INTERNATIONAL JOURNAL OF ADVANCES IN PHARMACY, BIOLOGY AND CHEMISTRY

Review Article

Vitex negundo Linn. : Ethnobotany, Phytochemistry and Pharmacology- A Review

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ABSTRACT

Vitex negundo Linn. is a large aromatic shrub distributed throughout India. Herbal medicine, rather than merely curing a particular disease, aims at returning the body back to its natural state of health. It has been used since ancient times as a female remedy and also for pains in Ayurveda and also in Roman medicine. It became known as the chaste berry tree. This species is globally distributed in Indo-Malesia, cultivated in America, Europe, Asia and West Indies. Within India, it is found throughout the greater part of India, in the outer Himalayas. Myriad medicinal properties have been ascribed to *Vitex negundo* Linn. and the plant has also been extensively used in treatment of a plethora of ailments as traditional medicine, folk medicine and pharmacological evidence. Traditionally the leaves of *Vitex negundo* Linn. are documented to possess antibacterial, antitumor, astringent, febrifuge, sedative, tonic and vermifuge. It has been reported to posses potent pharmacological properties like anti-inflammatory, anti-rheumatic, antibiotic, Hepatoprotective, antioxidant, anticonvulsant, oxidative stress, anti-androgen, snake venom neutralization and anti-allergic activities. The various chemical constituents like flavonoids, flavones glycosides, volatile oil, triterpenes, tannins and many others were identified in this plant. This review gives a bird's eye view mainly on the pharmacognistic characteristics. traditional uses, phytochemistry and pharmacological actions of *Vitex negundo* Linn.

Keywords: *Vitex negundo* Linn., anti-inflammatory, Phytochemistry, Pharmacological evidence.

INTRODUCTION

सिन्दुवारः श्वेतपुष्पः सिन्दुकः सिन्दुवारकः
नीलपुष्पी तु निर्गुण्डी शेफाली सुवहा च सा ।। (भा.नि., गुडूच्यादि वर्ग)

Uniyal et al. reiterates a popular local quote of the Bangalis in the Western Himalayan region of India which translates as – A man cannot die of disease in an area where *Vitex negundo, Adhatoda vasica* and *Acorus calamus* are found (provided that he knows how to use them). The plant holds great promise as a commonly available medicinal plant and it is indeed no surprise that the plant is referred to in the Indian traditional circles as *'sarvaroganivarini'* – the remedy for all diseases[1].

Taxonomical classification

Kingdom: *Plantae*- Plants
Subkingdom: *Tracheobionta* – Vascular plants
Super division: *Spermatophyte* – Seed plants
Division: *Magnoliophyta* – Flowering plants
Class: *Magnoliopsida* – Dicotyledons
Subclass: *Asteridae*
Order: *Lamiales*
Family: *Verbenaceae* – Verbena family
Genus: *Vitex* Linn.
Species: *Vitex negundo* Linn. – (Chastetree) [2,3,4]

Synonyms: table no. 1[4]

Geographical distribution: *Vitex* usually grows from three to nine feet tall, but under cultivation can develop to 20 feet tall. Nirgundi occur in tropical to temperate regions (up to 2200 m from east to west) grows gregariously in wastelands and is also widely used as a hedge-plant. This species is globally distributed in Indo-Malesia, cultivated in America, Europe, Asia and West Indies. Within India, it is found throughout the greater part of India, ascending to an altitude of 1500 metres in the outer Himalayas[5]. It is abundant in open-waste lands. Locally distributed throughout the State Maharashtra along the banks of rivers; very common near the sea-coast in tidal and beach-forests in Konkan; along Deccan rivers. Habitat found to be in Waste lands and moist situations. A small slender tree with quadrangular branchlets densely whitish, tomentose branchlets distributed throughout India. It is often found growing next to streams and it loves water[3,6,7].

Cultivation: It is widely planted as a hedge plant in between the fields and usually not browsed by the cattle. It can be reproduced readily from shoot cuttings. It produces root suckers which can also be utilized as planting material. An easily grown plant, it prefers a light well-drained loamy soil in a warm sunny position sheltered from cold drying winds succeeds in poor dry soils. Plants tolerate temperatures down to about -10°C. The leaves and stems are strongly aromatic. The flowers have a most pronounced musk-like perfume[8].

Pharmacognosy: Root: Roots are woody, fairly thick, 8-10 cm in diameter; external surface brownish, rough due to the presence of longitudinal fissures and a small rootlets. The bark is very thin and corky portion can be scrapped off easily. Transverse section shows outer cork consisting of 12-20 rows of nearly cubical to rectangular cells, the cells of peripheral rows being thick walled but not lignified.

Stem Bark: Bark occurs in channelled pieces, 0.3-0.5 cm thick; outer surface yellowish grey, rough, lenticelular, longitudinally channeled and transversely cracked; inner surface darker than outer, blackish and smooth; fracture short and splintery; taste slightly bitter. In transverse section the bark shows well developed periderm and secondary phloem elements.

Leaf

Morphology: Leaves are palmately compound, petiole 2.5-3.8 cm long; 3-5 foliate; the middle leaflet is petiolate; in trifoliate leaf, leaflet lanceolate or narrowly lanceolate, acute, entire or rarely crenate, middle leaflet 5-10 cm long and 1.6-3.2 cm broad, with 1-1.3 cm long petiolule, remaining two sub-sessile; in pentafoliate leaf inner three leaflets have petiolule and remaining two sub-sessile; Odour is agreeably aromatic surface glabrous above and tomentose beneath; texture, leathery[9].

Microscopy: Petiole shows single layered epidermis having a number of unicellular, bicellular and uniseriate multicellular covering trichomes and also glandular trichomes with uni to tricellular stalk and uni to bicellular head; cortex composed of outer collenchymatous tissue and inner 6-8 layers of parenchymatous tissue; collenchyma well developed in basal region and gradually decreases in middle and apical regions; pericyclic fibres absent in basal region of petiole and present in the form of a discontinuous ring in apical region surrounding central horse shoe-shaped vascular bundle; a few smaller vascular bundles present ventrally between arms of central vascular bundle and two, or rarely three, bundles situated outside the arms.

Lamina - shows single layered epidermis having mostly unicellular hairs, bi and multicellular and glandular trichomes being rare; hypodermis 1-3 layered interrupted at places by 4-8 palisade layers containing chlorophyll; a large number of veins enclosed by bundle sheath traverse mesophyll; stomata present only on the ventral surface, covered densely with trichomes; vein-islet and vein termination number of leaf are 23-25 and 5-7 respectively.

Powder – It shows number of pieces or whole, uni, bi and multicellular covering trichomes, glandular trichomes, palisade tissues with hypodermis, and upper and lower epidermis, xylem vessels with pitted walls[4].

Physical constituents: Table no.2[6]
Phytochemistry: Table no.3[10-18]
Ayurvedic properties: Table no.4

Formulations (Yog):

1. Arkadi kvath churna 2. Manikya rasa
3. Vatavidhvamsana rasa 4. Maha vishgarbha tiala 5. Vishagarbh taila(1).

Home remedies:

1. In cold, its decoction 20 ml should be used along with 1gm Pippali and 250 mg Vacha.

2. In pneumonitis, Swarasa of its leaves 10 ml is so beneficial along with Pippali.
3. It's paste on affected site is painkiller and anti-inflammatory[5].

Medicinal importance

Herbal medicine, rather than merely curing a particular disease, aims at returning the body back to its natural state of health. The phytochemical components of medicinal plants often act individually, additively or synergistically in improvement of health. After having analyzed the various chemical components present in different parts of *Vitex negundo* Linn., it is imperative that focus shifts to the medicinal applications of the plant. Myriad medicinal properties have been ascribed to *Vitex negundo* Linn. and the plant has also been extensively used in treatment of a plethora of ailments. These properties have been categorized under three heads – traditional medicine, folk medicine and pharmacological evidence.

Leaves: The leaves of *Vitex negundo* Linn. are antibacterial, antitumor, astringent, febrifuge, sedative, tonic and vermifuge. They are useful in dispersing swellings of the joints from acute rheumatism and of the testes from suppressed gonorrhea. The juice of the leaves is used for removing foetid discharges and worms from ulcers, whilst oil prepared with the leaf juice is applied to sinuses and scrofulous sores. Extracts of the leaves have shown bactericidal and antitumor activity. Leaves are antiparasitical, alterative, aromatic, vermifuge, pain reliever. Leaves are insect repellents. Extracts of the leaves have insecticidal activity. The fresh leaves are burnt with grass as a fumigant against mosquitoes. Decoction of leaves may improve eyesight[19-20.]

Dosage: Nirgundi Juice - 20 to 30 ml per day.
Nirgundi leaf Powder - 3 to 6 grams per day.

Stem: A decoction of the stems of *Vitex negundo* Linn. is used in the treatment of burns and scalds.

Fruit: The dried fruit of *Vitex negundo* Linn. is vermifuge. The fruit is also used in the treatment of angina, colds, coughs, rheumatic difficulties etc. The fresh berries are pounded to a pulp and used in the form of a tincture for the relief of paralysis, pains in the limbs, weakness etc. Fruit-nervine, cephalic, emengogue, dried fruit-vermifuge employing an aqueous extract from the fruit, a 1979 study reported good results on premenstrual water retention. Women were able to sustain a good level of milk production for breast feeding while taking this herb. While it took some time for the drug to take effect, the women were able to continue the use of the drug for months without harmful side effects[21].

Root: The root of *Vitex negundo* Linn. is expectorant, febrifuge and tonic. It is used in the treatment of colds and rheumatic ailments. It is harvested in late summer and autumn and dried for later use. Roots are tonic, febrifuge, expectorant, diuretic. Root juice is said to increases the growth of hair.

Seed: Seeds of *Vitex negundo* Linn. occasionally used as a condiment, it has pepper substitute. When washed to remove the bitterness it can be ground into a powder and used as a flour, though it is very much a famine food used only when all else fails[22].

A) Traditional medicine: Traditional medicine mainly comprises of Indian Ayurveda, Arabic Unani medicine and traditional Chinese medicine. In Asia and Latin America, populations continue to use traditional medicine as a result of historical circumstances and cultural beliefs. Traditional medicine accounts for around 40% of all health care delivered in China. Up to 80 % of the population in Africa uses traditional medicine to help meet their health care needs.

B) Ayurveda: The plant finds mention in the verses of the *Charaka Samhita* which is unarguably the most ancient and authoritative textbook of Indian Ayurveda. *Vitex negundo* Linn. has been designated as an anthelmintic and is prescribed as a vermifuge in the exposition on the *Charaka Samhita*.
Other Ayurvedic uses of *Vitex negundo* Linn. are people sleep on pillows stuffed with *Vitex negundo* Linn. leaves to dispel catarrh and headache and smoke the leaves for relief. Crushed leaf poultice is applied to cure headaches, neck gland sores, tubercular neck swellings and sinusitis. Essential oil of the leaves is also effective in treatment of venereal diseases and other syphilitic skin disorders. A leaf decoction with *Piper nigrum* is used in catarrhal fever with heaviness of head and dull hearing. A tincture of the root-bark provides relief from irritability of bladder, rheumatism and in dysmenorrhea. Formulations described in *Anubhoga Vaidya Bhaga*, a compendium of formulations in cosmetology, in outlining the use of *Vitex negundo* Linn. leaves along with those of *Azadirachta indica*, *Eclipta alba*, *Sphaeranthus indicus* and *Carum copticum* in a notable rejuvenation treatment known as *Kayakalpa.*

C) Unani medicine:*Vitex negundo* Linn. is commonly known as *Nisinda* in Unani medicine. The

seeds are administered internally with sugarcane vinegar for removal of swellings. Powdered seeds are used in spermatorrhoea and serve as an aphrodisiac when dispensed along with dry *Zingiber officinale* and milk.

D) Chinese medicine: The Chinese Pharmacopoeia prescribes the fruit of *Vitex negundo* Linn. in the treatment of reddened, painful and puffy eyes, headache and arthritic joints.

E) Uses in western herbal medicine: Modern medical world with *Vitex* began with the introduction of concentrate extracts of *Vitex* fruits in the 1950. From 1943 to 1997, approximately 32 clinical trial were conducted on a propriety *Vitex agnus* berry product for evaluating its effectiveness in treating mastitis and fibrocystic diseases, menopausal symptoms, poor lactation, uterine bleeding disorder and menstrual irregularities[9,23].
In homoeopathic medicine, *Vitex agnus* and *Vitex negundo* Linn. is used for various sexual debilities-marked depression of vital power, premature old age with apathy, self contempt for the sexual abuse nervous debility in unmarried person feeble erection without sexual desire, emission of prolactic fluid when straining at stool, cold, hard, swollen, painful testicle. In general practice, the drug is prescribes to female for leukemia staining yellow suppressed menses, slangy or suppressed breast milk, inflammation of uterus. The flowers are astringents and used in fever, diarrhoea and liver complaints. The fruits are prescribed in headache catarrh and watery eyes when dried. It is consider vermifuge. They are much valued medicinally in china. An aqueous extract of the fruits was found to be good analgesic action. In Philipins – the seed are reported to eaten after boiling. The young shoots are used in the basket making. The ash of the plants is source of potassium carbonate or peer ash and is reported to be used as an alkali in drying[3].

F) Folk medicine: Folklore systems of medicine continue to serve a large segment of population, especially those in rural and tribal areas, regardless of the advent of modern medicine. The entries regarding the multifarious applications of *Vitex negundo* Linn. in folk medicine have been grouped regionally to emphasize the ethanobotanical diversity and ubiquity of the plant; and the details have been laid out in table no.5 and uses of *Vitex negundo* Linn. in folk medicine in India given in table no.6[10,12].

Pharmacological evidence: Demands of the scientific community have necessitated experimental evidence to further underline the medicinal importance of *Vitex negundo* Linn. described above. Taking 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, gonorrhea, sinuses, scrofulous sores, bronchitis and as tonics. As vermifuge, lactagogue, antibacterial, antipyretic, 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[16].

1] Anti-inflammatory activity: The sub-effective dose of *Vitex negundo* Linn. potentiated anti-inflammatory activity of phenlbutazone and ibuprofen significantly in carrageenin induced hind paw oedema and cotton pellet granuloma models. The potentiation of anti-inflammatory activities phenlbutazone 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 anti-inflammatory properties of *Vitex negundo* Linn. extracts in acute and sub-acute inflammation which are attributed to prostaglandin synthesis inhibition[3,24].

2] Antinociceptive activity: Tail flick test in rats and acetic acid induced writhing in mice were employed to study the antinociceptive activity of ethanolic leaf extract of *Vitex-negundo* Linn. (100, 250 and 500 mg/kg, p.o). The effect was compared with meperidine (40 mg/kg, sc) in tail flick method and aspirin (50 mg/kg, p.o) in writhing test as a standard control respectively. An interaction with naloxone hydrochloride was also studied in tail flick method for its mechanism of central analgesic action. It showed significant analgesic activity in dose dependant manner in both the experimental models. It suggested that *Vitex-negundo* Linn. possesses both central and peripheral analgesic activity. The central analgesic action does not seem to be mediated through opioid receptors. It may prove to be a useful adjuvant therapy along with standard analgesic drug[25].

3] 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[8].

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 their 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[26].

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-ethyl benzothiazoline-6-sulfuric acid) ABTS radical cations in a concentration dependent manner, showing a 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[27,28].
The extracts also possess the ability to combat oxidative stress by reducing lipid peroxidation owing to the presence of flavones, vitamin C and carotene. Rooban et al. evaluated the antioxidant and therapeutic potential of *Vitex negundo* Linn. flavonoids in modulating solenoid-induced cataract and found it to be effective[3,29].

6] Enzyme-inhibitory activity: Root extracts of *Vitex negundo* Linn. showed inhibitory activity against enzymes such as lipoxygenase and butyryl-cholinesterase, α-chymotrypsin, xanthine-oxidase and tyrosinase. Also reported the HIV type 1 reverse transcriptase inhibitory activity of the water extract of the aerial parts of *Vitex negundo* Linn.[30].

7] Anticonvulsant activity: Maximal electroshock seizures (MES) in albino rats and pentylenetetarazole (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 valporic acid. The anticonvulsant activity of *Vitex negundo* Linn. has not been found equi-effective with standard drugs. Moreover, the potentiation of diphenylhydantoin and valporic 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 valporic acid[3,31].

8] Antibacterial studies: Essential oils and successive ethyl acetate and ethanol extracts of *Vitex negundo* Linn. showed antibacterial activity against *Staphylococcus aureus, Bacillus subtilis, Escherichia coli* and *Pseudomonas aeruginosa* bacterial strains.
Main constituents identified in leaves oil were d-guaiene, carryophyllene epoxide and ethylhexadecenoate; In flowers oil α-selinene, germacren-4-ol, carryophyllene epoxide and (E)-nerolidol while fruit oil showed β -selinene, α-cedrene, germacrene D and hexadecanoic acid as the main constituents which help for antibacterial activity.

9] Antiallergic Activity: Ethanolic extract of *Vitex negundo* Linn. showed antiallergic activity against immunologically induced degranulation of mast cells. It also inhibited edema during active paw anaphylaxis in mice. The extract significantly inhibited both the initial and later sustained phases of tracheal contractions. The initial phase was primarily due to histamine and the latter phase was due to release of lipid mediators from arachidonic acid. Inhibition of the latter phase may be secondary to inhibition of arachidonic acid by the ethanolic extract.

10] Snake venom neutralization activity: The methanolic root extracts of *Vitex negundo* Linn. and *Emblica officinalis* showed antisnake venom activity. The plant *Vitex negundo* Linn. extracts significantly antagonized the Vipera russellii and Naja kaouthia venom induced lethal activity both in in vitro and in vivo studies. Vipera russellii venom-induced haemorrhage, coagulant, defibrinogenating and inflammatory activity were significantly neutralized by both plant extracts. No precipitating bands were observed between the plant extract and snake venom[8,31,32].

11] Effect on reproductive potential: The flavonoid rich fractions of seeds of *Vitex negundo* Linn. caused disruption of the latter stages of spermatogenesis in dogs and interfered with male reproductive function in rats. It must however be noted that these findings are in sharp contrast with the traditional use of *Vitex negundo* Linn. as aphrodisiac. Hu et al. determined that ethanolic extracts of *Vitex negundo* Linn. showed estrogen-like activity and propounded its use in hormone replacement therapy[8,33].

12] Histomorphological and cytotoxic effects: Tandon and Gupta studied the histomorphological effect of *Vitex negundo* Linn. extracts in rats and

found the stomach tissue to be unaffected even by toxic doses; while dose-dependent changes were observed in the heart, liver and lung tissues. Cytotoxic effect of leaf extracts of *Vitex negundo* Linn. was tested and affirmed using COLO-320 tumour cells. On one hand, Diaz et al. found the chloroform extracts of *Vitex negundo* leaves to be toxic to a human cancer cell line panel. Yunos et al. reported that *Vitex negundo* Linn. extracts were non-cytotoxic on mammary and genito-urinary cells of mice[34].

13] Hepatoprotective activity: The ethanolic extract of *Vitex negundo* Linn. at 250 and 500 mg/kg doses significantly decrease Serum Bilirubin, Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT), Alkaline Phosphates (ALP) and Total Protein (TP) levels against hepatotoxicity (HT) produced by administering a combination of three antitubercular drugs isoniazide (7.5 mg/kg), rifampin (10 mg/kg) and pyrazinamide (35 mg/kg). Alcoholic extract of the seeds of *Vitex negundo* Linn. showed the hepatoprotective action against carbon tetrachloride-induced liver damage. The extract was found to be effective in preventing liver damage which was evident by morphological, biochemical and functional parameters[3].
Nirgundi exerts a protective effect on CYP2E1-dependent CCl4 toxicity via inhibition of lipid peroxidation, followed by an improved intracellular calcium homeostasis and inhibition of Ca^{2+} dependent proteases[35,36].

14] Hypoglycemic activity: Villasenor and Lamadrid have provided an account of the anti-hyperglycemic activity of *Vitex negundo* Linn. leaf extracts[37,38].

15] Laxative activity: The aqueous extract of the *Vitex negundo* Linn. leaves at doses 100 and 200 mg/kg was investigated for laxative activity according to Cappaso *et al*. in albino rats were compared with standard drug agar-agar (300 mg/kg, p.o.) in normal saline.

16] Immunomodultory activity: Immunomodulatory effect of *Vitex negundo* Linn. extracts has been reported by Ravishankar and Shukla .The decoction of leaves is considered as tonic, vermifuge and is given along with long pepper in catarrhal fever[39].

17] Drug potentiating ability: Administration of *Vitex negundo* Linn. extracts potentiated the effect of commonly used anti-inflammatory drugs such as ibuprofen and phenylbutazone analgesics such as meperidine, aspirin, morphine and pethidine; sedative-hypnotic drugs like pentobarbitone, diazepam and chlorpromazine; anti-convulsive agents such diphenylhydantoin and valporic acid[28].

BIOLOGICAL ACTIVITY: *Vitex negundo* Linn. has shown promise as an effective bio-control agent. The extracts of *Vitex negundo* Linn. possess inhibitory, deterrent or lethal activity on biological agents that cause disease and damage to other organisms in table no.7 .
Additionally, production of plant secondary metabolites *de novo*, by *in vitro* cell culture methods, has assumed importance in the last two decades because the structural complexity of naturally occurring metabolites forms the basis for the chemical synthesis of novel and more potent analogues[40].

CONTRAINDICATIONS: *Nirgundi* should be used with caution with the concurrent use of psychotropic drugs, including analgesics, sedatives, antidepressants, anticonvulsants and antipsychotics. *Vitex negundo* Linn. is quite similar botanically to the better studied *Vitex agnus castus*, and thus may have a similar range of contraindications, including the concurrent use of progesterogenic drugs and hormone replacement therapies[8].

Table 1: Data showing synonyms of *Vitex negundo* Linn. in different languages

Sanskrit	Indrani, Nilanirgundi, Nilapushpa, Nirgundi, Nirgundika, Renuka, Sephalika, Shephali, Shvetasurasa, Sindhooka, Sindhuvaram.
Hindi	Mewri, Nengar, Ningori, Nirgandi, Nirgunda, Nisinda, Panikisambhalu, Sambhal, Sambhalu, Nirgundi, Shimalu.
Urdu	Sambhalu, Tukhm sambhalu.
Bengali	Nisinda, Sinduari, Beguna, Nishinda, Nishinde.
Kannada	Bile-nekki, Bilenekki, Karilakki, Lakkagida, Lakki, Lakki-gida, Lakkili.
Malyalam	Bem-nosi, Indrani, Karunocci, Noch-chi, Nochi, Vella-noch-chi.
Marathi	Nirgunda, Nengar, Nirgur, Lingur, Nirguda, Nirgundi, Limgud, Negumd.
Oriya	Thingkhawilupa, Niligundi.
Tamil	Nallanocci, Nirkkundi, Nirkundi, Nochi, Sinduvaram, Tiriburamerittan.
Telgu	Nalla-vavili, Nallavavili, Sindhuvaruma, Sinduvaramu, Tell-vavili.

Table 2: Quantitative (%) analysis of physical constituents[10]

Total ash	6.055 %	**Carbohydrate**	7.5-10.57 %
Acid insoluble ash	0.920 %	**Crude fiber**	25.50-30.50 %
Water soluble ash	1.460 %	**Fat**	5.00-9.00 %
Pet. Ether extractive	0.912 %	**Alkaloids**	0.5 %
Benzene extractive	0.535 %	**Bitter**	5 %
Chloroform extractive	0.433 %	**Proteins**	12.22-15.23 %
Alcohol extractive	24.330 %	**Moisture**	15.00-18.70 %
Water-soluble extractive	Not less than 20 %	**Foreign Matter**	1.9-2.0 %

Table 3: Phytochemical constituents of different plant parts of *Vitex negundo* Linn.

PLANT PART	PHYTOCHEMICAL CONSTITUENTS
Leaves	6′-p-hydroxybenzoyl mussaenosidic acid; 2′-p-hydroxybenzoyl mussaenosidic acid viridiflorol; β-caryophyllene; sabinene; 4-terpineol; gamma-terpinene; caryophyllene oxide; 1-oceten-3-ol; globulol; 5,3′-dihydroxy-7,8,4′-trimethoxyflavanone; 5,3′-dihydroxy,6,7,4′trimethoxyflavanone; 5-hydroxy-3,6,7,3',4'-pentamethoxy flavones; 5,7dihydroxy-6,4' dimethoxy flavonone; 5hydroxy-7,4' dimethoxy flavones; 5,3'-dihydroxy-7,8,4'-trimethoxy flavanone; betulinic acid [3β-hydroxylup-20-(29)-en-28-oic acid]; ursolic acid [2β -hydroxyurs-12-en-28-oic acid]; n-hentriacontanol; β-sitosterol; p-hydroxybenzoic acid; protocatechuic acid; oleanolic acid; flavonoids angusid; casticin; vitamin-C; nishindine; gluco-nonitol;
Seeds	3β-acetoxyolean-12-en-27-oic acid; 2α, 3α-dihydroxyoleana-5,12-dien-28-oic acid; 2β,3α diacetoxyoleana-5,12-dien-28-oic acid; 2α, 3β-diacetoxy-18-hydroxyoleana-5,12-dien-28-oic acid; vitedoin-A; vitedoin-B; a phenylnaphthalene-type lignan alkaloid, vitedoamine-A; five other lignan derivatives, 6-hydroxy-4-(4-hydroxy-3-methoxy-phenyl)-3-hydroxymethyl-7-methoxy-3,4-dihydro-2-naphthaldehyde, β-sitosterol; p-hydroxybenzoic acid; 5-oxyisophthalic acid; n-tritriacontane, n-hentriacontane; n-pentatriacontane; n-nonacosane.
Roots	2β,3α-diacetoxyoleana-5,12-dien-28-oic acid; 2α,3α-dihydroxyoleana-5,12-dien-28-oic acid; 2α,3β-diacetoxy-18-hydroxyoleana-5,12-dien-28-oic acid; vitexin; isovitexin, negundin-A; negundin-B; (+)-diasyringaresinol; (+)-lyoniresinol; vitrofolal-E; vitrofolal-F, acetyl oleanolic acid; sitosterol; 3-formyl-4.5-dimethyl-8- oxo-5H-6,7-dihydronaphtho (2,3-b)furan.
Essential oil of fresh leaves, flowers and dried fruits	δ-guaiene; 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. viridiflorol (19.55%), β-caryophyllene (16.59%), sabinene (12.07%), 4-terpineol (9.65%), γ-terpinene (2.21%), caryophyllene oxide (1.75%), 1-oceten-3-ol (1.59%), and globulol (1.05%). Viridiflorol

Table 4: Data showing Ayurvedic properties of *Vitex negundo* Linn.

Rasa	Katu (pungent), Tikta (bitter)
Guna	Laghu (Ruksha), Ruksha (dry)
Virya	Ushna (hot)
Vipaka	Katu (pungent)
Doshakarma	Kapha-Vata Shamaka

Table 5: Emphasizing the ethnobotanical diversity and ubiquity of the plant

Sr. no.	Country	Region	Local name	Used in treatment of
1	Bangladesh	Chittagong	- -	Weakness, Headache, Vomiting, Malaria, Black fever
2	China	Guangdong	Buging′iab	Common cold, Flu and Cough
3	Nepal	Kali Gandaki	Simali	Sinusitis, Whooping cough
4	Pakistan	Buner	Marvandaey	Chest-pain, Backache, Used as toothbrush
		Kot Manzaray Baba valley	--	Used as anti-allergenic agent
		Siran valley	Kalgari	Used as medicine for buffaloes in colic
		Margallah hills	Nirgud	Gum and skin diseases
5	Philippines	- -	--	Cancer
6	Sri Lanka	--	Nilnikka	Eye disease, Toothache, Rheumatism Used as a tonic, carminative and vermifuge.

Table 6: Uses of *Vitex negundo* Linn. in folk medicine in India

Sr. no.	State	Region	Local name	Used in treatment of
1	Andhra Pradesh	Puttaparthi	Tella Vaavili	Asthma, Cancer, Used as bath for women in puerperal state and for new born children
2	Assam	--	Pochatia	Jaundice, Urticaria, Cellulitis, Abcesses, Carbuncles, Eczema, Liver disorders
3	Himachal Pradesh	Garwahl Parvati valley	Sambhaalu Bana	Kwashiorkor Wounds, Body ache
4	Karnataka	Dharwad	Lakki, Karilakki	Toothache
		Mysore	Bilenekki	Febrile, catarrhal and rheumatic afflictions
		Uttara Kanada	Nekki	Migraine
5	Maharashtra	Konkan	Lingur	Rheumatism
		Amravati	Samhalu	Encephalitis
		Chota Nagpur	Nirgundi	Expectorant
		Satpuda	-	Joint pain
6	Orissa	Malkangiri	Languni	Jaundice
7	Tamil Nadu	Southern parts	Notchi	Used as antidote for snake bite
8	Uttar Pradesh	Jaunsar-Bawar hills	Somi	Eye pain
		Moradabad	Mala	Used as refrigerant for cattle
		Uttaranchal	-	48 types of ailments

Table 7: Data summarizes the effect of *Vitex negundo* Linn. on different pathogens and pests

ACTIVITY	ACTION AGAINST
Anti-bacterial	*Escherichia coli*, *Klebsiella aerogenes*, *Proteus vulgaris* and *Pseudomonas aerogenes* (Bacteria)
Anti-feedant	*Spodoptera litura* (Asian army-worm), *Achoea janata* (Castor semi-looper)
Anti-filarial	*Brugia malayi* (Microfilarial parasite)
Anti-fungal	*Alternaria alternata*, *Curvularia lunata Trichophyton entagrophytes*, *Cryptococcus neoformans*, *Aspergillus niger*, *Candida albicans*
Anti-larval	*Cnaphalocrocis medinalis* (Rice leaf-folder)
Anti-viral	*Plasmodium falciparum* (Virus)
Insecticidal	*Callosobruchus maculatus* (Pulse beetle)
	Phthorimaea operculella (Potato-tuber moth)
	Sitotroga cerealella (Angoumois grain moth)
	Aphis citricola (Spirea aphid), *Aphis gossypii* (Melon or Cotton aphid), *Myzus persicae* (Green peach aphid)
Larvicidal	*Anopheles subpictus*, *Culex tritaeniorhynchus* (Mosquitoes)
	Culex quinquefasciatus (Mosquito)
	Anopheles stephensi (Mosquito)
	Plutella xylostella (Diamond-back moth)
Mosquito repellant	*Culex tritaeniorhynchus* (Mosquito)
Mosquito repellant	*Aedes aegypti* (Mosquito)

Fig. 1: *Vitex negundo* Linn. Plant

CONCLUSION

In recent year, ethnobotanical and traditional uses of naturally compound, especially plant origin receive much attention as they were well tested for their efficacy generally believed to be safer for human use. They obviously deserve scrutiny on modern scientific lines such as phytochemical investigation, biological evaluation on experimental animal models, toxicity studies, investigation of molecular mechanism of action of isolated phytoprinciples and their clinical trials. Thorough screening of the literature available on *Vitex negundo* Linn. depicted the fact that it is a popular remedy.

ACKNOWLEDGEMENTS

The authors are sincerely thanks to the Principal and Vice-principal of Appasaheb Birnale College of Pharmacy, Sangli for providing all the facilities to carry out the study.

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