



REVIEW ARTICLE

PHARMACOLOGICAL AND PHYTOCHEMICAL IMPORTANCE OF *STRYCHNOS POTATORUM* LINN. (F.): A REVIEW

Usma Gangwar*, Anita Chowbey

Dept. of Chemistry, Govt. M. L. B. Girls College, Bhopal (M.P.)

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***Correspondence for
Author**

Usma Gangwar

Dept. of Chemistry,
Govt. M. L. B. Girls College,
Bhopal (M.P.)

Email:

minigungwar90@gmail.com

ABSTRACT:

The present review deals with the phytochemical and pharmacological screening of pharmacological importance from *Strychnos potatorum* L., an important medicinal plant. *Strychnos potatorum*, is a herb well known in Ayurvedic treatment of eye diseases, skin diseases, anorexia, diarrhea and renal calculi. An attempt has been made to highlight this medicinal seeds through phytochemical and pharmacological study. This study includes the collective information of different medicinal uses of *Strychnos potatorum*. The data given in review article suggested the detailed information about the various use of *Strychnos potatorum*.

Keywords: Pharmacological, phytochemical, *Strychnos potatorum*.

INTRODUCTION:

Strychnos potatorum Linn.F. is a medicinally important endangered forest tree species which belongs to Loganiaceae and is also known as nirmali and clearing nut tree. *Strychnos potatorum* is a herb well known in Ayurvedic treatment of eye diseases, skin diseases, anorexia, diarrhea and renal calculi.¹

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The plant showed the presence of various important phytochemical constituents which may be responsible for many of the pharmacological activities such as diuretic activity, antidiarrhoeal activity, contraceptive efficacy, hepatoprotectivity, antioxidant activity, antiarthritic activity, antiulcerogenic activity, antinociceptive and antipyretic effects.



Figure 1: *Strychnos potatorum* Linn

Part used: Seed

Botanical classification

Domain: Eukaryote

Kingdom: Plantae

Phylum: Tracheophyta

Class: Magnoliopsida

Order: Gentianales

Family: Loganiaceae

Genus: *Strychnos*

Species: *potatorum*

Botanical name: *Strychnos potatorum* Linn

Classical Names²

Katak, Ambuprasad, Tiktaphala, Gudaphala, Toyaprasadana Phala, Chakshushya, Dantaphala, Dantapushpa, Tiktamaricha

Vernacular Names³

English –Clearing Nut Tree, Hindi – Nelmal, Nirmali, Marathi – Chilbing, Gajara, Niramali, Chilhara Gujarati – Nirmali, Punjabi –Nirmali, Bengali- Nimali, Kannada-Cilu, Cilledabjia. Malyalam – Katakam, Tetta, Tettamparel, Tamil – Akkolam, Ilalam, Tetla.

Chemical constituents

Singha AK, *et al.* isolated alkaloids, flavonoids, lignins, glycosides, phenols, saponins, sterols and tannins. β -sitosterol, oleanolic acid, 3β -acetoxyoleanolic acid, a saponin glycoside, having oleanolic acid as aglycone and D-galactose and n-mannose as sugar moieties from the extracts of roots, stem bark and seeds yielded. B-galactose and n-mannose as free sugar.⁴

Mallikarjuna PB, *et al.* worked on in vitro antimicrobial screening of alkaloid fractions and isolated alkaloids mainly strychnine, diaboline, and four triterpenes viz., isomotioli, sitosterol, stigmasterol and compesterol from the leaves and seeds of *S. potatorum*. Isomotioli was isolated from the leaves, whereas seven alkaloid fractions (PB-I to PB-VII) were isolated from seeds.⁵

Botanical Description^{6,7}

Tree -*Strychnos potatorum* is a medium-sized, glabrous tree of height 12-13 m. Stem is fluted and covered with black, thick, square to rectangular scales.



Figure 2: *Strychnos potatorum* Linn

Bark- Bark is 1.32 cm thick, black or brownish black, corky, with very deep and narrow vertical, thin ridges, which easily break off. Branches are swollen at nodes. **Leaves-** Leaves are about 57.5 cm long, nearly sessile, subcoriaceous, ovate or elliptic, acute, glabrous and shining, spuriously three or five nerved, with lateral nerves springing from the lower part of the mid rib, nearly reaching the tip. The base rounded, acute, petioles 2.5 mm long



Figure 3: leaves of *Strychnos potatorum* Linn

Flowers- flowers large for the genus, in short almost glabrous nearly sessile axillary cymes, peduncles 0.5 mm long and pedicels very short. Calyx-2 mm long, five lobed- lobes 2.5 mm long, oblong, acute with a tuft of hairs inside towards the base of each lobe. Ovary ovoid, glabrous, tapering into a long glabrous style, stigma obscurely two lobed



Figure: flowers of *Strychnos potatorum* Linn

Fruits- Fruit is a berry; black when ripe, globose, 12 cm in diameter, whitish, shining, with short adpressed yellow silky hairs. **Seeds-** Seeds are globose in shape.



Figure 4: seed of *Strychnos potatorum* Linn

Activity of *Strychnos potatorum* Linn

Antimicrobial activity

The antimicrobial activity of alkaloid fractions of *S. potatorum* seeds were proved against some pathogenic gram positive, gram negative and acid-fast bacteria like *Escherichia coli* (clinical isolate), *Klebsiella* sp., *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Salmonella typhimurium*, *Staphylococcus aureus*, *Vibrio cholerae* (clinical isolate), *Mycobacterium tuberculosis* (clinical isolate), *M. tuberculosis* H37Ra, *M. smegmatis*, and fungi (*Aspergillus niger*, *A. fumigatus*, *Candida albicans* and *Microsporum gypseum*) by agar-well diffusion method.⁸

Nephroprotective activity

Ruby V, *et al.* proved by experiments that the alcoholic extract of the plant possesses significant nephroprotective activity in rats. Dose level of 200 mg/kg body weight was found to normalize the raised blood urea, blood protein and serum creatinine levels.⁹

Anti-inflammatory activity

Shanmugapriya E, *et al.*, studied the anti-inflammatory effects of seed powder (100 and 200 mg/kg, p.o) and aqueous extract (100 and 200 mg/kg, p.o) of the plant in carrageenin-induced hind paw edema and cotton pellet granuloma models. Both powder and extract exhibited mild inhibition at 1 hr and maximum inhibition at 2.5 hrs in a dose-dependent manner.¹⁰

Antidiarrhoeal activity

In traditional systems of medicine, *S. potatorum* seeds are used as stomachic, demulcent, emetic and also used in diabetes, diarrhea, gonorrhoea, eye troubles, and liver and kidney complaints.²⁷ On the basis of the traditional use of the plant as a potent antidiarrhoeal agent, experiments were carried out with 90% methanolic extract of *S. potatorum* seeds to verify the folklore claim.¹¹

Antidiabetic activity

Dhasarathan P, *et al.*, evaluated the anti-diabetic activity in the ethanol extract of the plant on blood sugar level, which proved to be effective even at a lower dose (100 mg/kg) in decreasing blood sugar level in alloxan treated rats. The plant extract almost brought down blood glucose level by 50% in diabetic animals.¹²

Used

According to Ayurveda seeds are used in various diseases like Prameha, Netravikar, Mutravaha strotas vicar (urinary problems). Roots cure leukeoderma whereas fruits are useful in eye diseases, thirst, poisoning, and hallucinations. The fruits are emetic, Diaphoretic, etc., According to Unani system of medicine, seeds are bitter, astringent to bowels, aphrodisiac, tonic, diuretic and good for liver, kidney complaints, gonorrhoea, colic, etc.¹³

Traditional uses

Leaf - Pounded leaves are used to treat watering and aching eyes, leaf decoction is taken to treat epilepsy and cough.

Fruit - Pounded fruits are used as fish poison.

Seeds - Seeds are used for the treatment of complaints of the liver, kidneys and stomach and gonorrhoea, leucorrhoea, bronchitis, chronic diarrhoea, strangury, kidney and bladder stones, diabetes and eye diseases. Rubbed seeds are also used to clear muddy water.

Bark - crushed bark is also used as fish poison.

Wood - used to make tool handles.

Roots - Vapor of a root decoction is inhaled to treat venereal diseases, to treat cough and cold. Roots are also used as an aphrodisiac.

Therapeutic uses - Aruci, Krimi, Prameha, Mutrakrcchra, Mutrasmari, Trasna, Sula, Netraroga, Sarkara Meha, Rakta Abhisyanda, Vrscika Visa, Apasmara.

Conclusion:

The *Strychnos potatorum* Linn. is native plant of Indian subcontinent. It is traditional drug which is discussed by about all Nighantus. Preparations of Katak are written by all other granthas like Bhaishyaja Ratnavali, Sharangdhar, Vangasena etc. but more preparations are given in sahasrayoga as it is more used in South India. But overall there is very less literature available about Katak. It is very useful in Netravikar, Mutravikar, Prameha. The pharmacological activities reported in this present review confirm that the therapeutic value of *Strychnos potatorum* is very high having a leading capacity for the development of a new, safe, effective and cheaper drug in future, but more pharmacological investigations, clinical trials and public awareness for the best utilization of its medicinal properties is required. Hence, pharmaceutical companies should also come forward with new concepts and methods towards the best use of this potential medicinal plant.

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