Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol.14, Issue 5s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

"Strychnos Nux-Vomica Linn.: An Incredible Medicinal Plant – An Ayurvedic And Pharmacological Review"

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Cite this paper as: Dabas Ravi, Sweety, Kar A. C (2025) "Strychnos Nux-Vomica Linn.: An Incredible Medicinal Plant – An Ayurvedic And Pharmacological Review" Journal of Neonatal Surgery, 14, (5s) 1051-1062

ACCEPTED 20-02-2025 **PUBLICATION 28-02-2025**

ABSTRACT

In Ayurveda, Strychnos nux-vomica Linn. (SN) is known as Kuchla and is classified under Upavisha (semi-poisonous drugs). Despite its toxic nature, Kuchla occupies an important place in Ayurvedic therapeutics due to its potent medicinal properties when administered after proper purification. Classical Ayurvedic texts describe its judicious use in various disease conditions, highlighting the fundamental Ayurvedic principle that even poisonous substances can act as potent medicines when processed and used appropriately.In the system of homeopathy, Nux vomica is regarded as a highly versatile remedy, often quoted with the saying, "If you do not know what should be prescribed, give Nux vomica," reflecting its wide range of clinical applications. Commonly known as Poison Nut, Strychnos nux-vomica simultaneously exhibits significant therapeutic potential alongside its toxicity. The plant contains important alkaloids such as strychnine and brucine, which are responsible for both its pharmacological actions and toxic effects. These alkaloids are known to possess stimulant, neuroactive, digestive, and immunomodulatory properties and are incorporated into several traditional formulations.Various parts of the plant, including seeds, leaves, fruits, and roots, contain medically useful alkaloids. Among these, the seeds are of prime therapeutic importance and are extensively described in Ayurvedic classics as well as official pharmacopoeias. Ayurveda emphasizes specific pharmaceutical processes such as Śodhana (purification) and Māraṇa, which are essential to detoxify the seeds and reduce their toxic potential before therapeutic use. After proper processing, Kuchla is used in the preparation of several important formulations such as Ekāṅgavīra Rasa, Krimimudgara Rasa, and other Rasashastra preparations.The therapeutic utility of Strychnos nux-vomica is not confined to Ayurveda alone; it has been traditionally employed in other AYUSH systems, including Unani and Homeopathy, for centuries. Clinically, it is indicated in conditions such as chronic rheumatism, malarial fever, loss of libido, neurological disorders (including weakness of limbs), dysentery, and digestive disturbances. Outside medicinal use, it has also been employed as a piscicide and rodenticide, emphasizing its potent bioactivity.The present paper aims to comprehensively review Strychnos nux-vomica Linn. with respect to its therapeutic efficacy, pharmacological actions, toxicity profile, dosage considerations, and safety aspects, based on classical Ayurvedic literature and contemporary scientific evidence..

Keywords: Ayurveda, homeopathy, strychnos nuxvomica Linn. (SN), toxic, medicinal, purification, Piscicide.

1. INTRODUCTION

Strychnos nuxvomica Linn, is a also known by name as nux vomica, bearing mulitple clinical applications and therapeutical effects. S. nuxvomica is cultivated throughout the world in countries like Australia, United States, Taiwan and part of tropical Asia (1). Mainly seeds and bark of nux vomica are known to be used traditionally in various countries.

Presence of highly toxic alkaloids like strychnine due to its toxic properties can be used as toxic posions for domestic animals like dog, cat etc., and for human also. When used in small doses after proper purification it can be used for the preparation

of various ayurvedic formulations and its therapeutic effects are also mentioned in chineses system of medicine (2). S. Nuxvomica main Chemical consistuents are indole alkaloids. The alkaloids like brucine and strychnine, are known to be act as nervous system stimulants. Strychnine is melts at tempeature 275-285 Centigrade. It is white crystalline which is odorless. Strychnine is more effective than alkaloid brucine and it is bitter in taste (3)..

Strychnos nux-vomica showed its medicinal effect against certain disorders e.g. diabetes, asthma, heart and eye diseases, nervous disorders, respiratory diseases in aged person etc., and when consumed in large doses producing titanic convulsions and ultimately leads to death (4,5). Mainly two alkaloids i.e. *brucine* and *strychnine* isolated from the plant and showed therapeutic effects against cancer, inflammation and used for analgesic activities etc. (6,7).

Due to S. nuxvomica limited knowledge regarding its medical usefulness in general public, it is very less seen used for clinical pruposes. Out of 200 species of Nux vomica, 44 species are found in Asian region (8). S. Nuxvomica 5 species are found in Andaman Islands and southern part of India (9). SN is comerically being Cultivated in countries like Australia, USA, Taiwan and in Tropical area of asia (10). Multiple parts of SN conatining verious alkaloids which are known to therapeutic effects but seeds is mainly mentioned in Ayurvedic Pharmacopeia of India. In the Pharmacopeia texts purified forms of seeds are advised for the clinical conditions like Facial paralysis, Impotence (11). Snake bite, Interemittent fever are being sucessfully treated by using root part of SN. Wound healing effects in chronic wounds and ulcers seen when Paultice applied made up of leaves of SN, whereas Cholera, intermittent fever subsiding properties in root bark part of S. nuxvomica (12). Fruit of SN advised for the treatment of infections of palms and foot (13). SN seeds also advocated for digestive issues, loss of appetite (14). S. Nux vomica also mentioned for diseases of respirtaory systems like asthma, bronchitis, emphysema, malaria, epilepsy, constipation, Rhematism, Spermatorrhoea (15). It has also beem used as Avicide and rotendicide (16), Piscicide (17).

Botanical classification *S. nux-vomica* Linn (18) **- [Table no.-1]**

S.Nuxvomica belongs to strychnos genus, its family is Loganiaceae, Order-Gentianales, Kingdom is Plantae, Division is Magnoliophyta

Common names- Kuchila, dog buttons (19).

Sanskrita name- *Kupilu, visamusti, visatinduka, kakatinduka, kakapiluka, karaskara*

Vernacular names (20)- [Table no.-2]

Kuchla kajra	Hindi
Kuchila	Bengla
Kajarakar	Mar.
Kachila	Orissa
Jherakochala, Zerkochala	Gujarati
Nanjina, Kasa Kana	Kan.
Kaboung	Burm.
Yettikottai	Tamil
Musthtivittulu	Telugu
Kajjola	Mal.
Ajaraki, Habbul gurachu, Habbul gurav	Arabic
Kucula, Phulusemahi	Pers.
Nuxvomica	English

Classical Categorization (21) **[Table no.-3]**

Charaka Samhita	Not mentioned in any gana
Sushrut Samhita	Sursadi, phala visha
Dhanwantari Nighantu	Amradi varga
Madanpal Nighantu	Phaladi varga
Kaiyadev Nighantu	Aushadhi varga
Raj Nighantu	Amradi varga
Bhavaprakash Nighantu	Amradiphala varga
Rasatarangini	Sthavara vanaspatika visha upavisha

Botany

Strychnous nux-vomica is a medium in size, white wood which is dense and close grained. Its

branches are shiny dark green and irregular in shape and externally branches are covered with smooth ash coloured bark. Trunk is covered cylindrical, it is thick as well as tall and apperance is yellowish grey as well as dark grey (22). Leaves are short stalked broad, base rounded to cordate, simple and entire. its has acute glaborus and above shiny, little hairs on veins underneath from the base (22)

Nux Vomica Seeds (Courtesy- Rajesh bardale, Bardale Rajesh, Publisher- JP Brothers, Book on topic Principles of FM and Toxicology (2nd Edition:2017), Jaypee Brothers Medical Publisher)

Plant of S. Nuxvomica (Courtesy- Alamy stock photo)

Toxic parts of plant

Involving Root, stem, Bark, Seeds, fruits and leaves. After proper *Shodana* (Purification) above plant toxic parts can be used for multiple clinical purposes. Purified seeds can be benifical in spermatorhoea, vomiting (23). When Nux-Vomica seeds are known to be used as aphrodisiac when cutting into pieces and taken with betel leaves (24). Seeds provides oil as well as dye which is used to gives brown colour to cottons of fabrics and its oil is very helpful in rheumatism when used externally (25).

Pharmacodynamics- [Table no.-4] (26)

Rasa	***Tikta-Katu- Kashaya***
Guna	***Laghu- ruksha-tikshna***
Dosa	***Vata- Kapha Samaka effects***
Vipaka	***Katu***
Virya	***Ushna***

Some Authors explained Unripe fruits are having *Madhura rasa*, *Guru* and *Vishada Guna* and *sheeta Virya (27)*

Ayurvedic Formuations-

Agnitundi vat (28), *visatinduka taila* (29,30,31,1), *visamusti vati yoga, navajivana rasa, krimimudgara rasa* (32), *ekang veer ras* and *sulaharana yoga* (33), Kupilubeejadi kwatha (34), Kitmarda rasa (35), *Krimighatini gutika* (36), Mahavisagarbha tailam (37), Visatindukadilepa (38).

Chemical composition of *S. nux-vomica* Linn- [Table no.-5]

Phytochemicals constituents of S. Nux vomica Plant	
Leaves	Strychnine-Brucine. α and β- Colubrine. Vomicine, N-methyl pseudostrychnine. Kaempferol-7-glucoside, 7- Hydroxy coumarin. Quercetin-3-rhamnoside (39).

Stem Bark	Brucine- Strychnine, Mavacurine. α and β- Colubrine. Loganin. Longicaudatine. Strychnochrysine. Vomicine. Strychnoflavine Demethoxyguiaflavine, Fatty acids & Sucrose (40).
Root	C-mavacurine and Strychnochrysine (41)
Flower	Strychnine Brucine Vomicine and Novacine (42)
Fruit	Strychnine-Colubrine-Brucine, Pseudobrucine Strychnine N-oxide Brucine N-oxide Glycosides- Salidroaide & Cuchiloside (43).
Seeds	Strychnine-Brucine, Brucine-N-oxide Strychnine-*N*-oxide Loganic acid; 4-N-hydroxymethyl strychnidin-17- acetic acid, 10, 11-dimethoxy-4-N-hydroxymethyl strychnidin-17-acetic acid; Stryvomicine Stryvomitine, chloromethochloride, ß-colubrinechloromethochloride, α-colubrine-chloromethochloride; Pseudostrychnine, Pseudobrucine, Secoxyloganin, Caffeic acid, Catechol, Maltol, Adenosine; N-oxide, 2 hydroxy–3-methoxy strychnine (44,45)

Mechanism of action (46)

Mechanism of action of *S. Nuxvomica* initiated when *strychnine* start antagonizes the inhibitory neurotransmitter effects of *glycine* at the level of postsynaptic receptors. These receptors are present in abundance in the brain stem as well as in spinal cord, they played major part in controlling of motor functions. When Strychnine blocked the inhibitory neurotransmitter which causes increased neural excitability and stimuli which is sensory in nature will results into exaggerated reflex leads to strong contractions of muscles. As glycine receptors found to be in brains parts sauch as in hippocampus, nigra as well as in substantia nigra are mainly insensitive to strychnine, this is the reason S. Nux vomica effects are predominately spinal in origion.

Absorption, Metabolism and Excretion-

Strychinine is not absorbed through skin, but is known to be mainly absorbed through Nasal mucosa and Gastrointestinal mucosa. Strychnine mainly metabolized through liver. When its dose is non-fatal, it is mainly exerted through kidneys with a half life at around 10-16 hours and little traces found in milk, saliva and in bile.

Clinical features (47,48)-

If SN seeds are taken orally without crushing out, its hard pericarp covering resist and that causes seeds passed in feces without causing any poisnous effects. When anyone takes seeds in crushed form in this condition, symptoms will be seen

only after 15 minutes. It is bitter in taste. SN causes symotoms like anxiety, uneasiness ect. it will also causes difficulty in swallowing as well as in breathing. After involvement of Nervous system muscle spasm ocuured which followed by convulsions (49).

Prognosis-

Patients who ingested SN will form hypoxia, rahbdomyolysis, and also followed by lactic acidosis and hypothermia.

Cause of death

Death in S.Nuxvomica occured due to invlovement of nervous system that causes inhibitory effects on neurotramsmitter that leads to hypoixa turned medullary paralysis. Nervous system involvements leads to respioratory failure beacuse of respiratory muscles spasm.

Differential Diagnosis-

There are many conditions which can be mimic with symptoms as of SN like menigitis, hysteria, tetanus, cocaine intoxication as well as rabies, therefore one need to be sure regarding any history of taking S.Nuxvomica for differntial diagnosis.

Fatal dose

If person a ingested one crush seed, which is equal to 30 grains can cause death. The minimum dose of strychinine which is 30- 120 mg when taken orally can be lethal and in case of children 15 mg taken orally proved to be lethal (50). Lethal dose of Strychnine caused Cardiac arrest and Convulsion by paralysis of central nervous system (51). Brucine lethal dose cause acute renal failure (52).

Fatal period-

1 to 2 hours

Treatment- (53,54)

Patient need to be stabilized in a peaceful/calm environemnt. .

Emesis should be avoided

Activated charcoal should be administered.

Convulsions may be treated by using lorazepam or diazepam.

Symptomatic treatment.

Autopsy findings-

In Autospy finding earliest sign is Rogor mortis which disappears very soon. Convulsions induced Caloricity also seen at the time of postmortem. Froth can be seen at mouth, Hemorrhagic areas be seen on serosal surface.Spinal cord is congested. Organs are congested.

Medicolegal Importance-

Accidental poisoning.

Homicidal poisoning is rare.

Used in cattle poisoning.

Used as abortificient.

Used as tribal arrow poison to kill dogs (55)

Purification methods of *S. nux-vomica* (56) [Table no.-6]

Systems of medicine	**Method of Detoxification**
Ayurvedic medicine	First cow's ghrita should be fried until it turned into browinsh colour. After that above ghee covered with cotton cloth and put into a vessels containing boiling milk (cow's) for about 3 hours. Then placed S. Nuxvomica seeds in cow's urine for 7 days. Then these seeds placed in *Kanji which is aslo known as*

	sour gruel. After that parching in sand for 3 minutes at 40°C.

Pharmacological Property of *S. nux-vomica-*

Anti-alcoholic- Nux vomica extracts dilutions like 30C, 200C and 1000C showed anti alcoholic effect when experimented in mice (57,58,59,60).

Hepatoprotective- In a study loganin was showed excellent hepatoprotective effect and anticholestatic activity (61,62)

Anticancerous- SN roots extracts showed anti proliferative properties in human multiple myelome cells (63**).**

Antioxidant- In a study the effective role of flowers and seeds of S. Nuxvomica when taken as methanolic extract showed antioxidant property by decreasing Lipid peroxidation and leads to increases antioxidant activity (64).

Anti-diabetic-

Nuxvomica seed methanolic extract shown to reduced the level of blood sugar. It also showed anti diabetic effect by inhibition the non enzymatic gylcosylation of Hb and alpha amylase activity (65).

Analgesic and anti-inflammatory- Nux vomica seeds used for preparation of multiple Ayurvedic formulations for shown to be effective in the treatment of Rheumatic arthritis, pain and inflammation. Alkaloids of SN such as Brucine, Strychnine were found to be having anti-inflammatory property. Brucine alkaloids found to be very effective in inflammation (66).

Antisnake venom activity- Seeds extract of S. nuxvomica found to be effective against anti snake venom (67).

Indications (68)

It is used in *Kushta* (skin disease), *Amavata* (rheumatoid arthritis), *Sandhivata* (osteoarthritis), *Krimi* (worm infestation), *Swasa* (asthma), *kasa* (cough), *gulma* (abdominal lump), *aruchi* (anorexia), *visuchika* (cholera), *arsha* (piles), *kapha roga* (diseases of cold), *vrana* (wound), *dhwajabhanga* (erectile dysfunctions), kamp (tremor), *badhirya* (deafness), *ardita* (facial paralysis), *pakshaghata* (hemipplegia), *anidra* (insomnia), *raktavikara* (deseases related to impure blood), *vatarakta* (gout), *vishamajwara* (intermittent fever).

Contraindications-(69)

It is contraindicated in case of pregnancy and female doing breast feeding and in contact dermatitis. As per the Drug and Cosmetic Act, the medicine containing nux vomica should taken only under strict medical supervision.

2. DISCUSSION

In Ayurveda it is mentioned that each and every drug has therapetic effects even a poisnous drug when use and adminstered properly acts as a poison when used differently (70). In our ancient science *Ayurveda Kupilu* described under *Upvisha Varga* (71). Upvishas are those drugs which are less lethal and produce specific toxic effects when adminsitered (72). Therapeutic effects of *Upavishasa* drugs like *kupilu* can be seen only after proper Purification (*Sodhana)* as systemically mentioned in Ayurveda (73). Drugs comes mentioned under *upvishas* have known to be used in formulations of many Ayurvedic drugs used in the treatments of various Ayurvedic diseases (74). There are variuos *Sanskaras* (process) like *Shodana* and *Marana* whose ultimate goal to detoxification of drug as well as increase bilological effects of Nux Vomica by which poisnous drugs effects can be turned into lifesaving one (75).

In Ayurvedic literature like *Rasatarangini*, three process of purification of *Kuchla* mentioned in first process dried kuchla seeds were taken in *which* is also known as sour gruel and after passing of three days these seeds outer covering is pelled off and made them dried in sun and then churned into powdered (76). Second method is used in case of when fast purification of kuchala is required. In this method matured seeds are taken and mix with ghee and heated it until turn into brownish colour in apperance then its outer cover is separated (77). In Third method, dried kuchala were tied in pottali and placed in cow mil filled Dolayantra then heated for 3 hours and outer skin is removed and turned into powdered form by using *kharal* (mortar) (78)

In muticentre study of nuxvomica potencies were found effective in relieving sinustis (79).

Anti Allergic effects was demonstrated in vivo study in which nux vomica extract was found to reduced IgE in the esperiment done on mice.

Aqueous stem extract of nux vomica reduced the induction of specific IgE antibody in mice (80). In one multi- centre open clinical trial conducted by Nayak et al, nux vomica dilution was used in the case of acute rhinitis its usefulness in the treatment of acute rhinitis established (81). In Animal experiments of Nux Vomica Anti diabetic activity (82),

Hepatoprotective (83) were seen.

Kuchala after going through proper purification methods as mentioned in ayurveda. It is used in preparation of Mnay Ayurvedic formulation like *Maha Vishagarbha Taila* which is known indicated for Vata vadhi, Sciatica etc (84). *Ekangarvia Rasa* in which *Kuchla* is main ingredients which is used for *Pakshaghata* etc. (85). *Vishatindula Vati* mentioned in *Rasa tantra sara* its main content is kuchala which is indicated for Opium addiction (86). *Krimimudgara Rasa* used as digestive and ascariasis diseases (87). *Navjeevan Rasa* indicated for *Varna Shodana (*Wound healing) (88).

Kupilu along with *Navasadara* and *Hingu* when mix by rubbing lemon juice and pills were made which used in loss of appetite and in indigestion(89), this combination is used for *Viscucika* (Cholera) (90). When *Sudha Kuchala* mix with *maricha* which is equal amount as of *kuchla* as well as with with Indrayava (*Holarrhena antidysenterica* seeds) and pills wered made which will hels in constipation and fever (91). Tripathi et al reported antioxidant property of NV (92). Nux vomica extract is known to be useful in insomania by lowering serum cortisol levels (93). It was also seen that Nux vomica seed extract useful in muscular rigidity caused by morphine. (94). Nuxvomica Antipyretic activity was seen in rat by Eldashan et al study (95). Anti inflammatory effects of prified seed is seen rats (96). Antimicrobial activity of extract of bark of Nux Vomica seen against bracterials strains like *Staphylococcus aureus* etc. and *Escherichia coli (97).* Leaves extract were like seen active against microbes like *Vibrio cholera*, *E. coli* (98), (99), (100). *)Nux Vomica* noted to be beneficial gainst *H. Plyori* and established its gastroprotective effects (101).

3. CONCLUSION

In this paper we tried to analyze the therapeutic efficacy of Strychnus Nuxvomica, before the shodana (process) poisnous and toxicological effects and after purification clinical significance were understood. S.nuxvomica is used in the preparation of various Ayurvedic formulations after done ayuvrda mentioned Purification methods (*Shodhana and marana*). More analysis on phyto chemicals constituents as well as clinical studies of Nuxvomica to be done to established its real potency.

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