Datura induced delirium: 
A report of two cases

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ABSTRACT

The native herbal plants belonging to the Solanaceous family are found worldwide including Saudi Arabia. Though the various parts of these plants are used as herbal medicines in the treatment of a variety of diseases, some of them are toxic to humans and animals. We report two cases who treat themselves with cooked Datura leaves for common cold but developed toxic features suggestive of peripheral and central anticholinergic syndromes, in particular delirium. Besides discussing different aspects of Datura poisoning, it is recommended that clinicians working in emergency departments of general and psychiatric hospitals should take relevant history of herbal plant consumption in patients who present with acute delirium, in order to make a correct diagnosis and give specific treatment.

Keywords: Solanaceous family, Datura poisoning, delirium

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Anticholinergics are found in naturally occurring alkaloid plants, such as several Datura varieties in different parts of the world. The main alkaloidal constituents of these plants are atropine, scopolamine and hyoscyamine. The Solanaceous family has Atropa belladonna and Hyoscyamus niger and muticus. Although these plants have many therapeutic uses, the accidental or intentional ingestion or inhalation by smoking of their leaves, fruits or seeds, results in poisoning and intoxication in humans, as well as animals. Unlike humans, acute Datura poisoning in animals is rare. Interestingly, rabbits and sheep are not at risk because they have atropine esterase enzyme which nullifies the toxic effects of atropine.

Like many synthetic anticholinergics such as Benztropine mesylate, Biperiden hydrochloride, Ethopropazine hydrochloride, orphenadrine citrate, procyclidine hydrochloride, trihexyphenidyl hydrochloride, the plants of the Solanaceous family produce a variety of toxic effects, if taken in overdoses. In humans, these effects include delirium, coma, seizures, severe agitation, manic like symptoms, visual and auditory hallucinations, severe hypotension, supraventricular tachycardia, flushing, mydriasis with accommodation difficulties, hot dry skin and dryness of the mouth, skin rashes, hyperthermia, decreased bowel sounds, retention of urine, circulatory and respiratory failure and in some cases it is fatal. These salient features of Datura poisoning have been summarized eloquently in the following phrases; "hot as a hare, blind as a bat, dry as a bone, red as a beet, and mad as a wet hen". The aforesaid manifestations, also referred to as "plant toxidromes", are produced as a result of muscarinic receptors blockade in the central and the peripheral nervous system. Notably, the estimated fatal doses of atropine both in children and adults are 10-12 mg and 100 mg.

In addition, these alkaloids, like synthetic drugs, have mind alerting, hallucinogenic, mood elevating, and narcotic effects. Therefore, there is a risk of abuse. Epidemiologically, Datura intoxication has been reported in all age groups and

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both genders. In addition to the diagnostic clinical manifestations of Datura poisoning, the molecular ions and principal fragment ions of these alkaloids could be detected in urine extracts by mass spectroscopy which further confirm the diagnosis. Two other confirmatory tests of the diagnosis of atropine/belladonna poisoning include: first a pharmacological test which includes injection of 10-30 mg of methacholine to the suspected patient who fails to elicit moistening of the mouth mucous membranes, lacrimation, sweating and gastrointestinal hyperactivity. The second test is putting one drop of patient’s urine in cat’s eye which dilates due to atropine excretion in the urine.

On the other hand, the Datura weed leaves in small amounts have been used in animal feeds, in herbal teas, homemade toothpastes, other food items and herbal medicines. Additionally, the herbal medicines containing Datura are therapeutically used in asthma, chronic bronchitis, flu, a variety of pains, ophthalmic diseases, skin conditions and gastrointestinal disorders.

Although there is a lot of information available on Datura plant, including intoxication but there is scanty data from rapidly developing countries. We merely found a short clinical report in the form of a letter to the Editor on 2 brothers, ages 5 and 6 years, who developed Datura poisoning after eating its fruits.

The diagnosis of Datura poisoning is usually deceptive because the presentation is often characterized either by psychosis in adults or exanthematous-like rashes in children. There is a general interest in exploring the scientific basis of traditional herbal medicines (alternative medicine) and practices. Moreover, the utilization of health services by consumers is not equal, and this is due to many reasons which include: low paid immigrants, high cost of private consultations, poverty, illiteracy and the rural background of those people who need health services most. Finally, the difficult access to these services, dissatisfaction with modern medicine, the lack of legal restriction on the use of herbal plants in addition to socio-cultural beliefs usually drive this sector of the population to use indigenous medicines. Some users develop toxic symptoms which will probably increase the incidence of medical emergencies.

In the light of the above, we report two patients, both Bangladeshis working in Al-Qassim region, Saudi Arabia, to draw the attention of clinicians to consider medicinal plant consumption in patients who present with acute emergencies, i.e. plant toxidromes. This will facilitate a definite diagnosis, effective specific management and better epidemiological documentation.

Case Reports.

Patient 1. A 22 year old, Bangladeshi male, shepherd with a negative family history and not known to have any psychiatric disorders including drug abuse, was brought by police for admission to the Buraidah Mental Health Hospital. He was found in acute excitement and causing social disruption. After being overpowered, he was taken to the emergency services of the General Hospital where he was observed for a short period and later referred for psychiatric management. Due to excitement, he did not allow any physician to examine him physically. The relevant history revealed that 2-3 hours before developing acute behavioral and cognitive changes, the patient took his dinner which comprised of especially cooked plant leaves collected from the nearby farm and boiled rice. The weight of the leaves was almost 150-250 grams.

Furthermore, he did not consume the entire cooked leaves. The shepherd simply informed that he intended to use the leaves of this known plant for relieving common cold. He was afebrile.

Two to three hours after consumption of the meal, he began to show disturbed and impulsive behavior, restlessness, psychomotor hyperactivity, giberisher talk, fleeting attention, reduced concentration and altered level of consciousness, disorientation, visual and auditory hallucinations, aggressive and angry bouts, social disinhibitions, aimless wandering and ataxic gait. The approximate time duration for developing full syndrome was 5-6 hours. The police arrested him and transferred him to the emergency department of a general hospital. As the patient was uncooperative and violent, the medical personnel could not do much but to refer him to the psychiatric hospital. Following admission in the psychiatric hospital, he was immediately given 10 mg of diazepam intramuscularly and was also restrained. He had tachycardia, dryness of the mouth and flushed hot dry skin and mild fever. Blood pressure was normal. He slept well overnight and did not require any further sedation. He recovered fully in the next morning without any residual symptoms except mild amnesia for the acute disturbances, constipation and mydriasis. His sensorium was clear and he was well oriented with no perceptual or thought disturbances. His affect was normal and his judgment and insight were fairly good. Also the physical examination was within normal limits. The blood and urine laboratory investigations were not significant. Finally, the patient informed that the leaves were of Datura plant. As the patient showed complete recovery, no further psychotropic drugs were prescribed. However, as one of the future preventive measures, he was advised not to reconsume any parts of this plant but
Table 1 - Some common varieties of Datura Plant (Solanaceous family).

<table>
<thead>
<tr>
<th>Main constituents</th>
<th>Uses+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyoscine, hyoscine, atropine scopolamine</td>
<td>Tea, toothpaste, beverages vinegar</td>
</tr>
<tr>
<td>Atropine, hyoscine, scopolamine</td>
<td>Herbal medicines</td>
</tr>
<tr>
<td>Hyoscine, hyoscine</td>
<td>Herbal drugs</td>
</tr>
<tr>
<td>Atropine</td>
<td>Herbal medicine</td>
</tr>
<tr>
<td>Atropine, scopolamine</td>
<td>Medicinal plant</td>
</tr>
<tr>
<td>Hyoscine, hyoscine</td>
<td>Herbal drugs</td>
</tr>
<tr>
<td>Scopolamine</td>
<td>Chinese medicine</td>
</tr>
<tr>
<td>Atropine, scopolamine</td>
<td>Animal feeds</td>
</tr>
<tr>
<td>Scopolamine, hyoscine</td>
<td>Herbal drugs</td>
</tr>
<tr>
<td>Atropine</td>
<td>Chinese herbs</td>
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<tr>
<td>Scopolamine</td>
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</tbody>
</table>

*Thorn apple seeds, Jimson weed, Janestown weed, Angel's Trumpet tea
**Indian Datura (also found in Saudi).
***Himalayan scopolia

+All these medicinal plants are used differentially in ophthalmic practice, motion sickness, respiratory medicine, cardiovascular disorders, skin diseases, experimental biology and for adulteration purposes

to consult the nearest primary care center for any health problem. Finally, he was discharged in the fourth day with the diagnosis of Datura-induced delirium.

**Patient 2.** A 24 year old, Bangladeshi male shepherd was also brought by police for psychiatric consultation. He also had a referral letter from the emergency department of the General Hospital. This patient also took dinner with the aforesaid Bangladeshi and subsequently developed the similar sequence of events including behavioral, cognitive and neurological manifestations. However, some differences were noted in patient 2 which were: (1) The severity of symptoms as compared to patient 1 was relatively mild. (2) Two to three hours after consumption of dinner, he had one episode of vomiting which was not associated with abdominal pain. (3) At the time of admission to the psychiatric hospital, he did not require any sedation or restraint. (4) Physical examination was normal and vital signs were stable. The management was conservative and he was also discharged after 4 days with the diagnosis of Datura-induced delirium.

**Discussion.** Datura Stramonium and Datura innoxia are the most common varieties of native plants found in Al-Qassim region. Datura plants have been identified and the macroscopic, microscopic and the chemical structure of their constituents have been studied. Datura along with its common varieties found in this country need further basic and applied researches in animals as well as humans to evaluate any cross-cultural pharmacological differences and their pharmaceutical and therapeutic implications.

As reported earlier, the toxic manifestations of Datura are caused by blockage of muscarinic receptors in the peripheral and the central nervous system (CNS) effects are mediated through the diencephalon, medulla oblongata and telencephalon.

Patient 1 developed toxic CNS features suggestive of an acute chemically induced toxic psychosis or delirium. Acute toxic symptoms have been reported in about 25% cases of Atropa belladonna poisoning. The severity of delirium in this case was moderate. Besides, he also developed some peripheral nervous system side-effects. The toxic manifestations involving both central and peripheral nervous systems are common and have been reported in the majority of Datura poisoning cases. However, our most important concern is that the diagnosis in both cases was missed and this reflect the need to provide continuous education on herbal-induced intoxication.

Patient 1 had upper respiratory tract infection and he attempted to treat himself with Datura leaves. Immigrants working in private sectors do not have easy and prompt access to primary health care services. This pattern has even been found in rural and nomadic communities of Saudi Arabia. We feel this is the main reason driving this particular population to treat themselves with herbal medicines. Such population is usually familiar with some of the
Figure 1 - Datura plant

herbal plants.

It is likely that the use of herbal medicines, such as Datura leaves in these 2 patients resulted accidentally in Datura poisoning. The possible implication is that there will be an increased incidence of accidental herbal-induced poisoning. Therefore, clinicians working in emergency departments of general hospitals should be aware of the toxic manifestations of some of the worldwide reported herbal plants, including Datura varieties which are also encountered in Al-Qassim region. These patients then can be identified earlier and proper management should be instituted promptly.

The difference in symptoms severity in both patients might be explained mainly by the vomiting episode that patient 2 developed. Hence, the overall absorption of alkaloids was comparatively low. Therefore, patient 2 might have developed mild form of delirium. Alternatively, it is possible that patient 2 might have consumed a little amount of cooked Datura leaves. Individual sensitivity as another explanation can not be ruled out.

Taken together, the management of Datura poisoning includes immediate hospitalization, correct diagnosis, gastric lavage with 4% tannic acid solution, use of emetics and activated charcoal, adequate sedation while keeping the patient in a safe atmosphere, reduction of temperature by ice packs and sponging and the administration of phystostigmine salicylate, an antidote which crosses the blood brain barrier. The usual dose used is 2 mg for adults and 0.5 mg for children through IM, IV or SC routes in order to reverse the severe peripheral as well as central anticholinergic sequelae. This drug could be repeated every 15 minutes until the desired effect is achieved.

Other drugs such as propranolol and barbiturates are used to treat complications like arrythmias and convulsions. Notably, phenothiazines are contraindicated because of their atropine like actions on CNS. Due to the aforesaid reasons, patient 1 required mild sedation and restrain to control his agitation, while patient 2 did not require any of the above mentioned interventions.

Both patients were not diagnosed either by the emergency personnel of the general hospital or the resident psychiatrist who admitted them. The diagnosis of Datura induced anticholinergic syndrome versus delirium was made in the consensus meeting. Both patients also described the plant which was identified as Datura plant [Datura stramonium, Figure 1] and supported by the clinical manifestations. The common varieties of Datura plant of Solanaceae family are listed in Table 1.

The plant was further identified by one of the plant experts (Ahmed Hmam. Personal communication 1996) who added that this wild plant may lead to abortion in animals and that the cooked plant added to locally distilled beverages enhances its biological and behavioral effects. Datura innoxia is another wild plant from Solanaceae Family found in the central region of Saudi Arabia. Mass spectrometrical assay for detecting the constituents of Datura in urine are not available for us; this could have further confirmed our clinical diagnosis.

In conclusion, we emphasize that physicians working in emergency departments of various hospitals should take a relevant history of plant consumption in patients presenting with plant toxidromes. Eventually, this will help in making the correct diagnosis and accurate management.

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