

Nochi Ilai Kudineer—A Siddha management for Malaria

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Abstract

Siddha system is an ancient system which has rich herbal curatives and many of the preparations mentioned in the literatures are practiced in day today life in Southern India. One such simple preparation given in Siddha materia medica, medicinal plant division is Nochi ilai kudineer indicated for murai suram which is intermittent fever that occurs in malaria. This classical text is reviewed for its antimalarial activity which eventually has the property of curing intermittent fever. Various phytochemical constituents present in leaves of *Vitex negundo* Linn. are potent antipyretic agents. Against these backdrops, this review was attempted to reveal the hidden treasure of siddha literature regarding Nochi ilai kudineer for malaria through the scientific perspective for better understanding.

Keywords: Siddha, Nochi ilai kudineer, murai suram, malaria, phytochemical constituents, *Vitex negundo* Linn.

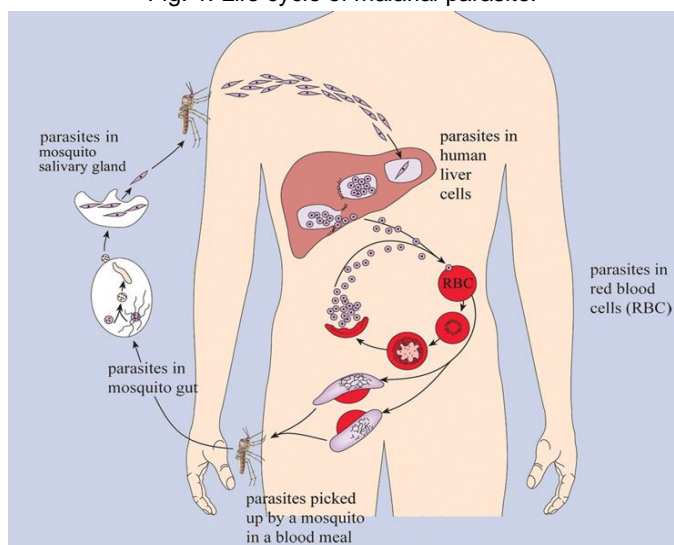
Introduction

Malaria is a widespread tropical disorder which affects 300 million and kills 1 million people every year (Robbins and Cortran, 2005). Malaria control and eradication is difficult to achieve and its recurrence is the commonest phenomenon in endemics. Nochi ilai kudineer, a Siddha curative for murai suram (intermittent fever), kulir suram (fever with rigor) and Vatha suram (fever caused due to vitiated vatha) is given in Siddha materia medica-medicinal plant division as an evidential indication (Vaidhya Rathnam and Murugesu mudhaliar, 2008). The scriptures clearly narrate the type of fever in malaria. The leaves of *Vitex negundo* Linn. contains phytochemicals which acts as an antimalarial agents. As the plant, *Vitex negundo* is commonly available in India; it is easier and economical for collection and preparation. The aim of this review is to explore the Siddha preparation of Nochi ilai kudineer scientifically as a Siddha medicine with antimalarial potential.

Malaria

Malaria is a protozoal disease caused by any one or combination of four species of plasmids namely, *Plasmodium falciparum*, *P. vivax*, *P. ovale* and *P. malaria*. It is transmitted by the bite of female anopheline mosquito (Robbins and Cortran, 2005). The female anopheline mosquito becomes infected when it feeds on human blood containing gametocytes, the sexual forms of the malarial parasite (Fig. 1). Development in the mosquito takes from 7-20 d. Sporozoites inoculated by an infected mosquito disappear from human blood within half an hour and enter the liver.

Fig. 1. Life cycle of malarial parasite.



After some days, merozoites leave the liver and invade red blood cells, where further asexual cycles of multiplication take place, producing schizonts. Rupture of the schizont releases more merozoites into the blood and causes fever, the periodicity of which depends on the species of parasite (Davidson, 2008).

Pathogenesis

Parasitation and destruction of erythrocytes are responsible for major pathological changes. Malarial pigment liberated by destructed red cells accumulates in the phagocytic cells of the reticuloendothelial system resulting in enlargement of spleen and liver (hepatosplenomegaly).

In *Plasmodium falciparum* malaria, there is massive absorption of haemoglobin by renal tubules producing blackwater fever (haemoglobinuric nephrosis). At autopsy, cerebral malaria is characterized by congestion and petechiae on the white matter. Parasitised erythrocyte in falciparum malaria are sticky and get attached to endothelial cells resulting in obstruction of capillaries to deep organs such as of the brain leading to hypoxia and death. Microhaemorrhage and microinfarct may be seen in the brain (Robbins and Cortran, 2005; Harsh Mohan, 2005).

Clinical features

Plasmodium falciparum infection: This is the most dangerous of the malaria. The onset is often insidious, with malaise, headache, vomiting, fever, cough and mild diarrhoea. The liver and spleen enlarge and become tender. Complication of this type is cerebral malaria.

Plasmodium vivax and ovale infection: Fever starts with rigor. The patient feels cold and temperature rises to about 40°C. After half an hour to an hour, the hot flush phase begins. It lasts several hours and gives way to profuse perspiration and a gradual fall in temperature. The cycle is repeated 48 h later; gradually the spleen and liver enlarge and may become tender. Anaemia develops slowly. Herpes simplex is common. Relapses are frequent in the 2 years after leaving the malarious area.

Plasmodium malaria: This is usually associated with mild symptoms of bouts of fever every third day. Parasitaemia may persist for many years with occasional recrudescence of fever. It causes glomerulonephritis and the nephrotic syndrome in children (Davidson, 2008).

Siddha aspects of malarial fever

Suram: Suram, the word denotes desert land (this is said to explain the raise of temperature, dryness and dehydration). The etiology of suram may vary but cause is due to the vitiated kabam in gastrointestinal tract. According to Siddha literature, suram is classified into 64 types. Muraisuram is one among it. The etiology for murai suram is toxic parasite penetration into the body which eventually produces symptoms (Shanmugavel, 2003).

Symptomatology of Murai suram: Rise of body temperature, rigor, intermittent fever with profuse sweat, malaise, goose flush, yawning, chest pain, joint pain and hepatosplenomegaly (Shanmugavel, 2003).

Preparation of Nochi ilai kudineer (leaf decoction): To prepare the decoction of *Vitex negundo* leaves, first it is to be cleaned and eight parts of water is added to it, allowed to boil till the water is reduced to 1/8 parts.

Traditionally it is used for intermittent fever, fever with rigor and vatha fever (Vaidhya Rathnam and Murugesu Mudhaliar, 2008).

Botanical aspects of *Vitex negundo* Linn.

Morphology: An aromatic large shrub or small tree of about 3 m in height with quadrangular branches; leaves opposite, exstipulate, long petioled and digitately 3-5 foliate, all leaflets with petiolules, the middle one longer, flowers bluish purple in panicles up to 30 cm long; fruits globose or ovoid or obovoid, four-seeded drupe, black when ripe (Orient Longman, 1996) (Fig. 2).

Fig. 2. *Vitex negundo* Linn.



Parts used: Whole plant (Orient Longman, 1996).

Taste: Bitter, pungent and acrid (Kritikar and Basu, 1975).

Family: Verbenaceae.

Taxonomy nomenclature

<i>Kingdom</i>	: Plantae
<i>Subkingdom</i>	: Viridiaeplantae
<i>Infrakingdom</i>	: Streptophyta
<i>Division</i>	: Tracheophyta
<i>Sub-division</i>	: Spermatophyta
<i>Infradivision</i>	: Angiosperms
<i>Class</i>	: Magnolipsida
<i>Super order</i>	: Asteranae
<i>Order</i>	: Lamiales
<i>Family</i>	: Lamiaceae
<i>Genus</i>	: <i>Vitex</i>
<i>Species</i>	: <i>negundo</i> L.

Various phytochemical constituents present in leaves of *Vitex negundo* Linn. are potent antipyretic agents. Table 1 lists the phytochemical constituents of *Vitex negundo* Linn.

Table 1. Phytoconstituents of *Vitex negundo* Linn. (Vishwanathan and Basavaraju, 2010).

Plant part	Phytochemical constituents
Leaves	Hydroxy-3,6,7,3',4-pentamethoxyflavone
	6'-p-hydroxybenzoyl mussaenosidiv acid
	2'-p-hydroxybenzoyl mussaenosidiv acid
	Viridiflorol
	β-caryophyllene;sabinene
	4-terpineol;gamma-terpinene
	Caryophyllene oxide
	1-oceten-3-ol
	Globulol
	Betulinic acid[3β -hydrolup-20-(29)-en-28-oic acid]
	Ursolic acid[2β-hydroxyurs-12-en-28-oic acid]
	n-hentriacontanol
	β-sitosterol
	p-hydroxybenzoic acid
	Protocatechuic acid
	Oleanolic acid
	Flavanoids
	Angusid
	Casticin
Vitamin-C	
Nishindine	
Gluco-nonital	
p-hydroxybenzoic acid	
Sitosterol	
Secondary compounds	Hentriacetontane
	Luteolin
	Nishidine
	Pedunularisid
	Vanilicacid.vitexin
	Reducing sugar
	Terpenoids
	Flavonoids
	Saponinis
	Tanins (Prasad and Wahi, 1965).

Pharmacological action of *V. negundo* in murai suram

The plant exhibited antiplasmodial activity on *Plasmodium falciparum* with IC₅₀ value ranging from 10-20 µg/mL (Julie Nguyen *et al.*, 2007). The fresh leaves extract exhibited antiparasitic activity and the essential oil acts as repellent towards mosquito (Hebbalkar *et al.*, 1992). It contains steroids and terpenoids COX-2 inhibitors which is a antipyretic agent (Miskin and Manjunath, 2012). The secondary compounds produced by plants to protect themselves against herbivorous insects. It has a larvicidal activity against mosquito *Anopheles subpictus*, *Culex tritaeniorhynchus*, *C. quinquefasciatus* and *A. stephensi* (Raji, 2013). Hepatomegaly is one of the complication managed by hepato-protective activity (Raji, 2013). It is also indicated for enlargement of spleen (Davidson, 2008), black water fever (Yang *et al.*, 1987) which is the major complication of malaria.

Conclusion

Malaria is an endemic disease with major global health problem causing alarming complications and its prevention and cure is the hour's need. Nochi a versatile herb is not only a potent mosquito repellent but also a possible remedy for the mosquito born disorder malaria and its complication. In the present decades, world's attention is turning towards discovering and globalizing new herbal drugs. This review pays a way for further studies in specification and elucidation of antiplasmodial activity of Nochi ilai kudineer and its clinical evaluation.

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