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# A REVIEW ON *VITEX NEGUNDO* LINN

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**Abstract—** *Vitex negundo* belongs to the family verbenaceae, is a aromatic shrub. This plant is commonly used for traditional medicines to treat various diseases. All parts include leaves, root, bark, seeds and flowers are used to treat diseases. It contains number of phytochemicals as secondary metabolites compare to other parts leaves contain number of phytochemicals these play a vital role in tradicinal medicines. Plant extracts of *Vitex negundo* possess different activities like anti-microbial, anti inflammatory, anti- oxidant, anti- pyretic and others. It is also used as a larvidal, mosquito repellent and insecticidal. This review aims to presenting the role of phytochemicals and its therapeutic uses to develop the modern medicine.

**Keywords—***Vitex negundo*, Verbenaceae, Traditional medicine, Phytochemicals

## I. INTRODUCTION

*Vitex negundo* linn is a aromatic shrub, is commonly called as nirgundi or nochi is found throughout the India is commonly grows in waste lands [1]. Its leaves, barks, roots, fruits and flowers are used as medicinal purposes in all over the India [2]. Phytochemical analysis of *Vitex negungo* confirms the presence of Treprenoids, Flavonoids, Steroids, Anthroquione, Glycosides,

Sugars, Alkaloid, Quinones, Phenols, Tannins, Saponins, Coumarin. [3]. It has a various medicinal properties particularly in the treatment of anti-arthritis, fungal diseases, antioxidant and other activities [4].

## II. PLANT DESCRIPTION

*Vitex negundo* is a woody, and large shrubs or small trees up to 2.5- 4.5m high, with quadrangular branches. The plant has pungent, bitter, acrid taste. Leaves are 3-5 penta foliate and the leaflets are arranged palmately and terminal leaflets are long (5-10 cm) acute with petiolate (1-1.3 long), hairy beneath and both the ends are pointed. Flowers are in pedunculate branched tomentose cymes, which are bluish purple in colour and the fruits are round, succulent and black on ripening with four seeds. [5]

### a) Geographical indication:

*Vitex negundo* is distributed throughout the India; altitude of 1500 m in the outer Himalayas It is grown commercially as a crop in parts of Asia, Europe, North America and West Indies. [5]

### b) Classification:

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

## III. ACTIVITIES

### a) Antimicrobial activity:

Microbes are present everywhere which causes infectious diseases to humans in world wide. *Vitex negundo* Linn acts on both gram positive and gram negative organism. The plant extract acts as a antimicrobial agent. [6]

### b) Anti-inflammatory activity:

Anti inflammatory property is to treat inflammation. The anti-inflammatory property of *Vitex negundo* is confirmed by clinical trials on rat. The leaf extract of *Vitex negundo* prevents carrageenan-induced rat paw edema and formaldehyde-induced rat paw edema. [1]

### c) Antipyretic activity:

Pyrexia or fever is caused by secondary impact of infection, graft rejection and other diseased states. Antipyretic are used to reduce the body temperature. The presence of flavonoids in the *Vitex negundo* is responsible for the antipyretic activity. The antipyretic property of *Vitex negundo* shows the good result in albino rats induced yeast hyper pyrexia and it was compared to standard drug paracetamol. [7]

### d) Anti micro filarial activity:

In India around 48 million people are affected by filariasis. It is a vector – borne parasitic disease a adult worm lives in the infected individual for several years. *Vitex negundo* plant extract as antifilarial activity against *Setariacervi*. [8]

### e) Anti -oxidant activity:

Free radicals causes cell damage due to the singlet oxygen or hydrogen peroxide leads to oxidative stress. This stress plays an important role in the pathogenesis of certain cancers and atherosclerosis. Fruits, vegetables and herbs are rich sources of antioxidants such as phenolic compounds, flavonoids, carotenoids, tocopherol and ascorbic acid.



Some of the antioxidant present in vitex negundo are Catechin, Epicatechin, Quercetin, Myricetin, Kaempferol, Naringenin,  $\beta$ -carotene, Tocopherol [9]

S.NO	ACTIVITY	ACTION AGAINST	REFERNCES
1	Anti bacterial	<b>Gram negative bacteria:</b> <i>Escherichia coli</i> , <i>Pseudomonas aeruginosa</i> , <i>Vibrio cholera</i> , <i>Salmonella typhi</i> , <i>Shigella boydii</i> , <i>Shigella dysenteriae</i> , <i>Vibrio mimicus</i> , <i>Salmonella paratyphi</i> , <i>Vibrio parahemolyticus</i> <b>Gram positive bacteria</b> <i>Bacillus subtilis</i> , <i>Streptococcus pyogenes</i> , <i>Staphylococcus aureus</i> , <i>Bacillus cereus</i> , <i>Bacillus megaterium</i> , <i>Sarcina lutea</i>	[12,13]
2	Anti pyretic	Yeast induced hyper pyrexia	[7]
3	Anti filarial	<i>Setaria cervi</i> (microfilarial parasite) <i>Brugia malayi</i>	[8,11]
4	Larvicidal and mosquito repellent	<i>Culex quinquefasciatus</i> , <i>Anopheles stephensi</i> , <i>Aedes aegypti</i> , <i>Culex tritaeniorhynchus</i> , <i>Andrographis paniculata</i>	[14,15]
5	Anti fungal	<i>C.albicans</i> , <i>C.krusei</i> , <i>C.parapsilosis</i> , <i>C.tropicalis</i> , <i>C.glabrata</i> , <i>Aspergillus flavus</i> , <i>Microsporium canis</i> and <i>Fusarium solani</i>	[16,17]
6	Anti inflammator	Carrageenin induced hind paw	[1]

#### Activities of *Vitex negundo*

#### f) Hepatoprotective Activity:

*Vitex negundo* contains negundoside and agundoside compounds are used to treat hepatic diseases.[4]

#### g) 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 convulsions, whereas methanolic leaf extract showed significant protection against both strychnine and leptazole induced convulsions. [10]

### IV. PHYTOCHEMICALS

#### a) Leaves:

Aromadendrene oxide-(1), n-Hexadecaonic acid, 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-2,4-Pentadien-1-ol, 3-propyl-, (2Z)-, D-Glucose, 6-O-D-galactopyranosyl-, Ascaridole epoxide, d-Mannose, Butane, 1,1-diethoxy-3-methyl, Hexanoic acid, ethyl ester, Propane, 1,1,3-triethoxy-, 2,3-Dihydrothiophene 1,1-dioxide, Ledol, Ethyl iso-allocholate (7-Isopropenyl-4,5-dimethyloctahydroinden-4-yl)methanol, Azulene, 1,4-dimethyl-7-(1-methylethyl)-, Ethanol, 2-(9-octadecenyloxy)-, (Z)-, 4,9-Decadienoic acid, 2-nitro-, ethyl ester, Hexadecanoic acid, ethyl ester, 10, 13-Octadecadienoic acid, methyl ester, 4-Decynoic acid, methyl ester, Caryophyllene, Benzoic acid, 3-hydroxy-, 2-Methyl-4-(2,6,6-trimethylcyclohex-1-enyl)but-2-en-1-ol, 6,9,12,15-Docosatetraenoic acid, methyl ester, Phytol, Ethanol, 2-(9,12-octadecadienyloxy)-, (Z,Z)-, 9,12,15-Octadecatrienoic acid, (Z,Z,Z)-, 12-Bromo-13-hydroxy-2,5,9,13-tetramethyltetradeca-4,8-dienoic acid, methyl ester, Vitamin E, negundoside, agnuside, vitegnoside [18]

1H-indene, cyclododecanol, patchoulane, 1,2-dihexylcyclopropene-3-carboxylic acid, 2-heptenoic acid, (+)-aromadendrene, trans-caryophyllene, 7-oxabicycloheptane, cyclohexane, farnesol, pentadecane and 1-octanol. Tetramethoxyflavone, trimethoxyflavone, ascerosin and 5-glucosylrhamnoside; casticin, chrysophenol D, lutcolin, isooxientin, sabinene, p-cymene, M-phelladune, N-terpinene, global and viridiflorol 4; mono and sesquiterpenes 5; viridiflorol, M-eudesmol and M-caryophyllene 6. [19]

Pentacyclic triterpenoids, betulinic acid (3-hydroxylup-20-(29)-en-28-oic acid), and ursolic acid (2-hydroxyurs-12-en-28-oic acid). [20]

#### b) Seeds:

Ono-3 $\beta$ -Acetoxyolean-12-en-27-oic acid; 2 $\alpha$ , 3 $\alpha$ -dihydroxyoleana-5,12-dien-28-oic acid; 2 $\beta$ , 3 $\alpha$ -diacetoxyoleana-5,12-dien-28-oic acid; 2 $\alpha$ , 3 $\beta$ -diacetoxy-18-hydroxyoleana-5,12-dien-28-oic acid, 6-Hydroxy-4-(4-hydroxy-3-methoxy-phenyl)-3-hydroxymethyl-7-methoxy-3,4-dihydro-2-naphthaldehyde,  $\beta$ -Sitosterol, p-hydroxybenzoic acid, n-tritriacontane, n-hentriacontane, n-pentatriacontane, and n-nonacosane. [21]



Phenyldihydronaphthalene-type lignan, vitedoin A , a new phenyl-naphthalene-type lignan alkaloid, vitedoamine A , and a new trinorlabdane-type diterpene, vitedoin B.[22]

c) **Essential oil:**

Ethyl-hexadecenoate;  $\alpha$ -selinene, germacren-4-ol; caryophyllene epoxide, (E)-nerolidol,  $\beta$ -selinene,  $\alpha$ -cedrene, germacrene D, hexadecanoic acid, p-cymene and valencene , viridiflorol,  $\beta$ -caryophyllene, sabinene , 4-terpineol ,  $\gamma$ -terpinene , caryophyllene oxide , 1-oceten-3-ol , and globulol. [23]

V. CONCLUSION

S.NO	COMPOUND	ACTIVITY
1	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-	Antimicrobial, anti-inflammatory
2	D-Glucose,6-O-_-Dgalactopyranosyl-	Preservative
3	Hexadecanoic acid, ethyl ester	Antioxidant, hypocholesterolemic nematocide, pesticide, anti androgenic flavor, hemolytic, 5-Alpha reductase inhibitor
4	Caryophyllene	Anti-tumor, analgesic, antibacterial, antiinflammatory, sedative, fungicide
5	Benzoic acid, 3-hydroxy	Antimicrobial
6	Ledol	Antimicrobial, anti-inflammatory
7	Aromadendrene oxide-(1)	Anti-tumor, analgesic, antibacterial, antiinflammatory, sedative
8	n-Hexadecaonic acid	Antioxidant, hypocholesterolemic nematocide, pesticide, anti androgenic flavor, hemolytic, 5-Alpha reductase inhibitor
9	Phytol	Antimicrobial, anticancer, antiinflammatory, diuretic
10	Vitamin E	Antiageing, analgesic, antidiabeticantiinflammatory, antioxidant, antidermatitic, antileukemic, antitumor, anticancer, hepatoprotective, vnocholesterolemic, ;
	<b>Activity of Phytochemicals[24]</b>	anticholesteremic, anticoronary

*Vitex negundo* is a natural gift from god it possess wide application in traditional medicines. All parts of the plants include leaf, roots, flowers, seeds and barks are used to treat many infectious diseases. It contains multiple numbers of phytochemicals as secondary metabolites, each plays the unique role to treat diseases. Caryophyllene, ledol, nishindaside, mussaenosidic acids, vitedoin, negundin and vitexin are some of the important phytochemicals in the plants.

This plant is known to possess ant-inflammatory, anti-microbial, anti pyretic, anticonvulsant, insecticidal and it is highly hepatoprotective. Besides, this medicinal properties it is also act as mosquito repellent and larvicidal activity.

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