Datura poisoning, clinical and laboratory findings. Report of five cases

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Abstract:
Introduction. Plants of Datura species contain belladonna alkaloids that can cause central and peripheral anticholinergic effects. Abuse of Datura plants for their hallucinogenic effects is growing among adolescents and young adults. Datura poisoning has caused a diagnostic challenge in medical emergency wards. In this article we report 5 cases of Datura toxicity at Clinical Toxicology Emergency of Baharloo Hospital, Tehran, Iran during Summer-Fall 2015, and discuss their clinical presentations and laboratory findings.

Cases. All 5 cases with Datura toxicity were young males and had intentionally used the plants. Mean duration of hospitalization was 3.2 days. Three cases were multiple-drug abusers. Mydriasis, tachycardia, tachypnea and flushing alongside with psychotic-like signs and symptoms were observed in all cases. Elevation of liver enzymes was present in three of cases but without clinical significance. Raised LDH or CPK in four patients were without myoglobinuria and evidence of rhabdomyolysis and these biomarkers returned to normal levels by supportive care. All patients discharged with complete recovery and there was no need to ICU admission.

Discussion. With the absence of routine laboratory diagnostic tests for alkaloids and complex and confusing presentations of Datura intoxication, diagnosis of such cases is difficult. Physicians' clinical suspicion and sufficient knowledge play the mainstay roles in appropriate and timely diagnosis and management of cases with Datura toxicity. Since regulatory legislation wouldn't be successful in halting the availability of natural plants, the best strategy to prevent Datura abuse is informing people about the adverse effects of these plants.

Key Words: datura stramonium, poisoning, abuse, anticholinergic, laboratory findings, liver function tests, rhabdomyolysis.

New features of drug abuse and addiction are emerging rapidly. Many alternatives for traditional drugs are being introduced, based on demands of abusers [1]. Besides chemicals, some of natural substances like plants are also being used as alternatives for illicit drugs with similar desired effects like hallucinogenic, sedative or stimulating effects [2]. The abuse of some of these herbs are welcomed by consumers because of their availability, low prices, lack of regulatory legislation and the commonly accepted idea of their higher safety compared to man-made or chemical preparations [2]. "Datura stramonium" species - also called "Jimson Weed" or "Angel's trumpet" - comprises of plants that are being abused as herbal psychoactive substances, usually by adolescents or youth [3]. Datura plants contain belladonna alkaloids (like Atropine, Scopolamine and Hyoscyamine), which cause central and peripheral anticholinergic effects [4-6]. Diagnosis and management of Datura poisoning is a challenge for emergency wards due to its confusing clinical picture, unavailability of routine laboratory diagnostic tests and physicians' unfamiliarity with this form of drug abuse [2].

In this article we report 5 cases of intentional

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Datura poisoning, admitted to Baharloo Hospital - a referral center of toxicology in Tehran, Iran - during Summer-Fall 2015. We describe their presentation, clinical course and laboratory findings.

CASE DESCRIPTIONS

Case 1
A 29-year-old man developed hallucination, vomiting and diarrhea two hours after drinking a cup of herbal tea containing “Datura flower” taken from his friend for breakfast. At admission, he had mydriatic pupils, flushing, persecutory delusions, vomiting and dry mouth. Vital signs at admission are available in Table 1. There was no previous history of any substance abuse. Findings of our routine laboratory studies (CBC, Ionograms, Liver Function Tests, Renal Function Tests, Lactate Dehydrogenase or LDH, Creatine Phosphokinase or CPK and Urine Screening Test for common toxins) are available in Table 2. Due to evident history of Datura intoxication, there was no diagnostic challenge. He received 10mg of intravenous Diazepam at Emergency Room for sedation and hospitalized at Clinical Toxicology Ward for supportive care. After 48 hours, he discharged with recovery of symptoms. His raised LDH had been steadily declining at repeated laboratory tests. Mild elevation of Liver Function Tests was persistent and he was advised on further outpatient follow-up for underlying liver diseases.

Case 2
A 23-year-old male patient was referred to General Emergency Ward with nausea and vomiting, disorientation, delusions, agitation, tachycardia and mydriasis. He was first admitted at Psychiatric Emergency Ward but after hours, referred to Clinical Toxicology Emergency with suspicion of substance poisoning. In detailed history, his friends reported ingestion of powder of Datura seeds for stimulation effects, before the onset of symptoms. There was no previous history of drug abuse or addiction. Vital signs and important laboratory findings are summarized in Tables 1 and 2. He received

Table 1. Important clinical and paraclinical findings of five cases of Datura poisoning at Clinical Toxicology Emergency of Baharloo Hospital, Tehran, Iran, during Summer-Fall 2015.

<table>
<thead>
<tr>
<th>Case Number</th>
<th>Pulse Rates/ min</th>
<th>Axillary Temperature (°C)</th>
<th>Respiratory Rates/min</th>
<th>Blood pressure(mmHg)</th>
<th>EKG Findings</th>
<th>O₂ Saturation</th>
<th>ABG Findings at admission</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>108</td>
<td>37.8</td>
<td>17</td>
<td>121/70</td>
<td>Sinus tachycardia</td>
<td>98%</td>
<td>Normal</td>
</tr>
<tr>
<td>2</td>
<td>120</td>
<td>38.4</td>
<td>23</td>
<td>150/80</td>
<td>Sinus tachycardia</td>
<td>97%</td>
<td>Respiratory acidosis</td>
</tr>
<tr>
<td>3</td>
<td>119</td>
<td>38</td>
<td>19</td>
<td>120/80</td>
<td>Sinus tachycardia</td>
<td>98%</td>
<td>Respiratory acidosis</td>
</tr>
<tr>
<td>4</td>
<td>110</td>
<td>38.2</td>
<td>18</td>
<td>143/70</td>
<td>Sinus tachycardia</td>
<td>98%</td>
<td>Respiratory acidosis</td>
</tr>
<tr>
<td>5</td>
<td>105</td>
<td>37.5</td>
<td>15</td>
<td>130/75</td>
<td>Sinus tachycardia</td>
<td>97%</td>
<td>Normal</td>
</tr>
</tbody>
</table>

All findings have been documented at the time of admission to Clinical Toxicology Emergency.

Table 2. Laboratory findings of five cases of Datura poisoning at Clinical Toxicology Emergency of Baharloo Hospital, Tehran, Iran, during Summer-Fall 2015.

<table>
<thead>
<tr>
<th>Case Number</th>
<th>Blood Sugar (mg/dL)</th>
<th>Kidney Function Tests</th>
<th>Ionogram</th>
<th>Liver Function Tests</th>
<th>Rhodomyolysis Indicators</th>
<th>CBC Findings</th>
<th>Urine Screening Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>122</td>
<td>Normal</td>
<td>Normal</td>
<td>64*</td>
<td>137</td>
<td>119</td>
<td>WBC=10200/ mcl (PMN=88%)</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td>Normal</td>
<td>Normal</td>
<td>36 69*</td>
<td>188</td>
<td>73</td>
<td>Normal</td>
</tr>
<tr>
<td>3</td>
<td>93</td>
<td>Normal</td>
<td>Normal</td>
<td>30 27</td>
<td>285</td>
<td>233*</td>
<td>WBC=12200/ mcl (PMN=86%)</td>
</tr>
<tr>
<td>4</td>
<td>97</td>
<td>Normal</td>
<td>Normal</td>
<td>38 54</td>
<td>217</td>
<td>180</td>
<td>Normal</td>
</tr>
<tr>
<td>5</td>
<td>102</td>
<td>Normal</td>
<td>Normal</td>
<td>44* 48</td>
<td>310</td>
<td>488*</td>
<td>1204*</td>
</tr>
</tbody>
</table>

All tests have been applied on the blood samples of patients obtained at the time of admission to Clinical Toxicology Emergency. AST(SGOT) = Aspartate transaminase. ALT(SGPT) = Alanine transaminase. ALKP = Alkaline Phosphatase. THC = Tetrahydrocannabinol. * Points to the elevated laboratory test values, based on the age-standardized normal ranges of our tests.
Physostigmine at Clinical Toxicology Emergency due to severity of his anticholinergic signs; sedatives also had been prescribed at Psychiatric Emergency. He stayed at Clinical Toxicology Ward for 3 days and discharged in good health condition. At discharge, his elevated ALT and LDH were in normal range.

**Case 3**

A 25-year-old male patient with the history of multiple-drug abuse was admitted to Toxicology Emergency Ward after smoking a preparation of “Cannabis and seeds of Datura”. He was very agitated and showed aggressive behaviors and tried to harm himself. Mydriasis, flushing, nausea and thirst were present. His vital signs and laboratory tests are available in Tables 1 and 2. Due to severe agitation, he received 20 mg of intravenous Diazepam in two doses, one dose of Midazolam and one dose of Haloperidol at first day of admission. He transferred to Clinical Toxicology Ward after sedation and was under supportive care for 4 days. He raised concerns about probable rhabdomyolysis among physicians. Neither myoglobinuria, nor any indicative symptom or sign of rhabdomyolysis were detected during hospital stay. He discharged when his elevated LDH and CPK returned to normal.

**Case 4**

A 17-year-old student brought to Toxicology Emergency by his friends due to severe agitation, hallucination, flushing and vomiting after taking a cup of herbal tea containing “Cannabis and Datura”. Tables 1 and 2 show his vital signs and laboratory tests. While there was no reported history of any drug abuse, Urine Screening Test was positive for Tramadol and Cannabis. He received 20 mg of intravenous Diazepam at Emergency Room but due to uncontrollable agitation, Midazolam was also prescribed. He stayed at Clinical Toxicology Ward for two days and discharged in good condition.

**Case 5**

A 17-year-old boy with the history of alcohol abuse, smoking and previous drug poisoning was brought to Clinical Toxicology Emergency Ward by his parents because of visual and hearing hallucinations and severe agitation. At admission, he presented with mydriasis, flushing and other anticholinergic signs (Table 1). Laboratory tests are summarized in Table 2. At Emergency Room he received two doses of intravenous Diazepam and one dose of Midazolam to control his severe psychotonic symptoms. With the elevated LDH and CPK levels, he was suspicious for rhabdomyolysis. He was hospitalized for 5 days and received intravenous fluids. Fortunately, there was no myoglobinuria and symptoms of rhabdomyolysis during hospitalization. His raised LDH and CPK levels had been gradually reducing in serial tests and mild elevated AST returned to normal at the time of discharge.

**DISCUSSION**

Datura plants grow spontaneously in most parts of the world and have been used in folklore and traditional medicine as herbal treatments for many medical problems [7]. Intentional use of Datura plants for their hallucinogenic and stimulating effects is growing especially among adolescents and youths [8]. Different Datura plants have various amounts and proportions of alkaloids and therefore severity of symptoms in poisoned patients may vary [4]. In each plant all parts contain alkaloids, but they are greatest in ripe seeds [4, 7]. Central effects of alkaloids are usually psychotic-like signs and symptoms including delirium, hallucination, confusion, disorientation, agitation, aggression, photophobia, blurred vision, seizure and even coma [3, 4, 7, 9]. Peripheral signs of alkaloids are mydriasis, dry skin and mouth, flushing, tachycardia, fever, hyper or hypotension and urinary retention [4, 9, 10]. Treatment is usually supportive care, fluid replacement and Benzodiazepines for sedation; but in severe cases Physostigmine may be used for the alleviation of anticholinergic symptoms [4, 9]. Patients with Datura poisoning usually recover soon, with short duration of hospitalization [4, 5, 11]. Despite benign nature of Datura poisoning in most cases, reports of fatalities [12], coma [7], seizure [7], rhabdomyolysis [13] and impairment of liver function tests [14] are also available.

In this report, we described 5 cases of Datura intoxication referred to Clinical Toxicology Emergency Ward of a toxicology referral center in Tehran, Iran. All cases were hospitalized in Clinical Toxicology Ward with mean duration of 3.2 days. Mydriasis, tachycardia, hyperthermia and altered mental condition were present in all patients. Urine Screening Test showed multiple-drug abuse in three of cases. Leukocytosis and mild elevation of liver function tests were observed in two and three of patients, respectively. Elevation of rhabdomyolysis biomarkers (LDH or CPK) were observed in four cases. There was no need to ICU admission and all patients treated with supportive care and sedation. Just one patient received Physostigmine due to severity of his anticholinergic symptoms.

With the available reports of rhabdomyolysis following Datura poisoning [13], elevation of LDH and CPK in our patients led to physicians’ concerns for probable rhabdomyolysis. None of these patients developed myoglobinuria and they showed reduction of CPK and LDH in serial laboratory tests with only conservative managements. As mentioned by Blackford et al., [15] the rise of “Creatine Kinase” is not uncommon in Datura ingestion but it is usually without any clinical sign and neither accompanied with
rhabdomyolysis. Few monographs in the literature have reported impaired Liver Function Tests in patients with Datura poisoning [14]. Most available investigations about the hepatotoxicity of Datura are experimental studies on animal subjects and results are with controversy [16-20]. Some of these experimental studies show no effect of Datura on liver function and enzymes [16, 17]; others report hepatic toxicity and rise of liver enzymes in prolonged or heavy Datura exposures [18-20]. Elevation of liver enzymes among our patients was mild and without any clinical significance. However, interpretation of laboratory tests among our patients is not easy and accurate because there is no reliable history of the duration of Datura abuse and some cases are multiple-drug abusers. Consistent with our cases, rise of WBC at acute phase of Datura toxicity have been reported in experimental rats [18]. Further methodologically-designed studies are needed to find the impact of Datura on different human organs and serum biomarkers.

Legislation can’t easily control availability of natural herbal substances as they grow spontaneously anywhere; thus the most important measures to halt Datura abuse is informing people with side-effects and consequences of abuse and dependency. With the absence of routine laboratory diagnostic tests for alkaloids and complex and confusing presentations of Datura intoxication, diagnosis of such cases is difficult and must be made on clinical findings and high suspicion of physicians. Physicians should have enough information about the physiopathology, clinical and paraclinical features of Datura poisoning to make their best diagnosis and management. In patients with anticholinergic and psychiatric symptoms, Datura poisoning should always be considered.

Conflict of interest. The authors declare that they have no conflict of interest concerning this article.

Ethical Considerations. Written informed consent for this report was obtained from all described patients and also from fathers of cases 4 and 5.

References