A Review on Pharmacological Activities and Medicinal Properties of *Vitex negundo*

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Abstract— Vitex negundo which belongs to Verbenaceae family is a commonly used plant in both Ayurveda and traditional medicine system in Sri Lanka. It is also known as the 'Nika' in sinhala and 'Nirgundi' in sanskrit. This review aims to provide an overview on Pharmacological activities and medicinal properties of Vitex negundo. The information is collected from authentic Ayurveda texts, scientific journals and electronic media. According to Ayurvedic texts, leaves and roots of Vitex negundo are mostly used. According to Ayurveda pharmacological properties of Vitex negundo tikta, katu and kashaya in rasa, laghu and ruksha in guna, ushna in veerya and katu in vipaka exist. Other medicinal properties are kapha-vatahara, shothahara, vrunashodhana, vrunaropana, keshya, janthugna, medya, kasahara, kushtagna, kandugna, jwaragna, balya, rasayana and chakshusya. Therapeutically it can be used for fever, ear diseases, skin diseases, diseases of the genito- urinary system and diseases of the respiratory system. Anti-inflammatory activity, Pain suppressing activity, Anti-histamine activity, Membrane stabilising activity, Antioxidant activity, Anti-itching activity, Anti-nephrotoxic activity, Antiradical and Anti- lipoperoxidative effects, Anxiolytic effect, Alpha-amylase inhibitory activity, Larvicidal activity, Anti-conulsant activity, Anti-nociceptive activity. Anti-bacterial activity and Anti- microbial activity of Vitex negundo have been scientifically proven. The present review attempts to encompass an up to date comprehensive literature analysis on Vitex negundo with respect to its pharmacological activities and medicinal properties.

Keywords— *Vitex negundo, Pharmacological activities, medicinal properties*

I. INTRODUCTION

The world is gradually seeking alternative solutions for the unsolved health hazards in the modern health promoting scenario in which the term 'herbal medicine' is playing a significant role. The Ayurveda or 'Science of Life' which is a well known and established system of medicine dated up to thousands of years is unforgettable in that scenario since from the origin being the guardian of all living creatures against ailments.

In that system *Vitex negundo* Linn. (Will henceforth be referred to as *Vn* for sake of convenience) or '*Nika*' in Sinhala, which belongs to family Verbenaceae is a very important herbal with a broad spectrum of pharmacological activities, medicinal properties and applications.

The name itself is giving a considerable justification about its significant in clinical practice. It is called *sindhuvāra* in Sanskrit for its ability of eliminating the inflammatory swellings (Jayasinghe*et al* , 1985, p.243). As well as it is called *Nirguṇdī* due to its ability of protecting the body against ailments (ibid.). *Sindhuvārikā, bhūtāveśī,nirguṇdī, varada, sinduvara* are the synonyms given in *Vanavāsanighanduwa* (Dipankara, 1970, p.19). They have probably given by considering its pharmacological activity. In addition to the above the *Sarasvatīnighanduwa* has given *bhūtakeśi* and *indrāṇi* as its other synonyms (Gunasena, 1970, p.24).

Mostly the leaves, roots and barks of the plant have been using in both Ayurveda and indigenous medicine in Sri Lanka. It has been using both internally and externally with a broad spectrum of preparation methods viz. oil, decoctions, medicated smokes, fermentations and dressings etc.

II. METHODOLOGY

This review has done with an intention to provide an overview on Pharmacological activities and medicinal properties of *Vn.* The data were collected from Ayurveda authentic texts, scientific journals and through the electronic media. They were well documented, categorized, analysed under different sections and compared with each other.

III. MORPHOLOGY AND VARIETIES

"It is a small slender tree or shrub, branch lets quadrangular, finely pubescent; leaves opposite,

compound palmate, petioles 3.7 – 6.2 cm long, slender, pubescent; leaflets 3 or 5, the two lowest smaller, nearly sessile, the others long stalked, 7.5-10 cm long, linear-lanceolate acute and often unequal at the base, tapering to very acute apex, nearly glabrous above, densely covered with fine white pubescence beneath; flowers irregular, bisexual, numerous, bright lilac blue, on very short pubescent pedicles, cymes small, stalked, opposite, on erect branches of erect pyramidal terminal panicle, bracts caduceus; sepals 5, fused into campanulate calyx pubescent, segments short triangular; petals 5, fused into a 2-lipped corolla, pubescent outside tube hairy within, 4 upper lobes short, triangular, lowest one large, rounded, forming the lower lip; stamens 4, didynamous, epipetalous, somewhat exerted; ovary superior, 2 or 4 locular ovules 4, stigma bifid; drupe invested at the base by enlarged calyx, under 0.6 cm in length, nearly globose, black; Flowers throughout the year" (Jayaweera, 2006, p.181). According to the Ayurveda pharmacopoeia it has been reported that there are several varieties viz. *śveta* (whitish), *nīla* (bluish), *ānūpa* (aquatic), *katurunika* and (wild type) *walnika* (Jayasinghe *et al* , 1985, p.244). In addition the *Siddhauṣadhanighantu* mentions *helanika* (whitish) and *nil nika* (bluish) as varieties (Gunarathne, 2008, p.55-56).

IV. LOCAL AND WORLDWIDE DISTRIBUTION

In his book *'Medicinal plants used in Ceylon'*, Jayaweera reports that it is common by the edge of streams especially in the dry regions of the low country in Sri Lanka (Jayaweera, 2006, p.181). *Vn* grows covering a broad distributional range in Africa and Asia. Kenya, Tanzania, Mozambique, Madagascar are the African countries while Afghanistan, China, Japan, Taiwan, Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka, Cambodia, Myanmar, Vietnam, Malaysia and Philippines are the Asian countries (GRIN).

V. CHEMICAL COMPOSITION

"Leaves contain alkaloid, nishindine, an essential oil and a resin. Fruit contains an acid resin, an astringent organic acid and mallic acid" (Jayaweera, 2006, p.181). According to Indian Materia Medica leaves contain a colorless essential oil of the drug, and a resin; fruits contain an acid resin, as astringent organic acid, malic acid, traces of an alkaloid and a coloring matter (Nadkarni, 2005, p.1278). Also leaves contain a alkaloid called hydrocotylene in addition to nishindine and fresh leaves yield pale greenish yellow oil (Prajapati, 2004, p.543).

VI. MEDICINAL PROPERTIES AND PHARMACOLOGICAL ACTIVITY ACCORDING TO AYURVEDA

According to the concept of *pañca padārtha* (fivefold properties) in Ayurveda it is *tikta* (bitter), *katu* (pungent) and *kaṣāya* (astringent) in *rasa* (taste); *laghu* (lightness) and *rūkṣa* (roughness) in *guṇa* (attributes); *Uṣṇa* (warm) in *vīrya* (potential) and *katu* (pungent) in *vipāka* (effect after digestion) (Jayasinghe *et al* , 1985, p.244). *Siddhauṣadhanighantu* also describes the same tastes and *laghu* as an attribute (Gunarathne, 2008, p.55-56).

Considering the effect on *doṣa* (*doṣa karma*) according to the Ayurveda *Vn* is reducing *kapha* and *vāta* (*kaphavātahara*) by its potential. Externally it shows analgesic (*vedanāpraśamana*) action, purifies wounds (*vṛṇaśodana*), regenerates healthy granulation tissues of wounds (*vṛṇaropaṇa*) and reduces inflammatory swellings (*śothahara*). Also it is beneficial for hair (*keśya*) and shows germicidal (*jantughna*) action externally (Jayasinghe *et al*, 1985, p.244).

Caraka saṁhitā, one of the foremost authentic texts in Ayurveda has included *Vn* under the *kṛmināśakadaśakaya* (ca.sū.04) which means the top 10 plants against intestinal worms (Buddhadasa, 2007a, p.21). Further it describes *Vn* under *kṛmiciktsā* (treatment for worm infestations) in ca.vi.13 (ibid., p.288). *Vn* also has recommended to be used in medicated oil enema (ca.si.04) for curing skin diseases, worm infestations, piles, mal absorption, impotency, impairment of digestion and excreta (ibid, p.897).

It has recommended medicated ghee well formed with *Vn* to be used in *kaphaja kāsa* (cough manifested by *kapha*) in ast.ci.03 (Buddhadasa, 2007b, p.371). In ast.ci.20, it has prescribed to take a kind of food item called '*pūpa*' made of rice, *Vn* and some other herbs for intestinal worm infestation (ibid., p.505).

Internally it acts as an analgesic for its *vāta nāśaka* properties and also acts as a brain tonic (*medhya*) in the nervous system. In the digestive system it is a stimulator, promoter, liver stimulator and acts against intestinal worms. *Vn* reduces inflammatory swellings in the circulatory system. It reduces *kapha* and cures cough, pulmonary and plural diseases in the respiratory system due to its pungent and bitter tastes. In the urinary system it promotes the production of urine (*mūtrajanaka*). It promotes menstruation due to *uṣṇa* vīrya. It cures skin diseases and possesses anti itching properties in the skin. *Vn* shows anti pyretic action due to its *āmapācaka* (promoting the digestion of mal-digested food particles and toxic materials) properties and could be specially used in *viṣamajvara* (intermittent fever). It is a stimulator, tonic and rejuvenator of the body. It is beneficial in developing eye sight also cures the ear discharges (Jayasinghe *et al*, 1985, p.244).

ABBREVIATIONS

ca. - Caraka saṁhitā
ast. - Aṣṭāṅgahṛdaya saṁhitā
sū. - Sūtrasthāna ci. - Cikitsāsthāna
vi. - Vimānasthāna si. - Siddhisthāna

Table 1 .Systemic pharmacological actions of *Vitex negundo*

Body system/ organ	Ayurvedic attribute	Pharmacological action
nervous	*vāta nāśaka vedanāpraśaman a*	analgesic
nervous	*medhya*	brain tonic
digestive	*deepana, pācana, yakṛtuttejaka, kṛmighna*	stimulator, promoter, liver stimulator and acts against intestinal worms
circulatory	*śothahara*	reduces inflammatory swellings
respiratory	*kaphaghna*	reduces *kapha* and cures cough, pulmonary and plural diseases
urinary	*mūtrajanaka*	promotes production of urine
reproductive	*ārtavajanaka*	promotes menstruation
Skin	*kuṣṭhaghna , kandūghna*	cures skin diseases, anti itching
Eye	*cakṣuṣya*	beneficial in developing eye sight
Ear	*karṇasrāvahara*	cures the ear discharges
Whole body	*jvaraghna, uttejaka, balya, rasāyana*	anti pyretic (specially in intermittent fever), stimulator, body tonic, rejuvenator

Table 2. Fivefold medicinal properties (*pañca padārtha*) and attributes

Attribute (quality)	Medicinal property
kaphavātahara	*uṣṇa vīrya*
deepana, pācana, yakṛtuttejaka, kṛmighna	*katu rasa, tikta rasa, uṣṇa vīrya*
kaphagna, kāsahara	*katu rasa, tikta rasa*
ārtavajanaka	*uṣṇa vīrya*

VII. UTILITY IN CLINICAL PRACTICE

Vn has been using against inflammatory swellings, headaches, arthritis, rheumatism as an external warm paste. It is used as a local herbal bath which is made of its decoction around lower back, flank and sacral areas in inflammatory conditions of the uterus, lower colons, rectal area and testis. Also its decoction can be applied as a gargle against the inflammatory conditions of throat and mouth. In common colds and headaches it is used as a medicated smoke made by burning leaves or as a cigarette inhaler. Oil made of leaves is used for preventing premature hair and soothing wounds. Sciatica is a main indication of *Vn* as it is acting on the nervous system. Juice of leaves is given with cow`s urine in spleenomegaly (Jayasinghe *et al*, 1985, p.244). Also leaves are applied as a plaster to enlarged spleen (Nadkarni, 2005, p.1278).

Table 3. Methods of application and indications

Part/ preparation	Method of application	Indications
Leaves	external warm paste (*upanāha*)	inflammatory swellings, headaches, arthritis, rheumatism
Leaves	decoction	Sciatica
decoction	local herbal bath	inflammation - uterus, lower colons, rectal area and testis
decoction	gargle	inflammation - throat and mouth
Dried leaves	inhaler	common colds and headaches
Leaves	juice	spleenomegaly
Leaves	juice	eye diseases
Seed	paste	eye diseases
Leaves	oil	ear diseases
Root (*helanika*)	juice	cobra venom
Root (*kalunika*)	chewing	inflammation – oropharynx and nasal bleeding
Leaves (*kalunika*)	Juice	Eczematous skin diseases
Whole plant	oil applying and drinking, nasal therapy	abscess

It is used in inflammatory conditions of plural membrane, oliguria and dysmenorrhea also. In eye diseases leaf juice and paste of the seed is applied. Oil made of leaf juice is administered into the ear in some ear diseases. Root juice of *helanika*(whitish type of *Vn*) is given to drink against cobra venom. Also root of *kalunika*(blackish/bluish type of *Vn*) is given to patient to be chewed in inflammatory conditions of oropharynx and nasal bleeding. Juice of *kalunika* is applied on eczematous skin diseases. Oil composed using whole plant is good for applying, drinking and nasal therapy in abscess. The whole plant oil of *kalunika* is given to drink in tuberculosis (Jayasinghe *et al*, 1985, p.244-245).

Table 4a. Pharmacological activities and medicinal properties proven by modern research findings

Pharmacological Activity	Laboratory organism / animal used	Ref.
Anti microbial activity	*Staphylococcus aureus*, *Escherichia coli* and *Klebsiellapneumoniae*	Renukadevi P, *et al* (2008)
Anti-bacterial	gram positive and gram negative organism viz., *B. subtilis* and *E. coli*	Phani K, *et al* (2014)
Antimicrobial activity	*C. albicans* *S. mutase*	Khatak S, *et al* (2014)
antimicrobial	*E. coli*, *Pseudomonas aeruginosa* and *Candida albicans*	Gautam K, *et al* (2011)
Larvicidal activity	*Culex quinquefasciatus* larvae	Kannathasan K, *et al* (2007)
Anti-inflammatory activity	rats	Dharmasiri MG, *et al* (2003)
Anti-inflammatory and antioxidant property.	Albino rats	Das S, *et al* (2013)
Anti-nephrotoxic activity	Wister rats	Mishra S, *et al* (2014)
Antioxidant properties		Pandey N, *et al* (2007)
Anxiolytic activity	Swiss albino male mice	Adnaik R, *et al* (2009)
Alpha amylase inhibitory activity		Gautam K, *et al* (2013)
anticonvulsant activity		Tandon VR, *et al* (2005)
cardio tonic activity	Frog heart	Pai PT, *et al* (2009)
Anti nociceptive activity		Gupta RK, et al (2005)
anti asthmatic activity		Patel J, *et al* (2009)
Anti-snake venom activity		Alam MI, (2003)

VIII. DISCUSSION

Vn shows a variety of pharmacological actions in different systems throughout the body (Table 1). Those actions have become obvious due to its fivefold medicinal properties viz. rasa, guṇa etc. (Table 2). Almost all parts have been used in Ayurveda clinical practice. Among them the leaves have been utilizing for the majority of indications (Table 3). Method of applications and also their indications have dispersed in a broad spectrum (Table 3). Many modern investigations have been carried out for searching the pharmacological actions of *Vn* using almost all parts of the plant. According to the survey among them majority of studies have been carried out on leaves (Table 4b). Different kinds of extraction methods, laboratory animals and microorganisms have used. Those finding proves that *Vn* is successful against variety of micro organisms viz. bacteria, fungi and also against parasitic larvae (Table 4a). According to the survey, while comparing modern and Ayurvedic pharmacological actions with indications, there is a correlation between them (Table 5).

Table 4b. Pharmacological activities and medicinal properties proven by modern research findings

Tested part	Type of extract	Ref.
Leaves	fresh, aqueous, heated aqueous extract, chloroform and methanolic extract	Renukadevi P, *et al* (2008)
leaves	crude drug powder extracts (Ethanol)	Phani K, *et al* (2014)
Leaves, barks	methanolic extract/ chloroform	Khatak S, *et al* (2014)
root, stem, leaf, flowers and fruit		Gautam K, *et al* (2011)
leaves	Methanol extract	Kannathasan K, *et al* (2007)
Mature fresh leaves	Water extract	Dharmasiri MG, *et al* (2003)
leaves	Ethanolic extract	Das S, *et al* (2013
roots	positive control and methanol-dichloromethane	Mishra S, *et al* (2014)
roots	ethanolic extract	Adnaik R, *et al* (2009)
All parts	Flavonoids extract	Gautam K, *et al* (2013)
Leaves	Aqueous extract	Pai PT, *et al* (2009)
leaves		Gupta RK, et al (2005)
leaves	Ethanolic extract and various fractions like petroleum ether, aqueous and ethyl acetate	Patel J, *et al* (2009)
roots	Methanolic extract	Alam MI, (2003)

Table 5. Probable comparison of pharmacological activities

Pharmacological Activity (Modern findings)	Pharmacological Activity (Ayurveda)	Indications according to Ayurvedic texts
Anti microbial activity Anti-bacterial Larvicidal activity	*jantughna, kṛmighna, kṛmināśaka*	tuberculosis, intestinal worms, purulent otitis
Anti-inflammatory activity	*śothahara*	arthritis, rheumatism inflammatory conditions of uterus, lower colons, rectal area, testis, throat and mouth, oropharynx
Anti-snake venom activity	*viṣaghna*	cobra bites
anti asthmatic activity	*kaphagna*	cough, pulmonary and plural diseases
Antioxidant properties	*rasāyana*	premature hair
anticonvulsant activity	*medhya, rasāyana*	brain tonic
cardio tonic activity	*uttejaka, balya*	

IX. CONCLUSION

According to the results obtained from the survey it can be concluded that *Vitex negundo* is a very valuable herb which has been utilizing in the system of indigenous medicine covering a vast range of applications. Also its pharmacological activities are correlated with its respective medicinal properties. Modern findings have supported to establish the Ayurvedic recommendations which have been made before thousands of years.

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