International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 5 Issue 4, May-June 2021 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

Various Formulation and Pharmacological Properties of Chinese Chaste Tree

Kiran Wadatkar, Sakshi Waghmare, Amol G Jadhao, Prashant A Patil

Gawande College of Pharmacy, Sakharkherda, Maharashtra, India

ABSTRACT

Indian societies have been using herbal medicine for many decades. Near about 80% of the population of the world use herbal medicine as a primary health care. Vitex negundo is a well- known medicinal herb that is used in the Indian system of medicine. It is commonly known as Five-Leaved Chaste Tree or Monk`s pepper. In India, it is known as punjgusht, Nirgundu, Sambhalu, or sephali. Vitex negundo Linn. Is credited with innumerable medicinal activities Like analgesic, anti-inflammatory, anticonvulsant, Antioxidant, Bronchialrelaxant, Hepatoprotective, etc. Although all parts of this plant possesses great medicinal values, but especially its leaves contain numbers of secondary metabolites such as alkaloids, phenols, flavonoids, glycosidic irridoids, Tannins, and terpenes. Because of the richness in phytochemicals, the plant is attributed to possessing several therapeutic uses; such as an antimicrobial, anti-inflammatory, astringent, bronchodilator, CNS-depressant, detoxicant, Diuretic, emmenagogue, anticancer and hepatoprotective, etc. It is also used as insecticide and larvicidal. Leaf extract is employed as nervine Tonic, tranquilizer, and vermifuge.

KEYWORDS: *Chinese Chaste tree, Nirgundi, Anti-inflammatory, Tannis, Monk`s paper, Vitex, Negundo Linn*

How to cite this paper: Kiran Wadatkar | Sakshi Waghmare | Amol G Jadhao | Prashant A Patil "Various Formulation and Pharmacological Properties of Chinese Chaste Tree" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-5 | Issue-4, June 2021, pp.965-974, URL: www.ijtsrd.com/papers/ijtsrd42482.pdf

IJTSRD42482

1. INTRODUCTION:

Vitex negundo Linn is a large aromatic shrub (commonly known as Nirgundi, five leaved chaste tree) belonging to the family Verbenaceae. 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, China, Siddha and Unani to treat various diseases. In Indian traditional medicine system Vitex Negundo (Vn) Linn. is referred as 'Sarvaroganivarani' the remedy for all diseases. A popular local quote of the Bhangalis in the western himalayan region of India which translates as a man cannot die of disease in an area where Vitex Negundo Linn, adhatoda vasica and acorus calamus are found (provided that he knows how to use them). Nirgundi in Sanskrit means which protects the body from disease.[1] Among all the plant described in Ayurveda, Nirgundi is one which holds greater Medicinal property. Majority of the traditional medicines used in healthcare are obtained from plants. Vitex Negundo Linn. (Verbenaceae), locally known as 'Nirgundi/ Sindhvar' is an important medicinal plant and is used fortreatment of a wide spectrum of health disorders in traditional and folk medicine, some of which have been validated. It is widely planted as a hedge plant along the roads. Traditionally it is reported to have Multifarious activities such as analgesic, anti-inflammatory, antioxidant, insecticidal, antimicrobial, anticancerGalactogogue, tonic, febrifuge, expectorant and diureticproperties.[2] The Vitex negundo is an erect shrub or small tree growing from 2 to 8 meter (6.6 to 26 ft) in height. The bark is reddish-brown to grey and thin. Its leaves are digitate, with five lanceolate Leaflets, sometimes three. Each leaflet is around 4 to 10 cm (1.6 to 3.9 in) in length, with the central leafletbeing the largest and possessing a stalk. The leaf edges are toothed or serrated and the bottom surface is covered in hairs. The petals are of different lengths, with the middle lower lobe Being the longest. Both the corolla and calyx are covered in dense hairs. Branchlets are quadrangular, whitish with a Fine tomentum. The terminal leaflet 5-10 by 1.6-3.2 cm. With a petiole 1-1.3 cm. long, the lateral leaflets smaller with a very short petiole, all nearly glabrous above, covered witha fine white tomentum beneath, base acute; common Petioles 2.5-3.8 cm long.[1,2] The numerous flowers are borne in panicles 10 to 20 cm (3.9 to 7.9 in) in length. Each Is around 6 to 7 cm (2.4 to 2.8 in) long and is white to blue in color. 3-5 Flowers in pedunculate branched tomentose Cymes, opposite along the quadrangular tomentose rachis [3]

Distribution:

The plant is found throughout India, ceylon-Afghanistan, Tropical Africa, Madagascar, China and Philippines. The plant occurs in Bengal, Southern India and Burma also It is common in waste places around villages, river banks, moist Localities and in the deciduous forests. It is common throughout India from coastal belt to subtropical. In the himalayas and Andaman Islands, abudent in drier zones. It is particularly found in Karnataka And Tamilnadu (Wild as well as cultivated). [4]

- Indian traditional medicine system, it is referred as 'sarvaroganivarani' – the remedy for all diseases

- Nirgundi might be helpful in managing diabetes by improving insulin levels due to its antioxidant property. It also helps manage inflammat tuory reactions by inhibiting the activity of certain mediators due to its anti-inflammatory property, As per Ayurveda, consuming Nirgundi powder two times a day or applying Nirgundi paste to the affected area helps manage arthritis and provides relief from pain due to its vata balancing property. The root powder of Nirgundi might also help in case of piles by reducing the irritation of inflamed tissue
- Nirgundi is beneficial for hair growth. Massaging with oil obtained from Nirgundi leaves along with sesame seed oil can help manage grey hair and scalpinfections
- In some cases, Nirgundi might cause stomach upset and mild skin rashes on skin. [5]

Classification of Chinese chaste tree: [6]

1.	Kingdom	Plantae
2.	Sub Kingdom	Tracheobionta
3.	Super Division	Spermatophyta
4	Division	Magnoliophyta
5.	Class	Magnoliopsida
6.	Sub Class	Asteridea
7.	Order	Lamilales
8.	Family	Lamiaceae
9.	Genus	Vitex
10.	Specie	Negundo

Fig.1: Species – Vitex nirgundi

Fig.2: Vitex nirgundi withflowers

History of Chinese chaste tree:

The Sanskrit word for V. negundo nirgundi literally means that which protects the body Fromdiseases. It is one of the herbs mentioned in all of the Ayurvedic Samhitas. People in ancient India identified two varieties of nirgundi, one bearing white flowers (shwetapushpi), Called sindhuvar, and the other having blue flowers (pushpanilika) designated as nirgundi in Sanskrit. The Amarakosha (500–800 CE) lists various names assigned to newri as sinduk, Sindhuvara, indrasursa, nirgundi, indranika, and sinduar. People in ancient India identified two varieties of nirgundi, one bearing white flowers (shwetapushpi), called sindhuvar, and the other having blue flowers (pushpanilika) designed. 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). In the Puranas, it is referred to by four Names: nirgundi, Matsya Purana, nirgundika, sindhuvara and Sindhuvaraka (Sensarma, 1989). [7]

Different names:

Botanical Name: Vitex negundo

Sanskrit: Nirgundi, Sindhuvara, Neelamanjari,

Hindi: Samhalu, Saubhalu, NirgandiEnglish: Five-leaved chaste tree Bengali: Nirgundi, Nishinda Gujarati: Nagod

Kannada: Bile-nekkiMalayalam: Indrani

Telungu: Nallavalli, Vavilli, TellavavilliTamil: Nirkunnchi, Nallanochi.[30-8]

Chemical constituents:

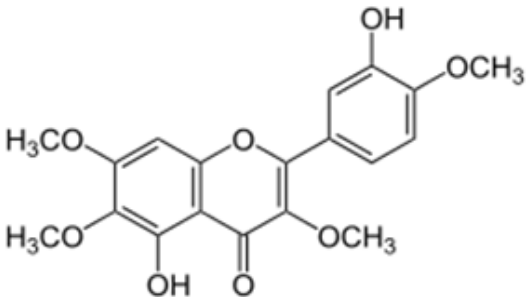
In Preliminary phytochemical study of the extract was Analysis for the presence of volatile oil, triterpenes, Diterpenes, sesquiterpenes, lignan, flavonoids, flavones, Glycosides, iridoid glycosidesand stilbene derivative. The Detailed of phytochemical constituents is present in each Part of the plant is given below. [1,8,9]

Leaves:

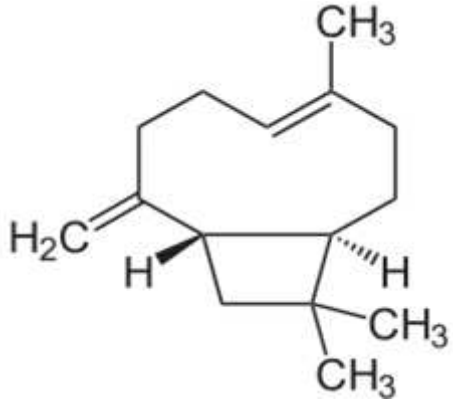
The various chemical constituents present in leaves of Vitex Negundo Linn. leaves are Friedelin, vitamin-C, carotene,Casticin, artemetin, terpinen-4-ol, α-terpineol, sabenine, Globulol,spathulenol, β- farnesene, farnesol, Bis(1,1dimethyl) methylphenol, α-pinene, β- pinene, linalool,Terpinyl acetate, caryophyllene epoxide, caryophyllenol,Vitexicarpin, viridiflorol, 4,4''- dimethoxy-trans- stilbene, 5,6,7,8,3'4'5- heptamethoxy, 5-hydroxy-6,7,8,3'4'- Pentamethoxy (5- Odesmethylnobiletin), 5-hydroxy-6,7,8,3',4',5-hexamethoxy(gardeninA), 5- hydroxy-6,7,8,4'- Tetramethoxy (gardeninB), 5- hydroxy-7,3',4',5'-Tetramethoxyflavone (corymbosin), terpinen-4- ol, α-Copaene, β-caryophyllene, β-elemene, camphene, α-thujene, A- pinene, sebinene, linalool, stearic acid and behenicacid, α-Elemene, δ-elemene, β-elemene, β- eudesmol, camphor, Camphene, careen, 1,8- cineol, 1-oceten-3-ol, γ-terpinine, α-Phellendrene, β-phellendrene, α- guaiene, abieta-7,13-diene, Neral, geranial, bornyl acetate, nerolidol, β- bisabolol, cedrol, 2'-p-hydroxybenzoyl mussaenosidic acid, agnuside, Lagundinin, aucubin viridiflorol, squalene, 5- hydroxy3,6,7,3',4'-pentamethoxy flavone, 5-hydroxy-3,7,3',4'- Tetramethoxy flavones 5, Dibutanoyloxy3,6,7,4-Tetramethoxyflavone,5,3'-Dipenty4enoyloxy-

3,6,7,tetraMethoxyflavone, 5,3-Dihexanoyl 3,6,7,4-tetramethoxy Flavone, betulinic acid, ursolic acid, dimethoxyflavon 5,3'- dihydroxy-7,8,4'-trimethoxy

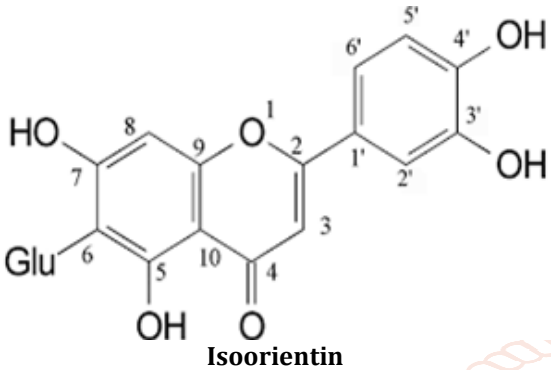
flavonone, 7,8-Dimehyl Herbacetin-3- rhamnoside 9, vitegnoside, 1,4a,5,7a tetrahydro 1βDglucosyl.[31]



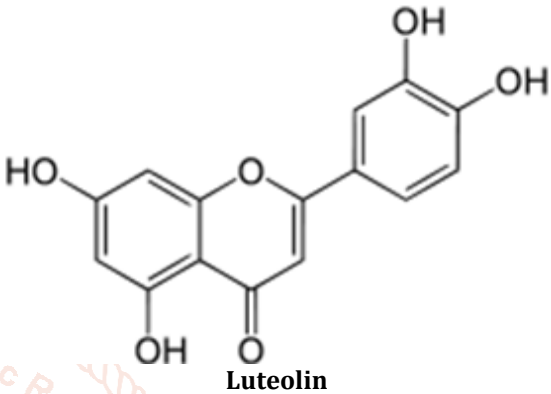
Casticin



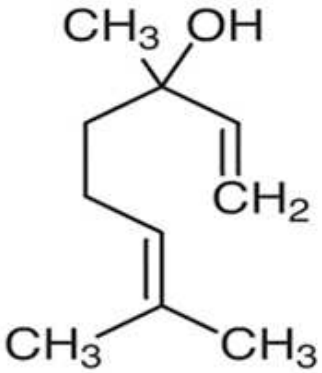
Caryophyllene



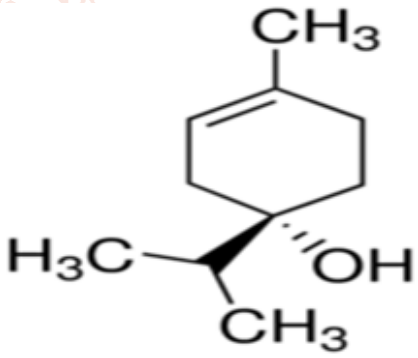
Isoorientin



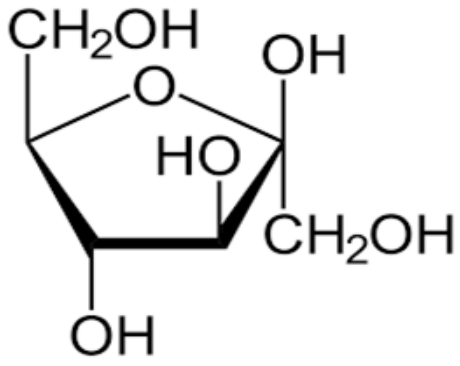
Luteolin



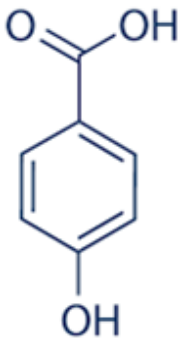
Linalool



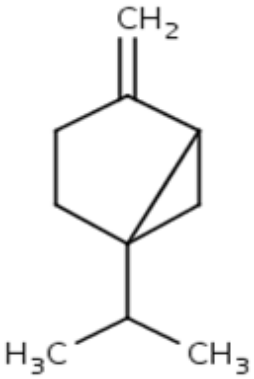
Terpinen-4-ol



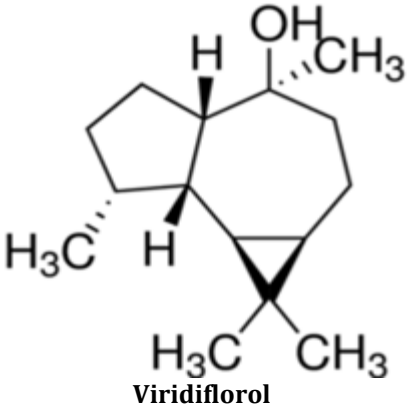
Beta D-Fructofuranose



4-Hydroxybenzoic Acid



Sebinene



Viridiflorol

Seeds:
The seeds of Vitex negundo Linn have chemical constituents such as n-Tritriacontane, n- hentriacontanol, nhentricontane, n-nonacosane, β-sitosterol, phydroxybenzoic acid and 5-oxyisophthalic acid, 3, 4-dihydroxybenzoic acid, artemetin, 3β-acetoxyolean-12-en-27-oic acid, 5β-hydro-8,11,13-abietatrien-6α-ol, 2α, 3α-dihydroxyoleana-5, 12-dien-28-oicacid, 2β, 3α- diacetoxyoleana-5,12-dien-28-oicacid and 2α,3β-diacetoxy-18-hydroxyoleana-5,12-dien-28- oicacid, vitedoin A, vitedoamine A, vitedoin B, 5,7,3'-trihydroxy 6,8,4'-trimethoxy, 6-hydroxy-4- -3-hydroxymethyl-7-methoxy-3, 4- dihydro-2-naphthaldehyde.[8]

Root:
It contains steroids like -sitosterol, acetate,Stimasterol, aliphatics (hentricontane) And several Compounds like 2 beta, 3 alpha diacetoxyoleana-5, 12-dien-28-oic acid, 2 alpha, 3 alpha dihydroxyoleana-5,12-dien- 28-oic acid, 2 alpha, 3 beta-diacetoxy- 18-hydroxyoleana-5,12-dien- 28-oic acid, vitexin and isovitexin.[9]

Essential oil:
The essential oil of fresh leaves, flowers, and dried fruits δ-guaiene contain guaia-3,7- dienecaryophyllene epoxide; ethyl-hexadecenoate; α-selinene; germacren-4-ol; caryophyllene epoxide; €-nerolidol; β-selinene; α-cedrene; germacrene D; hexadecanoic acid; p-cymene and valencene.[10]

From flowers:
Twelve identified constituents in Flower essential oil were formic acid, n-heptane, p-Cymene, β- caryophyllene, trans-α-bergamotene, Valencene, α-selinene, β-selinene, germacren-4-ol, Caryophyllene epoxide, €-nerolidol and P-(1,1-Dimethylethyl) toluene represented about 65% of Total composition of the oil, (Khokra et al., 2008) From the flower oil of V. negundo, the main Constituents of the oil were sabinene, linalool, Terpinen-4-ol, β-caryophyllene, α-guaiene and Globulol constituting 61.8% of the oil as major Constituents along with sesquiterpenes, Monoterpenes, terpenoids and sterols Flower [11]

From fruits:
The Thirteen Constituents namely alfa-Copaene, Beta-Caryophyllene, Alfa cedrene, Alfa guanine, Guaria 3, 7- diene, α-humulene, aristolene, Germacrene D, β-selinene, caryophyllene oxide, n- Hexadecanoic acid, palmitolic acid and traces of Acetyl lactyl glycerate were identified in dried fruit Oil. **[11]**

Bark:
Flavone glycosides- 6- -glucopyranosyl-7-hydroxy-3, 4, 5, tetramethoxyflavone-5-0—- Lrhamnopyranoside,3, 7-dihydroxy-4,6,8-trimethoxyflavone-5-O-,3,3,4,6,7, p-hydroxybenzoic acid. pentamethoxyflavoneO, Rhamnopyranoside,4,5,7- trihydroxyflavone-8, galactopyranoside, leucoanthocyanidines, leucodelphindin Methyl ether, leucocyanidin-7-O-rhamnoglucoside, luteolin,acerosin, terpenes, sterols, phenolic compounds, alkaloids,organic acid, - sitosterol, glucosides, anthocyanines.[31]

Material and Method:
Preparation of extracts:
Activity Leaf of Nirgundi plant dried in the Atmosphere followed by it will be crusheds 50g powder was initially soaked in 200 ml of DCM (Dichloro methane) in airtight conical flask in a shaker for Hours and then it was filtered through by Muslin cloth and then filtered it through whatman filter paper. The filtrate was Collected into airtight brown bottle, similar Process was repeated thrice with fresh DCM and the filtrates were pooled Together. Followed by the DCM can be Removed by using rotary evaporator at low Temperature and these dried extract Material was stored in the Refrigerator. [12] These extract can be sprayed in to the plant important crop plants including potato, tobacco, tomato, and groundnut to prevent the pathogenic Bacteria, inhibitory effect on Xanthomonas Axonopodis and Pseudomonas Solanacearum. [12]

Collection and Authentification of plant material:
The authenticated leaves of V. negundo were collected, purchased and identified from Vindhya herbal testing and research institute, minor forest produce processing & research center (PARC), Bhopal Madhya Pradesh, India. A sample specimen with laboratory reference no. VHTRL19121802ER has been deposited in the herbarium for future reference. Leaves of V. negundo were shade dried and coarsely powdered and used for further studies. [13]

Preparation of lemuni leaves powder:
The following methods were done in Food Processing Laboratory of School of Industrial Technology, Universiti Sains Malaysia. The leaves of Lemuni were plucked from the stem and washed Thoroughly using tap water. The leaves were kept at -20°C prior to freeze-dried for 3 days at -50°C. The freeze-Dried leaves were ground into a fine powder about 250 µm in size using a blender. The powder was kept at -20°C until use. [14]

The following survey report of Nirgundi plant use:[47]

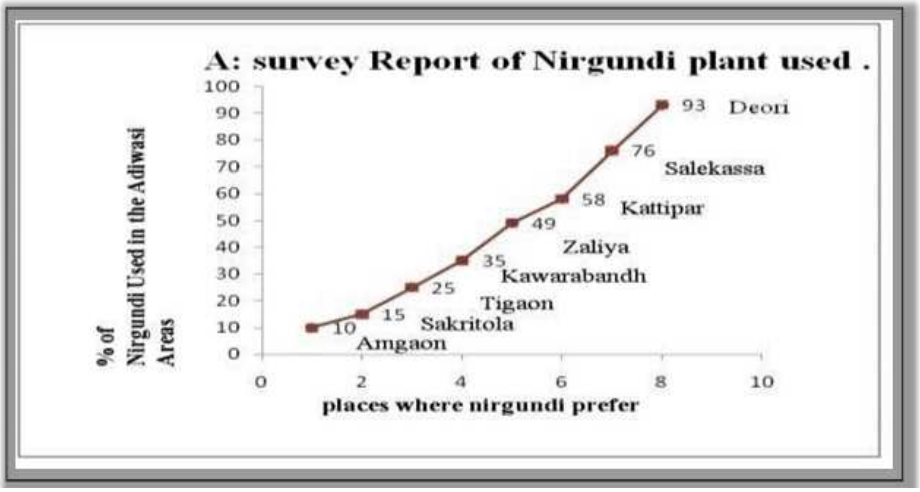


Fig 4, Marketed formulation of Nirgundi plant

Important formulation:
Manasa Mitra Vataka, Amrtarista, Dantyadyarista, Agastya Haritak, Rasayana, Dasamularista, Dasamula Kwatha Churna, Bilvadi Letha.Ayurvedic -, Sotha, Sula, Agnimandya, Chardi, Mutrakreehra, Amava. [4]

Medicinal importance:
Herbal medicine, rather than merely curing a particular disease, aims at returning the body backto 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 Vn, it is imperative that focus shifts to the medicinal applications of the plant. Myriad medicinal properties have Been ascribed 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. [15]

Uses of V. negundo in traditional system of medicine:
As stated earlier, nirgundi has been used since ancient time for large number of clinical conditions and is still being used. In early times, in Roman society, V. negundo leaves were used to reduce Sexual desire. Also, monks used to chew nirgundi berries for the same purpose and hence the name Monk's berry or Monk's pepper was assigned to it.[12] In homoeopathic system of medicine the herb Is used to treat reproductive system related disorders like depression of vital power, self-contempt for the sexual abuse, feeble erection without libido, emission of prostatic fluid during stool, painful, hard, Cold, swollen testicles, etc. Plant may also be used to reduce hot Flashes due to reduced progesterone production during menopause and to regulate ovulatory cycles. In south east asian countries Viz. Cambodia, Laos and Vietnam, V. negundo is used as herbal Medicine to heal wounds, and to treat beriberi and paralysis. Some of its uses in various traditional systems of medicines practiced all over the world. [16,32]

Ayurveda:
The plant finds mention in the verses of the Charaka samhita which is unarguably the most ancient and authoritative textbook of Indian Ayurveda. Vn has been designated as an anthelminthic (verse Su:.) and is prescribed as a vermifuge (verse Vi:7-21). In the exposition on the Charaka Samhita by Sharma others, Ayurvedic uses of Vn are described by Tirtha. People sleep on pillows stuffed with Vn leaves to dispcel 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 oilof the leaves, 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 and Rheumatism. Jadhav and Bhutani report the Ayurvedic use of Vn in dysmenorrhea. Patkar refers to the formulations Described in Anubhoga Vaidya Bhaga, a compendium of formulations in cosmetology, in outlining the use of Vn Leaves along with those of Azadirachta indica, Eclipta alba, Sphaeranthus indicus and Carum copticum in a notable Rejuvenation treatment known as Kayakalpa. [15,33]

Ayurvedic preparations containing Vitex Negundo:
Liv. 52, Pilex, V-Gel, Himcolin Gel, Rumalaya Gel, Acne-n-Pimple Cream And Muscle & Joint Rub, Nirgundi Kalka, Nirgundi Ghrita, Nirgundi Kwatha, Varnyasodhna Taila, Visagarbha Taila Etc. [17]

Unani medicine:
Khare outlines the applications of Vn, 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. Unani drug Anisoon, the seeds of a plant Pimpinella anisum Linn, is one of the oldest spices and important medicinal herb mentioned by Greek and Roman Unani physicians in their treatises for its diverse therapeutic properties centuries ago.[34]

Ayurvedic And Chinese medicine:
The Chinese pharmacopoeia prescribes the fruit of Vn, in the treatment of reddened, painful, and puffy eyes; Headache and arthritic joints. Ayurveda, the traditional Indian medicine (TIM) and traditional Chinese medicine (TCM) remain the most ancient yet living traditions. There has been increased global interest in traditional medicine. Efforts to monitor and regulate herbal drugs and traditional medicine are underway. China has been successful in promoting its therapies with more research and science-based approach, while Ayurveda still needs more extensive scientific research and evidence base.[35]

As folk medicine in India:
The Vitex plant is used as a folk medicine in Bangladesh, India, China, Indo-China, Indonesia, Nepal, Pakistan, the Philippines, And Sri Lanka (Perry, 1980; Vishwanathan and Basavaraju, 2010). Various tribes in India use the leaves, juice of leaves, Boiled leaf water, dry leaf powder. leaf Extract, oil, flowers, stem, roots, and fruits of V. negundo to treat various afflictions Tarafdar (1983) has listed 33 uses of V. negundo by tribals of Hazaribagh, Bihar. It is used as folk medicine in Diseases such as asthma, jaundice, urticaria, abscesses, carbuncles, eczema, and liver disorders in Assam; wounds and body Ache in Himachal Pradesh; toothache, febrile catarrh, rheumatic afflictions, And migraine in Karnataka; rheumatism, encephalitis, joint pain and as expectorant In Maharashtra; jaundice in Odisha; as an Antidote to snakebite, respiratory disorders, fever, sinus problem, and headache in Tamil Nadu; and in eye pain and 48 other ailments in Uttar Pradesh (Vishwanathan And Basavaraju, 2010). In the Dharward district of Karnataka, leaves are used in the

treatment of impotency, crack foot, bone fracture, and paralysis (Hegde and Hebbar, 2009). [18]

Pharmacological activity:

1. Anti-inflammatory activity:

The sub-effective dose of Vitex negundo Linn. Potentiated anti-inflammatory acactivit of phenyl butazone and ibuprofen significantly in Carrageenin induced hind paw oedema and cotton pellet granuloma models. The potentiation of anti-inflammatory activities of phenyl butazone and ibuprofen by Vitex Negundo Linn. Indicates that it may be useful as an Adjuvant therapy along with standard anti-inflammatory drugs. Reactive oxygen species are implicated in various inflammatory disorders. *Vitex negundo* is mentioned in Ayurveda as useful in treating arthritic disorders. The present work was undertaken to evaluate the antioxidant potential and anti-inflammatory activity of the plant. The total methanol extract of the plant was standardized in terms of total polyphenols. [18,36]

2. Analgesic activity:

Ravishankar et al (1985, 1986) Found that interperitoneal (I.P.) administration of some leaf and root extracts using different solvents showed Analgesic activity. Ethanol and cold Aqueousleaf extract showed only weak effect in acetic acid writhing test. Whereas, Chloroform and toluene leaf extracts raised the threshold of tail-flick response moderately. While studying the root extract of the plant, ethanol extract significantly Increased threshold of tail-flick response. In rat uterus preparation, they noticed the inhibitory action of extract on Prostaglandin (PG) biosynthesis and thereby confirming non-steroidal anti- Inflammatory (NSAID's) like activity. Moreover, they indicated that Naloxone did not reverse the analgesia Induced by the extract, indicating that central analgesic action is not mediated Through opioid receptors. The analgesic effects at graded doses of VNE (40-320 mg/kg, p.o.) were evaluated in mice against acetic acid induced writhing (chemically induced pain) and hot- plate method (thermally induced pain). The analgesia produced by VNE was compared with the standard analgesics diclofenac sodium (DIS, 5 mg/kg, p.o.) and pentazocin (PTZ, 5 mg/kg, p.o.). [19,37]

3. 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. Fungal infections are emerging as major threat especially in immune compromised patients in developing countries including India. Availability, effectiveness and cost are the major constraints in effective treatment of fungal infections in modern medicines. Nirundi (Vitex nigundo) is one of the anti-infective medicinal herb mentioned in ayurvedic literature. Antifungal effect of aqueous, ethanol, methanol and chloroform extract of V. nigundo dried leaf powder was investigated against clinical isolates of Candida albicans and Candida tropicalis.[38]

4. Antiproliferative Properties:

It was observed in a study conducted to assess the antiproliferative properties and PASS (predicted activity of antioxidant) on hepatoma cells in humans that the *Vitex negundo* extract significantly enhanced antioxidant activity and proposed a tumour preventive action against HepG2 cell lines. This action was dose and time dependent and there was lower toxicity towards WRL68 cells. In addition to this, on morphological analysis using AO/EB staining, it was revealed that the inhibition of the growth and proliferation was through proteolytic cleavage of caspase-3 protein and intrinsic apoptosis pathway.[39]

5. 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 Viperarussellii 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. The methanolic root extracts of Vitex negundo Linn. and Emblica officinalis Gaertn. were explored for the first time for antisnake venom activity. The plant (V. negundo and E. officinalis) extracts significantly antagonized the Vipera russellii and Naja kaouthia venom induced lethal activity both in in vitro and in vivo studies. [20,40]

6. Enzyme-inhibitory activity:

Root extracts of Panjghust (vitex negundo) showed inhibitory activity against enzymes such as lipoxygenase and butyryl-cholinesterase (Azhar, 2004); α-chymotrypsin (Lodhi, 2008); Xanthine- oxidase (Umamaheswari, 2007) and tyrosinase (Azhar, 2006). Woradulayapinij et Al. (2005) reported the HIV type 1 reverse transcript. In the present study, leaf extracts (methanol, acetone and aqueous) of V. negundo were tested for their enzyme inhibitory activity against α-amylase and urease and it was observed that the plant extracts showed ≥50% α-amylase inhibition at concentration of 1 mg/mL.[41]

7. Effect on reproductive potential:

The flavonoid rich fraction of seeds of Panjghust (vitex negundo) caused disruption of the latter stages of spermatogenesis in dogs (Bhargava, 1989) and interfered with male Reproductive function in rats (Das, 2004). It must however be noted that these findings are in sharp contrast with the traditional use of Panjghust (vitex negundo) as aphrodisiac (Khare, 2004). Hu et al. (2007) determined that ethanolic extracts of Panjghust (vitex negundo) showed oestrogen like activity and propounded its use in hormone replacement therapy. [21]

8. CNS Depressant activity:

A methanolic extract of the leaves of Vitex negundo was found to significantly potentiate the sleeping induced by pentobarbitener sodium diazepam chlorpromazine in mice. [22] Gap cross test: Steel partition was fixed in the middle of a crate having a size associated with 30 × 20 × 14 cm3. A hole of three cm diameter had been made with a height associated with 7.5 cm inside the center of typically the cage. Twenty animals were divided into five organizations containing four mice within each group. Group We animals received vehicle (1% Tween 80 in normal water, 10 ml/kg, p.o), animals of Group II received diazepam at one mg/kg body weight (p.o.) while Group III and Group 4 were treated with 2 hundred and 400 mg/kg body bodyweight (p.o.) of the MESAL. He quantity of pathways of mice from the opening from one chamber to a new was counted for a new period of three min about 0, 30, 60, 90 days and 120 min following oral administration of analyze samples.[42]

9. Nephroprotective activity:

The methanolic extracts of bark were 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 Nirgundi bark shows a significant reduction in biochemical parameters has Nephroprotective activity. The present study was carried out to investigate the nephroprotective effect of Vitex negundo extract on nephrotoxicity induced by cisplatin in male albino rats. Rats were randomly divided into four groups. Group I was treated as Normal control. Group II was treated with single intraperitonial dose of cisplatin.[43]

10. Wound healing activity:

Munamad ibrham et,al., reported that an improved rate of wound contraction and reduction in healing time in animals treated with ointment containing V. negundo leaf extracts in both incisionand excision wounds. 25% Agnuside (Group III) was found to be The most effective and quickest when compared to the ethanolic extract (Group II) Tried in both types of wounds. The wound Healing rate was significantly greater than that of the control and almost nearer to that of the standard drug soframycin. The plant has a pungent, bitter; acrid taste. This plant has been used for various medicinal purposes in the ayurvedic and unani systems of medicine. Leaves are aromatic tonic and vermifuge. Decoction of nirgudi is given along with pepper in catarrhal fewer.[44]

11. Anticonvulsant activity:

The plant has been studied for its anticunvolsant activity The petroleum and butanol leaf extracts have shown Protection, whereas, none of root extract has shown protection. against maximal shock seizers. Petroleum root extract could only provide protection against Leptazole Induced convulsion. Maximal electroshock seizures (MES) in albino rats and Pentylenetetarazole (PTZ) 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 hours' mortality against PTZ induced seizures. It also decreased number and duration of convulsions significantly. Vitex negundo popularly known as "Nirgundi" in Hindi and "Five leaved chaste tree" in English is widely distributed throughout in India. Almost all parts of the plant are used in the Ayurvedic and Unani system of medicines. Vitex negundo is used for dispelling inflammatory swelling of joints from acute rheumatism, healing wounds, ulcers and different bacterial infections. It is also used in treatment of neuropharmacological disorders like convulsions as a traditional drug. The aim of the present study was to carry phytochemical screening for the identification of various phytoconstituents and anticonvulsant activity of alcoholic extract of root of Vitex negundo. [45]

12. Immunomodulatory effect of Vitex negundo Linn.:

Extracts Has been reported by Ravishankar and Shukla. The Decoction of leaves is considered astonic, vermifuge and is given along with long pepper in catarrhal fever. Immunomodulatory effect of Vitex negundo Linn. extracts has been reported by Ravishankar et al., (1985). The decoction of leaves is considered as tonic, vermifuge and is given along with long pepper in catarrhal fever (Adnaik et al.,2008; Prashant, 2014).[46]

13. Antiestrogenic activity: [24]

The various fractions of Vitex negundo leaf extract (n-hexane, Chloroform, n-butanol, remnant fraction) was administered to female swiss albino mice to evaluate the anti-implantation potential. Mice uterus was used to estimate the lipid Peroxidation and assay of superoxide dismutase (SOD) Activity. In comparison to control n-hexane fraction treated Mice altered the level of superoxide anion radical and Superoxide dimutase activity. The antifertility activity of the extract administered at dose levels (100 and 200 mg/kg body weight, po.) was evaluated in two experimental animal models i.e. anti-implantation activity in female wistar rats and estrogenic/antiestrogenic activity in ovariectomized female rats.[48]

14. 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 H.[49]

15. Anticancer activity:

Cancer is a dreadful disease, which features uncontrollable Cellular growth, local tissue invassion and metastasis and cause several deaths per year. Vitex is widely used in Chinese folk medicine, and ethanolic extracts of flowers of vitex trifolia Linn were effective on CCL4 induced Hepatic injury in rats. Anticancer studies against Hep-2, MCF-7 and Vero cell lines using methanol and n-hexane fractions on ononis hirta showed better inhibitions in cancer cell lines. Cancer is a major public health burden in both developed and developing countries. Cancer is the second leading cause of death in the United States, where one in four deaths is due to cancer. Plants have long been used in the treatment of cancer. The National Cancer Institute collected about 35,000 plant samples from 20 countries and has screened around 114,000 extracts for anticancer activity.[50]

16. Antibacterial activity:

The antibacterial activity of nirgundi (viex negundo, chinise chaste tree) extracts where tested against bacteria dental infections (staphylococcus aureus, streptococcus mutans, S. Sanguis, S Salivarious and lactobacillus acidophilus) and some other pathogens (bacillus subtilus, E-Coli) the aqueous, methanolic and petrolium ether extract of plant were tested for their antibacterial activity using well diffusion method at the sample concentration of 200 mg / ml. The methanolic extract showed maximum activity as compared to other extracts. The methanolic extracts was most active against S. Sanguis and Lactobacillus acidophilus. The antibacterial activity of Nirgundi (Vitex negundo) extracts were tested against bacterial dental infections (Staphylococcus aureus, Streptococcus mutans, S. Sanguis, S. Salivarius and Lactobacillus acidophillus) and some other pathogens (Bacillus subtilus, E.coli). the aqueous, methanolic and petroleum ether extracts of plants were tested for their antibacterial activity using well diffusion method at the sample concentration of 200 mg/ml. [29,51]

17. Insecticidal and Pesticidal activity:

The plant product of V. negundo are variously reported to possess insecticidal activity against stored product pests,

mosquito larvae, houseflies and tobacco leaf eating larvae. Leaf oil of the plant is shown to have repellent action against stored product pests (Deshmukh et al, 1982; Prakash & Mathur, 1985; Hebbalkar et al, 1992). [28]

The structure of two compounds extracted from the leaves of Vitex negundo L., their repellent activity and toxicity against three strains of Tribolium castaneum (Herbst) were elucidated. Two compounds were purified and a residual film bioassay was used to evaluate the toxicity to adult T. castaneum. Mortality was recorded 24, 48 and 72 h post-exposure to compounds.[52]

Uses of Chinese chaste tree /Nirgundi Plant:

There are very less herbs as multi-talented and as versatile as Nirgundi is. Used both for external application in the form of Paste / oil, and also for oral administration in the form of powder, leaf juice extract or water. Useful in intestinal worm Infestation, skin diseases, eczema, ring worm relieves muscle and arthritis related pain, spleen disorder, abdominal tumour, useful in anorexia, improves intelligence, relieves anxiety, good for eyes, carminative, improves hair quality, anti- toxic, anti-poisonous, abdominal colic, anti-spasmodic, Ama (a Product of altered digestion and metabolism), Useful against cholesterol, heals wounds faster, cleanses wounds, running nose, asthma, bronchitis, cold cough, Improves memoryIts fumes are useful in getting rid of mosquitoes. The leave is made into paste, heated a little and applied Externally to relieve headache, orchitis (swelling in testicles), rheumatoid and osteo arthritis. Nirgundi oil is one of the most popular, natural anti-biotic, anti-inflammatory and analgesic. [7] Chaste tree is used by some women to help with problems related to hormone imbalances. Some women use it to help with signs of premenstrual syndrome like bloating, breast pain, or low mood.[53] Liv. 52, Pilex, V-Gel, Himcolin Gel, Rumalaya Gel, Acne-n-Pimple Cream and Muscle & Joint Rub, Nirgundi Kalka, Nirgundi Ghrita, Nirgundi Kwatha, Varnyasodhna Taila, Visagarbha Taila etc.[54]

Benefits of Nirgundi:

Relieves inflammation: Nirgundi plant is enriched with anti-inflammatory properties that make it highly effective to be used for several health issues. It reduces inflammation and pain associated with it. This quality makes it appropriate for the treatment of arthritis, joint pain, muscle pain,etc. The anti-inflammatory effect is even useful for treating acute rheumatism.

Helpful in treating liver disorders: Liver issues can be treated with the use of Nirgundi plant. The extracts of this plant improve digestion, increase appetite and prevent gas and bloating. These extracts are also useful for reducing stomach pain and inflammation.

Good for headaches: The analgesic property of Nirgundi plant helps in treating headache and bodypain. It is an effective herbal treatment for headaches.

Effective for respiratory problems: The use of Nirgundi extracts decongests the pathways of the respiratory system. It improves the breathing process by opening the air passages properly. This quality is utilised by Ayurveda for treating respiratory issues like bronchitis, asthma, etc.

Provides relief to sore throat: Gargling with Nirgundi decoction soothes throat pain. It helps in reducing the swelling of the throat. The anti-bacterial action of this plant helps in reducing the bad bacteria in the throat and mouth. Mouth ulcers can also be given relief by its analgesic and anti-inflammatory effect.

Controls symptoms of PMS: PMS symptoms include mood swings, abdominal pain, hormonal imbalance, depression, etc. Such symptoms can be reduced with the extracts of this plant. It even helps at the time of menopause. Vaginal infections can also be treated with its use. [26]

Fig 5: Healthbenefits of Nirgundi:[27]1

Conclusion:

Nirgundi is indeed a unique and versatile ayurvedic herb, being see used both for external application and internal consumption, to treat a host of illnesses like arthritis and menstrual cramps. It augments physical and mental wellness and bestows holistic healing benefits. Always consult with a professional Ayurvedic practitioner, to ensure taking the correct dosage and to avoid the risk of side effects caused by excessive use. V. negundo possesses numerous biological activities proved by many experimental studies. It represents a class of herbal drug with very strong conceptual or traditional base as well as strong experimental base for its use. There is a need to conduct clinical trials and prove its clinical utility. [28]

Reference:

[1] Suganthi N. and Sonal Dubey A review article Phytochemical constituents and pharmacological activities of Vitex negundo Linn Journal of Chemical and Pharmaceutical Research, 2016, 8(2):800-807

[2] Basri, H.P. Sharma, Sazya Firdaus, Paras Jain and Alok Ranjan, A Review of Ethnomedical plant -Vitex negundo Linn. International Journal of Advanced Research (2014), Volume 2, Issue 3, 882-894

[3] Brief Review on Vitex negundo Linn.: Ethnobotany, Phytochemistry and Pharmacology Manoj ASuva1*, Neeraj Sharma1 Inventi Rapid: Planta Activa Vol. 2014, Issue 1

[4] Kambham Venkateswarlu Vitex negundo: Medicinal Values, Biological Activities,Toxicity Studies and Phytopharmacological Actions International Journal of Pharmaceutical and Phytopharmacological Research 2012, 2(2): 126-133

[5] https://www.1mg.com/ayurveda/nirgundi-192

[6] Pavithra Dass and Palayyan Muralidharan Review on the neuronal aspect of vitex Negundo-benificial to the brain health world journal of pharmaceutical and medical research Vol 7, Issue 2, 2021.

[7] Kumar, Rajesh Kumar and Kumari Shard Medicinal uses of Nirgundi plant Journal of Pharmacognosy and Phytochemistry 2018; SP1: 2147-2151

[8] Yogendra Singh*1, Pankaj Mishra2 and Pushpendra Kannoj Morphology, Phytochemistry and Pharmacological Activity of Vitex negundo: An Overview Journal of Drug Delivery & Therapeutics. 2020; 10(3-s):280-285

[9] Vitex negundo Linn.: Phytoconstituents and Research Findings by R.V. Shete, K.V. Otari and O.G. Bichewar Research J. Pharm. and Tech. 4(1): January 2011.

[10] https://www-bimbima-com.cdn.ampproject.org/v/s/www.bimbima.com/ayurveda/medicinal-useofnirgundivitexnegundo/1452/?amp_js_v=a6&amp_gsa=1&amp&usqp=mq331AQHKAFQArABIA%3D%3D #important_medicinal_properties.

[11] Zahoor Ullah*1, Riaz Ullah 1, 2, Azhar-ul-Haq Ali Shah 2, Ijaz Ahmad 2and Sajjad Haider 1 PHYTOCHEMICAL AND BIOLOGICAL EVALUATION OF VITEX NEGUNDO LINN: A REVIEW IJPSR(2012), Vol. 3, Issue 08.

[12] Rakesh Tiwle*1, D. K. Sanghi Review Article, comprehensive Study of Nirgundi Plant: A SurveyReport Journal of Innovations in Pharmaceuticals and Biological Sciences Vol 2 (2), 125- 130, 2015.

[13] Swati Bagde*, Debasis Biswas, Deepak Dwivedi Evolution of antioxidant activity, antibacterial potential and phytopharmacetuics properties of ethanol extract of Leaves of Vitex nigundo Life Science Informatics Publications 2019 Jan – Feb R.

[14] Antioxidant and antimicrobial activity of lemuni noodle by Syahirah, J. and *Rabeta, M.S. Food Research 3 (1): 7 - 13 (February 2019).

[15] A. S. Vishwanathan* and R.Basavaraju Review on Vitex negundo L. – A Medicinally Important PlantEJBS 3 (1) April-June2010.

[16] Lubna Abidin1, Aftab Ahmad2, Shokat Rasool Mir1, Mohd Mujeeb1*, Shah Alam Khan3*Ethnobotany, phytochemistry and pharmacological potential of Vitex negundo L. (five- leaved chaste tree): An updated review Lubna Abidin et al./Journal of Coastal Life Medicine 2015; 3(10): 826-833 829.

[17] Arora Vimal*, Lohar Vikram, Sandeep Singhal, Bhandari Anil Vitex negundo: A Chinese Chaste Tree Volume 1, Issue 5, November_December 2011.

[18] SC Ahuja1, Siddharth Ahuja2, and Uma Ahuja3 Nirgundi (Vitex negundo) – Nature's Gift to Mankind Asian Agri-History Vol. 19, No. 1, 2015 (5–32).

[19] Medicinal uses and biological activities of Vitex negundo by Vishal R Tandon Vol 4(3) May- June 2005.

[20] Sachinkumar Baghel1*, Atul G. Ginode2, Karunakar G V3. Critical Review on Sinduvara (Vitex Negundo) with Special Reference to Visha Chikitsa Int. J. Ayur. Pharma Research, 2017; 5(7):67-73.

[21] Uzma Bano1 Azhar Jabeen2, Asrar Ahmed3 M. Akhtar Siddiqui4, M. Akhtar Siddiqui4 Therapeutics uses of Negubdo World Journal of Pharmaceutical ResearchVol 4, Issue 12, 2015.

[22] Vinutha T1, Gopenath TS2, Shanmukhappa B Kaginelli3, Karthikeyan M4, Ashok G4, RanjithMS4, Pradeep Palanisamy5, Vijay Kotra6And Kanthesh M Basalingappa1*Medicinal uses and pharmacological activity of – VitexNegundo Kanthesh M Basalingappa et al, J. Global Trends Pharm Sci, 2020; 11 (1): 7579 – 7589.

[23] Dr. Purnendu Panda*, Dr. Banamali Das, Dr. D.S. Sahu, Dr. S.K. Meher, Dr. B.K. Das, Dr. G.C. Nanda Uses of Vitex negundo Linn (Nirgundi) in Ayurveda and its Pharmacological Evidences Research Journal of Pharmacology and Pharmacodynamics. 6(3): July-September, 2014, 162- 165.

[24] Mohammad Abu Bin Nyeem, Md. Obaydul Haq, Md. Moksed Ali, Nasim Ahmed, Helal Uddin, Meher Nowrose Nishinda (Vitex negundo Linn) – A valuable medicinal plant used in herbal medicine International Journal of Advanced Educational Research Volume 2; Issue 2; March 2017;Page No. 25-31.

[25] Vasanti.V.J., Radhejaylakshmi.R. Nasrin F Evolution of anticancer activity using Hexanic extract of vitex trifilia on two different cell lines international Journal of Pharmacognosy andPhytochemical research, 2014;6(3):449-453.

[26] https://www.preservawellness.com/herbs/nirgundi.

[27] https://www.lybrate.com/topic/nirgundi-benefits-and-side-effects.

[28] (Medicinal uses and biological activities of Vitex Negundo) Vishal R Tandon Post Graduate Department of Pharmacology and Therapeutics GMC, Jammu-1800 001, Jammu & Kashmir, India.

[29] https://www.researchgate.net/publication/313006561_Antibacterial_activity_of_Nirgundi_Vitex_negundo_Linn.

[30] https://indiabiodiversity.org/species/show/32833.

[31] https://www.bimbima.com/ayurveda/medicinal-use-of-nirgundi-vitex-negundo/1452//

[32] https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/vitex-negundo.

[33] https://www.asianagrihistory.org/pdf/volume19/nirgundi-natures-gift-to-mankind.pdf.

[34] https://ccrum.res.in/writereaddata/UploadFile/Hippocratic%20Journal%20Vol%20120Issue%20Number%201_1790.pdf.

[35] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1297513/.

[36] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3040892/.

[37] https://www.researchgate.net/publication/263275777_Analgesic_and_anti-inflammatory_activities_of_Vitex_Negundo_leaves_extract.

[38] International Journal of Ayurvedic and Herbal Medicine 8:3 (2018) 3207–3212 Journal homepage: http://www.interscience.org.uk DOI:10.31142/ijahm/v8i3.02 Impact Factor: 4.415 Page 3207 Antifungal effect of Nirgundi (Vitex nigundo) crude extracts on medically important Candida spp. Usha Patil Sri Jayendra Saraswathi Ayurveda College and Hospital, Nazaratpettai, Chennai, India 600123.

[39] Farkaad A K. Normadiah M K, Mahmood A A, and Wageeh A Y. PASS-predicted Vitex negundo activity: antioxidant and antiproliferative properties on human hepatoma cells-an in vitro study. BMC Complementary and Alternative Medicine 2013. 13:343.

[40] Snake venom neutralization by Indian medicinal plants (Vitex negundo and Emblica officinalis) root extracts M.I. Alama,∗, A. Gomes b a Department of Physiology, Acharya Shri Chander College of Medical Sciences and Hospital, Sidhra, Jammu 180006, India b Department of Physiology, University of Calcutta, 92, A.P.C. Road, Calcutta 700009, India.

[41] Research Article *Author for Correspondence: vedp685@gmail.com Studies on Analysis of Antioxidant and Enzyme Inhibitory Activity of Vitex negundo Linn. Ved Prakash*, Shelly Rana, Anand Sagar Department of Biosciences, Himachal Pradesh University, Shimla, (H.P.) 171005, India.

[42] Natural Products Chemistry & Research Asad et al., Nat Prod Chem Res 2017, 5:5 DOI: 10.4172/2329-6836.1000277, Analgesic, Anti-Inflammatory and CNS Depressant Activities of Methanolic Extract of Sonneratia alba Leaves in Mice Asad S1, Nesa L2, Deepa KN3, Sohel MdD1,4* and Kawsar MdH1.

[43] World Journal of Pharmaceutical Sciences ISSN (Print): 2321-3310; ISSN (Online): 2321-3086 Published by Atom and Cell Publishers © All Rights Reserved Available online at: http://www.wjpsonline.org/ Original Article, Nephroprotective effect of Vitex negundo linn. on cisplatin induced nephrotoxicity in male albino rats M. Janakiraman*1, K. Jeyaprakash2.

[44] Jounal of Pharmacognosy and Phytochemistry, Wound healing activity of the ethanolic extract and agnuside isolated from Vitex negundo L. Leaves Muhamad Ibrahim A, Nagarajan A and Muhammed Majeed.

[45] https://www.whitesscience.com/product/phytochemical-screening-and-anticonvulsant-activity-of-alcoholic-extract-of-root-of-vitex-negundo/.

[46] The Pharma Innovation Journal 2018; 7(9): 330-336, Sanbhaloo (Vitex negundo): Pharmacological Actions and Therapeutic Benefits: A Review Shamim, Saad Ahmed and Lubna Fatima.

[47] Journal of Innovations in Pharmaceuticals and Biological Sciences, Review Article Comprehensive Study of Nirgundi Plant: A Survey Report Rakesh Tiwle*1, D. K. Sanghi 1 1Shri Laxmanrao Mankar Institute of Pharmacy, Amgoan, Gondia, Maharashtra, India- 441902.

[48] https://www.jbcrs.org/articles/some-medicinal-plants-with-antifertility-potential-a-current-status-4400.html.

[49] https://www.researchgate.net/publication/236605044_HIV-1_reverse_transcriptase_inhibition_by_Vitex_negundo_L_leaf_extract_and_quantification_of_flavonoids_in_relation_to_anti-HIV_activity.

[50] http://repository-tnmgrmu.ac.in/4947/1/260416_261425222_Jenet.pdf.

[51] https://www.researchgate.net/publication/313006561_Antibacterial_activity_of_Nirgundi_Vitex_negundo_Linn.

[52] https://www.researchgate.net/publication/231868845_Insecticidal_activity_of_compounds_from_the_leaves_of_Vitex_negundo_Verbenaceae_against_Tribolium_castaneum_Coleoptera_Tenebrionidae.

[53] https://www.drugs.com/npc/chaste-tree.html.