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A VERSATILE PLANT: *NIRGUNDI* (*VITEX NEGUNDO* LINN.) W.S.R TO ITS MEDICINAL USE AND PHARMACOLOGICAL ACTIVITY

Rakhi Nautiyal*[1], Suresh Chaubey[2], Meenakshi Pandey[3] and Chityanand Tiwari[4]

[1,3,4]M.D. Scholar, Department of Dravyagun, Rishikul Campus Uttarakhand Ayurved University Dehradun.
[2]Professor Department of Dravyagun, Rishikul Campus Uttarakhand Ayurved University Dehradun.

***Corresponding Author: Rakhi Nautiyal**
M.D. Scholar, Department of Dravyagun, Rishikul Campus Uttarakhand Ayurved University Dehradun.

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ABSTRACT
Vitex negundo (Nirgundi) belongs to family Verbenaceae is one of the very useful plant in Indian System of medicine. The *Sanskrit* name *Nirgundi* literally means 'that which protects the body from all diseases'. The plant is referred in the Indian traditional system as '*Sarvaroganivarini'* means, the remedy for many diseases. All parts of *nirgundi* plant especially its leaves contain numbers of secondary metabolites such as alkaloids, phenols, flavonoids, glycosidic irridoids, tannins and terpenes. Due to these phytochemicals, *Nirgundi* attributed to possess pharmacological activities like anti-inflammatory, anti-oxidant, analgesic, antipyretic, antibacterial, larvicidal, nephroprotective, hepatoprotective, anti- HIV activity, anti-eosinophilic, anti-cancer and anti-snake venom activity etc. It is a multi-purpose herb and used both for external application in the form of paste/oil etc and also for internal use in the form of powder, leaf juice extract or decoction. The present review aim to compile comprehensive information on *Ayurvedic* literature, pharmacognostic characteristics, phytochemical constituents, therapeutical uses and pharmacological actions of *Vitex negundo* Linn.

KEYWORDS: *Vitex negundo*, *Nirgundi*, pharmacological, anti-inflammatory.

INTRODUCTION
Medicinal plants have been a major source of therapeutic agents since ancient times to cure human disease. The revival of interest in natural drugs started in last decade mainly because of the wide spread belief that green medicine is healthier than synthetic products. Now-a-days, there is manifold increase in medicinal plant based industries due to the increase in the interest of use of medicinal plants throughout the world which are growing at a rate of 7-15% annually. Despite the major advances in the modern medicine, the development of new drugs from natural products is still considered important.[1] Plants are used for medicinal purpose since traditional time. Among millions of plants and species, one of the wonderful medicinal plant that is well established in Indian system of medicine is *Nirgundi* (*Vitex negundo* Linn). *Vitex negundo* Linn. belonging to the family Verbenaceae, is commonly known as *Nirgundi* in *Sanskrit*, *Sambhalu* in *Hindi* and five leaved Chaste tree in English is a fabulous plant where all parts possesses a multitude of secondary metabolites which imparts a high medicinal value to the plant. It is an aromatic large shrub or small slender tree of about 3 meter in height and is distributed throughout India.[2]

Nirgundi is an extremely beneficial plant. It not only has medicinal benefits but also various others uses like keeping its dried leaves in between clothes that are stored for a long period of time prevents insects from damaging them, also burning the leaves of this plant works as an extremely effective mosquito repellent. The leaves of *Nirgundi* are used as bio pesticides and insecticides. The chemicals used to ward away pests and insects are bad for the environmental as well as human health and it is always better to use natural alternatives to these.[3] Almost all the parts of this plant possesses great medicinal values and it is employed as a remedy in various traditional systems of medicine like *Ayurveda*, *Chinese*, *Siddha* and *Unani* to treat various diseases.[4] The leaves are generally used as a fomentation in sprains, rheumatism, swelled testicles, contusions. The root is used as tonic, febrifuge, and expectorant, and the fruit nervine, cephalic, and emmenagogue. The leaves are often placed between the books to preserve them from insects. The leaves are also used to preserve rice and clothes from insects and to drive them away and the extract from it used as a carminative and emmenagogue. Pillows stuffed with leaves are slept on to remove catarrh and headache (they are also smoked for relief). *Nirgundi* Oil is good for sexually transmitted diseases, syphilis, venereal diseases, and other syphilitic skin disorders. Roots are used for fever, cough, urinary problems, dyspepsia, rheumatism and also for boils. The powdered root is

consumed as an anthelmintic. Flowers are used in fever, diarrhea and liver complaints, fruits in headache, catarrh and coryza.[5] People in ancient India identified two varieties of *nirgundi*, one bearing white flowers (*shwetapushpi*), called *sindhuvar*, and the other having blue flowers designated as *nirgundi* in *Sanskrit*. The *Amarakosha* (500–800 CE) lists various names assigned to newri as *sinduk, sindhuvara, indrasursa, nirgundi, indranika,* and *sinduar*. The ancient treatise *Varahamihiras Brhat Samhita* (c. 500 CE) identifies two names as *sindhuvara* (XXIX 9, LIII 103, and LIII.14) and *sindhuka* (Sharma, 1979).[6] In the *Puranas*, it is referred to by four names: *Nirgundi, nirgundika, sindhuvara and sindhuvaraka* (Sensarma, 1989).[7] *Vitex negundo* is the richest source of stable Vitamin C. This richness in Vitamin C makes the Nirgundi one of the best anti-inflammatory and anti-biotic. *Nirgundi* is a drug of choice for problems where inflammation has occurred like- pharyngitis, tonsillitis, endometrosis and even orchitis.

Taxonomical Classification.[8]

KINGDOM	Plantae
DIVISION	Magnoliophyt
CLASS	Magnoliopsida
ORDER	Lamiales
FAMILY	Lamiaceae
GENUS	*Vitex*
SPECES	*Negundo*

Synonyms[9]

1. *Sheetsaha* – Plant resistant to cold.
2. *Sugandhika* – Aromatic plant.
3. *Indrani* – the leaf juice is an efficacious drug in a number of ailment.
4. *Suvaha* – it purifies body.
5. *Sindhuvara* – it checks accumulation of fluid.
6. *Bhutakesi* – it eliminates evil organisms.

Vernacular Names[10]

Sanskrit: Sinduvara, Samphalika, Nila
Assamese: Aslak
Bengali: Nirgundi, Nishinda
English: Five Leaved Chaste tree
Gujrati: Nagod
Hindi: Nirgundi, Sinduar, Sambhalu
Kannada: Lakkigida, Nekkigida
Malayalam: Indranee, Nirgundi
Marathi: Nirgundi
Punjabi: Sambhalu, BannaB
Tamil: Karunochchi, Nocchi
Telugu: Nallavavilli, Vavili
Urdu: Sambhalu, Panjangusht

***Ayurvedic* Properties[11]**

Rasa (Taste) – Katu (Pungent), *Tikta* (Bitter)
Guna (Qualities) – *Laghu* (Light for digestion), *Ruksha* (Causes dryness)
Veerya (Properties) – *Ushna* (Hot in potency)
Vipaka – *Katu* (Undergoes Pungent taste after digestion)
Doshakarma – Kapha-vata shaman.

Part Use[12] - Root, fruit, leaves, seed.

Dose[13] - Leaves juice – 10-20ml
Powder – 3-6gm

Formulations - *Nirgundi kalpa, Nirgundi taila[14],* *Vatagajankusa Rasa, Mahavata Vidhvansana Rasa, Trivikrama Rasa, Nirgundi Taila, Visa Tinduka Taila*.

Description[15]

a) Macroscopic

Leaves palmately compound, petiole 2.5 - 3.8 cm long; mostly trifoliate, occasionally pentafoliate; in trifoliate leaf, leaflet lanceolate or narrowly lanceolate, middle leaflet 5- 10 cm long and 1.6 -3.2 cm broad, with 1- 1.3 cm long petiolule, remaining two 209 sub-sessile; in pentafoliate leaf inner three leaflets have petiolule and remaining two subsessile; surface glabrous above and tomentose beneath; texture, leathery.

b) Microscopic

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 - 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.

Chemical Constituents[16]

Leaves - Hydroxy-3,6,7,3′,4′-pentamethoxyflavone; 6′-p-hydroxybenzoyl mussaenosidic acid; 2′-p-hydroxybenzoyl mussaenosidic acid; protocatechuic acid; oleanolic acid; flavonoids; 5, 3′-dihydroxy-7,8,4′-trimethoxyflavanone; 5,3′-dihydroxy-6,7,4′-trimethoxyflavanone; viridiflorol; β-caryophyllene;

sabinene; 4-terpineol; gamma-terpinene; caryophyllene oxide; 1-oceten-3-ol; globulol; angusid; casticin; vitamin-C; nishindine; gluco-nonitol; phydroxybenzoic acid; sitosterol; 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.

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; β-sitosterol; p-hydroxybenzoic acid; 5-oxyisophthalic acid; n-tritriacontane, n-hentriacontane; n-pentatriacontane; n-nonacosane; 6-hydroxy-4-(4-hydroxy-3- methoxy-phenyl)- 3-hydroxymethyl-7-methoxy-3, 4-dihydro-2-naphthaldehyde.

Essential oil of fresh leaves, flowers and dried fruits - δ-guaiene; guaia-3,7-dienecaryophyllene epoxide; ethylhexadecenoate; α-selinene; germacren-4-ol; caryophyllene epoxide; (E)-nerolidol; β-selinene; α-cedrene; germacrene D; hexadecanoic acid; p-cymene and valencene.

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 and isovitexin, negundin-A; negundin-B; (+)-diasyringaresinol; (+)-lyoniresinol; vitrofolal-E and vitrofolal-F, acetyl oleanolic acid; sitosterol.

Classical Review

Nirgundi first described in *Charak Samhita*, which is oldest and most authentic text of *Ayurveda*. Latter *Bhavprakash nighantu, Kaiyadeva, Raj nighantu, Dhanwantari nighantu and Chakradatta* etc has mentioned detailed about this plant.

1. *Charaka Samhita* – In *Krimighna* and *Vishagna mahakashaya*.
2. *Susrutha Samhita* – In *Surasadi gana* and *Sleshma Samshamana.*
3. *Astanga Sangraha* - In *Surasadi gana.*
4. *Astanga Hridaya* - In *Surasadi, Sleshma Samshamana, Vishagna.*
5. *Astanga Nighantu* – In *Shyamadi gana.*
6. *Dhanvantari Nighantu*- In *Karaveeradi varga.*
7. *Sausrutha Nighantu* - In *Surasadi gana.*
8. *Sodhala Nighantu* - In *Karaveeradi varga.*
9. *Siddhamantra* - In *Kaphavataghnavarga*
10. *Madanapala Nighantu* – In *Harithakyadi varga*
11. *Raja Nighantu* – In *Shatavaryadi varga*
12. *Kaiyadeva Nighantu - In Oushadi varga*
13. *Bhavaprakasha Nighantu* - In *Guduchyadi varga*
14. *Shaligrama* - In *Tailavarga*
15. *Mahaoushada Nighantu* - In *Bilwadi varga*
16. *Nighantu Adarsh*- In *Nirgundyadi varga*
17. *Priya Nighantu* – In *Harithakyadi varga*

Morphology and Uses of Different Species of Nirgundi

❖ ***Vitex Negundo*[17]** - A large shrub or sometimes a small slender tree.

- **Bark** - Thin, grey, **Branchlets** – quadrangular, whitish with a fine tomentum
- **Leaves** - 3-5 foliolate, **Leaflets**- lanceolate, acute, the terminal leaflet 5-10 by 1.6-3.2 cm long, the lateral leaflets smaller with a very short petiolule.
- **Flawers**- Pedunculate branched tomentose cymes, opposite along the quadrangular tomentose rhachis of a large terminal often compound pyramidal panicle.
- **Bracts**- 1.5-2.5mm long, lanceolate, caduceus.
- **Calyx**- 3 mm long, white tomentose
- **Corolla**- 1 cm long, bluish purple, tomentose outside, hairy inside at the insertion of the stamens.
- **Ovary**- Glabrous, style- glabrous, stigma- forked
- **Drupe**- Less then 6 mm diameter, black when ripe.

Uses

✓ **Root** is considered tonic, febrifuge and expectorant. The root is an antidote of snake-venom (*Ayurveda*).
✓ **Decoction of *Nirgundi* leaves** is given with the addition of long pepper in catarrhal fever with heaviness of head and dullness of hearing.
✓ **Oil** prepared with the juice of the leaves is applied to sinuses and scrofulous sores.
✓ **Leaves** are discutient, and are useful in dispersing swellings of joints from acute rheumatism and of the testes from suppressed gonorrhea.
✓ The dried **fruits** act as a vermifuge.

❖ ***Vitex Trifolia*[18]** – A shrub or small tree.

- **Bark**- Smooth, pale gray
- **Leaves**- variable, some simple and some tri-foliolate, **Leaflets**- elliptical or oblong-obovate, usually obtuse, the terminal leaflet sessile.
- **Flowers**- Pedunculate tomentose cymes, opposite along the tomentose rhachis of a terminal panicle.
- **Bracts**- minute.
- **Calyx**- 3mm long in flower, white –pubescent, slightly enlarged in fruit.
- **Corolla**- Pubescent outside, pale purple, rather more than 1cm long
- **Drupe**- Globose, exceeding 6mm diam., purplish black when ripe.

Uses

✓ **Leaves** are anthelmintic, improve memory, favour the growth of hair, good for the eyes, bronchitis, pain in the joints.
✓ Fruits is emmenagogue.
✓ Roots are tonic, expectorant, febrifuge (*Ayurveda*).

❖ ***Vitex Peduncularis*[19]** - A tree, 6-12 m, shoots cinereous-pubescent.

- **Leaves**- 3 foliolate, Leaflets-11.5 by 2.5 cm, acuminate, petioluled, lanceolate, entire, glabrate,

densely covered by minute yellow glands beneath, midrib sometimes peberulous, petiole 5-10cm, slender or sometimes slightly winged.
- **Bracts-** 2mm, linear
- **Calyx-** 2.5mm, grey-pubescent, sub-truncate
- **Corolla-** 5mm, grey-pubescent.
- **Drupe-** 5mm diam, Cuboid-globose.

Uses
The plant is used in various ways, chiefly as an infusion of the leaves or of the root bark, in fever of malarial type, and especially in blackwater fever.

❖ ***Vitex Glabrata***[20] **-** Large Tree
- **Leaves-** Chartaceous, digitate, 3-5 foliate, **Leaflets-** subequal except small lowest pair, obovate-elliptic to oblanceolate, blunt or acuminate, pubescent when young, glabrous except the nerves beneath when adult.
- **Calyx-** Campanulate, 1.25-25mm long, pubescent outside, a ring of hairs inside at insertion of stamens.
- **Stamens-** long, exsert, villous.
- **Drupe-** Succulent, ovoid or obovoid.

✓ **Uses**
The bark and root are used as astringents.
❖ ***Vitex Agnus-Castus***[21] **-** A shrub or tree
- **Leaves-** Long petiolate, digitately 5, rarely 7-foliolate, **Leaflets**-slightly tomentose above and green, below canescent, lanceolate, acuminate, attenuate at the base, petiolulate, subentire.
- **Calyx-** Tomentose, campanulate, teeth triangular, obtuse, 3-times shorter than the tube.
- **Corolla-** Lilac, 3-times as long as the calyx, tube subexserted, throat inflated, mouth glabrous.
- **Drupe-** Spherical, obtuse, slightly longer than the calyx.

Uses
✓ The **seeds** have stomachic, abortifacient, diuretic and alexiteric property.

❖ ***Vitex Pubescens***[22] **-** Bushy tree about 6-18 m tall.
- **Leaves-** Chartaceous, 3-5 foliate, middle leaf largest, obvate or elliptic, blunt or acuminate, base round or cuneate, nearly glabrous above, pubescent beneath, mid- leaflet 15-20 cm long.
- **Calyx-** Campanulate tomentose, 3-8 mm long.
- **Corolla-** 2-lipped, tube pubescent, lower lobe long, violet blue.
- **Drupe-** Globose, 5mm.through, black.

Uses
✓ In Malaya, the resin is burnt with datura seeds to produce lethargy.
❖ ***Vitex Leucoxylon***[23] **-** A large deciduous tree with spreading head and thick trunk.
- **Leaves-** 3-5 Foliolate (when 5-foliolate the basal pair of leaflets much smaller than the other pair). **Leaflets-** Petiolulate, oblong, subobtuse, the terminal leaflet usually the largest, reaching 7.5-10 by 2.5-3.2 cm.
- **Flowers-** Fragrant, in axillary pedunculate laxcorymbose cymes.
- **Calyx-** Pubescent or tomentose, 3mm long.
- **Corolla-** 1.3 cm long, pubescent outside, white with purplish hairs.
- **Overy-** Densely hairy at the top with erect white hairs
- **Drupe-** 2cm long, succulent obovoid, blunt, dark purple when ripe, supported on the enlarged flattened calyx.

Uses
✓ **Root** is used in intermittent fever.
✓ **Leaves** are smoked in catarrh and for headache.
✓ **Fruits** are anthelmintic.

Therapeutic Properties
1. **In mental disorders -** 2-4 gm of fruit powder, 2-3 times a day. It cures disorders of nasal passages and mind.
2. **In Throatache -** Decoction of *Nirgundi* is used as gargles to cures all the throat and mouth related disorders.
3. **In Chronic Rhinitis-** 10 gm leaves of *Nirgundi* in 100 ml water is given to the patient, every morning and evening.
4. **In Headache–** Paste of *Nirgundi* leaves is used in headache.
5. **Enhance digestion power -** 10 ml juice of its leaves with 2 black peppers and Ajwowan, twice a day.
6. **For Eased delivery-** Grind its leaves and apply the paste on stomach, abdomen and vaginal area.
7. **Treatment for Fever-** In case of fever due to severe cold and pneumonia, massage its oil.[24]
8. In Malaysia, it is used in traditional herbal medicine for women's health, including treatments for regulating the menstrual cycle, fibrocystic breast disease and post-partum remedies.[25]
9. **In Rheumatism-** leaves are very efficacious in dispelling inflammatory swelling of the joints, also over sprained limbs, contusions, leech bites etc.
10. Juice of the leaves removes foetid discharges and worms from ulcers.
11. **In enlarged spleen-** leaves are appplied as plaster to enlarged spleen.
12. Tincture of root –bark in 1-2 drops doses is recommended in cases of irritable bladder and of rheumatism.
13. IN Mysore, febrile, catarrhal and rheumatic affections are treated by means of a vapour bath prepared with this plant.[26]

Pharmacological Activity
Anti-inflammatory and Analgesic activity - Anti-inflammatory refers to the property of a substance or treatment that reduces inflammation. Anti-inflammatory drugs make about half of analgesics, alleviate pain by

reducing inflammation as opposed to opioids, which affect the central nervous system. The anti-inflammatory property of *Vitex negundo* has been validated by clinical trials on rat. It has been confirmed that leaf extract prevents carrageenan-induced rat paw edema and formaldehyde-induced rat paw edema.[27] Anti-inflammatory properties of *Vitex negundo* extracts in acute and sub-acute inflammation is also reported. The anti inflammatory activity of the plant have been extensively studied by several workers.[28] This activity has been attributed to prostaglandin synthesis inhibition, antihistamine and antioxidant activities of the plant.[29]

Antibacterial activity

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 ethylhexadecenoat; In flowers oil α-selinene, germacren-4-ol, carryophyllene epoxideand (E)- nerolidol while fruit oil showed β -selinene, α- cedrene, germacrene D and hexadecanoic acid as the main constituents which help for antibacterial activity.[30]

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.[31]

Anti-allergic 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.[32]

Effect on reproductive potential: The flavonoid rich fraction of seeds of Vitex negundo caused disruption of the later stages of spermatogenesis in dogs[33] and interfered with male reproductive function in rats.[34] As such the plant is said to have anti androgenic properties. It must however be noted that these findings are in sharp contrast with the traditional use of Vitex negundo as aphrodisiac.[35] Ethanolic extracts of Vitex negundo showed estrogenlike activity so it can be used in hormone replacement therapy.[36]

Antipyretic activity: The yeast induced hyperpyrexia method was used to evaluate the antipyretic activity of methanolic and petroleum ether extract of *Vitex negundo* Linn leaves in groups of male rabbits. Paracetamol was used as the positive standard and 1% CMC was used as control. Compared to petroleum ether extract methanolic extract has excellent antipyretic activity.[37]

Anticonvulsant activity: The petroleum ether and butanol leaf extract have shown protection against electro shock seizures, whereas root extract has shown little effect. Petroleum ether extract of root could only provide protection against leptazole induced convultions, whereas methanolic leaf extract showed significant protection against both strychnine and leptazole induced convultions.[38] Ethanolic extract of leaf shows not only anticonvulsant activity but also can potentiate the effects of 10 standard anticonvulsants, which may help to reduce dose and dose related side effects of standard anticonvulsants.[39]

Hepatoprotective activity: Negundoside and Agundoside from *Vitex negundo* have been studied for their hepatoprotective activity. Extract of *Vitex negundo* is reported to decreases Serum Bilirubin, Aspartate, Aminotransferase, Alanine Aminotransferase, Alkaline Phosphates and Total Protein (TP) levels in case of liver damage. Leaf extracts of *Vitex negundo* were found to possess hepatoprotective activity against liver damage induced by d-galactosamine[40], commonly used tubercular drugs and carbon tetrachloride.[41]

Anti-eosinophilic activity: Egg albumin induced asthma in guinea pig model was used to study the anti eosinophilic activity of the *Vitex negundo* Linn. The effects of various fractions such as aqueous subfraction, acetone subfraction, chloroform subfraction of the leaves of *Vitex negundo* Linn on the bronchial hyper responsiveness and serum bicarbonate level was evaluated. Aqueous subfraction of the leaves of *Vitex negundo* Linn possessed anti eosiniphilic activity.[42]

Anti-HIV activity: The anti-HIV activity of ethanolic leaf extract of *Vitex negundo* Linn was studied against HIV-1 reverse transcriptase. Using a non radioactive HIV-RT colorimetric ELISA kit and with recombinant HIV-1 enzyme it was evaluated in vitro. The study concluded that the ethanolic extract exhibits anti HIV activity and the flavonoids as anti-viral agents.[43]

Anti snake venom activity: Snake venom neutralization by the methanolic roots extracts of *Vitex negundo* Linn and *Emblica officinalis* was performed against the Vipera russelli and Naja kauthia venom induced lethal activity both in vivo and invitro and since no precipitating bands were found between the plants extract and snake venom which revealed that these plants extracts posses potent anti snake venom activity.[44]

Anticancer Activity: F. Diaz et al. (2003) evaluated cytotoxicity of flavones isolated from the chloroform extract of *Vitex negundo* leaves. Vitexicarpin, a flavone was investigated for its cytotoxic action in human cancer cell line.[45]

Nephroprotective activity: The methanolic extracts of bark was tested for nephroprotective activity against kidney damage which was induced chemically by oral administration of paracetamol in male wistar rats. The kidney damage was studied based on the assessment of biochemical parameters such as serum glutamate pyruvate transaminase (SGPT), serum glutamate oxaloacetate tranaminase (SGOT), alkaline phosphate (ALT), bilirubin, total protein and enzymatic antioxidant SOD, CAT, GSSH, GPx, Px, non enzymatic antioxidants (GSH) and it was concluded that the methanolic extracts of Vitex negundo Linn bark shows a significant reduction in biochemical parameters has nephroprotective activity.[46]

Larvicidal activity: The larvicidal activity of flavonoid extract of different parts of *Vitex* negundo Linn and *Andrographis paniculata* is performed against the late III or IV instar larvae of Aedes aegypti and Anopheles stephensi and the two plants showed good larvicidal activity and can be used to synthesis eco- friendly insecticide.[47]

CONCLUSION

Vitex negundo (Nirgundi) also known as the five-leaved chaste tree is used popularly in *Ayurveda, Unani, Sidhdha, Homeopathy* and Allopathy to treat a number of ailments. In *Ayurveda* number of plants are described, in which *Nirgundi* is one which holds greater medical importance. In *Ayurveda* it has been used for the different diseases with pharmacological evidence since a long time. It possess a variety of phytochemical constituents which makes it very effective antimicrobial, cytotoxic, analgesic, anti-inflammatory, anti arthritic, hepatoprotective, antidote for snake venom etc. Besides its therapeutic properties it is also reported to have larvicidal, repellent and pesticidal activities. Though almost all parts of *Vitex negundo* are used, the leaves and the bark are the most important in the field of Medicine. It has been mainly used for the treatment of diseases related to *Vata* (nervous disorders). So this review attempts to encircle the available literature on *Vitex negundo* with respect to its traditional uses, chemical constituents and summary of its various pharmacological activities.

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