A Critical Review on *Datura Upavisha* and Its Toxicity

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**ABSTRACT**

As far as Ayurvedic literature is concerned *upavisha* are the group of drugs which were less poisonous in nature and also not harmful but it can cause several toxic prodrome on consumption or administration. *Datura (Datura metel. Linn)* is a well-known poisonous plant in Indian system of medicine. It is included in *Upavisha* by ayurveda texts. In modern view datura is a deliriant type of cerebral poison. Every parts of Datura plant contains highly toxic alkaloids in dangerous levels and may even cause death if it is consumed by humans or other animals. Seeds are the most toxic part, contains hyoscine, hyoscyamine and atropine alkaloids. In authentic books of Keraliya vishachikitsa like Kriyakoumudi reference of prathyoushada(antidote) for datura visha is available. This review article includes the overall information about the poisonous plant Datura, i.e. both ayurvedic and modern view of datura, in its Toxicological aspect, Medicolegal aspect, therapeutic uses and treatment of Datura poisoning etc.

**KEYWORDS**

*Datura, Datura metel, Ayurvedic view, Modern view, Toxicity*
INTRODUCTION

Ancient scholars of Ayurveda has classified poisonous drugs into two types i.e. Sthavara (plant origin) and Jangama (animal origin) visha. Sthavara visha is again classified into mahavisha and upavisha. Among the mahavishas only the Vatsanabha (Aconitum ferox) is using for medicinal purpose now. Upavishas are the group of drugs which were less poisonous in nature and also not harmful but it can cause several toxic prodrome on consumption or administration. Depending on number of upavishas different views are there in Ayurveda. Mainly upavishas include Vishatintuka (Strychnosnux-vomica Linn), Ahiphena (papaver somniferum) Jayapala (Croton tiglium Linn), Dhatura bija (Datura metel Linn.), Vijaya (Cannabis sativa Linn.), Gunja (Abrus precatorius Linn.), Bhallataka (Semecarpus anacardium Linn.f.) Arka (Calotropis gigantica Linn.) Snuhi ksheera (Euphorbia ligularia Roxb.), Langali (Gloriosa superba Linn), Karaveera (Nerium oleander Linn). Ayurveda also states that sometimes strong poisons serve as the best medicine but used only after proper Shodhana (Detoxification), provided in a proper therapeutic dose and formulation. On the contrary a good medicine may affect adversely unless it is used for proper person with proper dose.

Datura is well known and commonly used drug for treating various ailments and it is an ingredient in most of the formulations in Ayurveda which is in practical use now. It is commonly known as ‘devil’s trumpet’ and it was first described by Linnaeus in 1753. In some places it is prohibited to buy or sell or cultivate Datura plants. The main chemical composition of Datura are tropane alkaloids hyoscine, hyoscyamine and atropine alkaloids. This review article is a sincere attempt to synopsize the information concerning about poisonous drug Datura (Datura metel Linn) described in Indian system of medicine.

Scientific Classification

Table 1

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<tr>
<th>Kingdom</th>
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Botanical Name-Datura metel Linn

Family - Solanaceae

Vernacular Names

Hindi – Datura
English- Thorn Apple, Jimson Weed
Malayalam- Ummam
Kannada- Unmathi
Marati- Dhatra
Gujarati- Dhaturo
Tulu- Umbe
Tamil- Emanamam
Sanskrit Synonyms of Datura
Dattura, Dhoortha, Dhusthura, Unmatha, Kanakahvaya, Devatha, Kithava, Thoori, Mahamehi, Shivapriya, Maathula, Madana, Kanaka, shata, shivapriya, Mahamohi

Bheda (variety) of Datura

There are two main varieties, Rajadatura and Krishna Datura
Depending on colour of flowers -sita, nila, Krishna, lohittha, pita

Classification
Ayurveda: upavisha
Modern medicine: under deliriant type of cerebral poison

Habit and Habitat
A sub glabrous spreading herb, sometimes shrubby. Common in waste places throughout India and occasionally in gardens.

Plant description
It is an herb, pubescent. Leaves are large, entire sinuate or toothed bar unequal. Flowers are erect, whitish purple, calyx long tubular, 5-toothed at apex, corolla long tubular to funnel shaped. Fruits are capsule globose or ellipsoid spinous 4-valved or irregularly breaking up, seeds are compressed rugose and brown.

Major chemical constituent
Datura contains mainly tropane alkaloids. Scopolamine, hyoscyamine, hyosine, Daturadiol, β-sitosterol, Daturanalone, fastusinine

Fig 1 (Datura flower)

Fig 2 (Datura fruit & seeds)

Part used
Root, fruit, seed, flower, leaf

Ayurvedic view of Datura
In Charaka Samhitha Acharya Charaka delineated Datura in the context of visha chikitsa and in kushta chikitsa, he described thrice in the name kanaka. Susrutacharya and Vagbhatacharya mentioned it as Datura in the context of alarkavisha. In Haritha samhitha, it has been mentioned in the context of vataja netra roga chikitsa as an ingredient in an anjanayoga. while moving through...
nighantu kala in Dhanvantari nighantu and Sodhala nighantu it included under karaveeradi varga, and Madanapala nighantu quoted under abhayadi varga, while Bhavamisra described it under guduchyadi varga.

Ayurvedic properties

The ayurvedic properties of Datura in ayurveda according to different Acharya’s are explained in Table 2.

Karma and Rogagnatha

Jwaranashana, twakdoshashamana,

Table 2: Ayurvedic properties

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krimigna, shothahara, kanduhara, swasa prashamana, karnashoola nibarhana, vedanahara

Therapeutic uses

Alarka - Datura and sweta punarnava combination is very effective remedy

Krimi - Juice of Datura leaves mixed with Mercury or juice of heated leaves singly destroys ticks and lice on local application

Pitakamaya - Juice of madukaparni and paste of Datura root destroys the boils.

Maatra (therapeutic dose) of Datura

Maatra of Purified Datura beeja choorna is ¼ ratti (30.37mg) to ½ ratti (60.75mg) and purified Datura patra choorna is ½ ratti to 1½ ratti (182.25 mg).

Shodhana of Datura

First method - Datura seeds are tied in a pottali. This pottali is heated with cow milk in a dolayantra for three hours. Then pottali is opened and Datura seeds are washed with hot water. These pure Datura seeds are then used in the formulations.

Second Method - New Datura seeds are heated in cow urine with the help of dolayantra and dried in the sun. These
seeds are powdered & filtered through cloth. Then it is used for therapeutic purpose.\textsuperscript{31}

\textit{Datura visha lakshana}
A person if poisoned by Dattura, his visual perceptions would all become yellowish (\textit{sarvam pashyathi peetakam}) and also he would develop symptoms like \textit{kampa} (tremors), \textit{laala} (excessive salivation), \textit{mada} (intoxicated), \textit{chardi} (vomiting), \textit{smruthibhramsha} (amnesia) and \textit{bhra} (giddiness).\textsuperscript{32}

\textbf{Ayurvedic treatment for Datura poisoning}
Cow’s milk with sugar can be given two times a day for treating Datura.\textsuperscript{32}

\textbf{Ayurvedic antidotes for Datura visha}
- \textit{Changeri swarasa} internally
- Administration of milk and sugar in deliriant condition
- Chandana mixed with tender coconut water for internal administration
- \textit{Haridra choorna} with karpasa patra swarasa (\textit{Gossypium herbaceum Linn.}) and administer internally
- \textit{Mrunaala} (stalk of lotus) \textit{kwath} or swarasa.\textsuperscript{33}

\textbf{Vishishta yogas (Ayurvedic formulations) of Datura}
\textit{Kanakasava, Sutashekhara rasa, Mahavishagarbhataila, Unmatta rasa}.\textsuperscript{34}

\textbf{Modern view}

\textbf{Toxic symptoms:}
Summarised in the classical phrase: “\textit{blind as a bat, hot as a hare, dry as a bone, red as a beetroot, and mad as a wet hen}”. The important manifestations can be better remembered as a series of D’s
- Dryness of mouth, thirst, slurred speech
- Dysphagia
- Dilated pupils
- Diplopia
- Dry hot skin, with flushing, hyperpyrexia
- Drunken gait(ataxia), hyperreflexia, convulsions
- Delirium with hallucinations, agitation, amnesia, incoherence
- Dysuria, urinary retention, bladder distension
- Death, preceded by tachycardia, arrhythmias, coma, and respiratory depression.\textsuperscript{35}

\textbf{Toxic part:} All parts especially seeds

\textbf{Fatal dose}
The fatal dose is about 50-100 Datura seeds, or about 10-100mg of atropine, however recovery has been recorded with 1000 mg of atropine\textsuperscript{36}

\textbf{Fatal period}
In the majority of fatal cases death usually occurs within 24 hrs.

\textbf{Diagnosis}
Even minute traces of atropine in blood can be detected by GC-MS (Gas chromatography –mass spectrometry). However, there is little or no correlation between dose of atropine, plasma concentration and observed clinical effects.

- Neutrophil leucocytosis is often encountered.
- Dilated pupils-if the pupils do not constrict within 15-30 minutes after instillation of 2-3 drops of 1% pilocarpine, it is indicative of atropine or anticholinergic poisoning.
- Cat’s eye test-instillation of a few drops of the patient’s urine into the eyes of a cat results in rapid mydriasis.

**Treatment:**
- Treat the patient in a quiet and dark environment. Treat respiratory failure with endotracheal intubation and assisted ventilation. Tidal volume should be at least 10 to 15 ml/kg. Monitor ECG, pulse, and temperature continuously.
- Gut decontamination-gastric lavage (after intubation), activated charcoal. Dialysis and haemoperfusion do not appear to be effective. Catheterise bladder. Administer IV fluids keeping a close watch on intake and output and renal function. Agitation can be controlled with judicious use of diazepam. Do not use phenothiazine s or antihistamines, since they can aggravate anticholinergic effects. Hyperthermia can be managed by hydration and cooling measures.
- **Antidote**- physostigmine is the antidote of choice, should be administered if the indications like, coma, arrhythmias, hallucinations, severe hypertension, convulsions, are present. The adult dose is 2mg IV, slowly repeated if required in 20 minutes. Do not give it as a continuous infusion. Phystostigmine is an effective but dangerous antidote and can give rise to convulsions, systole, hypotension, and hyper salivation and Brady arrhythmias if administered without caution.
- **Precaution**-In the treatment of Datura poisoning, certain drugs such as antihistamines, phenothiazine, tricyclics, quinidine, disopyramide, procainamide, and morphine should be avoided.

**Post Mortem Appearance**
The Datura seeds or their fragments may be found in stomach and intestine. It is therefore necessary to make a careful search for the vomited matter, stomach contents and faeces. The oesophagus, stomach and duodenum and other internal organs are mostly congested. In rare cases mucous membrane of stomach may be found slightly inflamed.

**Medico legal importance**
Accidental poisoning- Mistaken identity, involving capsicum seeds for aging children in the countryside chewing on the seeds out of curiosity, therapeutic misadventures, overenthusiastic use of atropine as an antidote for organophosphate or carbonate poisoning. Suicidal poisoning-Owing to easy acceptability, Datura is not infrequently reported in suicidal ingestions, especially in rural parts of India.

Homicidal-There have been rare instances of murder being accomplished with one or the other belladonna alkaloids.

Stupefaction-It is a process of making a victim debilitated suddenly by divulging him to a deliriant poison such as Datura in order to ease robbery or rape.

CONCLUSION

Datura is included one among the upavisha by laghutrareyes, except sharangadhara samhitha. In Ayurvedic literatures, Datura is described as a useful remedy for various diseases like jwara, kushta, krimi, visha. For the preparation of many Ayurvedic formulations like Kanakasava, Sootashekhara rasa, mahavishagarbha taila Datura is used as one of the ingredient. Improper or inadequate shodhana and Datura in high dose, can give rise to toxic problems like dryness of mouth, excessive thirst, nausea, vomiting, giddiness. The most toxic part of Datura is seeds in modern concept it is a deliriant type of cerebral poison and the main toxic principles are hyoscyamine, hyoscine, and atropine. So for getting rapid outcome in ayurvedic treatments we can use Datura like upavishas in ayurvedic formulations.
REFERENCES