

## International Research Journal of Ayurveda &amp; Yoga

Vol. 5 (10),130-134, Oct,2022

ISSN: 2581-785X;<https://irjay.com/>DOI: [10.47223/IRJAY.2022.51021](https://doi.org/10.47223/IRJAY.2022.51021)

## Therapeutic Properties of *Datura Stramonium* (*D. Stramonium*) and its Medico Legal Aspect

Bharat Bhushan <sup>1</sup>, Jaram Singh <sup>2</sup>, Rajveer Sason, <sup>3</sup> Kulwinder Kaur<sup>4</sup>

1.PG Scholar – Department of Agada Tantra R. G. Govt. P G Ayurvedic College Paprola , Himachal Pradesh.

2. Professor & H.O.D Department of Agad Tantra, R. G. Govt. P G Ayurvedic College Paprola , Himachal Pradesh.

3. Lecturer Department of Agad Tantra R. G. Govt. P G Ayurvedic College Paprola , Himachal Pradesh.

4. Lecturer (A.M.O), R.G.G.P.G Ayurvedic College & Hospital Paprola, Himachal Pradesh.

### Article Info

#### Article history:

Received on: 15-08-2022

Accepted on: 20-10-2022

Available online: 31-10-2022

#### Corresponding author-

Bharat Bhushan, PG Scholar,  
Department of Agada Tantra R. G.  
Govt. P G Ayurvedic College  
Paprola , Himachal Pradesh.

#### Email:

[drbharatbhushan1516@gmail.com](mailto:drbharatbhushan1516@gmail.com)

### ABSTRACT:

Various diseases can be treated and managed with plants, and they have been utilized in many nations to cure a variety of disease situations. Plants have therapeutic potential because of their bioactive phytochemical components, which have specific physiological effects on living things. Many therapeutic plants include chemical components that, when ingested in large doses, may have adverse effects on individuals. Despite having medical properties, plants with high concentrations of alkaloids could become poisonous. One of the well-known folk medicines with widespread use is *Datura*, a member of the Solanaceae family, also known as Jimson weed and as "Jaozmase!" in Arabic. Chemical analysis of this plant revealed its components as alkaloids, carbohydrates, and proteins, among which alkaloids including scopolamine, hyoscyamine, and atropine are the main active ingredients that exhibit various activities, such as anti-asthmatic. In addition to being used medicinally, *Datura* is one of the most abused plants in the world due to its widespread availability, particularly in Africa, Southeast Asia, and India, where it is primarily used for spiritual or religious purposes and has a much higher rate of negative reports than other psychoactive substances. When used excessively or abused, it can have poisonous side effects including delirium, mydriasis, mental disorientation, psychosis, and even violent conduct. In this review, various decorative appeal of the medicinal value of *Datura* has been mentioned along with its medico legal importance.

**Keywords:** *Datura*, medico legal importance, Agada Tantra

## INTRODUCTION

*Agada* means anti-poison drug and *Tantra* means system. The technology of the remedy of toxins is *Agada Tantra* and it changed into the historic call of Toxicology. In Ayurveda, *Dhatura* is considered *Upavisha* because it is

much less toxic and only shows its side effects when consumed. Throughout history, plants have been used extensively to cure illnesses and injuries in people all over the world. The growing popularity of natural products has



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increased demand for medicinal plants in both developed and developing nations. Herbal medicine plays a significant role in both the conventional and contemporary medical systems<sup>1</sup> The Solanaceae family includes the common annual plant *Datura stramonium* (*D. stramonium*). It is one of the most well-known traditional medicinal plants. It is a wild flowering plant that has been looked at as a potential local source for tropane alkaloids, which include the anti-cholinergic pharmaceuticals atropine and scopolamine and include a methylated nitrogen atom (N-CH<sub>3</sub>).

It is stated in numerous *Ayurvedic* books that it is able to treat issues such as, *Deepana* (remedy of hypo functioning of *Jataragni*/digestive fire), *Pachana* (facilitates in digestion and neutralize *Ama*), *Kustha* (treats pores and skin issues), *Hridaya* (treats coronary heart issues), etc.

## AIMS AND OBJECTIVES

To review the therapeutic properties of *Datura* plant along with its medico legal aspect.

## MATERIALS AND METHODS

Review of *Ayurvedic* Literature and their corresponding commentaries have undergone in-depth. Peer-reviewed medical publications and textbooks of contemporary medical sciences have also been cited as sources for this topic.

### Plant Review –

This plant, *D. stramonium*, is annual. The stem is glabrous or only sparsely hairy, branching, and herbaceous. The plant can be grown to a height of around one meter<sup>2,3</sup>. Spreading, leafy, sturdy, upright, smooth, and pale yellowish green in color, the branching stems branch frequently in a forked fashion. The leaf stalks are stalked, 4-6 inches long, oblong, and pale green. The leaves are hairy, large, simple dentate, oval, and glabrous. The underside is whiter and when dried, has minute wrinkles and is often rougher than the upper surface, which is dark and grayish-green. Funnel-shaped, white or purple blooms with 5 stamens and a superior ovary are produced by *D. stramonium* bears. The typical blossom is around 3 inches long. The calyx has five sharp teeth on top and is long, tubular, somewhat inflated below, and very sharply angled. The funnel-shaped Corolla. White or greenish blue stem stalks are visible. Flat, black, kidney-shaped seeds are available<sup>4,5</sup>. The fruit is covered in thorns and as large as walnuts, hence the English term "thorn apple." The plant

has been classified under Schedule E-1 of the Drugs and Cosmetics Act of 1940 because of this.<sup>6</sup>

### Common names:

Thorn apple (fruits are spherical and have sharp spines), Jimson weed,\* Hell's bells and devil's trumpet (for their large trumpet-shaped flowers)

### Chemical Constituents –

Numerous functional groups, including saponins, tannins, steroids, alkaloids, flavonoids, phenols, and glycosides, are present in the plant.<sup>7</sup> As competitive antagonists of muscarinic cholinergic receptors, atropine and scopolamine depress the central nervous system. All plant parts are poisonous, however the mature seeds have the largest concentration of alkaloids.

### Details description is as followed –<sup>8</sup>

**Root** - 3 $\alpha$ , 6 $\beta$ -ditigloyloxytropene, 3 $\alpha$ , 6 $\beta$ -ditigloyloxytropen-7 $\beta$ -ol, tigloidine, apohyoscyne, hyoscyne, 3 $\alpha$ -tigloyloxytropen, norhyoscyne, meteloidine, hyoscyminine, cuscohygrine and tropine Pericarp -  $\beta$ -sitosterol, scopolamine and fastusine

**Leaves** - Scopolamine and a mixture of two unidentified alkaloids

**Flower, leaves, aerial parts and roots** - Hyoscyne and hyoscyamine

**Fresh aerial parts** - Withanolide, (17R, 20R 22R, 25R)-21, 25R-epoxy-2-methoxy-1-oxowitha-2, 5-di enolide and hyoscyne and hyoscyamine

**Fruits** - Daturanolone and daturadiol

**Seeds** - Scopolamine, atropine, fastunine, fastudine, fastusidine, daturanolone and fastusic acid

**Seed oil** -4 $\alpha$ -methylsterols-31-nprlanost-9(11) enol. 31-norcroartenol. Cycloeucaenol, 31-norlanost-8-enol.31 norlanosterol; obtusifoliol, 4 $\alpha$ -methyl cholesta-8-enol, lophenol and citrostadienol

### Mode Of Action

1. Atropine and hyoscyne block the acetylcholine receptor and produces sympathomimetic or parasympatholytic actions.
2. CNS stimulant in early phase, but later CNS depression occurs, especially of the respiratory center.
3. Vagolytic action resulting in stimulation of the heart.

## Pharmacodynamics Of *Dhatura* According to Ayurveda

### -Table 1

### Ayurvedic Formulations Containing *Dhatura* – Table 2

### Actions and Therapeutic Uses –

The herb has narcotic, anodyne, antispasmodic, emetic, and caustic properties. It helps with dysmenorrhea, calculi, duodenal ulcer, renal colic, fever, inflammations, neuralgia, mania, myalgia, hyperacidity, and asthma. Rabid dog bites are treated with roots. Leaf is helpful for piles and inflammations. Leaf juice is utilized topically for skin conditions including lice. For lumbago, sciatica, neuralgia, mumps, and painful swellings, leaves are applied as a poultice. In addition to being an aphrodisiac, seeds can be used to cure dandruff, lice, and stomach issues as well as tooth and earaches.<sup>9</sup>

### Toxic part

All parts of these plants are poisonous—fruit, flowers and seeds (highest concentrations of alkaloids are found in roots and seeds).

The seeds resemble chilli seeds. Poisoning occurs only if seeds are masticated and swallowed. The usual route is ingesting seeds or other plant parts as tea, although smoking dried leaves also are common

### Toxic Alkaloids –<sup>10</sup>

*Datura* contains three main toxic

Alkaloids: Atropine, scopolamine and hyoscyamine.

### Fatal Dose<sup>11</sup>

The fatal dose is not certain. A ripe fruit weighs, on an average, about 7.50 g and contains the seeds which weight about 5.60 g. One hundred dried *Dharura* seeds weigh around 1.2-1.23 g. A decoction of 125 seeds of *Datura stramonium* has proved fatal to a woman.

### Fatal Period<sup>12</sup>

In the majority of fatal cases, death usually occurs within 24 hours. Other causes of dilated pupils like cerebral aneurysm, brain tumor, subdural and subarachnoid hemorrhage should be ruled out.

### Postmortem Appearance<sup>13</sup>

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

### Medico-legal Points-<sup>14</sup>

1. *Dhatura* is commonly used in India for criminal purposes. The seeds are generally used by bandits to stupefy travelers and rob them. It is rarely used to destroy life, although deaths have occasionally occurred from excessive quantities.

2. The seeds are sometimes given to children with a view to kidnapping them when they become unconscious or delirious.

3. Accidental cases also occur from the injudicious use of the seeds in medicines by *Vaids* and *Hakims*. The seeds are reputed to have an aphrodisiac property. Medicated ghee is prepared with the seeds for local application. The juice of *dhatura* leaves is used to subdue pain and inflammation in rheumatism. If applied to an abraded surface, it may produce poisonous symptoms.

4. The active principle of *Dhatura* is excreted unchanged in the urine almost immediately after its administration, and the excretion is completed in 10-20 hours. It is therefore, advisable to preserve the urine in cases of *Dhatura* poisoning, since the urine will show the active principle on chemical analysis, while the stomach wash may not occasionally respond to the test.

## DISCUSSION

Drug development and pharmacological research are two areas where medicinal plants are increasingly crucial to the world's health care system. This article gives a brief overview of the active components as well as the historically recognised medical benefits of *Datura* when applied topically and consumed for treating a variety of human ailments. Due to the existence of chemically active ingredients, plants exhibit many properties. To ensure rational and sustainable utilisation of the world's biodiversity, ongoing work in the pertinent areas are still required. Also this article establish the medicolegal importance of *Datura* in many criminal cases.

## CONCLUSION

*Datura* is a medicinal plant that is used all over the world as herbal medicine to treat a variety of health issues. It is necessary to do additional research and quantify the phyto constituents that are accountable for the mentioned pharmacological profiles and toxicity. Due to its psychoactive effects, this plant should only be utilised by trained healthcare practitioners. The adverse outcomes may

be quite harmful and severe. Therefore, given all the positive therapeutic properties of this herb, the risk-benefit ratio should always be considered before utilising it.

**Acknowledgements - Nil**

**Conflict of interest - None**

**Source of finance & support - Nil**

## ORCID

Bharat Bhushan , <https://orcid.org/0000-0001-9058-2910>

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**How to cite this article:** Bhushan B, Singh J, Sason R "Therapeutic Properties Of *Datura Stramonium* (D. Stramonium) And Its Medico Legal Aspect IRJAY.[online]2022;5(10); 130-134.  
Available from: <https://irjay.com>  
DOI link- <https://doi.org/10.47223/IRJAY.2022.51021>

**Table 1 Shows Pharmacodynamics Of *Dhatura* According to *Ayurveda* –**

<i>Rasa</i>	<i>Tikta, Katu</i>
<i>Guna</i>	<i>Laghu, Ruksha, Vyavayi, Vikasi</i>
<i>Virya</i>	<i>Ushna</i>
<i>Vipaka</i>	<i>Katu</i> <sup>[SEP]</sup>
<i>Prabhava</i>	<i>Madaka</i> <sup>[SEP]</sup>
<i>Doshagnata</i>	<i>Kaphavatashamaka</i>
<i>Rogagnata</i>	<i>Shotha, Vedana, Arsha, Vatavikara, Hridmandata, Nadimandata, Amlapitta, Parinamashoola, Pittashmari, Shwasa, Vrikkashoola, Ashmari, Shaiyyamootra, Rajahkrichchhra, Yuka, Liksha</i>
<i>Karma</i>	<i>Jantughna, Vedanasthapana, Twagdosahara, Madaka, Antrashamaka, Shoolaprashamana, Hridayottejaka, Basti avum Gavini sankochaka, Garbhashaya prasaraka, Shukrastambhana, Swedavarodhaka</i>

**Table 2 Shows *Ayurvedic* Formulations Containing *Dhatura* –**

<i>Kanakasundara rasa</i>	<i>Rasendra Sara Sangraha Jwaratisara Chikitsa 26-27</i>
<i>Lakshmivilasa rasa</i>	<i>Rasendra Sara Sangraha Vatavyadhi Chikitsa 45-48</i>
<i>Unmadaganjakusha rasa</i>	<i>Unmadaganjakusha rasa</i>
<i>Pralapantaka rasa</i> <i>Kanakasava</i>	<i>Bhaishajya Ratnavali 24/379-382</i> <i>Bhaishajya</i>
<i>Unmatta rasa</i>	<i>Sharangadhara Madhyama 12/135</i>
<i>Mahajwarankusha rasa</i>	<i>Sharangadhara Madhyama 118/119</i>
<i>Tribhuvanakirti rasa</i>	<i>Yoga Ratnakara Jwara chikitsa</i>
<i>Kanakaprabha vati</i>	<i>Rasendra Sara Sangraha Jwaratisara Chikitsa 28-29</i>