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DATURA: A SYSTEMATIC REVIEW

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ABSTRACT
India has numerous naturally occurring, pharmacologically active plant compounds. Datura stramonium is a popular traditional medicinal herb. The problematic weed is a plant with both toxic and medicinal properties. It has been shown to have significant pharmacological potential and is used in folklore medicine. The Solanaceae family of medicinal plants contains the genus Datura, which has both toxic and therapeutic properties. Due to the number of bioactive components, the various plant parts of Datura spp., especially Datura stramonium L., often known as Datura or Jimson Weed, display powerful analgesic, antiviral, anti-diarrheal, and anti-inflammatory activities.

KEYWORDS: *Anti-Inflammatory, Datura, Datura Stramonium, Phytochemistry, Solanaceae*

INTRODUCTION
Plants have traditionally been used to treat ailments and injuries worldwide. Medicinal plants are in high demand in both developed and emerging countries, driven by a growing acceptance of natural products. Both ancient and modern medical systems place a high priority on herbal medicines. It is one of the widely well-known folklore medicinal herb [1] . It is a wild growing flowering plant and was investigated as a local source for tropane alkaloids which contain a methylated nitrogen atom (N-CH_3) and included in the anti-cholinergic drugs atropine and scopolamine. It has been demonstrated through science that *D. Stramonium* contains alkaloids, tannins, carbohydrates, and proteins [2]. Indian medical systems have benefited from the plant's varied pharmacological activities, including analgesic and anti-asthmatic attributes. Striped bark is applied locally to treat swellings, burns, and ulcers, while an oral preparation of the leaves treats asthma and sinus infections. The plant has various medical benefits, including anti-inflammatory effects, stimulation of the neurological system, respiratory elimination, treatment of dental and skin infections, alopecia, and toothache alleviation. This plant causes hallucinations and is extremely toxic, potentially fatal. Consuming the plant might cause an anticholinergic response, creating diagnostic problems and potentially resulting in overdose. After consuming the berries, cases of poisoning have been documented [3]. The seeds may be an effective alternative to atropine in treating muscarinic symptoms of organophosphate poisoning and central anticholinergic effects due to their high concentration and early onset of action. Consuming 125 seeds may lead to heart failure, which can cause death. *Datura* anoxia and *Datura stramonium* are among the 10 identified species. Plants typically include alkaloids, tannins, saponins, and cardiac glycosides, which contribute to their therapeutic qualities. Phytochemical screening detected glycosides, alkaloids, flavonoids, phenols, steroids, saponins, and tannins. Atropine and scopolamine both depress the central nervous system by acting as competitive antagonists of muscarinic cholinergic receptors. while the entire plant is deadly, ripe seeds have the highest concentration of alkaloids [4].

Few of the Datura Species are

Datura Metal	*Datura Dolichocarpa*
Datura Alba	*Datura Ferox*
Datura Stramonium	*Datura Innoxia*
Datura Fastuosa	*Datura Inoxia*
Datura Candida	*Datura Kymatocarpa*
Datura Ceratocaula	*Datura Leichhardtii*
Datura Discolor	*Datura Reburra*
Datura Wrightii Regel	

Geographical Source The plant
species are found in India, Africa, Asia, Europe, South America, Mexico

Chemical Constituents
The plant contains numerous functional groups such as saponins, tannins, steroids, alkaloids, flavonoids, phenols, and glycosides. Atropine and scopolamine act as competitive antagonists of muscarinic cholinergic receptors, leading to central nervous system depression. All plant components are dangerous, however mature seeds contain the highest concentration of alkaloids [5].

Chemical components of Datura
Daturine (Alkaloid), Mucilage, Scopolamine, Hypocyamine, Hyoscine, Atropine, Norhyoscyamine, Meteolodine, Albumen, Tropane and Malic Acid.

Common names of Datura
Datura is known by various names depending on its location, including Jamestown weed, purple thorn-apple, Hell's bell, Devil's snare, Stinkweed, Jimsonweed, Mad apple,

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Moonflower, Stink wort, False castor oil, Devil's-apple, Stramonium jimsonweed, Devil's trumpet, Devil's cucumber, and Prickly burr [6] recognized as *Dhuttura Kanaka* or *Kanakahvya* in Sanskrit, Sada Dhatura, Kaladhattura in Hindi, Ummetta in Telugu, Ummattangani, Ummattai, Umate in Tamil, Dhattura, Dhotra in Bengali, Dhatura, Dhaturo, Dhanturo in Gujarati, Unmatta, Unmatte-gida in Kannada, Ummattu, Ummatta, Rotecubung, Ummam, and Ummam. The *datura* plant family includes herbaceous, leafy annuals and short-lived perennials that grow up to 2 meters tall. The plant Is known in the United States as "jimsonweed" or, less frequently, "Jamestown weed" after the town of Jamestown, Virginia, when English soldiers drank it while trying to put down Bacon's Rebellion. English Thorn apple.

Description of the plant:

The leaves are alternate, measuring 10-20 cm long and 5-18 cm wide, with a lobed or toothed border. The blooms are trumpet-shaped, upright or spreading, measuring 5-20 cm long and 4-12 cm wide at the mouth. The flower colours range from white to yellow and pastel purple. When ripe, the fruit breaks to release its many seeds. The fruit is a spiny capsule that measures 4-10 cm long and 2-6 cm wide. The seeds quickly spread throughout the meadows, farmland, as well as desolate places. *Datura* is considered a "witches' weed," among deadly nightshade, henbane, and mandrake. The plant genus has a lengthy history of being used to cause delirium and death, as all components are toxic. It was often used in magical ointments, potions, and witches' brews. Typically, the blooms occur in the summer. Stramonium (*Datura*) The fragrant blooms are trumpet-shaped, 6-9 cm (2+12- 3+12 in) long, white to creamy or violet, and have a pleasant fragrance. They grow from leaf axils or branch forks, and are supported by slender stems. The calyx is long, tubular, acutely inclined, swollen at the bottom, and has five pointed teeth on top. The corolla is funnel-shaped, white, folded, and has pronounced ribs. It is only half open. Night-time moths feed on the blooms as they bloom and release a nice smell. The egg-shaped seed capsule has a diameter of 3 to 8 cm (1-3 in) and is either bald or covered with spines. When fully grown, it divides into four chambers, each containing many tiny, black seeds [7].



Figure:1



Figure:2

Parts of *Datura* used in Medicinal Formulations

The whole *datura* plant contains several distinguishing qualities, including anti-spasmodic, analgesic, sleep-inducing, expectorant, sedative, hypnotic, intoxicating, uterine stimulant, and bronchodilator qualities. *Datura* has found a place in many conventional and alternative medicines because to its various therapeutic properties. This includes the fresh or dried leaves, seeds, roots, and fruits. *Datura* seeds need to undergo a series of *sodhana*, or purifying processes, to remove the adverse effects, to lower the toxicity levels in the human body and to increase the therapeutic value of the component. This is because datura seeds are exceedingly hazardous and deadly when consumed in raw form.

***Datura* Seeds**

Datura seeds are commonly used in Ayurvedic and complementary medicines. *Datura* seeds undergo numerous detoxification and purification procedures prior to their use in pharmaceuticals. These treatments enhance datura's medicinal potential while reducing its toxicity in the body. *Datura* seeds can be poisonous and hazardous when consumed raw.

***Datura* Leaves**

Datura leaves have a bitter flavour and a smell that is comparable to that of the seeds. It is a component in herbal plasters. The whole plant contains anodyne, analgesic, sedative, and antispasmodic properties. *Datura's* fresh seeds, fresh leaves, roots, dried leaves, dried mature seeds, and fruits are all employed in pharmaceutical products. Even though all parts of the plant have essentially the same therapeutic qualities and effects on the body, seeds are the component most frequently employed in alternative and conventional medicine.

Medicinal Properties of *Datura*

Antispasmodic	Bronchodilator
Analgesic or Anodyne	Emetic
Sedative	Cardiac Stimulant
Hypnotic	Soporific
Digestive	Uterine Stimulant
Expectorant	Intoxicant

Health Benefits of *Datura*

Enhances Respiratory Health	Reduces Pain and Inflammation
Improves Cardiac Performance	Reduces Fever
Reduces Stress	Improvements to skin and hair health
Improves Fertility and Birth Rates	Promotes Lactation
Immune System Support	Aims to tackle urination issues
Encourages Digestion	Avoids Oral Infections
Treatment for insomnia	

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Toxicity

Datura is a deliriant poison, mentioned under *upavisha* [8]. Datura's leaves and seeds contain toxic alkaloids such as Daturine, albumen, mucilage, and ash. Approximately 25% of the potassium nitrate in these alkaloids is potassium. Consuming uncooked and unprocessed plant components can pose a significant health risk. Scopolamine in drinking water was given to pregnant rabbits on days 10 to 14 and induced fatal eye abnormalities. All the foetuses that were alive and present in six different animals had these abnormalities [9].

Lethal dosage. A petroleum ether extract has a five-fold higher 50% (LD50) than an aqueous extract. Functional groups such as flavonoids, glycosides, and essential oils, which are soluble in petroleum ether but insoluble in water, may contribute to the difference in LD50. The study examined the effects of atropine and scopolamine treatment in male Albino-Wistar rats at acute, subacute, and chronic levels. Administering 100 mg/kg (1/4 DL50) of total alkaloids intraperitoneally to *Datura* seeds had no significant impact on overall appearance, and no fatalities occurred in any of the experimental groups. Consuming the entire alkaloids of seeds led to a significant decline in liver, spleen, and brain function 24 hours later. The treated groups showed significantly higher levels of white blood cells, haemoglobin, haematocrit, and red blood cells than the control group.

An overdosage or use of impurified *Datura* can lead to

Hallucination and intoxication	Muscle stiffness
Fever	Urticaria
Vertigo	Allergic reactions
Restlessness	Increased heart rate
Dry mouth	Increase in Intraocular pressure
Heart palpitation	

Datura Shodhana

Datura is a well-known and frequently used drug in Ayurveda. Since its seeds are highly toxic, Ayurveda advocates specific procedures called *Shodhana* (purification procedures) before rendering it into a safe therapeutic drug. Hence *shodhana* procedure helps in reducing the toxicity of a drug and gives additional properties which are more beneficial therapeutically. Thus, it helps in increasing the medicinal value of the drug [10].

Phytochemicals

There are various minor tropane alkaloids as well as the major tropane alkaloids hyoscyamine and scopolamine found in *Datura* species. Minor alkaloids found in include D. stramoniumtigloidin, aposcopolamine, apoatropine, hyoscyamine N-oxide, and scopolamine N-oxide17–20. This species also contains the first reports of 6 alpha - ditigloyloxy tropane and 7-hydroxyhyoscyamine. In the distribution of D. stramonium, hyoscyamine and scopolamine was investigated. It has been studied how produces hyoscyamine and D. stramonium scopolamine in various plant sections and phases of its life cycle. Young plants' stems and leaves had the highest concentrations, with hyoscyamine always making up most of the mixture. These substances were used in several pharmacopieas due to their anticholinergic properties [11].

CONCLUSION

Plants and herbs are widely recognized as reliable and efficient medicines in both traditional and modern medicine. *Datura*, a wild blooming plant, contains tropane alkaloids such as atropine and scopolamine, which have anticholinergic characteristics. They have been extensively studied for their pharmacological effects, including pain alleviation, central nervous system stimulation, respiratory system decongestion, therapy of skin infections, toothaches, and dental difficulties, and skin congestion. Mature seeds have the largest alkaloid concentration among plant components, despite being harmful overall. Therefore, they are beneficial for treating organophosphate-induced toxicity and its anticholinergic effects. The bark extract is used topically to treat burns, ulcers, swellings, and other skin conditions, while the leaf extract is used internally. It has traditionally been used to treat tumors, swellings, abscesses, headaches, rattlesnake bites, and arthritis. *Datura* is used in Ayurvedic medicine to treat pains, sciatica, ulcers, rheumatism, inflammation, bruises, swellings, asthma, bronchitis, and other respiratory issues. It can also be applied topically to alleviate sciatica and rheumatic symptoms. To treat cestodes and other intestinal worms, juice produced from the leaves in the milk are particularly beneficial.

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