



## PHARMACOLOGICAL DIMENSION AND TRADITIONAL EMPLOYMENT OF *DATURA STRAMONIUM* L.—A REVIEW

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### ABSTRACT

India has a great wealth of various naturally occurring plant drugs which have great potential pharmacological activities. *Datura stramonium* (*D. stramonium*) is one of the wild well known folklore medicinal herbs, which is found in Asia, but is also found in the United States, Canada, and the West Indies. *D. stramonium*, in the form of paste or solution to relieve the local pain, may not have a deleterious effect; however, oral and systemic administration may lead to severe anticholinergic symptoms. For this reason, it is very important for individuals, mainly young people, to be aware of the toxic nature and potential risks associated with the use of this plant. Fresh leaves of *D. stramonium* are squeezed and the juice is dropped on the affected parts in order to stop bleeding. Dhatura juice with the root of *Boerhavia diffusa* (Satodi) and opium is used as an application for the relief of rheumatic pains and swellings over the hands and feet. The seeds are used in Tibetan medicine, they are said to have a bitter and acrid taste with a cooling and very poisonous potency. This comprehensive review of *D. stramonium* includes information on pharmacology, toxicology and ethnomedicinal uses. Phytochemical of the plant are alkaloids, atropine, scopolamine, tannin, saponine, glycosides, phenol, sterols, lignins, fats, carbohydrates and proteins. Alkaloids, tannins, carbohydrates and proteins are used in medicines due to its analgesic and antiasthmatic activities. Atropine used in treatment of Parkinson's disease, peptic ulcers, diarrhea and bronchial asthma. Traditionally leaves past and extracts are externally used for injuries, wounds, bleeding and pain. Juice of flower petals is used in ear pain and seeds are used as purgative, in cough, fever and asthma.

**Key Word :** *Datura stramonium*, Solanaceae, pharmacology, medicinal, traditional uses and Jimsonweed.

*Datura stramonium*, the most common species within Solanaceae family, is native to Asia, but is also found in the United States, Canada, and the West Indies. In addition, some botanists say var. *stramonium* is native to Asia and var. *tatula* to America. It is widespread with higher abundance in temperate, tropical and subtropical regions(1). However, imsonweed is thought to be a short form of "James Town Weed," commemorating Jamestown, Virginia, where ingestion of the plant was reputed to have a narcotic effect on British soldiers during Bacon's Rebellion of 1676 (2). Traditionally, *D. stramonium* has been used for mystic and religious purposes(3), and as an herbal medicine with narcotic effects or to treat asthma(4). The seed of *D. stramonium* is smoked to achieve hallucinogenic experiences as well[9].The genus "*Datura*" (Solanaceae) comprises all the nightshades and agricultural plants, including potato, tomato, coffee and pepper. Classification of different species within *Datura* genus relies heavily on genetic markers, which suggests that this genus has huge variation due to mutation(5, 6). *D. stramonium* is toxic when consumed improperly. Accidental poisoning of humans and

animals who consumed food sources contaminated with *D. stramonium* has been reported(7). In areas where millet, wheat, rye, corn, and bean seeds are used for human consumption, and where *D. stramonium* is a common weed, the grain sometimes has been contaminated with *Datura* seeds(8). The juice of its fruit is applied to the scalp, to treat dandruff and falling hair. The growing plant works as an insect repellent, which protects neighboring plants from insects(9). *D. stramonium* is mostly used as anthelmintics and antiparasitic in Marche, Abruzzo and Latium. Records of continued use of the plant in these sectors was collected from farmers and shepherds (mostly old people)(10, 11). *D. stramonium* contain variety of alkaloids including atropine, hyoscamine and scopolamine (12).

### Names in other Region

Hindi : Sadah-Datura, Safed Datura, Sanskrit : Umatta-virkshaha, English : Thornapple, Marathi : Kanaka, Bengali : Dhatura, Gujrat : Dhatoria, Tamil : Umatai, Malayalam: Maraummam and Arab : Jonz-masal.



### Classification of *D. stromonium*

Kingdom	:	Plantae
Division	:	Magnoliophyta
Class	:	Magnoliopsida
Order	:	Solanales
Family	:	Solanaceae
Genus	:	Datura
Species	:	Datura stromonium

### Distributions and Cultivation

*D. stromonium* is probably originated in Caspian Sea territories and spreaded to Europe in the first century. At present it grows in waste places in Europe, Asia, America and South Africa. *D. stromonium* is cultivated in Germany, France, Hungary, South America and throughout the world(13). Thorn apple is easily cultivated, growing well in open, cheery situation. It flourishes in most moderately good soil but grows best in calcareous rich soil, or in a good sandy loam, with leaf mould added. Seeds are sown in open in May, in drill 3 feet apart, barely covered. Thin out the young plants to a distance of 12 to 15 inches between each plant in the drill. The soil should be kept free from weeds in the early stages. If the summer is hot and dry, give a mulching of rotted cow-manure. In August the plant reaches to a height of 1 meter and bears flowers and fruits. In the end of August stems with leaves and flowering tops are collected and dried as soon as possible at 45 °C to 50 °C. The leaves should be gathered when the plant is in full bloom and carefully dried. They are generally harvested in late summer. In August, the crop is cut by the sickle on a fine day in the morning, after the sun has

dried off the dew, and the leaves are stripped from the stem, dried carefully as quickly as possible (13, 14, 15).

### Medicinal uses:

#### In asthma

*D. stromonium* in asthma treatment and possible effects on prenatal development was studied. Exposure of the foetus to *D. stromonium* when a mother use it for asthma, will cause a continuous release of acetylcholine, resulting in the desensitization of nicotinic receptors, this could ultimately result in permanent damage to the foetus. Therefore we conclude that this African herbal remedy should be used with caution during pregnancy(16).

#### Problem of Breast Milk Secretion

The herb is highly beneficial in checking secretion of breast milk. In case of an unfortunate death of a newly born baby, accumulation of milk in the breasts of the mother poses a problem, causing severe pain. In such a case, warmed leaves of the *Datura* tied on the breasts will help dry the milk without any pain and difficulty. Just 2 or 3 applications will bring the desired results.

**Precautions :** The usual dose of *Datura* is about 2 decigrams. In large doses, it may lead to dilation of the pupils and dryness of the mouth and throat. (11)

#### Skin Diseases

Externally the paste of the seeds is used in urticaria and other skin diseases due to the presence of lice or other animal parasites. It is also applied to decayed teeth and to relieve 65 toothaches. Indians apply medicated oil to the head in headache, to enlarged testis and boils and to skin in skin diseases such as pediculi, lice and psoriasis.

*Datura* juice with the root of *Boerhavia diffusa* (Satodi) and opium is used as an application for the relief of rheumatic pains and swellings over the hands and feet. In hemorrhoids, fissures and painful diseases of rectum leading to tenesmus its application as a local anodyne ointment gives relief(16).

### In Bleeding Disorder

Fresh leaves of *D. stramonium* are squeezed and the juice is dropped on the affected parts in order to stop bleeding(17).

### In cancer

An integrated approach is needed to manage cancer using the growing body of knowledge gained through scientific developments. Thousands of herbal and traditional compounds are being screened worldwide to validate their use as anticancerous drugs. *D. stramonium* in therapeutic dose of 0.05-0.10 g was used to cure cancer. Likely unsafe produce vomiting, hypertension, loss of consciousness may lead to coma but may interact with anti-cholinergic drugs(17).

### Inflammation

*Coriandrum sativum* (*C. sativum*), *D. stramonium* and *Azadirachta indica* (*A. indica*) are traditionally used in treatment of inflammation. Ethanolic extracts of fruits of *C. sativum*, leaves of *D. stramonium*. Ethanolic extracts of fruits of *C. sativum*, leaves of *D. stramonium* and *A. indica* were subjected to preliminary screening for anti-inflammatory activity in albino rats. All ethanolic extracts exhibited significant anti-inflammatory activity comparable to the standard drug diclofenac sodium against carrageenan induced rat paw edema method. Among these plant *A. indica* showed maximum anti-inflammatory activity per hour(18).

### Medicinal uses of specific parts of *D. stramonium*

#### Roots and barks

A paste prepared by mixing the root bark powder of *Echinops echinatus* with the juice of *D. stramonium* and *Blumea lacera* leaves is used to avoid premature ejaculation (19).

#### Leaves

Hernandez reported that the decoction of leaves is applied to the body for fever or administered as a suppository. The fruit and leaves were considered good for pain in the chest. If too much was taken, it was believed to cause insanity. In northwestern New Spain,

the Opata rubbed a leaf of *Datura* is applied on the painful area for "spleen disease". They believed it also matured tumors and abscesses. An ointment of the ground seeds and suet is rubbed on boils, pimples, and swellings; the powdered leaves are applied to hemorrhoids; and hot baths containing the plant give relief to colds and diarrhea (20).

For treating malarial fever a leaf is taken in the morning with some sweets or uncooked grains of rice, on three days in a week (that is on Sunday, Tuesday and Saturday). The paste of leaves along with turmeric is used externally in chest pain (21).

### Flower

The juice of flower is useful for earache (21). The poultice made from the flowers is applied to wounds to reduce pain. A decoction of flower and root has been used as a sedative to calm patients during setting of fractures (22).

### Fruits

The juice of the fruit is applied to the scalp to treat dandruff and falling hair (22).

### Seeds

The seeds are used in Tibetan medicine, they are said to have a bitter and acrid taste with a cooling and very poisonous potency. They have analgesic, anthelmintic and anti-inflammatory activity and they are used in the treatment of stomach and intestinal pain due to worm infestation, toothache and fever from inflammations. (23).

### Traditional use of *Datura stramonium*

When the leaves of *Datura stramonium* mixed with mustard oil then it is useful in skin disorders. Juice of flower petals is used in ear pain and seeds are used as purgative, in cough, fever and asthma. Seeds are smoked due to its narcotic action (24). Leaf paste and extract is externally used for injuries, wounds, bleedings and pains. Seeds in small quantity used for asthma and tonsil problems. The extract of leaves is also used for baldness (25). Leaves used externally for management of pains (26). *Datura stramonium* plant frequently used as antiparasitics and repellents (27). Fruit oil is used for body pain (23). Leaf or whole plant is Antiinflammatory and antispasmodic (28). Green leaves are applied for the softening of the boils. Juice of the fruit is applied to scalp for falling hairs and as antidandruff. Juice of the flower is used in earache. One

drop is poured in the ear at night (19). Paste of leaves is topically applied for skin diseases (29). Dried leaves and seeds are used as Anticholinergic and sedative (23). Seeds are used to make somebody unconscious (30). Traditionally it is used for cure of Rheumatism. 75 gm rhizomes of ginger (*Zingiber officinale*), 100 gm of garlic (*Allium sativum*) and 85 gm of onions (*Allium cepa*) are macerated together to extract the juice. To the juice is added 86 gm atosh (root of an unidentified plant) and an equal amount of darmuz (arsenic), mudra shankar (unidentified chemical, possibly a chromium salt) and camphor. One powdered seed of *Datura stramonium* is added to the mixture along with 400 gm of oil from seeds of *Brassica campestris*. The whole amount is boiled thoroughly, slightly cooled and applied to places where there is rheumatic pain. This is done 2-3 times daily till cure of the pain (31).

### Dosage

*D. stramonium* is generally administered at a dose of 60 to 185 mg powder for leaf and 60 to 120 mg powder for seed (32).

### Precautions and safety of usage

Almost all the parts of *D. stramonium* are reported to have toxic effects, and the toxicity of this plant is mainly due to the tropane alkaloids. Each part varies in the concentrations of alkaloids and other active substances. For this reason, it is very important for individuals, especially young people, to be aware of the toxicity and potential risks associated with the "recreational" use of this plant. *D. stramonium* in the form of a paste or solution to relieve local pain may not have a deleterious effect; however, oral and systemic administration of the *D. stramonium* may lead to severe anticholinergic symptoms. Various cases of toxic delirium and psychiatric symptoms have been reported after ingestion of *D. stramonium* (20, 33, 34, 35), indicating the necessity of extreme precaution while using this plant.

### CONCLUSION

Present studies indicated that *Datura stramonium* is a wild plant also known as Jimsonweed, having various medicinal and pharmacological properties. Phytochemical of the plant are alkaloids, atropine, scopolamine, tannin, saponine, glycosides, phenol, sterols, lignins, fats, carbohydrates and proteins. Alkaloids, tannins, carbohydrates and proteins are used in medicines due to its analgesic and

antiasthmatic activities. Atropine used in treatment of Parkinson's disease, peptic ulcers, diarrhea and bronchial asthma. Traditionally leaves past and extracts are externally used for injuries, wounds, bleeding and pain. Juice of flower petals is used in ear pain and seeds are used as purgative, in cough, fever and asthma.

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