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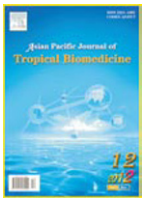

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Pharmacological properties of *Datura stramonium* L. as a potential medicinal tree: An overview

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PEER REVIEW

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Comments

From the time of immemorial, plants have been widely used as curative agents for variety of ailments. Present review gives a broad information about the bioactive constituents, ethnopharmacology along with the scientifically claimed medicinal uses of *Datura stramonium*. The contents of this paper are highly beneficial to scientists who want to work on this plant.

(Details on Page 1007)

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 widely well known folklore medicinal herbs. The troublesome weed, *D. stramonium* is a plant with both poisonous and medicinal properties and has been proven to have great pharmacological potential with a great utility and usage in folklore medicine. *D. stromonium* has been scientifically proven to contain alkaloids, tannins, carbohydrates and proteins. This plant has contributed various pharmacological actions in the scientific field of Indian systems of medicines like analgesic and antiasthmatic activities. The present paper presents an exclusive review work on the ethnomedical, phytochemical, pharmacological activities of this plant.

KEYWORDS

Datura stramonium, Jimsonweed, Phytochemistry, Ethnopharmacology, Traditional uses, Pharmacology

1. Introduction

Plants have always played a major role in the treatment of human traumas and diseases worldwide. The demand for medicinal plant is increasing in both developed and developing countries due to growing recognition of natural product. Herbal medicine is an important part of both traditional and modern system of medicines[1]. *Datura stramonium* (*D. stramonium*) is a widespread annual plant from the Solanaceae family. It is one of the widely well known folklore medicinal herb. 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 include the anti-cholinergic drugs atropine, and scopolamine. From ancient civilization it was traditionally used for religious visionary purposes throughout the world and used by witchcraft in medieval Europe. The god lord Shiva was known to smoke *Cannabis* and *Datura*. People still provide the small thorn apple during festivals and special days as offerings in Shiva

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icons at temples. An extract made from the leaves is taken orally for the treatment of asthma and sinus infections, and stripped bark are applied externally to treat swellings, burns and ulcers. The incidence of *D. stramonium* poisoning is sporadic with a cluster of poisoning cases in the 1990s and 2000s, the United States media reported some cases occurring mostly among adolescents and young adults dying or becoming seriously ill from ingesting. Some medicinal uses of the plant are its anti-inflammatory property of all parts of the plant, stimulation of the central nervous system, respiratory decongestion, treatment of dental and skin infections, alopecia and in the treatment of toothache. It is a hallucinogenic plant that causes serious poisoning. Consumption of any part of the plant may result in a severe anticholinergic reaction that may lead to toxicity and occasionally cause diagnostic difficulties. Cases of poisoning have been reported after eating the berries. Death may occur from heart failure after ingesting 125 seeds, because the seeds contain the highest concentration and has a rapid onset of action, thus may be potentially useful as an alternative to atropine for the treatment of the muscarinic symptoms of organophosphate toxicity and some of central anticholinergic effects. The wide distribution, the strong toxicity and the potential for occurrence in foodstuffs are responsible for the numerous incidents in humans[2]. *Datura* genus distributes over tropical and warm temperate regions of the world. About ten species of *Datura* are found, of which *Datura anoxia* and *D. stromonium* are most important drug plants. *Datura* has long been known as a medicinal plant and as a plant hallucinogen all over the world. Pre-historic use of *Datura* in medicinal and ceremonial rituals could be observed in aboriginal in Indian sub-continent[3]. The therapeutic activities of most plants are due to the presence of one or more of such components like alkaloids, tannins, saponins and cardiac glycosides. The phytochemical screening revealed the presence of saponins, tannins, steroids, alkaloids, flavonoids, phenols and glycosides[4].Atropine and scopolamine are competitive antagonists of muscarinic cholinergic receptors and are central nervous system depressants. All parts of the plant are toxic, but the highest amount of alkaloids is contained in the ripe seeds[4,5]. Many cases of accidental poisoning by *D. stramonium* have been reported when these plants were eaten accidentally[6].

2. Regional and other names

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

3. Scientific classification of *D. stromonium*

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

4. Botanical description

4.1. Plant appearance

D. stramonium is an annual plant (Figure 1). The stem is herbaceous, branched and glabrous or only lightly hairy. By cultivation the plant reaches a height of about one meter[7,8]. The branching stems are spreading, leafy, stout, erect, smooth and pale yellowish green in color, branching repeatedly in a forked manner. Leaves are hairy, big, simple dentate, oval glabrous, apposite veins of leaves are pale black, stalked, 4-6 inch long, ovate and pale green. The upper surface is dark and grayish-green, generally smooth, the under surface paler, and when dried, minutely wrinkled (Figure 1a). *D. stramonium* bears funnel shaped, white or purple coloured flowers, with 5 stamens and superior ovary (Figure 1b). The average length of flower is about 3 inches. The calyx is long, tubular and somewhat a swollen below and very sharply five angled surmounted by five sharp teeth. Corolla is funnel shaped. Stem stalk is pale blue or greenish white. Seeds

Figure 1. *Datura stramonium*.
a: *Datura* plant (leaves and flowers); b: *D. stramonium* fruit; c: *D. stramonium* flower.