

A Review: Analgesic & Antiinflammatory Activity of Vitex Negundo

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Abstract— *Vitex negundo*, commonly known as the Chinese chaste tree or the five-leaved chaste tree, is a large aromatic shrub found in tropical to temperate regions of Asia and Africa. It has been traditionally used in various medicinal systems like Ayurveda, Unani, and traditional Chinese medicine. The plant is renowned for its analgesic (pain-relieving) and anti-inflammatory properties. This review will cover the pharmacological activities, mechanisms of action, and potential therapeutic uses of *Vitex negundo*, with a focus on its analgesic and anti-inflammatory effects.

I. INTRODUCTION

According to WHO, 60–65% of people worldwide currently utilise herbal and traditional medicines. These days, these remedies are most commonly used worldwide. *Vitex negundo* Linn., a deciduous shrub that grows gregariously in wastelands and is commonly used as a hedge plant, is a member of the Verbenaceae family, which includes 75 genera and nearly 2500 species.[1] It is also known as the Five Leaved Chaste Tree (Eng), Nirgandi (Hindi), and Nirgundi (Sanskrit).

With quadrangular branchlets, the tree is erect and slender, measuring 3-5 metres in height. Fine lanceolate, 4–10 cm long, hairy underneath, and pointy at both ends leaflets are arranged palmately in the leaves.[2] There are lots of the bluish-purple blossoms. When ripe, the fruit is spherical, black, and succulent, with a diameter of approximately 4 mm. One of the plant that is frequently used in traditional medicine is *Vitex negundo* (Linn.), which has been shown to exhibit a range of pharmacological properties.[3] The plant is known for its wide range of pharmacological properties, including analgesic, anti-inflammatory, antioxidant, antimicrobial, and hepatoprotective activities. This review provides an

overview of the phytochemical composition, pharmacological activities, therapeutic applications, and safety profile of *Vitex negundo*. [1,3,4]

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:	Lamilales	
Family:	Verbenaceae	
Genus:	<i>Vitex</i> linn	
Species:	<i>Vitex negundo</i> Linn.	(Chaste tree)

II. MORPHOLOGY

Variations in the form, apex, and base of the leaves of *V. negundo* were examined. The majority of morphotypes featured lanceolate to elliptic lanceolate leaves, though they varied from obovate to oblanceolate. Having an acuminate leaf apex, whereas three morphotypes had an acute-acuminate *leaf apex* [4].



A. Leaflet of *Vitex negundo*



B. Plant of Vitex Negundo

Six morphotypes with acute leaf bases included two attenuate morphotypes, one attenuate-oblique, one acute-cuneate, and one acute-oblique. Simple leaves could also be observed in the young branches, even though both had trifoliolate leaves. Three to five leaflets in different morphotypes were present in one individual. The abaxial surface of every leaf morphotype was light-green, while the adaxial surface was green. The glabrous abaxial surface of the leaves indicated a high trichome density. [3, 5] The medium-sized shrub species *V. Negundo* L. can grow up to 5 m in height. Adaxially green, abaxially light green, smooth, petiolate; leaves opposite, palmately

compound, with 3–5 leaflets; longer leaflet 7.3–10.0 × 1.3–1.9 cm, smaller leaflets 4.9–6.0 × 1.0–1.4 cm; lanceolate, acuminate apex, sharp base, whole edge. [5]

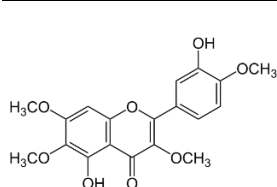
III. PHYTOCHEMICALS:

A variety of leaf extracts from *Vitex negundo* L. demonstrated the presence of flavonoids, anthraquinones, proteins, carbohydrates, amino acids, and phenolic compounds, among other phytochemicals.[6] The major active constituents responsible for its medicinal properties include casticin, vitexin, negundoside, and nishindine. These compounds have been studied for their various pharmacological activities. Finding effective treatments for a range of illnesses can be aided by the current study's findings.[7] Strong bioactive chemicals are primarily found in medicinal plants. The present study is valuable for creating medications based on flavonoids, which have been most important in antioxidant, antiallergic, and antibacterial activities. Acetone extract and aqueous extract of *Vitex negundo* leaves demonstrate the existence of flavonoids.[8, 9]

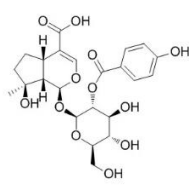
Table No. 1: Phytochemical screening of various extracts of *Vitex negundo* L. [7, 8, 9]

Phytochemicals	Extracts				
	Benzene	Chloroform	Acetone	Methanol	Aqueous
Carbohydrates	+	+	+	+	+
Proteins	-	-	-	+	+
Alkaloids	-	-	-	-	+
Amino acid	-	+	+	+	+
Steroids	+	+	-	+	+
Triterpenoids	+	+	-		
Flavonoids	+	+	-	+	+
Glycosides	-	-	-	-	+
Tannins and phenolic compounds	-	+	+	+	-

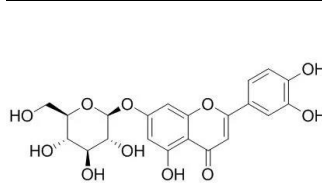
+ indicates present and – indicates absent



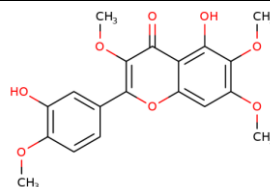
A. Casticin



B. Negundoside



C. Luteolin-7-O-glucoside



D. vitexicarpin

IV. PHARMACOLOGICAL ACTIVITY

A. ANALGESIC ACTIVITY:

Vitex negundo extracts inhibit the synthesis and release of pain mediators such as prostaglandins, which are involved in the inflammatory response and pain sensation.[10] This inhibition is primarily mediated through the modulation of the cyclooxygenase (COX) pathway.[11] The mice's tail-immersion test, which measures the analgesic effect's central origin, and the acetic-acid-induced writhing test, were used to evaluate VLE's analgesic efficacy.[12] Pre-screened animals that were susceptible to acetic acid-induced writhing had their writhing motions monitored and counted for a duration of 30 minutes. Additionally, conventional medications were employed to compare the analgesic impact at the peripheral and central levels, namely sodium salicylate (500 mg/kg, p.o.) and pethidine (5 mg/kg, s.c.). For these trials, six mice per treatment group were employed. [13, 14]

B. ANTI-INFLAMMATORY ACTIVITY:

Some studies suggest that Vitex negundo may exert its analgesic effects through interaction with opioid receptors. Opioid receptors are part of the endogenous pain control system, and their activation can lead to pain relief. [15, 16] The percentage of inhibition for anti-inflammatory properties was calculated using the TPA-induced mice ear oedema assay. An inhibitory activity of 54.1% was observed in the first crude ethanolic leaf extract. The inhibitory activity was spread over the dichloromethane (72.2%), ethyl-acetate (23.5%), and aqueous fraction (3.3%), respectively, after the leaf extract was further fractionated. [17, 18] Rats treated with the Vitex negundo Linn extract showed considerable ($P < 0.05$) anti-inflammatory efficacy. It is claimed that administering Vitex negundo ethanolic extract. Oedema inhibited linn within the first hour of inflammation and at all stages of the condition.[19] By regulating the expression of neutrophil recruitment and macrophage activation, vitexin and flavonoids govern the anti-inflammatory impact. In lipopolysaccharide-challenged mice, vitexin decreases NO release, TNF- α , and IL-1 β release in the peritoneal cavity as well as leukocyte migration in vivo in RAW 264.7. In LPS-induced cells, vitexin also inhibits the

production of transcriptional factors for pro-inflammatory mediators, such as p-p38, p-ERK1/2, and p-JNK.[20]

C. ANTIOXIDANT PROPERTY:

The antioxidant activity of Vitex negundo helps in reducing oxidative stress, which is often associated with chronic pain conditions.[21] By scavenging free radicals, the plant extracts protect tissues from oxidative damage and reduce pain.[22] Vitexnegheteroins I-J and K-L, two iridoid glycosides with excellent antioxidant potential, and two coumarin glycosides were discovered in a recent research.[20] The thioacetamide (TAA)-induced nephrotoxicity in rats is prevented both biochemically and morphologically by the powerful antioxidant activity of VN extract.[23]

V. CONCLUSION

Vitex negundo is a versatile medicinal plant with a rich phytochemical composition and a broad spectrum of pharmacological activities. Its traditional use is supported by scientific evidence, highlighting its potential in treating various ailments, including pain, inflammation, infections, liver disorders, and respiratory conditions. Vitex negundo exhibits significant analgesic activity, supported by both preclinical and limited clinical evidence. The plant's traditional use as a pain reliever is backed by scientific studies, although more extensive clinical trials are required to fully establish its therapeutic potential. With its high safety margin and broad spectrum of activity, Vitex negundo holds promise as a natural remedy for pain management. Despite its promising therapeutic benefits, more extensive clinical trials are needed to fully establish its efficacy and safety in humans. With its high safety margin and diverse therapeutic applications, Vitex negundo holds significant potential as a natural remedy in modern medicine.

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