



A Synergistic Approach: Phytochemical and Pharmacological Insights into the Therapeutic Uses of Vitex Negundo Linn. In Ayurveda

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ABSTRACT

Historically, medicinal plants provided most therapeutic compounds for human illnesses. Over the last decade, natural medicine has gained popularity due to the belief that it is better than drugs. Verbenaceae shrub Vitex negundo Linn, known as Nirgundi or the Five-Leaved Chaste Tree, is big and scented. Each portion of this plant has therapeutic properties and is used in Ayurveda, Chinese medicine, Siddha, and Unani medicine. US herbal medicine is growing in popularity. Herbalists and traditional healers have used botanicals to treat liver illness. Herbal liver disease treatments have been shown effective in clinical trials this century. Basic science has shown how certain plants are medicinal. Anti-inflammatory, antioxidant, antipyretic, anti-arthritic, analgesic, antibacterial, anticancer, anti-amnesic, anxiolytic, nephroprotective, anti-HIV, antitubercular, and anti-snake venom activity are found in Vitex nigundo Linn extract.

KEYWORDS: Phytochemical, Pharmacological, Therapeutic, Vitex Negundo Linn, Ayurveda.

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INTRODUCTION

Ayurveda is the science of lifestyles, since India's historical instrument for intense treatment focuses on ones, concepts and sickness [1]. The practice of Ayurveda medicine comprised of 80 phases separated into 180 chapters and counted 314 flowers, which are utilised as medicine in India. Approximately 15,000 medicinal flowers have been identified in India, however traditional communities still use the most basic 7000–7500 plant species to treat certain illnesses [2].

In most societies worldwide, pain is the primary clinical, social, and economic concern. It may be described as an unpleasant emotional and sensory experience linked to real or probable tissue damage [3]. Pain receptor stimuli come in three different varieties. An example of a mechanical or chemical stimulus would be high pressure [4]. Herbal medicine is becoming more and more well-liked in the US and is still a common substitute in China and the Far East. Herbalists and indigenous healers throughout the world have long utilised botanicals to prevent and cure liver illness. This century's clinical studies have validated the effectiveness of a number of plants in the management of liver disease. The methods via which certain plants provide their medicinal properties have been discovered by basic scientific study. The benefits of plants historically utilised by indigenous healers and herbalists to promote liver function and treat liver illnesses have been the subject of several studies in recent years. By identifying the mechanisms and modes of action of these plants and confirming the medicinal efficacy of specific plants or plant extracts in clinical tests, science has often validated traditional experience and knowledge.

Commonly referred to as "Nirgundi," Vitex negundo has antibacterial, anticancer, antifungal, antimicrobial, enzyme-inhibiting, anticonvulsant, and drug-potentiating properties. Based on the literature review, it seems that the analgesic properties have received the least attention among all the biological effects examined on [5] *A. paniculata* and *V. negundo*. In order to assess the analgesic efficacy of the leaf extracts from *A. paniculata* and *V. negundo* in an animal paradigm, the current study was designed [6]. The Verbenaceae family includes the aromatic plant Vitex nigundo Linn. It is also known as nirgundi, or the Five-Leaved Chaste Tree. Among Vitex nigundo Linn's many chemical constituents are flavonoids, volatile oil, triterpenes, diterpenes, sesquiterpenes, lignan, flavones, glycosides, iridoid glycosides, and stilbene derivatives. These chemical components are present in every part of the plant [7]. Anti-inflammatory, antioxidant, antipyretic, anti-arthritic, analgesic, antibacterial, anticancer, anti-amnesic, anxiolytic, nephroprotective, anti-HIV, antitubercular, and anti-snake venom activity are among the pharmacological characteristics of the extract from Vitex nigundo Linn..[8]



Figure 1 *Vitex negundo* Linn



Fig. 2 – Nirgundi or Five-leaved chaste tree: Leaves, Inflorescence, fruit

TAXONOMICAL CLASSIFICATION

- Kingdom - Plantae
- Subkingdom - Tracheobionta
- Super division - Spermatophyte
- Division - Magnoliophyta
- Class - Magnoliopsida
- Subclass - Asteridae
- Order - Lamiales
- Family - Verbenaceae
- Genus - *Vitex*
- Species - *Negundo*

General information

Vitex negundo is indigenous to China, the Philippines, tropical Africa, and India. The plant is also found in Bengal, Southern India, and Burma. It is prevalent in deciduous forests, riverbanks, damp locations, and derelict regions next to communities. In India, it is grown as a hedging plant. The tree, reaching heights of 2-4 meters and characterised by thin, grey bark, is prevalent in Tamil Nadu and Karnataka, both in the wild and in cultivation.[9]

It is prevalent across India and may to heights of 1,500 meters in the outer Himalayas. It is referred to by several names in different languages.

Vitex negundo is generally known in several languages, including Arabic.

- Arabic: Aslag
- (Persian) Panjgusht
- Assamese: Pochotia
- Bengali: Nirgundi, Nishinda, Samalu
- Bontonok: Liñgei
- Chinese: Huang jing (黄荆)
- English: Five-leaved chaste tree or Horseshoe vitex
- Filipino: Lagundi

- Gujarati: Nagoda
- Shamalic:
- Hindi: Mewri; Nirgundi; Nisinda; Sambhalu; Sawbhalu (निर्गुंडी)
- Ifugao: Dabtan
- Ilokano: Dangla
- Kannada: Bile-nekki
- Malayalam: Indrani
- Marathi: Nirgunda
- Punjabi: Banna; Marwan; Maura; Mawa; Swanjan Torbanna
- Sanskrit: Nirgundi; Scephalika; Sindhuvara; Svetasurasa; Vrikshaha(सिन्धवग ार)
- Sinhala: Nika
- Tamil: Chinduvaram; Nirnochchi; Nochchi; Notchi; Vellai-nochchi
- Telugu: Sindhuvara; Vavili; Nalla-vavili; Tella-vavili (వావిలి / సీంధువార) lekkali.

In its native environment, the panjghust (*vitex negundo*) may be found in the tropical regions of Eastern and Southern Africa as well as Asia. In several other locations, it is generally cultivated and has been naturalised. There are a number of countries in which it is indigenous, including Afghanistan, Bhutan, Cambodia, China, India, Indonesia, Japan, Kenya, etc.. The panjghust, also known as *Vitex negundo*, may be found in a variety of environments, including grasslands, mixed open woods, recently disturbed ground, and water bodies (Nadkarni). (Nadkarni).10]

Morphology Description (Habit)

Tropical areas of Asia, Eastern and Southern Africa, and the tropics of Africa are home to the panjghust (*vitex negundo*). It is widely grown and has become a native plant in a number of different places. Afghan, Bhutanese, Cambodian, Chinese, Indian, Indonesian, Japanese, Kenyan, etc. are among the many nations where it is native. The panjghust, or *Vitex negundo*, is a plant that grows in a wide range of habitats, including open grasslands, disturbed soil, water, and freshly disturbed ground (Nadkarni). [11]

Principal Constituents

Chrysophenol D, luteolin, p-hydroxybenzoic acid, D-fructose, isoorientin, and casticin are all present in leaf juice. Vitamin C, carotene, E-sitosterol, and C-glycoside are among the other ingredients. The primary components of the oil, which comprise 61.8% of its composition, are sabinene, linalool, terpinen-4-ol, β -caryophyllene, α -guaiene, and globulol. Hydrocarbons, β -sitosterol, benzoic acid, and phthalic acid are present in the seeds..

OBJECTIVES OF THE STUDY

1. To study on Traditional Medicinal Use of *Vitex* Species
2. To study on Morphology Description (Habit) of *Vitex* Species

METHODS

To gather, consolidate, and synthesise information on *Vitex* plant fundamentals, Google Scholar, ScienceDirect, and PubMed Central were used to review the literature. Assessments classify *V. Negundo*'s 120 distinct molecules as phenolic compounds... Conventional Medicinal Use of *Vitex* Species

Vitex has been recognised and used as a medicinal herb by many different health systems, including those of ancient Greece, traditional China, Ayurveda, Unani, Europe, and Malay traditional medicine. In addition, they mentioned that *Vitex* may be used to treat a wide range of conditions, such as rheumatism, troubles with female reproduction, postpartum health, decreased libido, skin problems, gastrointestinal disorders, fever relief, and more. Traditional treatments frequently make use of a variety of *Vitex* species, including *V. agnus-castus* L., *V. negundo* L., *V. peduncularis* Wall, and *V. trifolia* L. Ex Schauer. While.. [12]

Conventional Medicinal Uses of *Vitex negundo* L.

The species of *Verticillium negundo* L. is known as Nirgundi or Sindhvar in the Philippines and India. It has a long history of usage in traditional medicine, particularly as a hedge along highwaysides, and some of its claims have even been backed by science. Many people, especially in India, consider this plant to be a sacred medical herb because to its many beneficial properties, such as its ability to reduce inflammation, alleviate pain, promote overall health, and fight germs. Traditional medicine practitioners in India and Malaysia recommend ingesting the Nirgundi plant's leaves, fruit, and stems to aid in postpartum recovery. Boiling the leaves and adding them to a postpartum bath can help the mother recover faster after giving birth, and the fruit and shoot juice can aid with nursing. For a long time, people in Pakistan and India have made decoctions out of the root, bark, and flowers of the *V. negundo* L. plant to cure cholera, flatulence, diarrhoea, and dysentery.. [13].

Conventional Medicinal Use of *Vitex agnus-castus* L.

The species *V. agnus-castus* L. has been known by a number of different names throughout the course of human history. Some of these names are chaste tree, Sambhalu in Urdu, Gattilier in French, and Sambha in hindi [14]. Because of the plant's beneficial effects on reproductive health, it is widely used by the locals to cure diseases of the female reproductive system and to reduce the urge to engage in sexual activity. The seeds of the *V. agnus-castus* L. plant were used by the natives of Latin America to make beverages for the same reason that the Romans did. *V. agnus-castus* L. is also known as the pepper or berry of Monk. This is due to the fact that in the prehistoric past, monks would chew the berries, consume them, and carry them in their

pockets in order to subdue their sexual impulses. During the Thesmophoria festival, Athenian women also utilised the plant to protect their virginity by covering their bed sheets with the fragrant leaves [14]. This was done in anticipation of the event. According to some additional sources, the chaste tree has been utilised by traditional herbalists and practitioners in North America and Europe for the purpose of treating gynaecological disorders such as premenstrual syndrome, infertility, and irregular menstruation. In addition to that, it has been utilised for the treatment of acne, digestive problems, and sedative effects. Conventional Medicinal Uses of *Vitex trifolia* L.

China, India, Indonesia, Sri Lanka, Australia, and Singapore are among the many nations where the medicinal plant *V. trifolia* L. grows, which is typical of tropical and subtropical regions. Various names are used for it in different regions of the world. In Chinese, it is called Manjingzi. In Sanskrit, it is called *Jalanirgundi*. In Hindi, it is called *Nichinda*. In English, it is called *Fructus Viticis* [15]. A comprehensive analysis of the literature reveals that *V. trifolia* L. has a long history of use in traditional medicine for a variety of conditions, including skin rashes, ringworm infections, leprosy, and joint problems. The author learnt that certain Asian nations utilise decoctions produced from *V. trifolia* L. leaves to treat sciatica and joint pain. Aside from that, the author discovered that leprosy and skin rashes may be treated by applying the leaves topically or swallowing them with honey. They went on to say that a traditional remedy for fungal infections involves applying a combination of crushed leaves and ghee, a semi-fluid butter made from animal milk, typically buffalo or cow. Some people who have intermittent fever along with severe thirst and vomiting have found relief by combining honey with the leaves of the *V. trifolia* L. plant [16]. Using *jalanirgundi* leaves and other herbs can help control the buildup of pitta in the blood, which is associated with fire, heat, and energy in Ayurveda. Additionally, the root may be used to make a tonic, an expectorant, and something that acts as a febrifuge. [17].

Conventional Medicinal Uses of *Vitex peduncularis* Wall. Ex Schauer

There are a number of local names for the species *V. peduncularis* Wall. Ex Schauer, which may be found in countries including Vietnam, Myanmar, Bangladesh, and India. *Horina* in Chittagong, *Korobaong* in Bengali, *Chang Xu Jing* in China, and *Charaiygoda* in Hindi are some of the indigenous names for the plant [18]. Traditional medicine made use of several parts of the plant *V. peduncularis* Wall. Ex Schauer, including its bark, roots, and leaves, to cure a variety of illnesses. The *Korobaong* plant has a long and varied history of use among the several ethnic groups in Bangladesh. People living in the *Khagrachari* hill region, for example, once thought that the plant's bark and leaves may be used to treat diabetes [19]. At the same time, the *Chakma* people ground the bark of the plant into a paste and used it topically to alleviate jaundice and facial and ocular numbness. Another method for treating urethritis was by mixing the same material with water [20]. Folk remedies for malaria and blackwater fever allegedly include *V. peduncularis* Wall. Ex Schauer's bark, roots, and leaves. [21].

Table 1. An overview of the traditional medical uses of several *Vitex* species.

Vitex Species	Conventional use	Plant Parts use	Reference
<i>Vitex negundo</i> L	Add to lactation	Shoot, fruit	[22-25]
	Post-partum bath	Leaf	[26]
	Dianhea, dysentery, flatulence, indigestion, and cholera	Root, bark, flower	[27,28]
	nusance	Leaf	[29,30,31]
	Cough, sore throat	Leaf	[32,33,34,35]
	Rheumatism	Root, leaf	[36-40]
	Hives, cellulitis, carbuncle Catanhal fever, muffled hearing	Leaf Leaf	[41] [42]
<i>Vitex agnus-castus</i> L.	Decline sexual drive	Leaf, seed, fruit	[43]
	Menstrual irregularities, infertility, premenstrual syndrome, acne, digestive complaint, sedative	-	[44-46]
	Enhance lactation	Leaf, fruit	[47]
	Inflammation, injury, snake and spider antivenom, epilepsy, madness, insanity	-	[48]
	Flatulence, unmatation, dropsy, splenic disease	Seed	[49]
	Pain due to chills	Leaf	[50]
	Calming agent for hysteria	Fruit	[49]
<i>Vitex trifolia</i> L	Joint pain, ringworm, leprosy, skin rashes	Leaf	[41,25]
	Intermittent fever, catanah, headache	Leaf	[40,42]
	Pitta in blood	Leaf	[40,42]
	Tonic, expectorant, febrifuge	Root	[51]

	Headache, migraine, common fever, eye pain, cancer	Fruit	[50-51]
	Decrease sexual drive	-	[51]
	Dysentery	Stem, leaf	[42,43]
	Rheumatism, sprained joint	Leaf	[48]
	Headache	Leaf	[29,30]
<i>Vitex peduncularis</i> Wall. Ex Schauer	verbal infection, inflammation	-	[52]
	Diabetes	Leaf, bark	[32,33,34,35]
	Jaundice, numbness of face and eyes, urethritis	Bark	[53]
	Blackwater fever, malaria	Bark, root, leaf	[54]
	Chest pain, joint pain	Bark	[55]

Chemical Constituents

There are 120 distinct components that have been isolated from *V. negundo*. These components may be classified into the following major categories: proteins, lignans, terpenoids, phenolic compounds, flavonoids, iridoids, and steroids. Caryophyllene, caryophyllene oxide, benzaldehyde, 1-8-cineole, sabinene, camphene, camphor, carene, caryophyllene, and bornyl acetate are the components that define volatile oil. The leaves of the *V. negundo* plant are the source of this volatile oil. A total of 0.05% of the essential oil is produced by fresh leaves. [56] Nihindaside and negundoside are two novel iridoid glycosides that have been discovered. These glycosides were discovered in conjunction to an alkaloid that was obtained from air-dried leaves. Bark is the source of flavone glycosides that are produced. Seeds are said to be the source of vaniline as well as a great number of other alkaloids that have not yet been found. Flavonoids, artemisinin, hydrocarbons, benzoic acid, phthalic acid, and diterpenes are all anti-inflammatory compounds that may be found in seeds. Agnuside, eurostoside, and aucubin are the monoterpenes that are found in the *V. negundo* plant. [57] Additionally, the plant is a source of the flavonoids vitexin, chrysoplenol, and casticin. There is a chemical called chysoplenol D that may be discovered in *Vitex negundo*. It has qualities that include antihistamine and muscle relaxant. Most of the time, chemicals or secondary metabolites are found in complex mixes that vary from plant section to plant section and from developmental stage to developmental stage. Compounds produced from the plant have been proven to have potential anti-inflammatory and analgesic activities, according to research conducted both in vitro and on animals. For the purpose of determining the plant's true medicinal efficacy, it is necessary to have a solid understanding of the secondary plant elements. [58] Various parts of the *Vitex negundo* plant include phytochemical components that are distinct from one another. Trimethoxyflavanone, viridiflorol, hydroxy-3,6,7-pentamethoxyflavone, hydroxybenzoylmusaenoside acid, β -caryophyllene, sabinene, 4-terpineol, gamma terpinene, and caryophyllene oxide are all components that may be found in the leaves. Compounds such as flavonoids, n-Hentriacontanol, globulol, betulinic acid, ursolic acid, oleanolic acid, protocatechuic acid, p-hydroxybenzoic acid, and 1-octen-3-ol are found..

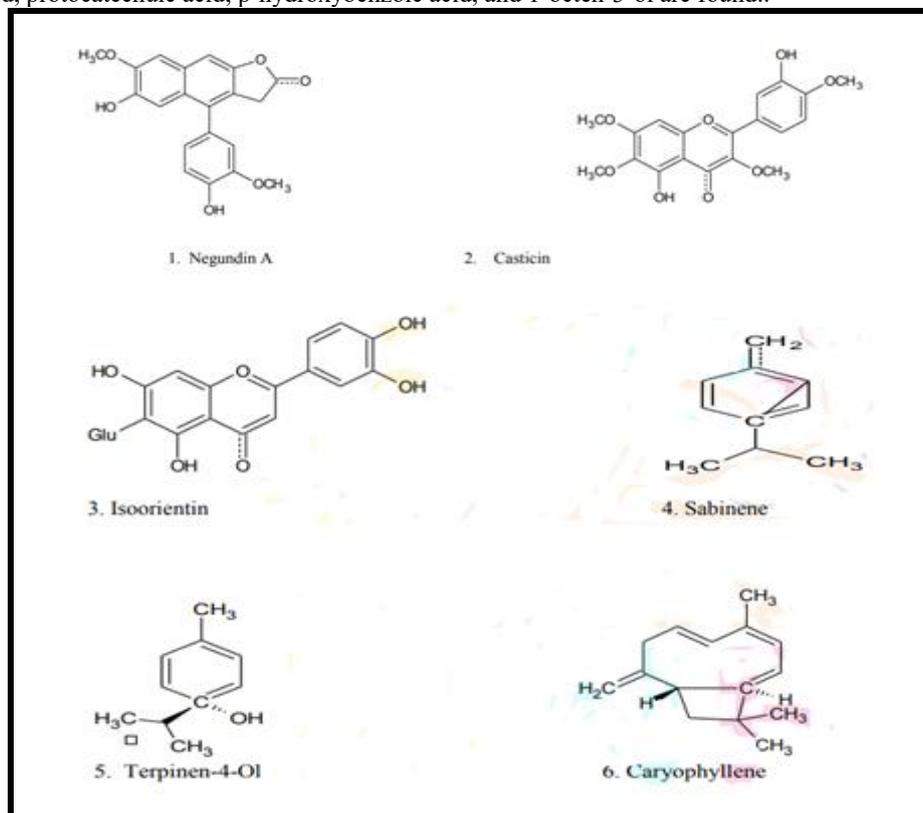


Figure 3 Chemical constituents

Pharmacological evidences

Analgesic and anti-inflammatory properties

Extracts from Panjghust (*Vitex negundo*) possess anti-inflammatory properties in both acute and sub-acute inflammation. The anti-inflammatory and analgesic benefits of fresh panjghust (*Vitex negundo*) leaves are attributed to the suppression of prostaglandin formation, antihistamine properties, membrane stabilisation, and antioxidant activities. [59]

Effect on oxidative stress

Antioxidant activities were proven by research conducted on the leaf extracts of the panjghust (*Vitex negundo*) plant. In rats that had Freund's adjuvant-induced arthritis, the extracts were able to efficiently lower levels of glutathione peroxidase, catalase, and superoxide dismutase. As a result of the presence of flavones, vitamin C, and carotene in the extracts, lipid peroxidation can be reduced, which in turn helps to battle oxidative stress. Flavonoids derived from Panjghust (*Vitex negundo*) have been shown to be useful in reducing the severity of solenoid-induced cataracts because to their antioxidant and therapeutic properties.

Enzyme-inhibitory action

Extracts obtained from the root of Panjghust (*Vitex negundo*) have demonstrated the ability to inhibit enzymes such as tyrosinase, xanthine oxidase, butyrylcholinesterase, α -chymotrypsin, and lipoxygenase to a significant degree. According to Woradulayapinij et al. (2005), an extract of water taken from the aerial portions of Panjghust (*Vitex negundo*) possesses inhibitory effect against HIV type 1 reverse transcriptase. [60]

Consequence on reproductive potential

The flavonoid-rich fraction of Panjghust (*Vitex negundo*) seeds adversely affected male reproductive function in rats and negatively influenced the last stages of spermatogenesis in dogs. Conversely, it is imperative to emphasise that these results contradict the conventional application of panjghust (*Vitex negundo*) as an aphrodisiac. After the identification of the oestrogenic properties of ethanolic extracts from panjghust (*Vitex negundo*), Hu et al. (2007) recommended the application of this plant in hormone replacement therapy. [61]

Effects on histomorphology and cytotoxicity

Even at dangerous doses, panjghust (*Vitex negundo*) extracts did not affect stomach tissue in rats, according to Tandon and Gupta (2004). However, dose-dependent changes were found in the heart, liver, and lungs. Panjghust (*Vitex negundo*) leaf extracts were tested for cytotoxicity using COLO-320 cancer cells. [62]

Drug potentiating ability

The effects of several medications were improved when Panjghust (*vitex negundo*) extracts were taken. These included ibuprofen, phenylbutazone, analgesics, pentobarbitone, diazepam, chlorpromazine, and anticonvulsive drugs like diphenylhydantoin and valporic acid. [63-65]

Marketable formulations containing *V. negundo*

Panjghust, also known as *Vitex negundo*, has been successfully exploited by a multitude of pharmaceutical firms in the production of commercial medications for the treatment of inflammatory musculoskeletal diseases, rheumatic illnesses, and dermatological eruptions. Conditions affecting the liver, infections of the vaginal and cervical regions, and haemorrhoids. As a dietary supplement, it is suggested that one capsule (40 mg each capsule) be taken on a regular basis with either meals or liquids. It is this hormone that helps maintain the hormonal homeostasis of a woman. To get the most out of Solaray *Vitex* (Chaste tree), it is recommended to take 100 vegetarian capsules containing 400 milligrammes twice day, either with meals or beverages. In addition to assisting in the management of premenstrual symptoms, Blackmores *V. agnus-castus* L., a classic Western herbal remedy, helps to maintain hormonal homeostasis. It is recommended that one capsule be taken all three times a day, before each meal.

According to the findings of pharmacological studies, *V. agnus-castus* L. possesses anticancer, antimicrobial, antifungal, antibacterial, anti-inflammatory, and antioxidant properties. The *V. agnus-castus* L. species is the subject of the majority of the four patents that have been granted for the *Vitex* genus. Additionally, the *Vitex* extract was employed as a medicinal agent for movement problems in earlier patents, while the genus was utilised as an auxiliary product to address health concerns that mostly affected women.

CONCLUSION

The many different kinds of biological activity that *V. negundo* is capable of exhibiting have been established by a great number of experimental research. For instance, it is an example of a category of herbal treatment that has a strong theoretical background. Therefore, pharmaceutical firms have a great deal of potential to develop this plant as a medication; nevertheless, clinical trials need to be carried out in order to establish the plant's therapeutic benefit before it can be suggested for treatment in certain situations. The purpose of these studies was to investigate the potential of the plants to serve as sources of novel therapeutic chemicals and lead compounds for the development of the pharmaceutical industry. Therefore, in order to provide the groundwork for further pharmacological study, it is required to conduct screenings of medicinal plants to identify the presence of bioactive compounds. Upon thorough evaluation of the data that is now accessible, it is clear that *Nirgundi* had a significant role in the ancient medical system. Natural remedies are derived from almost every part of the plant that they are derived from. There are a number of qualities that are known to be found in the plant, including anticancer, antibacterial, antifeedant, anti-inflammatory, anti-hyperpigmentation, hepatoprotective, antihistaminic, and analgesic effects. The company

Indipth asserts that scientific research on the plant, its therapeutic properties, and the chemical components that it contains can assist in the treatment of a wide range of human disorders.

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