



A Review of Medicinal Uses and Pharmacological Activities of a Siddha medicinal herb *Nelumbo nucifera* GAERTN.

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Abstract

Thamarai (*Nelumbo nucifera* GAERTN) *Nelumbo nucifera* also known as Lotus, an aquatic belongs to the family of Nelumbonaceae. It is cultivated throughout the world as an important nutritious herb. Thamarai (*Nelumbo nucifera* GAERTN) is an important herbal ingredient in all traditional systems of medicine and has been using for several decades because of its varied medicinal properties. In India systems of medicine it is considered as a high medicinal value drug. In Siddha medicine, it is widely used for pregnancy care (antenatal care and post natal care).

Different part of plant (leaves, seeds, flower, and rhizome) can be used in traditional siddha system of medicine. Several recent researches revealed that it has hepatoprotective, hypoglycemic, immunomodulatory, antianalgesic, antifertility, antimicrobial, anti inflammatory properties etc. Documentation of traditional medicinal uses and phyto-pharmacological activities of a thamarai kilangu is essential for the time. This review attempts to cover all the available literature on *Nelumbo nucifera* with respect to its traditional uses, chemical constituents, physicochemical properties, phytoconstituents with therapeutic benefits.

Key words:

Thamarai kilangu, *Nelumbo nucifera*, Literature review, Siddha medicine

Introduction

Nelumbo nucifera Gaertn, commonly known as lotus or sacred lotus is an perennial water based plant belonging to family *Nymphaeaceae*. *N.nucifera* is an important aquatic economic plant, not only as a dainty and ornamental flower but also as a source of herbal medicine with strong sedative, cooling, astringent, and nutritive & demulcent properties as per Siddha Materia medica (*Gunapadam Mooligai Vaguppu*). In other Indian traditional system, past of lotus has been widely used for the treatments.

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Traditional siddha literature about Thamarai

There was a largest traditional trait that, lotus is considered as a goddess flower and Lord of *Lakshmi* denoting as sacred of the flower. The flower has huge pleasant smell and purely aqua based. *N.nucifera* as cure of numerous diseases considerable efforts have been made by researchers. It is basically four types which are classified based on its color. The parts like flower, seed, petals, tuber has widely used for the medicinal preparations.

- White flowered lotus
- Reddish flowered lotus
- Blue flowered lotus
- Yellow flowered lotus

Table 1. Parts of Thamarai and its Siddha medicinal actions

Parts of Thamarai Plant	Siddha medicinal actions
Flower	Coolant Astringent Expectorant Sedative
Tuber	Demulcent
Seed	Tonic Nutritive
Petals	Nutritive

Table 2. Parts of Thamarai and its Therapeutic properties

Parts of Thamarai	Siddha Therapeutic properties
Flower	Removes eye irritation, fever
Tuber	Toad skin, Cough, Stomach pain
Seed	Abdominal disturbances, Tastelessness
Petals	Deafness, Anxiety, Nervous enchantments

Taxonomic Classification

Kingdom	- Plantae – Plants
Sub Kingdom	- Tracheobionta
Class	- Magnoliopsida
Subclass	- Magnoliidae
Order	- Proteales
Family	- Nymphaeaceae
Genus	- Nelumbo Adans
Species	- Nelumbo nucifera Gaen.

Geographical Synonyms

English:	Sacred lotus
Hindi:	Kanwal, Kamal
Sanskrit:	Ambuja
Bengal:	Padma
Manipuri:	Thambal
Marathi:	Kamal
Gujarat:	Suriyakamal
Malayalam :	Tamara
Kannada:	Tavare
Assamese :	Padam
Bengali:	Komol
French:	Nelumbo
German:	Indische lotosblume
Persian:	Nilufer

Apart from this, in siddha system of medicine it has few different names based on its usage and geographical origin. The other tamil local names are *Aravintham*, *Ellimanai*, *Suriyanatpu*, *Ponamanai*, *Pundareegam*, *Padhumam*, *Kamalam*, *Nalinam*, *Mulari*, *Mundagam*, *Malunthi*, *Sarogam*, *Kokanam*, *Inadai*, *Kanjugam*, *Appusam*, *Ambhorugam*, *Salasam*, *Vasanam*, *Vaarisam*, *Saraseerugam*, *Pangerugam*, *Saroroogam*, *Pangasam*.

Habitat

Warm-temperate to tropical climates, in a range of shallow (up to about 2.5 m deep) wetland habitats, including flood plains, ponds, lakes, pools, lagoons, marshes, swamps and the backwaters of reservoirs.

Morphology

Leaves

Leaves are large, aerial as well as floating orbicular ranging from 20-90 cm. In diameter, acute to form a short tip, petiolate present, entire glaucous, watery, strong cupped in case of aerial leaves and flat in case of floating ones, radiantly nerved, the fresh leaves are leathery, but on drying they are nearly membranous and brittle, and more or less brownish red blotching on the lower surface, petioles of the aerial leaves are erect and stout white those of the floating ones are not strong enough. When transversely cut, the petiole of leaf stalk always shows four distinct large cavities in the centre and small cavities in the periphery.

Flowers

Solitary cyme and large, 10-25 cm in diameter, white pink or pinkish white fragrant peduncles arising from the nodes of the rhizomes, sheathing at the base, 1-2 cm long. The color may green or blackish green, hard and stout, smooth or rough due to the presence of numerous small scattered prickles, sepals, petals and stamens are spirally arranged passing gradually one into another.

Fruits

Fruit is an aggregate of indehiscent nut-lets. Ripe nutlets are ovoid, roundish or oblongish up to 1.0 cm long 1.5 cm broad, with hard smooth, brownish or greyish black pericarp which is faintly longitudinally striated, pedunculated and one seeded. Seeds fill in the ripe carpel.

Rhizomes

The rhizomes are 60-140 cm long 0.5 to 2.5 cm in diameter, yellowish white to yellowish brown in colour, smooth longitudinally striated with brown patches, Nodes and internodes are present. When freshly cut it exudes mucilaginous juice and show a few large cavities surrounded by several larger ones, fracture is tough and fibrous. Odour is indistinct

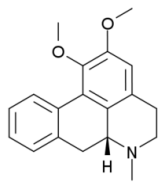
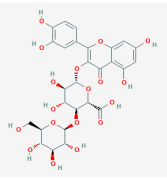
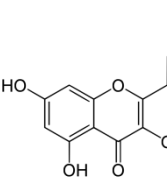
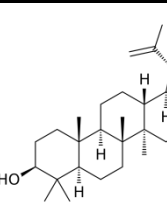
Nutritional value of *Nelumbo nucifera*

Lotus seed is rich in proteins, carbohydrates, and fats, and also contains particularly large amounts of trace elements, including calcium, phosphorus, iron, vitamin B, C, E.

Chemical constituents

The nelumbo nucifera contains chemical constituents like nuciferine, roemerine, anonaine, pronuciferine, N-nornuciferine, nelumboside, flavonoids, quercetin, leucoanthocyanidin, leucocyanidin, leucodelphinidin, nelumboside A and nelumboside B, Betulinic acid, kaempferol 3-O-β-D-galactopyranoside, kaempferol 3-O-β-D-glucopyranoside, kaempferol 7-O-β-D-glucopyranoside, kaempferol 3-O-a-L-rhamnopyranosyl-(1-6)-β-D-glucopyranoside, kaempferol 3-O-a-L-rhamnopyranosyl-(1-2)-β-D-glucopyranoside.

Table 3. Chemical structure for major compounds of *Nelumbo nucifera*

Chemical name	Formula	Structure
nuciferine	C ₁₉ H ₂₁ NO ₂	
Nelumboside	C ₂₇ H ₂₈ O ₁₈	
Quercetin	C ₁₅ H ₁₀ O ₇	
Betulinic acid	C ₃₀ H ₄₈ O ₃	

Traditional uses of *Nelumbo nucifera*

Lotus is used in traditional medicine by people for its tremendous health benefits in many parts of the world. It is used to treat sunstroke, diarrhea, dysentery, hemorrhoids, dizziness, vomiting of blood, uterine bleeding disorders, promoting conception, improving the skin condition, controlling burning sensation, against infections, cough, hypertension, fever, urinary problems, hematemesis, epistaxis, hemoptysis, hematuria, and metrorrhagia etc.

Pharmacological activities

Anti-microbial activity

The antibacterial activity of the seeds of *Nelumbo nucifera* was tested in a study which included 7 different bacterial strains and it was observed that it was equally effective against the majority of gram positive and gram negative microbes. Thus it proves enough data for its antimicrobial potency.

Anti-ischemic activity

The Plant extract of *N. nucifera* shows potent anti-ischaemic effects in the isolated rat heart. The effective amount of Plant extract against ischaemia induced in the isolated rat heart was assessed by measuring cardiac output; doses of 0.1–30 mg/ml were tested by the researchers. Maximal recovery was seen at a dose of 10 mg/ml, and normalize the cardiac output was Thus, the 3 mg/ml dose was determined to be the optimum dose for anti-ischaemic effects in the rat.

Antiproliferative activity

The ethanolic extract of *N. nucifera* seed has dormant the cell cycle progression, cytokine gene expression and cell proliferation in human peripheral blood mononuclear cells. In this study, the effects on peripheral blood mononuclear cells proliferation, resting cells or cells activated with phytohaemagglutinin (PHA) were treated with 100 mg/ml of *N. nucifera* seed ethanolic extract. Cell proliferation was determined based on the uptake process of tritiated thymidine. The proliferation was not affected by DMSO treatment. Ethanolic extract of *N. nucifera* seed (100 mg/ml) significantly suppressed human peripheral blood mononuclear cells proliferation stimulated with phytohaemagglutinin.

Antioxidant activity

The ethanol extract of the *Nelumbo nucifera* seed has evaluated for its antioxidant activity using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical assay. Potent free radical scavenging effects was found in this method with a median inhibition concentration (IC₅₀) of 6.49 mg/ml. Furthermore, the antioxidant activity of the hydroalcoholic extract of seed has also shown sufficient antioxidant activity using the DPPH and nitric oxide methods.

Hepatoprotective activity

The hepato-protective effects was studied carbon tetrachloride and aflatoxin B₁-induced hepatotoxicity models. Cell death caused by carbon tetrachloride was significantly inhibited in a dose-dependent manner by the ethanolic extract at concentrations between 10 and 500 mg/ml. The same extract reduced the genotoxicity of aflatoxin B₁, showing complete inhibition at a concentration of 250 mg per plate. Hence they concluded the hepatoprotective action of *Nelumbo nucifera*.

Anti-inflammatory activity

The anti-inflammatory activity of *Nelumbo nucifera* was evaluated in carrageenan-induced edema in rats and acetic acid induced vascular permeability in mice. It was observed that the anti-inflammatory effect was approximately the same as that of Indomethacin. The results propose that nelumbogenin present in drug is responsible for anti-inflammatory action.

The anti-inflammatory property of nelumbo nucifera might be due to inhibition of chemokines, cytokines, nitrous oxide and growth factors in double-stranded RNA (dsRNA) stimulated macrophages via the calcium pathway. The methanol extract from seeds of *nelumbo nucifera* used for the treatment of inflammatory diseases also had inhibitory effects on nitric oxide (NO) production.

Table 2. List of medicine prepared with Thamarai parts as Ingredients

Medicine name	Part of the plant	Indications	Reference
Arugampul Ghritham	Thamarai poo	Raktha pitham	Thanjai vaidya raja Sindhamani Part-2
Pooshanuga Chooranam	Thamarai poo	Moola rogam, Yoni rogam, Pramiyam	Thanjai vaidya raja Sindhamani Part-2
Kana ennai	Thamarai valaiyam	18 vagai kanam	Anuboga vaidhya navaneetham Part-2
Satchiyathy kashayam	Thamarai kilangu	Vatha suram	Anubhoga vaidhya brama ragasiyam
Elathi chooranam	Thamarai kilangu	Pandu, kamalai, vikkal, unmaatham	Anubhoga vaidhya theva ragasiyam part 3
Prasarini thailam	Thamarai ithal	Vatham, Pitham, Kabham	Anubhoga vaidhya theva ragasiyam part 3
Kamatheva Ghritham	Thamarai vithai, Thandu	Pandu, Soolai, Kamalai	Anubhoga vaidhya theva ragasiyam part 3
Thurva ghritham	Thamarai ithal, thandu	Raktha vanthi	Anubhoga vaidhya theva ragasiyam part 3
Sathavari rasayanam	Thamarai kilangu	Thathu boshti, 20 megam	Anubhoga vaidhya theva ragasiyam part 3
Indhiriya pusti thambanathi legyam	Thamarai vithai, parupu	Thathu viruthi	Kanusamy Parambarai vaithyam
Abrakach sanjeevi chooranam	Thamarai kilangu	Pitham, Megam, Irumal	Thanjai vaithya raja sinthamani

Conclusion

In this review we explore the phytochemical and pharmacological knowledge about this well known plant species as well as several emerging aspects for research on *Nelumbo nucifera*. Different parts of *N. nucifera*, including the leaves, rhizomes, seeds and flowers, have been reported to have therapeutic potential in traditional system of medicine for the treatment of various diseases. Pharmacological activities of different extracts have been studied throughout the world. This needs to be explored further through clinical studies on human volunteers to provide evidence-based method.

Conflict of Interest

None declared

Source of Funding

Nil

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