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Anu Mohan
Department of Dravyaguna
Vijnana, Government Ayurveda
College, Thiruvananthapuram,
Kerala, India

MS Deepa
Department of Dravyaguna
Vijnana, Government Ayurveda
College, Thiruvananthapuram,
Kerala, India

A review on ethno botanical importance of an endemic species of Western Ghats: *Strychnos colubrina* Linn. Sp. (Vallikanjiram)

Anu Mohan and MS Deepa

Abstract

Strychnos colubrina Linn. Sp.-Loganiaceae, *Vallikanjiram* or *Modirakanjiram* in Malayalam is being used in traditional medicine for a variety of ailments. The plant is a woody climber and root bark is widely used internally and externally for the treatment of snake bite. It is also given in intermittent fever, in skin diseases and to alleviate pain and swelling from small pox. The *taila* (oil) prepared with seeds are used externally for reliving joint pain by the local people of Urulanthanni, Ernakulam district. A comprehensive compilation of medicinal uses, pharmacological actions about the plant has been done. This helps to conserve our endemic resources, which would finally lead to the authentication and scientific validation.

Keywords: *Strychnos colubrina* Linn. Sp., *Vallikanjiram*, *Modirakanjiram*, *Hortus malabaricus*, ethnobotany

1. Introduction

Plants have been the sources of medicine for mankind from time immemorial and continue to play a very significant role in the health care system. Ethno-medicine is a study or comparison of the traditional medicine based on bioactive compounds in plants and animals and practiced by various ethnic groups, especially those with little access to western medicines [1]. A large number of species of plants have been used as medicine traditionally based on the knowledge inherited orally from generation. *Strychnos colubrina* Linn. Sp., belongs to Loganiaceae family commonly called as *Modirakanjiram* or *Vallikanjiram* in Malayalam is an endemic species of Kerala. Hendrik Van Rheede in his book '*Hortus Malabaricus*' mentions this plant under name *Cherukattuvallikanjiram*. An authentic traditional book '*Aushadha sasyangal*' (by Fr. Raphael Tharayil) briefly quotes 'the plant'- with a short botanical description and therapeutic uses. Some latest lexicons of medicinal plants - like '*Nighantu Adarsha*' (by Dr. Bapalal G. Vaidya) included this plant in the family of *karaskara* (*Strychnos nux-vomica*). It is called Pao de solor or Pao da cobra by the Portuguese; and *Modirakanjiram* in Malayalam signifies moustache like tentacles of the plant. The plant is a woody climber and root bark is widely used internally and externally for the treatment of snake bite. Oil prepared with seed is widely used externally as a potent analgesic by local people of Urulanthanni, Ernakulam district, Kerala [2].

2. Materials and Methods

Information on *Strychnos colubrina* Linn. Sp., was collected from all traditional literatures and from some latest lexicons of medicinal plants (*Nighantus*), recent literature, journals, and from search engines like PubMed, google scholar, science direct. Comprehensive data was prepared by reviewing various ethno- botanical survey articles.

3. Result & Discussion

In India the wood of *Strychnos colubrina* is used medicinally and in Europe it is known as *Lignum colubrinum*. Rheede speaking of this wood, tell that it is called Pao de solor or Pao da cobra by the Portuguese. This species is described in *Hortus Malabaricus* under the name '*Cherukattuvallikanjiram*'. Description about the plant is not found in any of the Ayurveda treatise, but mentioned in the latest lexicons '*Nighantu Adarsha*'. The plant is mentioned under the title '*Kuchilalata*'/ *Karaskaralata* along with a brief botanical description, medicinal uses, and dose & chemical constituents [3].

Corresponding Author:
Anu Mohan
Department of Dravyaguna
Vijnana, Government Ayurveda
College, Thiruvananthapuram,
Kerala, India

3.1 Vernacular Names

- English : Snake wood tree
- Malayalam : Cherukattuvalikanjiram, Modirakanjiram, Motirakanjiram
- Telugu : Kavusukandira, Nagamushti, Tigemushti
- Hindi : Kuchilalata
- Marathi : Kajarvel, Kanel
- Bengal : Kuchilalata
- Bombay : Goagarilakei
- Konkani : Pandri
- French : Arbre aux serpents, Bois de coulevre, Rasine de coulevre
- Portuguese : Pao de cobra

Taxonomy

- Botanical name : *Strychnos colubrina* Linn. Sp
- Synonyms : Lignum colubrinum
- Family : Loganiaceae

Systemic Position : (Takhtajan's system of classification)

- Division : Magnoliophyta
- Class : Magnoliopsida
- Subclass : Asterids
- Order : Gentianales
- Family : Loganiaceae
- Genus : *Strychnos*
- Species : *Colubrina*

Botanical description

3.2 Distribution and habitat of *Strychnos colubrina* Linn. Sp.

Distributed along the West coast tropical evergreen and semi-evergreen forests, West deccan peninsula from Konkan to Cochin. This taxon is known to occur in Western Peninsular India covering parts of Karnataka and Kerala. According to Van Rheede (Hortus Malabaricus), the plant (*Strychnos colubrina* Linn. Sp.) is distributed in Kerala along Alangattu (A place near Kodungalloor, Thrissur district) and North Paravoor, Ernakulam district. It is so far recorded only at Veligonda hills of Nellore district in the entire Eastern Peninsular India. It was first collected by Ramaswamy in

1906 from Veligonda and again it could be recovered in "Flora of Nellore District, Andhra Pradesh". The existence of the plant also recorded in Chittoor District particularly at Kambakkam hills, Ambakkam, Sadhumalammakona, Brahmadevudigundam (Mamandur) [4].

Morphology

Habit: Large woody climbing shrubs.

Stem and bark: Often 7.5cm diameter at the base, wood is of a light brown colour and sometimes covered with a scabrous soft bark which is of a dark brown in colour, porous and hard.

Tendrils: Usually single but sometimes in pairs, circinate, thickened upwards.

Leaves: 7.5 to 11.5 cm, elliptic or elliptic – lanceolate, acute, glabrous, shining, strongly 3 – nerved from the usually narrowed base, petioles 6-10mm, long.

Flowers in small compound axillary puberulous cymes; peduncles very short, pedicels 0-2.5mm long. Calyx 2mm long, puberulous; segments 5, orbicular – oblong; 1mm long with membranous ciliolate margins. Corolla-3mm long, 5 – lobed; lobes 2.5mm, long, oblong, sub-acute, with a dense fringe of hairs about ½ -way down inside. Ovary glabrous below, hairy in the upper part.

Fruits: berry, globose, pulpy, 1.7 cm diameter, orange yellow with crustaceous pericarp.

Seeds: Many seeded or 1-2 seeded 1.3 cm diameter, discoid [5].

Flowering and fruiting time: In May to August

Conservation status: Sporadic [6].

Useful parts: Root, fresh leaves, bark, fruit, seeds

Phyto-constituent: Wood and root bark of the plant contains two potent alkaloids Strychine and Brucine. Its analysis gave 0.96 percent of the alkaloids in the dry wood, and 5.54 percent, in the dry bark [7].



Fig 1: Seeds of *Strychnos colubrina* Linn. Sp.

3.3 Ethno-botany & Medicinal use

The wood is esteemed by the Telinga doctors as an infallible remedy in the bite of venomous serpents. It is given both externally and internally. It is also given in substance for the cure of intermittent fevers. In Java the plant is used in intermittent fevers, as an anti-helminthic, and externally in cutaneous diseases, especially for alleviating the pain and swelling in small pox. In Konkan, the fresh leaves, rubbed

into a paste with the kernel of the cashew nut, are applied to suppurating tumors. The bruised fruit is applied to the head in mania, the root rubbed down with pepper is given to check diarrhea, and boiled with oil it is used as a liniment for pains in the joints. As a tonic, it is given in dyspepsia and malarious cachexia^[8]. An excellent bitter tincture is prepared from its root bark by Malayas. The tincture has purgative qualities. These medicinal uses have been summarized as in Table 1.

Table 1: Ethno-botanical and medicinal uses of various parts of *Strychnos colubrina* Linn.Sp

Locality	Part used	Methods	Medicinal use
Andhra	Stem bark	Decoction and paste (topical)	In snakebite
Java	Root	Tincture (2 -10 drops)	Fever, as a tonic in indigestion, malaria
Konkan	Root	Paste	Diarrhoea, smallpox
Urulanthanni, Ernakulam district	Seeds	Oil prepared with seeds applied externally	Joint pain (arthritic pain)
Konkan	Leaves	With cashew kernel in the form of paste	To suppurate tumours
Konkan	Fruit	Paste (applied externally)	Mental disorders

3.4 Pharmacological activity

3.4.1 Antioxidant and antibacterial study

500g of fine powdered root of *Strychnos colubrina* Linn. Sp. was taken and Soxhleted for 6-8 hrs with solvents based on the increasing polarity using hexane solvent initially followed by Hexane, ethyl acetate, methanol & aqueous to get their soluble parts. Preliminary phytochemical analysis of the hexane, ethyl acetate, methanolic & aqueous crude extracts were carried out to detect the different classes of secondary metabolites in the selected plant materials by adopting standard qualitative methods. Phytochemical screening in qualitative analysis showed the active compounds presence in high concentration, such as flavonoids, steroids, tannins, alkaloids, glycosides, phenols, reducing sugars. Free radical scavenging activity was recorded highest in methanol extracts than ethyl acetate & aqueous root extracts.

Different plant extracts were studied for antibacterial activity against pathogenic bacteria (clinical isolates) using agar well diffusion assay method. Antibacterial activity of solvent extracts was tested against three Gram positive (*C.perfringens*, *B.subtilis*, *S.aureus*) and one Gram negative (*S.typhi*). The effects were compared with Streptomycin as a positive control. In case of anti-bacterial activity of methanol extracts showed more inhibition zones than the ethyl acetate and aqueous root extracts to compare the streptomycin. It may be due to the primary, secondary, tertiary, and quaternary type indole alkaloids as the extracts showed anti-microbial activity^[9].

3.4.2 Anti pyretic study

Anti-pyretic effect of methanolic extract of *Strychnos colubrina* L. Bark by Brewer's Yeast Induced Pyrexia in Albino Rats

Anti-pyretic potential of methanol extract of bark of *Strychnos colubrina* L. was done. The dried bark of *Strychnos colubrina* Linn. Sp. was extracted with methanol. The antipyretic effects of extracts of bark of *Strychnos colubrina* L. were investigated at doses 100 and 250 mg/kg b.w. using yeast induced pyrexia in rats. Most of the antipyretic drugs inhibit COX-2 expression to reduce the elevated body temperature by inhibiting PGE2 biosynthesis. Extracts of *Strychnos colubrina* L. revealed dose dependent significant antipyretic effect at low doses (100, 250 mg/kg), it produced marked antipyretic activity in Brewer's yeast induced febrile rats.

In general, non-steroidal anti-inflammatory drugs produce their antipyretic action through inhibition of prostaglandin

synthetase within the hypothalamus. The present results show that *Strychnos colubrina* L. possesses a significant antipyretic effect in yeast-provoked elevation of body temperature in rats and its effect is comparable to that of paracetamol. The preliminary phytochemical investigation revealed the presence of phenolic compounds in the polar extracts of the plant^[10].

3.4.3 Anti-helminthic activity

Anti-helminthic activity of methanolic extract of *Strychnos colubrina* L. bark

Anti-helminthic activity of methanolic extract of *Strychnos colubrina* bark was performed on adult Indian earthworm *Pherithima posthuma*. The activity was measured with the time taken for paralysis and death of earthworm in drug solution. This study selected three different concentrations such as 100, 250 and 500 mg/ml of methanolic extract of *S. colubrina* bark. Albendazole was used as standard control. Carboxymethylcellulose used as negative control to find out interference of polymer as well as with the drug in the activity. The study revealed the most significant activity at 500mg/ml of the drug extract. The activity may be due to the presence of alkaloidal content of methanolic extract of the drug^[11].

3.4.4 Ethno-botanical studies

Inventory of endemic and threatened flora of three sacred groves in kannur district, northern kerala, India

The study was conducted in three sacred groves which are located in three distinctive regions of Kannur district of Kerala. Data were collected using square quadrats (20 x 20 m size) randomly placed on the forest floor of each selected site. Vegetation structure and floral composition were assessed to invent the plants present there. Ferns, Nonvascular plants, gymnosperms and lianas were mostly observed in these groves. 17 endemic plants including *Strychnos colubrina*, *Myristica malabarica* were identified^[12].

An ethnobotanical survey of plants used by Yanadi tribe of Kavali, Nellore district, Andhra Pradesh, India

An ethnobotanical survey was done among Yanadi tribe of Cheruvukattasangham, Kavali. The survey revealed that 30 plant species belonging to 20 families to treat scorpion sting, snake bite, cold, helminthic diseases etc. *Strychnos colubrina* L. root is used for applying as paste in snake bite. The data should be validated by further clinical trials^[13].

4. Discussion

Herbalism, ethnomedicine and ethnobotany are the core disciplines of traditional medicine. Belonging to Loganiaceae family, the general appearance of the plant resembles that of *Strychnos nux-vomica*. But *Strychnos colubrina* Linn. Sp. is a climbing shrub with a rusty colour bark with small lenticels upon it, instead of being pale and having ovate leaves, unarmed stem like *Strychnos nux-vomica*. The pieces of wood are very much in size, more knotty, crooked & thick than those of *S. nux-vomica*. Parts used are root, bark, fresh leaves, fruits and seeds. Root and wood contain phyto-constituents like Strychnine and Brucine. Unlike *Strychnos nux-vomica*, there is no mentioning about strychnine and brucine content in its seeds. Root bark is applied externally, and at the same time given internally in snake bite. It is also given in intermittent fever, in skin diseases and to alleviate pain and swelling from small pox. Many ethno-botanical surveys reveal its effectiveness in digestive problems, blood pressure and diabetes [14]. Pharmacological activity of root and bark includes anti-oxidant, anti-bacterial, anti-helminthic, anti-pyretic effect.

5. Conclusions

Strychnos colubrina Linn. Sp. is an endemic species of Western Ghats distributed over small areas of Kerala, Tamil Nadu, Karnataka. Although plant is mentioned in many old traditional treatise like *Aushadha Sashyangal*, *Hortus Malabaricus* and *Nighantu Adarsha*, relevant compiled data is missing. Many ethno-botanical surveys have added its medicinal use by many ethnic or tribal groups or local people. Documenting the Indigenous knowledge through ethno-botanical studies is essential for conservation and utilization of biological resources. Only about four percentage of existing plants have been researched on. More researches are needed to validate their uses scientifically.

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