

# Hallucinogenic plant poisoning in children

Adnan M. Al-Shaikh, MRCP, FRCPC, Zakira M. Sablay, MBChB.

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## ABSTRACT

*Datura* is a hallucinogenic plant found in urban or rural areas in the Kingdom of Saudi Arabia (KSA). It grows wildly in many parts of the country. Its taste and shape makes it unattractive to both man and animals, though deliberate use by young adults for its hallucinogenic effects have been widely reported for the past 30 years. *Datura* contains 3 main toxic alkaloids: atropine, scopolamine and hyoscamine. Consumption of any part of the plant can result in severe anticholinergic toxicity. Clinical symptoms are those seen in atropine poisoning, particularly mydriasis and hallucinations. Children have a special susceptibility to atropine toxicity; even small amount may produce central nervous system manifestations. Hospitalization is required for agitation and combative behavior although symptomatic treatment is usually sufficient. We report a case of acute *Datura stramonium* intoxication in a 6-year-old boy from Khamis Mushayt, KSA, who presented with restlessness, hallucinations and mydriasis 8 hours after ingesting the seeds of *Datura* plant.

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*Datura stramonium* (*D. stramonium*) plant is known by a variety of names, jimsonweed, devils weed, devils apple, thornapple, angels trumpet, malpitte.<sup>1</sup> The name actually comes from Jamestown weed, considering the first recorded accidental ingestion occurred in Jamestown, Virginia when soldiers consumed a salad containing *Datura* and developed disease in the central nervous system (CNS). It is widely distributed and easily accessible allowing various cultures to use it as a hallucinogen. It contains toxic anticholinergic alkaloids. Voluntary or accidental ingestion can produce serious illness or death.<sup>2,3</sup> The clinical presentation is similar to that seen in cases of atropine poisoning.

The aim of this case report and review of literature is to describe the clinical features, management and outcome of *Datura* plant poisoning, and to orient physicians on this rare but serious poisonous plant.

**Case Report.** A 6-year-old boy from Khamis Mushayt, Kingdom of Saudi Arabia (KSA) was

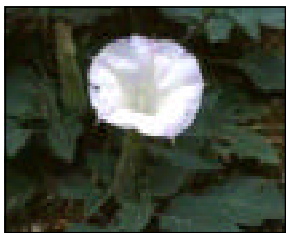
brought to the emergency room (ER) with complaint of increasing confusion, restlessness and aggression after ingesting the seeds of a plant which the parents fortunately brought along for identification. According to the mother, he developed facial flushing, progressive confusion, combativeness and aggression until he was brought to the ER 8 hours later. Previously he was healthy, with no significant past medical history, was not taking regular medication and had no known allergies. Parents and other 3 siblings were all healthy. On examination he was afebrile, tachycardic, flushed face, hemodynamically stable, normotensive and maintaining his own airway. Systemic examination was unremarkable. There were no skin rashes or strange odors observed. Cardiovascular examination was with normal electrocardiogram. His abdomen was soft, bowel sounds were audible and he was passing urine normally. Neurological examination revealed disorientation to time, place and person. He was having visual hallucinations and had bilateral mydriasis, with pupil's size 7 mm and photophobia. He had normal power, tone and

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From the Department of Pediatrics, Armed Forces Hospital, Southern Region, Khamis Mushayt, Kingdom of Saudi Arabia.

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Address correspondence and reprint request to: Dr Adnan M. Al-Shaikh, Consultant Pediatrician, Department of Pediatrics, Armed Forces Hospital Southern Region, PO Box 101, Khamis Mushayt, Kingdom of Saudi Arabia. Tel. +966 (7) 2500001 ext 2170. Fax. +966 (7) 2500001 ext 2186. E-mail: ashsaik@health.net.sa



**Figure 1** - *Datura stramonium* plant. Note the trumpet-like shape and white flowers.



**Figure 2** - *Datura stramonium* plant. Note the spiny appearance of seed pods.

reflexes with no evidence of cerebellar ataxia. The main feature was behavioral, with emotional lability, flitting between euphoric laughter to inappropriate crying and disturbing visual hallucinations. We admitted him to our high dependency unit where he was kept on cardiac monitor. He received one dose of activated charcoal. A few hours after admission we administered an oral benzodiazepine to control his severe agitation. Though he continued to have hallucinations for the first few hours after admission, he settled after the oral diazepam. Thirty-six hours after admission he was fully oriented, though he still had bilateral mydriasis. Investigations including complete blood count, urea and electrolytes, coagulation profile, random blood sugar and blood gas were all normal. Urine toxicology screen was negative for amphetamines, opiates, cannabis, benzodiazepines and cocaine. Fortunately, the parents brought a specimen of the plant and extensive search on the internet allowed identification of the offending agent, namely, *D. stramonium*.

**Discussion.** *Datura stramonium* is a hallucinogenic plant, which causes serious poisoning. *Datura* species is the most commonly encountered plant containing tropane alkaloids.<sup>3</sup> They are 3-5 ft. annuals with coarse toothed leaves. The plant usually flowers from May to September. Trumpet shaped flowers are 3-5 inches in length, with white pale violet colored petals (Figure 1). Seed pods are rounded, covered with spikes and contain 50-100 small seeds which is most important for taxonomic identification (Figure 2). The seeds, leaves, roots, flowers and stems contain belladonna alkaloids, atropine, scopolamine and hyoscamine.<sup>4</sup> The seeds contain the most alkaloid (.40%) principally as atropine. Scopolamine, acting as an antagonist at both peripheral and central muscarinic receptors, is thought to be the primary compound

responsible for the toxic effects of these plants. Ten seeds contain approximately 1 mg of atropine. Atropine is readily absorbed from the gastrointestinal tract and distributed to tissues throughout the body, including the CNS. Between 15-50% of atropine is excreted unchanged in the urine, the rest undergoes enzymatic hydrolysis in the liver.<sup>5</sup> Atropine blocks the acetylcholine receptor sites of postganglionic synapses of the cholinergic nerves, producing CNS manifestations, which are linked to atropine poisoning. The pharmacologic effects are dose-related. The anticholinergic toxidrome "mad as a hatter, red as a beet, blind as a bat, hot as a hare, dry as bone" suitably describes the symptoms and signs produced. Due to its hallucinogenic effects, abuse of *D. stramonium* should be suspected in adolescents presenting with altered mental state and hallucinations in conjunction with other anticholinergic symptoms and signs. *Datura stramonium* grows in many parts of KSA. Taha et al<sup>6</sup> reported 3 cases of *D. stramonium* poisoning in Riyadh, KSA. Due to the special susceptibility of children to atropine toxicity and the relatively small lethal dose (<10 mg), treatment with the specific antidote, physostigmine were needed for severe cases in addition to symptomatic treatment. The management of anticholinergic overdoses generally includes provision of supportive care of the airway, breathing and circulation. Hospitalization is indicated for all cases, since an altered mental state may persist for several days. Gastric lavage and activated charcoal are useful in the first 24 hours after ingestion, as decreased gastric motility associated with atropine poisoning may lead to prolonged absorption and effect.<sup>7,8</sup> Benzodiazepines are helpful for severe agitation, though caution against the use of phenothiazines, due to their anticholinergic properties. Cholinesterase inhibitor such as tacrine hydrochloride or physostigmine may be used to reverse CNS manifestations, but should be reserved

for severe cases, unresponsive to supportive measures, tachydysrhythmias, hemodynamic compromise, intractable seizures, extreme agitation or psychosis.<sup>4,5</sup> Following GI decontamination, most patients rarely require more than physiologic and psychological support. The prognosis for *Datura* intoxication is good, with most patients making a full uneventful recovery, although fatal poisoning with *D. stramonium* in a 20-year-old male was reported by Urich et al<sup>3</sup> in 1982.

Review of the literature on *Datura* poisoning reveals little published on diagnosis and treatment of this toxic plant. Klein-Schwartz and Oderda<sup>9</sup> reviewed 73 jimsonweed exposures reported to a regional poison center over a 5-year period. The ingestors mean age was 17.3 years (range, 11-28 years). Fifty-nine of them required medical care in an emergency department or were admitted to the hospital. Treatment consisted of gastrointestinal decontamination, supportive care, and physostigmine administration. Almost 40% of the medically treated patients received physostigmine for severe hallucinations. One of the 59 medically treated patients developed seizures. He concluded that abuse of jimsonweed is a serious form of substance abuse. Francis and Clarke<sup>4</sup> reported 5 adolescent boys aged 14-15 years with deliberate *Datura* ingestion as hallucinating agent. All of them had prior experience with drugs including alcohol, tobacco and marijuana. They were presented to ER one hour after *Datura* ingestion with various degrees of agitation, confusion and hallucinations. One of them needed ventilation for 1 day and 3 of them required intravenous diazepam to control agitation. Two of the patients experienced a rapid reversal of their toxic features following administration of the anti-cholinesterase tacrine hydrochloride and avoided intubation. He recommended that the use of the anti-cholinesterase tacrine or physostigmine should be considered in moderate to severe cases to rapidly control symptoms. Fifty-six patients (ages 2-76 years) with plant poisoning in Tunisia was reported by Hamouda et al.<sup>10</sup> 25% were due to *D. stramonium* ingestion, their treatment was mainly symptomatic. Tiøngsen and Salen<sup>11</sup> reviewed 11 cases (aged 13-21 years) who presented to ER following oral ingestion of jimsonweed pods and seeds. Their symptoms and signs ranged from asymptomatic mydriasis and tachycardia to severe agitation, disorientation and hallucinations. Nine of them were admitted for observation. There were no deaths associated with these ingestions and none of the patients required physostigmine for reversal of severe anticholinergic symptoms. All of them made complete recovery. Amlo and Haungeng<sup>12</sup> described 5 cases of poisoning with jimsonweed (*D. stramonium*), all were admitted to the hospital with moderate to severe anticholinergic symptoms, agitation,

hallucinations and seizures. Owing to their agitated behavior, gastrointestinal decontamination was impossible. All of them needed repeated doses of physostigmine (2-3 mg) administered intravenously reversed the anticholinergic features without side effect. In the most severe case, physostigmine was needed for 18 hours and all patients recovered in 2 days but mydriasis persisted in many cases. Dewitt et al<sup>1</sup> reviewed 9 teenagers who were treated in hospital after ingesting jimsonweed. Their treatment consists of activated charcoal, gastric lavage and -blocker to reduce severe tachycardia. Physostigmine was given to those with seizures, severe hypertension and severe hallucinations. Centers for Disease Control and Prevention reported that during October and November 2002, the Cincinnati Drug and Poison Information Center (DPIC) received notification and offered treatment advice for 14 adolescents in the Akron/Cleveland, Ohio, area who became ill after intentional exposure to toxic seeds that DPIC identified as *Datura innoxia*.<sup>13</sup> All became ill shortly after eating the seeds or drinking tea brewed using the seeds. All patients recovered fully after treatment.

The clinical data of 17 victims of jimsonweed poisoning were retrospectively studied by Salen et al<sup>14</sup> to examine the impact of the administration of physostigmine and of nasogastric evacuation of jimsonweed seeds on intensive care unit (ICU) use. All of them presented with an anticholinergic toxidrome 3-9 hours after ingestion of 7-200 seeds. Altered mentation, manifested by combative behavior, necessitated admission of 13 patients to the ICU. The administration of physostigmine did not reduce admissions to the ICU or reduce length of stay in the hospital compared with the use of benzodiazepines alone. Nasogastric lavage was performed in 14 (82%) and seeds were recovered in 8 (57%) of those lavaged. The successful removal of jimsonweed seeds did not decrease ICU use rates or shorten length of stay in the hospital compared with not recovering seeds ( $p=0.85$ ). The use of physostigmine and the successful nasogastric lavage of jimsonweed seeds did not result in the decreased intensive care use or shorter length of stay in the hospital for jimsonweed induced anticholinergic toxicity.

Chang et al<sup>15</sup> reported an incident of 14 people with *Datura* intoxication presented to the emergency room within 15-30 min of *Datura* ingestion. The symptoms or signs were dizziness, dry mouth, flushed skin, palpitations, drowsiness, tachycardia, blurred vision, mydriasis, hyperthermia, disorientation, agitation, delirium, urine retention, hypertension and coma. Three patients were hospitalized for 2-3 days. Thirteen persons received supportive fluid therapy. Three persons needed Foley catheterization for urine retention or coma status. Four patients presented

with delirium or coma needed physostigmine therapy with good response. One patient was intubated due to coma and respiratory depression. All patients recovered with no sequelae.

In conclusion, *D. stramonium* poisoning is a potentially serious form of deliberate or accidental plant ingestion in children, adolescents and young adults. Due to its hallucinogenic effects, abuse of *D. stramonium* should be suspected in adolescents presenting with altered mental state and hallucinations in conjunction with other anticholinergic symptoms and signs. All patients should be admitted to the hospital, some may need ICU admission according to the severity of symptoms. Medical care giver should be aware of the signs, symptoms and the possible management of *Datura* poisoning. Patients with moderate to severe anticholinergic symptoms may require the use of the anti-cholinesterases physostigmine or tacrine to control or reverse symptoms, but should be reserved for severe cases unresponsive to supportive measures.

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