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## A review: *Neeli*: An integral drug in the management of *Visha*

Divya KM, Shanti R Nair, Rukma CK and Ittoop J Ancheril

#### Abstract

*Neeli* or Indian indigo is an Ayurvedic herb used in the management of *visha* (poison) and its related conditions. Many references regarding the *visha hara* (anti-toxic) property of the drug is available in the classics. It forms the ingredient of various *Agada yogas* (formulations for the treatment of poison and toxic conditions) and other commonly practiced formulations. In addition to the *brihat trayis* (three main treatise in Ayurveda classics), the drug is frequently mentioned in *Keraleeya visha chikitsa granthas* (Classic books followed in Kerala for the treatment of poisonous conditions) like *Prayogasammucchayam*, *Kriyakaoumudi*, *Kodasherymargam* etc which highlights its potency and the important role played by *Neeli* even in the management of high potent poisons like *mandali visha* (viper bite). Proper evaluation of the drug and its properties with genuine research studies may help practitioners of *Agadatantra* to tackle the innumerable ailments arising due to exposure to various toxins, seen in the present era, with a better and cost effective treatment. In this article, an attempt is made to throw light on the significance of the anti toxic property of the drug *Neeli* and its potency in treating various poisonous conditions including snake bites.

**Keywords:** Agadatantra, *Neeli*, *Indigofera tinctoria*, *visha*, *mandali*, *lootha*, *Keraleeya Visha chikitsa*

#### Introduction

*Neeli/ Neelini* known by the botanical name *Indigofera tinctoria* is an ayurvedic herb widely used in the management of various ailments especially in the treatment of *visha* (poison). The plant is commonly called as Indian Indigo as it was used for the extraction of dye to color cloths. Hailing from Fabaceae family, the plant is identified as a branching shrub growing upto 2 m high, possessing leaves with 7-13 leaflets which are green when fresh and turns greenish black on drying. The tender branches are bluish red in colour and the flowers are many in nearly sessile lax spicate racemes which are much shorter than the leaves, Flowers are red or pink in colour and the fruits are cylindric pods, which are pale greenish grey when young and turns dark brown on ripening and contains 10 -1 2 seeds <sup>[1]</sup>.

**Distribution:** Throughout India, mainly as an escape from cultivation. It may be an annual biennial, or perennial depending on the climate in which it is grown <sup>[1]</sup>.

**Parts used:** whole plant.

**Properties and uses:** The roots, stems and leaves are bitter, thermogenic, laxative, trichogenous, expectorant, anthelmintic, tonic and diuretics, and are useful for promoting the growth of hair and in gastropathy, splenomegaly, cephalalgia, cardiopathy, chronic bronchitis, asthma, ulcers and skin diseases. The juice expressed from the leaves is useful in the treatment of hydrophobia. An extract of the plant is good for epilepsy and neuropathy. The plant possesses anti – toxic property <sup>[1]</sup>.

#### Properties & action of root of *Indigofera tinctoria*: <sup>[2]</sup>

- Macroscopic:** Tap root having lateral roots with pale yellow to light yellowish brown colour. The roots are hard, woody, cylindrical, nearly smooth except for a few having scattered lenticels. The odour is not distinct and has a slightly bitter taste.
- Microscopic:** Roots show a narrow zone of cork, consisting of 4 – 10 layers of tangentially elongated, rectangular, thin – walled cells with lenticels. It has a narrow zone of secondary cortex consisting of rectangular to polygonal, thin – walled cells containing rhomboidal to hexagonal crystals of calcium oxalate. There are groups of fibres and secondary phloem which compose of usual elements. The secondary xylem consists of xylem parenchyma, vessels, fibres and rays. Fibres are large aseptate with pointed end and vessels are solitary or 2-4 in groups having simple pits.

The medullary ray is 1-4 cells wide and prismatic crystals of calcium oxalate is present in the secondary cortex, phloem, xylem parenchyma and rays. There are oil globules present in the cortex and phloem parenchyma. Starch grains are simple and round to oval in shape and are present in the cortex, phloem, xylem parenchyma and rays.

#### T.L.C [2].

T.L.C of alcoholic extract of the drug on Silica gel 'GF 254 + Silica gel 'G' (1.3 w/w) plate using Chloroform: Ethylacetate (6:4) show under U.V. (366 nm) ten fluorescent zones at Rf. 0.14 (blue), 0.30 (bluish green), 0.40 (blue) 0.47 (blue), 0.58 (blue), 0.63 (bluish green), 0.75 (blue), 0.81 (blue), 0.86 (green) and 0.91 (blue). On exposure to Iodine vapour, thirteen spots appear at Rf. 0.06, 0.10, 0.14, 0.27, 0.33, 0.40, 0.50, 0.58, 0.63, 0.75, 0.80, 0.86 and 0.91 (all yellow). On spraying with 5% Methanolic Sulphuric acid reagent and heating the plate at 110 °C for 10 minutes fourteen spots appear at Rf. 0.06, 0.10, 0.14, 0.21, 0.27, 0.33, 0.40, 0.50, 0.58, 0.63, 0.75, 0.81, 0.86, and 0.91 (all grey).

**Main constituents:** Glycoside (Indican) [2].

Classics	Classified under :
<i>Charaka samhita</i>	<i>Virechana gana in Apamarga tanduleeyam adhyayam Of Sutra sthana</i> [3]
<i>Kaiyadeva Nighantu</i>	<i>Oushadi varga.</i> [4]
<i>Bhavaprakasha Nighantu</i>	<i>Guluchyadi varga</i> [5]
<i>Dhanwantari Nighantu</i>	<i>Guluchyadi varga.</i> [6]
<i>Raja Nighantu</i>	<i>Shatahvadi varga.</i> [7]

Synonyms by different *nighantukaras* [1].

<i>Sivadatta Nighantu</i>	<i>Bhavaprakasa Nighantu</i>	<i>Raja Nighantu</i>	
		<i>Neela</i>	
	<i>Neelini</i>	<i>Neelini</i>	<i>Neelapushpa</i>
	<i>Tooli</i>	<i>Tutha</i>	<i>Sreephala</i>
	<i>Kaalaadola</i>	<i>Raajni</i>	<i>Bhaaravahi</i>
<i>Neelika</i>	<i>Neelika</i>	<i>Neelika</i>	<i>Vyanjana- kesi</i>
<i>Neela patra</i>	<i>Ranjani</i>	<i>Kaali</i>	<i>Mahaphala</i>
<i>Sarapun-ga dala</i>	<i>Sreephali</i>	<i>Syama</i>	<i>Neelakesi</i>
<i>Bahu shimba</i>	<i>Tutha</i>	<i>Shodhani</i>	<i>Chaaratika</i>
<i>Kalika</i>	<i>Grameena</i>	<i>Gramya</i>	<i>Gandapushpa</i>
<i>Ranga patri</i>	<i>Madhuparnika</i>	<i>Bheda</i>	<i>Syamalika</i>
<i>Ranjani</i>	<i>Kleetaka</i>	<i>Mocha</i>	<i>Rangapatri</i>
	<i>Kaala kesi</i>	<i>Krishna</i>	<i>Mahabala</i>
	<i>Neela pushpa</i>	<i>Ranjani</i>	<i>Sthira ranga</i>
		<i>Asita</i>	<i>Rangapushpi</i>
		<i>Kleetani</i>	

Properties of neeli according to different *nighatukaras* [1]

Classics	M.N	B.P	D.N	R.N	So.N	K.N	N.R
<b>Rasa</b> (taste)		<i>Tikta</i> (bitter)	<i>Tikta</i>	<i>Katu</i> (pungent) <i>Tikta</i>		<i>Tikta</i>	<i>Katu</i> <i>Tikta</i>
<b>Guna</b> (property)		<i>Usna</i> (hot)	<i>Usna</i>	<i>Usna</i>	<i>Saram</i> (laxative)	<i>Saram</i>	<i>Usna</i> <i>Sara</i>
<b>Veerya</b> (potency)		<i>Usna</i>	<i>Usna</i>	<i>Usna</i>		<i>Usna</i>	
<b>Vipaka</b> (post - digestive taste)						<i>Katu</i>	
<b>Karma</b> (action)	<i>Bhedini</i> (purgative) <i>Sleshma</i> <i>anilapaha</i> (mitigates kapha and vata)	<i>Rechani</i> (induces drastic purgation) <i>Keshya</i> (good for hair growth) <i>Moha</i> (disease of mind) <i>Bramapaha</i> (mitigates giddiness)	<i>Kati vata</i> <i>kaphapaha</i> <i>Mitigates vata</i> <i>localized in lumbar region &amp; kapha</i> <i>Keshya</i>	<i>Keshya</i> <i>Kaphanuth</i> (mitigates kapha)	<i>Keshya</i>	<i>Brama moha krit</i> (induces giddiness and delusions) <i>Kapha</i> <i>anilahara</i> <i>Keshya</i>	<i>Keshya</i> <i>Kapham jayeth</i> (mitigates diseases caused by kapha)

#### Rasa panchaka of Neeli moola [2].

*Rasa* : *Katu, Tikta*  
*Guna* : *Sara*  
*Virya* : *Usna*  
*Vipaka* : *Katu*  
*Karma* : *Kapha vata hara, Kesya, Rechani., Bhrama Mohahara.*

**Therapeutic uses:** *Gulma, Kasa, Pliharoga, Udavarta, Udararoga, Vatarakta, Vishavikara, Amavata, Krimiroga* [2]

**Dose of Root:** 48 gm of drug for decoction [2].

A glance into the classics in the field of *Agadatantra* will reveal the administration of different parts of the plant, either alone or in combinations, to manage wide range of toxic conditions

#### Classification according to various ayurvedic texts:

The drug has been mentioned by *brihat trayis* and *nighantukaras* and *vishaharatwa* has been quoted as one of its cardinal property [1].

#### Classification by various classics

		<i>Hanti kapha anilan</i> (mitigates kapha and vata)					
Classics	M.N	B.P	D.N	R.N	SO.N	K.N	N.R
<b>Roga karma</b> (curing action on different ailments)	<i>Pleeha udavartha nashini</i> (mitigates splenic disorders & reverse movement of vata dosha)	<i>Hanti udara</i> (mitigates abdominal disorders) <i>Pleeha Vatarakta</i> <i>Amavata</i> (joint disorders) <i>Udavartha madam</i> (intoxication)	<i>Udaram hanti Vataasrik</i> (vatarakta) <i>Krimi nasani</i> (removes parasites & microorganism)	<i>Kasanuth</i> (cures cough) <i>Udaravyadhi Gulma</i> (abdominal disorders) <i>Jantu</i> (microorganism) <i>Jwarapaha</i> (alleviates fever)	<i>Siro Rogam</i> (diseases pertaining to head) <i>Vrana</i> (ulcers) <i>Kusta-paha</i> (alleviates skin disorders)	<i>Pleha udarapaha Vatarakta Udavartha Amavatha gadam hareth</i>	<i>Vyanga</i> (facial melanosis) <i>Sleshmodara</i> (abdominal disorder caused by kapha) <i>Moha</i> <i>Hridroga cha bramam</i> (cardiac disorders & giddiness) <i>Vatarakta Udavartha Amavatha Madam kasam Vata gulma Jwaram Kushtam Krimi Udaram Pleeha cha Vinashayeth</i>
<b>Vishagna karma</b> (anti toxic action)	<i>Bhoota Sammohahari Gara doshagni</i> (various diseases with psychological involvement)	<i>Hanti vishamuddhatam</i> (mitigates potent poisons)	<i>Visham hanti</i> (removes poison)	<i>Vishapaha</i> (mitigates poison)		<i>Vishapaha</i>	<i>Visham cha amam vinashayeth</i> (destroys visha & aama )

Different from the above *nighantu* references, the text *Hridaya priya* claims the drug to be, *vata pitta hara* (mitigates *vata* and *pitta*) and *kandu vrana vinashini* (relieves itching and cures ulcers) [11].

*Neeli* has a wide range of therapeutic indications. Some of which include, external application in *palitha* (premature greying of hair) due to its *keshya* and *kesharanjaka* property (helps in hair growth and induces good colour to hair).

Internal intake of the root with *aja ksheera* (goat's milk) to mitigate *mutra krricha* (dysuria) as explained in *Vaidya manorama* [1].

#### Few references regarding *neeli* in *visha chikitsa*

*Susruta acharya* has mentioned the intake of '*sa sarpishkam niliniphalam*' (intake along with ghee) to induce *virechana* (purgation) in the management of *pakswasaya gata visha* (*visha* located in lower Gastro Intestinal Tract) [8].

*Raja marthanda* has indicated the intake of *neeli moolam* (root of *Neeli*) grinded in *tandula jalam* (prepared by soaking pounded rice grains in water) for the management of *mandali visha* (viper bite). [1] A similar reference, regarding the intake of *neeli moola kalka* in warm water along with its application at the *damsha sthana* (bite site) of *mandala* (viper), is available in *Prayoga sammucchayam*, a *keraleeya visha chikitsa grantha* (Classic text books followed in Kerala for the treatment of poisonous conditions) [9].

External application and internal administration of the roots of *Nimba* (*Azadirachta indica*), *Neeli* and *Karanja* (*Pongamia pinnata*) is said to have the power for quick mitigation of *visha* [10]. They are considered as the Trinity in the treatment of *Visha* by *visha vaidyas* (Traditional Ayurvedic toxicologists of Kerala).

Quite different from the other classics, *Prayogasammucchayam* explains 16 types of *mandali* and its treatment. *Neeli* has been mentioned for the treatment of *kumbha mandali* and *rakta mandali* (two varieties of viper snake) [11-12].

Internal and external use of *Neeli moola* along with *Shireesha*

*moola* (root of *Albizia lebbek*) grinded in their *patra swarasa* (juice extracted from leaves) helps in fast relief from *lootha visha* (spider bite poison) [13]. *Dhara* (An external therapy in which the prepared medicine is continuously poured on the affected part) and *pana* (intake) of *Sariba* (*Hemidesmus indicus*) and *Neeli moola kwadhitha jala* (water boiled with the above mentioned two drugs) is indicated in case of *loota visha*. [13] Intake of *ghrita* (ghee) processed in *Neeli patra swarasa* along with *Tulasi swarasa* (juice of *Ocimum sanctum*), *Nirgundi swarasa* (juice of *Vitex negundo*) and certain other drugs is also indicated in *loota visha*. The same yoga is advised to be processed in coconut oil for external application which is available in the market under the name *Neelidaladi keram* [14]. Application of *Neeli dala* (leaves of *Neeli*), made into *kalka* (paste) in milk, over the abdomen has been explained by acharyas as one of the earliest method of diagnosis of the site of *Garavisha* (A condition of latent poisoning) [15-16]. The site where the paste does not dry is considered to be the site of *visha*. References regarding the usage of *Neeli moola* (Root of *Neeli*) for treating *Manushya visha* (human poison) and lizard poisoning are available in *Sahasrayoga* [17-18].

*Kodasseri margam*, a unique *keraleeya visha chikitsa grantha* has indicated the intake of *Neeli moola* in the *swarasa* (juice) of *Dronapushpi* (*Leucas aspera*) for the management cobra bite venom along with other drugs [19]. References regarding *Thala* (treatment in which Application of medicinal paste on the vertex of head is done) and *lehya yogas* (lickable formulations) containing *Neeli* for the treatment of *visha atura* (A person afflicted with poison) is also available in the text [20].

Traditional *visha vaidyas* of Kerala use *Neeli* as an extra addition to classical *yogas* to yields better results. Similarly, *Neeli patra swarasa* (leaf juice of *Neeli* is used for grinding certain *Agada yogas* in which *bhavana dravya* (Medium for grinding the drugs in a formulation) is not specified by *acharyas* (eminent scholars), in order to enhance its potency. In the context of *pratyoushdha prayoga* (antidote), *pana* (intake) and *vilepana* (external application) of *Neeli* is considered to be effective as a *samanya pratyoushdha dravya*

(general antidote) against *nana visha* (various toxic conditions) [21].

### Yogas

Though it forms the ingredient of many formulations used commonly in clinical practice such as, *Aravindasavam*, *Neelibhringadi tailam*, *Neelimoooladi gutika*, *Gorochanadi gutika*, *Chemparathyadi keram*, *Triphladi tailam*, *Mahapanchagavya ghritam* etc, for the management of a wide range of diseases, the presence of drug *Neeli* in *Agadayogas* cannot be left unnoticed.

### Few commonly practised *Agadayogas* with *Neeli* as an ingredient

- 1) ***Vishavilwadi Gutika*** mentioned in *Kriyakaumudi* [22] contains *Neeli moola* as an ingredient in addition to the *Vilwadi gutika*, *Patha* (*Cyclea peltata*) and *Eswaramooli* (*Aristolochia indica*). The yoga is said to have the same *phala sruthi* (therapeutic results) as that of *Vilwadi gutika* but is considered to be more potent than the latter.
- 2) ***Neelithulasyadi Kashayam*** explained in *Prayogasammuchyam* which is indicated for *lootha visha* [14].
- 3) ***Kottamramachadi Choorna***, a *lepa yoga* advised to be applied in milk, mentioned in *lootha samanya chikitsa* (general treatment line for spider bite) in *Prayoga samuchchayam* [13], contains *Neelimooola* as one of its four ingredients.
- 4) ***Neelimoooladi Lehyam*** explained in *Kriyakoumudi*, is indicated for *sarva visha samanam* (useful in all kinds of toxic conditions) [23].
- 5) ***Neelikaranjadi Kashayam*** indicated for *akhu visha* (Rat poison) has been mentioned in *Prayoga samuchchayam* [24].
- 6) ***Kaivishaparihari Gutika*** which is used to remove 'kaivisha' (Administered poison in traditional black magic) has been explained in *Kriyakaumudi* [25].
- 7) ***Neelini Ghritam***, a single drug *ghritha* preparation using *Neeli moola* and *patra swasara* as *dravadravya* (liquid medium used in medicinal ghee preparation) and *Neelimooola as kalka dravya* (paste), explained as a *sthavara jangama samanya chikitsa oushadha* (general medicine used in both animate and inanimate poisoning) [26].

Apart from these, various other *yogas* (formulations) prepared from *Neeli* such as *Neelipatradi lehyam*, *Neelikadi lehyam*, *Neelikadi ghritam*, *Neeli ghritam*, *Amari mooladi ghritam* has been mentioned for various toxic conditions under the *Lehatailadi prayoga adhikaram* of *Jyotsnika* - a *Keraleeya visha chikitsa grantha* [27].

### Research studies done on *Indigofera tinctoria*:

Not many research studies have been conducted on this plant. The few studies did, show the following:

1. A phytopharmacological research study shows that the plant possesses anti-toxic property along with anti-hyperglycemic, anti-bacterial, anti-oxidant, anti-inflammatory, anti-diabetic activity and also acts as an anticonvulsive agent [28].
2. An animal study conducted with the aqueous extract of *Indigofera tinctoria* (250, 500 mg/kg b.wt) reported that the histopathological changes in the liver showed antihepatotoxic efficacies against paracetamol induced liver damage in rats [29].
3. Significant nephroprotective activity was detected in

cisplatin induced renal damage in wistar albino rats. A dose of 500 mg/kg of water decoction of leaves of *Indigofera tinctoria* was induced for the same, where remarkable changes were noted in RFT and body weight [30].

### Discussion

Though various references regarding the properties of the drug is available in the classics, most acharyas opines that the plant possess *tikta rasa* (bitter taste), *laghu ruksha guna* (light to digest and dry in nature), *katu vipaka* (becomes pungent after digestion) *usna virya* (hot in potency) and is *kapha vata shamana* (*alleviates kapha and vata*). *Visha* is said to be attributed with *avyaktarasa* (undefined taste) [31] *dosa pradhanya* as *vata-pittothara* (predominant with *vata* and *pitta dosha*) [32], *laghu ruksha guna* and *usna virya* [31]. Though it is said '*samanyam vriddhi karanam*' (exposure to situation or materials with similar properties results in the increase of the particular substance or condition)... [33], it can be inferred that the drug *Neeli* acts as *vishahara* due to its *prabhava* (unexpected unique pharmacodynamics of a drug), as *Charakacharya* rightly quotes. '*vishagnamuktam yath prabhavastatra karanam*. (*visha hara* property of drugs is due to their *prabhava*) [34].

Though specific doses are not mentioned in most conditions, The Ayurvedic pharmacopoeia of India concludes the dose of *Neeli patra Kashaya* (decoction of leaves of *Neeli*) as 50 – 100 gm and that of root as 48 gm of drug for decoction [2]. This dose may be chosen for ailments other than *visha*, as *visha*, quite different from other diseases, is considered to be *atyaya* (emergency) condition which demands intervention in *muhurmuhu: oushadakaala* (frequent administration of medicine) [35], and in doses which depend on the condition of the victim and the potency of the *visha* inflicted, as *Acharya Vagbhata* quotes '*sthana vega balaabala, alochya nipunam bhudhya karmanantharam achareth...*' (*Visha* condition should be treated according to the logic of the physician after carefully looking into various aspects such as the location & severity of the poison in the body, the strength of the patient etc) [36]. Hence the dose of *Neeli* to be administered in *visha* may vary depending on the condition of the patient and logic of the *vaidya* (physician).

Ayurvedic classics reveal that *Neeli* is widely used in the management of numerous conditions of *visha*. Apart from the *brihat trayis* and the *nighantus*, the drug is frequently mentioned in *keraleeya visha chikitsa granthas* like *Prayogasammuchchayam*, *Kriyakaumudi*, *Kodasherymargam* etc which throws light on its easy accessibility and its efficacy even in the management of high potent poisons like *mandali visha*.

More research work is to be taken up in order to assess the properties of each plant part to evaluate its action against any particular *visha* condition. The plant, with its *vishahara* potency and its availability in abundance, can be utilized by practitioners to advise as a household remedy as well as for clinical practice in order to treat *vishayukta* conditions.

### Conclusion

Since ancient times *Neeli* has been widely used for the management of various conditions of *visha* along with other disorders. References regarding the plant and its therapeutic uses are available in the classics and *Samhitas*. The drug forms the part of many *Agadayogas* and various Ayurvedic formulations widely used in practice by clinicians. Research work conducted on the plant reveals its anti-toxic,

hepatoprotective and nephroprotective action. More studies are to be conducted on the plant in order to widen its use in the treatment of pathological conditions arising due to exposure to various toxins, hence helping the *Agadatantra* clinicians to utilize this valuable drug for providing cost effective and better management in their day to day clinical practice.

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