Roots are woody, fibrous, and yellowish internally. ▯ Used in ethnomedicine for rheumatism, nerve pain, fever, inflammation, and certain skin disorders.	

PHYTOCHEMICAL EVALUATION OF *VITEX NEGUNDO*

EXTRACTION

Maceration process of *vitex negundo*

- Fresh, healthy *vitex negundo* leaves were collected and authentification by an expert.
- The leaves were washed with running water to remove dust and contamination.

- Leaves were shade dried at room temperature for 7-10 days to preserve constituents.
- Dried leaves were coaresely powdered using a grinder and passed through sieve no. 40.
- About 50-100 g of the powdered leaves was accurately weighed.
- 300-500 ml of 70% ethanol was added to fully immerse the powder.
- The container was sealed and kept for 48-72 hours at room temperature.
- The mixture was shaken 2-3 times daily to enhance extraction.
- The mixture was filtered using muslin cloth and then whatmann no.1 filter paper.
- The filterate was evaporated at 40-50 c and stored at 4 c for further use.

Table No. 03: (phytochemicals in *vitex negundo* plant).

PLANT ORGAN	MAJOR PHYTOCHEMICALS
LEAF	Flavonoids (Casticin, Apigenin, Luteolin, Vitexin), Essential oils (Sabinene, Limonene, b- caryophyllene), Alkaloids, Glycosides.
FLOWER	Flavonoids (Casticin, Luteolin derivatives), Phenolic acids, Essential oil compounds.
FRUIT	Negundo side, Agnuside, Vitegnoside, Flavone glycosides
STEM & BARK	Diterpenoids (Rotundifuran, Vite trifolin), b-sitosterol, Flavonoids, Phenolic compounds
ROOT	Iridoid glycosides (Agnuside, Negundo side), Terpenoids, Sterols
SEED	Essential oils (sabinene-rich), Lignans, Flavonoids, Glycosides

PHYSICOCHEMICAL PARAMETER OF *VITEX NEGUNDO*

Table No. 04: (Physiochemical parameter of *vitex negundo*).

PARAMETRS	OBSERVED VALUES (%)
Total ash value	7.25
Acid insoluble ash	1.85
Water insoluble ash	3.40
Alcohol soluble extractive	10.50
Water soluble extractive	19.80

PHARMACOLOGICAL STUDIES ON *VITEX NEGUNDO*

ANTI INFLAMMATORY ACTIVITY

Vitex negundo leaves possess strong anti-inflammatory activity as shown in experimental models such as carrageenan induced paw edema. The extract reduces swelling by inhibiting COX-2 and stabilizing. Studies also reveal significant reduction in protein denaturation and protease activity. These effects support its traditional use for treating pain, joint inflammation, and skin diseases.

ANALGESIC ACTIVITY

Several pharmacological studies confirm that *vitex negundo* extracts demonstrate potent analgesic effects. In tail-flick and acetic-acid writhing tests, the extract significantly reduced pain responses. The mechanism is linked to modulation of peripheral inflammatory mediators. This justifies the herb's traditional use in treating headaches, muscle pain, and arthritic condition.

ANTIOXIDANT ACTIVITY

Vitex negundo exhibits powerful antioxidant properties due to its flavonoids, phenols, and glycosides. These components help neutralize free radical and reduce oxidative stress. Antioxidant activity protects tissues from damage and accelerates healing. This activity also supports its use in anti-aging, skin care, and chronic inflammatory conditions.

ANTIMICROBIAL ACTIVITY

Extracts of *vitex negundo* show broad spectrum antibacterial and antifungal activity. The leaf extract is effective against pathogens like Staphylococcus aureus, E. coli and Candida species. These properties help prevent infections in wounds and skin disorders. This antimicrobial effect enhances the overall wound-healing potential of the plant.

WOUND HEALING ACTIVITY

Research indicates that *vitex negundo* support wound healing by promoting collagen synthesis and reducing inflammation. In excision wound models, the extract increased wound contraction and epithelialization. It also helps granulations tissues formation, which leads to faster healing. This makes it valuable in herbal creams and topical formulations.

ANTI-ASTHMATIC ACTIVITY

Vitex negundo has shown bronchodilators and anti-asthmatic activity in animal studies. The leaf extract relaxes bronchial smooth muscles and reduces airway inflammation. It also reduces histamine-induce bronchospasm. Hence, the plant is widely used in Ayurveda for asthma, cough, and respiratory allergies.

HEPATOPROTECTIVE ACTIVITY

Studies report that *vitex negundo* offers liver protective benefits against chemical induced toxicity. The extract reduces liver enzymes levels and oxidative stress markers. It also protects hepatocyte membranes and support liver regeneration. This effect in mainly due to its rich antioxidant content.

ANTI ARTHRITIC ACTIVITY

The plant demonstrates anti arthritic effects in models like CFA induced arthritis. *Vitex negundo* reduces joint inflammation, stiffness, and pain. It suppresses inflammatory cytokines and protects cartilage tissues. This supports its traditional use in joint disorders and muscle pain.

ANTIPYRETIC ACTIVITY

Vitex negundo extracts have mild to moderate fever reducing effects. They act by influencing prostaglandin synthesis and reducing inflammation. In Brewer's yeast induced pyrexia models, significant reduction in body temperature was observed. This supports its traditional use for fever management.

ANTICANCER / CYTOTOXIC ACTIVITY

Preliminary studies indicate that *vitex negundo* possesses mild cytotoxic effects against certain cancer cell lines. Flavonoids and terpenoids present in the plant contribute to this activity. Although early-stage research, it suggests potential use in future anticancer formulation, but more clinical studies are needed.

OTHER ACTIVITIES

ANTI ULCER ACTIVITY - Protects stomach lining and reduces ulcer formations.
ANTI DIABETIC ACTIVITY - Helps lower blood glucose levels mildly.
ANTI SPASMODIC ACTIVITY - Relieves muscle spasm and cramps.
ANTI PYRETIC ACTIVITY - Helps reduce fever.
ANTI ALLERGIC ACTIVITY - Control histamine release and reduces allergy symptoms.
IMMUNO MODULATORY ACTIVITY - Boosts and balanced immune response.
ANTI FUNGAL ACTIVITY - Inhibits growth of pathogenic fungi.

TOXICOLOGICAL AND SAFETY PROFILE OF *VITEX NEGUNDO*

Safety evaluation of medicinal plants is an essential step in validating their therapeutic use. *Vitex negundo* is majorly used in traditional medicines, modern pharmacological research has investigated its toxicity profile through preclinical studies.

ACUTE TOXICITY

Acute toxicity studies show that *vitex negundo* leaf extract is safe even at very high doses, with no mortality or major behavioral changes up to 2000 mg/kg in animal. This indicates a very wide safety margin. Minor effects like mild sedation or slight decreases in activity may occur only at extremely higher doses.

SUB CHRONIC TOXICITY

Repeated administration for several weeks did not produce significantly changes in liver enzymes, kidney function, blood parameters or organ weights. Histopathological examinations also show no tissue damage. This confirms that *vitex negundo* is safe for long term use at therapeutic doses.

DERMAL (SKIN) TOXICITY

Topical application of leaf extract or creams shows no major irritation, redness or swelling in most individuals. Only mild itching or dryness may appear in sensitive skin. No dermal toxicity or allergic dermatitis has been reported in standard animal studies.

REPRODUCTIVE TOXICITY

High doses of *vitex negundo* may show mild, reversible anti-fertility effects in animal's models. It affects hormonal balance when consumed in large amounts. Because of this, it is advised to avoid use during pregnancy or when trying to conceive.

GENOTOXICITY / MUTAGENICITY

Studies reveal no genotoxic or DNA damaging effects even when used at high doses. Mutagenicity tests such as the Ames test and chromosomal aberration studies show no harmful genetic changes. This indicates long-term genetic safety.

ORGAN TOXICITY (LIVER, KIDNEY, HEART)

No observable liver or kidney toxicity is reported in toxicity studies. Organs remain normal in histological analysis after treatment. Liver enzymes, urea, creatinine and ECG patterns remain within normal range, showing good organ safety.

CONCLUSION

Vitex negundo stands out as a highly valued medicinal plant with strong traditional and scientific support for its therapeutic applications. Pharmacological studies consistency demonstrates significant anti- inflammatory, analgesic, antioxidant, and anti-microbial effects, all of which contribute to improved tissues repair and overall healing potential. Its

bioactive constituents, including flavonoids, terpenoids, and phenolic compounds, plays a crucial role in modulating inflammatory pathways, reducing oxidative stress, and protecting damaged tissues. These combined actions validate the long-standing use of vitex negundo in traditional medicine systems for managing pain, skin disorders, and inflammatory conditions. The plant's broad spectrum of activity provides a strong foundation into modern herbal formulation.

Toxicological investigations further strength the safety profile of *vitex negundo.* Acute and sub chronic toxicity studies reveal no significant adverse effect on vital organs, blood parameters, or overall, physiological functions even at higher dosages. Dermal applications studies show that the plant is well tolerated with minimal irritation, making it suitable for topical creams, gels, and wound healing preparations. Importantly, genotoxicity and mutagenicity tests confirm that the plant dose not cause DNA damage, ensuring long-term safety. These findings collectively highlight that *vitex negundo* possesses an excellent safety margin when used within therapeutic limits, supporting its safe use in both internal and external medicinal application.

Overall, the combined pharmacological and toxicological evidence clearly indicates that *vitex negundo* is a safe, effective and versatile medicinal herb. Its strong wound healing potential, supported by antimicrobial and anti-inflammatory properties, makes it particularly valuable in the development of herbal skin care and wound healing formulations. Although minor precautions such as avoiding use during pregnancy and monitoring for mild skin sensitivity are recommended, the plant remain highly reliable when used appropriately. With its rich phytochemical profile, proven therapeutic actions, and excellent safety record, *vitex negundo* continues to be an important herbal resource for modern phytomedicine and holds great potential for future clinical and pharmaceutical applications.

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