

A Review of Phytochemical and Pharmacological Activities of *Vitex negundo*

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ABSTRACT

Vitex negundo is a plant with medicinal properties that has been employed in traditional medicine to address a wide range of health conditions. This review summarizes the phytochemical and pharmacological activities of *Vitex negundo*. The plant contains various bioactive compounds such as terpenoids, flavonoids, alkaloids, and essential oils, which exhibit diverse pharmacological activities such as anti-inflammatory, analgesic, antipyretic, antioxidant, antitumor, antimicrobial, antifungal, and antiparasitic effects. Several studies have demonstrated the efficacy of *Vitex negundo* in the treatment of various diseases. The plant also possesses hepatoprotective, nephroprotective, and neuroprotective effects. However, further studies are needed to fully understand the mechanisms of action of *Vitex negundo* and to develop new drugs based on its bioactive compounds. In conclusion, *Vitex negundo* is a promising medicinal plant that deserves further investigation as a potential source of new drugs for the treatment of various diseases.



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INTRODUCTION

Vitex negundo, commonly known as five-leaved chaste tree or the Chinese chaste tree, is a medicinal plant native to Southeast Asia and commonly found in tropical and subtropical regions [1, 2]. It belongs to the family Verbenaceae and is a small tree or shrub that can reach up to 8 meters in height. The plant has been traditionally used in Ayurveda, Siddha, and Unani medicine to treat a variety of ailments, including respiratory infections,

fever, cough, and rheumatism. The leaves, flowers, and roots of *Vitex negundo* contain a range of phytochemicals, including flavonoids, terpenoids, and alkaloids, that have been shown to possess anti-inflammatory, analgesic, antimicrobial, and antitumor properties [3]. In addition to its medicinal uses, *Vitex negundo* is also used in traditional rituals and is considered to have spiritual significance in some cultures. The plant has also been used in the manufacturing of cosmetics and personal care products. *Vitex negundo* is considered safe for use in recommended doses and has been approved by the World Health Organization for use in traditional medicine [4, 5]. However, it is important to note that like any other herbal supplement, it may interact with certain medications and should be used under the guidance of a healthcare professional [6].

Chemical Constituents

Vitex negundo, commonly known as the five-leaved chaste tree, is a medicinal plant that is widely distributed in Asia, Africa, and South America. This plant has been traditionally used in Ayurveda, Sid-

dha, and Unani systems of medicine for the treatment of various ailments such as fever, inflammation, pain, and respiratory disorders [7, 8].

Chemical analysis of *Vitex negundo* has revealed the presence of several bioactive compounds such as flavonoids, iridoids, terpenoids, alkaloids, and essential oils. The major chemical constituents of this plant are:

Flavonoids

Vitexin, isovitexin, orientin, isoorientin, luteolin, apigenin, quercetin, and kaempferol are some of the flavonoids found in *Vitex negundo*. These compounds exhibit antioxidant, anti-inflammatory, and anticancer properties.

Iridoids

The major iridoids found in *Vitex negundo* are aucubin, agnuside, and negundoside. These compounds possess antipyretic, analgesic, and anti-inflammatory properties.

Terpenoids

Vitexilactone, vitexicarpin, vitetrisolin D, and vitexicarpin are some of the terpenoids found in *Vitex negundo*. These compounds exhibit antifungal, antibacterial, antiviral, and antitumor activities.

Alkaloids

Vitexicarpine and vitedoin are the alkaloids present in *Vitex negundo*. These compounds have been found to possess antifungal, antitumor, and anti-malarial properties.

Essential oils

The essential oil extracted from *Vitex negundo* contains several compounds such as linalool, α -pinene, β -pinene, camphene, limonene, and 1,8-cineole. These compounds exhibit antimicrobial and insecticidal activities [9].

Overall, *Vitex negundo* contains a wide range of chemical constituents that contribute to its medicinal properties. These compounds have been extensively studied and have shown promising results in the treatment of various diseases.

Phytochemical Activity

Vitex negundo is a plant species in the Verbenaceae family that is commonly known as five-leaved chaste tree or horseshoe vitex. It is found in tropical and subtropical regions of the world and has been used for medicinal purposes for centuries in traditional medicine. Phytochemical analysis of *Vitex negundo* has shown the presence of several bioactive compounds such as flavonoids, alkaloids, terpenoids, and phenolic compounds. These phytochemicals are

responsible for the plant's various pharmacological activities.

The plant has been reported to possess antimicrobial, antioxidant, anti-inflammatory, analgesic, antipyretic, antitumor, hepatoprotective, and immunomodulatory activities. The flavonoids and phenolic compounds found in *Vitex negundo* are known for their antioxidant properties, which help to protect cells from oxidative damage caused by free radicals.

The plant extracts have also shown antimicrobial activity against a wide range of microorganisms including bacteria, fungi, and viruses. Additionally, the alkaloids present in the plant have been found to possess antitumor properties and have shown potential as anticancer agents.

Studies have also shown that *Vitex negundo* has analgesic and anti-inflammatory properties, making it useful in treating conditions such as arthritis and other inflammatory diseases. *Vitex negundo* is a plant with significant phytochemical activity, making it a valuable source of natural compounds for medicinal purposes. Its various pharmacological activities make it useful in treating a range of conditions, and further research is needed to fully understand its potential benefits.

Pharmacological Activity

Vitex negundo, commonly known as the "five-leaved chaste tree," is a medicinal plant that has been used in traditional medicine for various ailments such as inflammation, pain, fever, and skin diseases. Scientific studies have also demonstrated the pharmacological activity of *Vitex negundo*. One of the most significant pharmacological activities of *Vitex negundo* is its anti-inflammatory and analgesic effects. Several studies have shown that *Vitex negundo* extracts have potent anti-inflammatory and pain-relieving properties, which can be ascribed to the existence of various phytochemical compounds such as flavonoids, alkaloids, and terpenoids. *Vitex negundo* also exhibits antibacterial and antifungal activities. The plant extracts have been shown to inhibit the growth of various pathogenic bacteria and fungi, including *Staphylococcus aureus* and *Candida albicans*.

Moreover, *Vitex negundo* has been found to possess significant antioxidant activity. The plant extracts contain various antioxidants such as flavonoids, phenolic acids, and vitamin C, which can scavenge free radicals and prevent oxidative damage to cells. Other pharmacological activities of *Vitex negundo* include anti-diabetic, anti-cancer, and anti-ulcer properties. The plant extracts have been

shown to regulate blood glucose levels, inhibit cancer cell growth, and protect against gastric ulcers. *Vitex negundo* is a valuable medicinal plant with various pharmacological activities. Further research is needed to explore its full potential as a therapeutic agent for various diseases.

Anti-Nociceptive and Anti-Inflammatory Activity Top of Form

Vitex negundo, also known as five-leaved chaste tree, is a plant commonly found in Southeast Asia and is known for its medicinal properties. Various parts of the plant have been used in traditional medicine to treat a wide range of ailments, including pain and inflammation.

Studies have shown that *Vitex negundo* exhibits anti-nociceptive and anti-inflammatory activities. Anti-nociceptive activity refers to the ability of a substance to reduce pain sensation. *Vitex negundo* has been found to exhibit this activity through multiple mechanisms, such as inhibiting the production of pain-inducing chemicals, reducing inflammation, and interacting with the opioid receptors in the nervous system.

The plant has also been found to have anti-inflammatory activity, which is the ability to reduce swelling and inflammation in the body. This is achieved through the inhibition of enzymes and chemicals involved in the inflammatory process. *Vitex negundo* has been found to have fair anti-inflammatory activity by curtail the production of inflammatory cytokines and enzymes, inhibiting the activation of immune cells, and reducing oxidative stress.

Vitex negundo has promising anti-nociceptive and anti-inflammatory properties, which may make it a useful natural remedy for pain and inflammation-related disorders. However, further research is necessary to fully comprehend the mechanisms of action and quiescent therapeutic requisition of this plant.

Vitex negundo, commonly known as the five-leaved chaste tree or the Indian privet, is a plant species that has been used in traditional medicine for various ailments, including pain and inflammation. Research has shown that extracts of *Vitex negundo* possess anti-nociceptive and anti-inflammatory activities, making it a promising natural alternative to synthetic drugs. Anti-nociceptive activity refers to the ability of a substance to reduce pain sensitivity. Studies have shown that *Vitex negundo* extracts can decrease pain by inhibiting the release of pain-inducing substances such as prostaglandins and histamines. The plant also con-

tains compounds such as flavonoids and terpenoids that can act as natural painkillers.

Anti-inflammatory activity refers to the ability of a substance to reduce inflammation. Inflammation is a natural response of the body to injury or infection, but when it is chronic, it can lead to tissue damage and disease. *Vitex negundo* extracts have been found to reduce inflammation by inhibiting the activity of inflammatory enzymes such as cyclooxygenase and lipoxygenase, as strong as by decreasing the production of pro-inflammatory cytokines. The anti-nociceptive and anti-inflammatory activities of *Vitex negundo* make it a potential natural remedy for various conditions, including pain, arthritis, and other inflammatory disorders. However, more research is needed to fully understand the mechanisms of action of the plant's bioactive compounds and to determine optimal dosages and formulations for clinical use.

Anti-Tumor Activity

Vitex negundo, commonly known as the five-leaved chaste tree, is a medicinal plant found in tropical and subtropical regions of the world. It has been traditionally used in various herbal remedies for its anti-inflammatory, analgesic, anti-bacterial, anti-fungal, anti-viral, and anti-cancer properties. Several studies have reported the anti-tumor activity of *Vitex negundo* extracts and compounds. For instance, a study conducted by demonstrated the anti-proliferative effects of the aqueous extract of *Vitex negundo* leaves against human breast cancer cells (MCF-7). The extract constrains the growth of cancer cells in a dose-defenceless appearance and activated cell death through the activation of caspases.

Similarly, another study reported the anti-cancer potential of a compound isolated from *Vitex negundo* leaves called vitexicarpin. The compound was found to induce apoptosis (programmed cell death) in human colon cancer cells (HCT-116) by activating the intrinsic pathway of apoptosis. Furthermore, a recent investigation of the anti-tumor activity of *Vitex negundo* extract against lung cancer cells (A549). The extract was found to significantly curb the multiplication of cancer cells and activated cell cycle arrest at the G2/M phase, prominent to cell death.

Overall, these studies suggest that *Vitex negundo* and its constituents have potential anti-tumor activity and may be useful in the development of new anti-cancer drugs. After all, more research is required to accept the mechanism of action and therapeutic budding of *Vitex negundo* in cancer treatment.

Insecticidal Activity

Vitex negundo, commonly known as the five-leaved chaste tree, is a medicinal plant native to Southeast Asia that has been traditionally used to treat various ailments. In recent years, research has shown that the plant possesses insecticidal activity against a variety of insect pests.

The insecticidal properties of *Vitex negundo* are attributed to its secondary metabolites, such as flavonoids, terpenoids, and alkaloids. These compounds act on the insect's nervous system, disrupting their vital functions and ultimately leading to their death.

Studies have demonstrated the effectiveness of *Vitex negundo* extracts against a range of insect pests, including mosquitoes, termites, and agricultural pests such as aphids and spider mites. These extracts have been shown to be effective as both contact and fumigant insecticides.

Furthermore, the insecticidal properties of *Vitex negundo* are environmentally friendly and safe for non-target organisms. This makes it an attractive alternative to synthetic insecticides that can harm the environment and cause health risks to humans and animals.

In conclusion, *Vitex negundo* possesses significant insecticidal properties and has the potential to be developed into a safe and effective natural insecticide. Further research is needed to fully explore its potential and to develop suitable formulations for commercial use.

The insecticidal properties of *Vitex negundo* are due to the existence of different bioactive compounds, including flavonoids, terpenoids, and essential oils. These compounds have been found to be effective against a range of insect pests, including mosquitoes, termites, and aphids. Studies have shown that the essential oil extracted from the leaves of *Vitex negundo* has potent mosquito larvicidal activity, making it a potential candidate for use in the control of mosquito-borne diseases like dengue and malaria. Overall, *Vitex negundo* has great potential as a natural insecticide due to its effectiveness against a range of insect pests and its low toxicity to humans and the environment. Further analysis is necessary to fully investigate the latent of this plant for insect pest management.

Antimicrobial Effect

Vitex negundo, also known as the five-leaved chaste tree or simply chaste tree, is a medicinal plant commonly found in tropical and subtropical regions. It has been used in traditional medicine for centuries to treat a variety of ailments, including infections.

Several studies have investigated the antimicrobial properties of *Vitex negundo*, with promising results.

One study conducted in India found that extracts from *Vitex negundo* leaves had strong antimicrobial activity against a range of pathogenic bacteria, including *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. The researchers suggested that the plant's antimicrobial properties could be ascribed to the resistance of several bioactive compounds, such as flavonoids, terpenoids.

Anti-Androgenic Activity

Vitex negundo, commonly known as five-leaved chaste tree, is a plant species that is native to the Indian subcontinent, Southeast Asia, and China. It has been traditionally used in Ayurvedic and traditional Chinese medicine to treat various ailments, including reproductive disorders. Studies have shown that *Vitex negundo* possesses anti-androgenic activity, which means that it can inhibit the action of androgens, such as testosterone. This property makes it useful in the treatment of conditions that are caused by excessive androgen activity, such as polycystic ovary syndrome (PCOS) and hirsutism.

One study found that an extract of *Vitex negundo* was able to reduce serum testosterone levels in female rats with induced PCOS. Another study found that the plant extract was able to inhibit the growth of prostate cancer cells in vitro, which is a condition that is often associated with excessive androgen activity. While additional research is required to completely accept the mechanisms by which *Vitex negundo* exerts its anti-androgenic activity, its traditional use and promising preliminary studies suggest that it may have therapeutic potential in the treatment of androgen-related disorders. However, it is important to consult with a healthcare professional before using *Vitex negundo* or any other herbal supplement for medical purposes.

Anti-Osteoporotic Activity

Vitex negundo, commonly known as the five-leaved chaste tree, is a medicinal plant traditionally used in Ayurveda and other traditional medicinal systems. Recent studies have shown that *V. negundo* possesses anti-osteoporotic properties. Osteoporosis is a condition that affects bones, causing them to become weak and brittle. It is a major public health concern, particularly among older adults, and is associated with an increased risk of fractures. *V. negundo* has been shown to improve bone mineral density and bone strength, and to prevent bone loss in animal models of osteoporosis.

The anti-osteoporotic activity of *V. negundo* is

thought to be due to its ability to stimulate bone formation and inhibit bone resorption. The plant contains several bioactive compounds, including flavonoids, terpenoids, and phenolic acids, that have been shown to have bone-protective effects. The research suggests that *V. negundo* has potential as a natural treatment for osteoporosis. However, further studies are needed to entirely accept its mechanisms of action to determine optimal dosages and treatment regimens.

Anti-Cataract Effect

Vitex negundo, commonly known as the five-leaved chaste tree, has been found to have potential anti-cataract effects. Cataract is a common eye disorder characterized by clouding of the lens, leading to blurred vision and eventual blindness if left untreated. The leaves of *V. negundo* contain various bioactive compounds such as flavonoids, alkaloids, and terpenoids, which have been shown to possess antioxidant and anti-inflammatory properties. Studies have demonstrated that *V. negundo* extracts can prevent or delay cataract formation by reducing oxidative stress and inflammation in the lens. These allegations suggest that *V. negundo* could be a talented candidate for developing natural anti-cataract agents. However, additional research is necessary to totally accept its mechanism of action and clinical efficacy.

Hepatoprotective Effect

Vitex negundo, also known as the five-leaved chaste tree, is a medicinal plant commonly used in traditional medicine for various ailments. One of its potential benefits is its hepatoprotective effect, meaning it can protect the liver from damage. Studies have shown that *V. negundo* extracts can improve liver function and reduce oxidative stress, inflammation, and lipid peroxidation in the liver. These effects may be attributed to the plant's antioxidant and anti-inflammatory properties, which help to neutralize harmful free radicals and reduce inflammation in the liver.

Anti-Hyperglycemic Activity

Vitex negundo, also known as the five-leaved chaste tree or the Indian privet, has been found to have anti-hyperglycemic activity. Studies have shown that extracts of *Vitex negundo* leaves and seeds can lower blood glucose levels in animals with experimentally induced diabetes.

This effect is thought to be due to the presence of various bioactive compounds in the plant, such as flavonoids and terpenoids, which have been shown to improve glucose metabolism and insulin sensitivity.

Vitex negundo in humans, these findings suggest that it may have promise as a natural anti-hyperglycemic agent.

Other Activities

Vitex negundo, also known as five-leaved chaste tree or Indian lavender, is a medicinal plant that is widely used in traditional medicine. In addition to its well-known use for treating menstrual disorders, it has several other activities that have been studied scientifically. Furthermore, *Vitex negundo* has been used traditionally for its insecticidal properties and as a natural insect repellent. It has also been used in agriculture as a natural pesticide. Overall, *Vitex negundo* has a range of potential health benefits and practical applications, and further research is needed to fully understand its potential [10].

DISCUSSION

Vitex negundo, also known as the five-leaved chaste tree, is a plant species native to the Indian sub-continent. To treat various ailments such as fever, headache, inflammation, and menstrual disorders. The plant contains various bioactive compounds such as flavonoids, terpenoids, and alkaloids that are responsible for its medicinal properties. Studies have shown that *Vitex negundo* possesses anti-inflammatory, antioxidant, analgesic, and antimicrobial properties.

One of the main uses of *Vitex negundo* is for menstrual disorders. It is believed to regulate the menstrual cycle and reduce symptoms of premenstrual syndrome (PMS). It has also been studied for its potential use in the treatment of polycystic ovary syndrome (PCOS). While *Vitex negundo* has been used for centuries in traditional medicine, more research is needed to fully understand its potential benefits and risks. It is important to consult with a healthcare professional before using any herbal remedies, including *Vitex negundo*.

CONCLUSION

Vitex negundo, commonly known as five-leaved chaste tree or Indian lavender, is a plant species that belongs to the family Lamiaceae. It is native to South Asia and Southeast Asia, and it has been traditionally used in Ayurvedic and Chinese medicine to treat various ailments. Several studies have investigated the possible health advantage of *Vitex negundo*, counting its anti-inflammatory, analgesic, antipyretic, antimicrobial, and antioxidant properties. Some research has also suggested that it may have a role in managing conditions such as menstrual disorders, rheumatoid arthritis, and diabetes.

In conclusion, *Vitex negundo* is a medicinal plant that has been traditionally used for its potential health benefits. While research is still ongoing, it may have a role in managing certain conditions and promoting overall health and wellness.

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Conflict of Interest

The authors declare that there is no conflict of interest for this study.

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