Anticholinergic toxicity associated with lupin seed ingestion: case report

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We describe a case of acute poisoning in a 51-year-old female patient who presented to the Emergency Department with weakness, anxiety, dry mouth, bilateral mydriasis and lid drop. In differential diagnosis, botulism, Guillain–Barré syndrome and myasthenia gravis were considered, as well as cerebral haematoma because of a cranial injury a week before. Symptoms, which resolved within 12 h without any therapy, were instead related to the ingestion of lupin seeds. European Journal of Emergency Medicine 11:119–120 © 2004 Lippincott Williams & Wilkins.

Introduction
Lupin, a member of the Leguminosae family, is a plant characterized by compound leaves that have five to 17 oblong leaflets; the legume-like flowers can be purple, blue, yellow, white or reddish, and contain a flattened seed inside a pod.

The lupinus genus comprises more than 500 species, of which Lupinus albus L., Lupinus luteus L. and Lupinus angustifolius L. are widespread.

It is cultivated all over the world and is a source of alimentary protein that has been used for animal feed and for human consumption [1]. Lupin seeds are consumed in the middle east and southern Europe as an appetizer [2,3] and are used as herbal therapy in the treatment of diabetes mellitus [4,5].

Lupin seeds may cause poisoning as a result of the presence of quinolizidine and piperidine alkaloids that account for 0.05–3% by weight of the fresh plant and are responsible for the characteristic bitter taste. Two alkaloids in particular that are contained in the lupin plant are sparteine and lupanine [6].

Sparteine has cardiac, oxytocic and ganglioplegic effects, and, in the past, has been used to induce labour and in the treatment of cardiac disturbances [7,8]; lupanine has anticholinergic effects [9].

To remove a significant amount of the alkaloids, it is necessary to cook and wash the seeds for several days; this preparation eliminates the toxicity and makes the seed more palatable for human consumption.

At the time of this article, there are limited reports of adverse events associated with the ingestion of lupin seeds.

Case report
A 51-year-old female patient presented to the Emergency Department with weakness, anxiety, dry mouth, bilateral mydriasis and lid drop.

The symptoms had arisen some hours before. No important diseases were present in the medical history, and the patient did not take any drug, narcotic or alcohol.

Physical examination showed bilateral mydriasis with normal accommodation reflex and lid drop; temperature was 36.5°C, blood pressure was 110/80 mmHg, heart rate was 90 beats/min; electrocardiogram showed sinus rhythm. Blood examinations (haematocrit, natrium, potassium, glycaemia, creatinine, transaminases, fibrinogen, prothrombin time, and partial prothrombin time) were all normal.

Because of a minor cranial injury a week before, a cerebral computerized tomography scan was performed and cerebral haematoma was excluded.

Then, in differential diagnosis were considered botulism, Guillain–Barré syndrome, myasthenia gravis and anticholinergic syndrome. The classic symptoms of botulism include drooping eyelids, dry mouth and muscle weakness, and the patient had eaten a capsicum preserve (Capsicum annuum L.) a day before. In Guillain–Barré syndrome weakness and suffering of the cranial nerves are also present, as well as in patients with myasthenia gravis.
Mydriasis, anxiety and dry mouth can be expressions of an anticholinergic syndrome; this possibility could have been related to the ingestion, some hours before, of uncooked lupin seeds. There have also been a few reports concerning the ingestion of lupin seeds in scientific literature, and the last possibility turned out to be the correct diagnosis.

The patient was kept under clinical observation; blood pressure, heart rate and electrocardiogram were monitored, and the symptoms resolved gradually within 12 h with no therapy.

**Discussion**

In 1999, the American Association of Poison Control Centers Toxic Exposure Surveillance System reported 4025 exposures to pharmaceuticals classified as anticholinergic in the United States.

This frequency of occurrence is not surprising, considering the wide distribution of compounds with anticholinergic activity. Poisonings caused by the ingestion of vegetables (*Atropa belladonna* L., *Datura stramonium* L., *Mandragora officinarum* L. and *Autumnalis* L.) are not rare [10], but anticholinergic intoxication caused by lupin seeds is uncommon. This is related to the ingestion of debittering water (a boiling method used to detoxify) as a home remedy for diabetes mellitus, or to the improper cooking preparation of the seeds [11]. Our patient revealed that she had eaten uncooked lupin seeds knowing nothing about their potential danger when the cooking instructions are not followed. It is noteworthy that, often, no warning is given on the packing to indicate this dangerous possibility.

Adverse effects are cardiovascular (dysrythmias), neurological (weakness, dizziness, blurred vision, mydriasis, loss of coordination), gastrointestinal (nausea and vomiting); anaphylaxis has been reported in a child [12]. Chronic ingestion produces permanent neurological effects such as hyperreflexia, fasciculations, dysarthria, dysphagia, pyramidal signs.

Diagnosis is anamnestic and clinical; gas chromatography and mass spectrometry can be used to identify alkaloids present in serum and urine [3–5]. No specific laboratory tests are necessary if not clinically indicated; it is otherwise recommended to monitor electrocardiogram, blood pressure and urinary output.

**Therapy**

Therapy is based on the prevention of absorption with gastric lavage and activated charcoal administration. Sinus tachycardia does not generally require treatment; if therapy is required, a short-acting cardioselective agent such as esmolol is preferred [5]; dysrythmias could require specific treatment.

Physostigmine (0.02 mg/kg administered intravenously) is indicated in patients with severe seizures, hypotension with dysrythmias and as a diagnostic agent (ex-adjuvantibus therapy) [13,14]; benzodiazepines can be used to treat anxiety. If mydriasis is present, pilocarpine collyrium could be useful in differential diagnosis.

In our patient, gastric lavage was not considered because the time of ingestion exceeded 4 h; she did not require any therapy because the symptoms resolved spontaneously.

**Conclusion**

The unusual aetiology makes this case a paradigmatic example of how a detailed medical history can help to achieve a correct diagnosis.

The purpose of this report is to alert poison control centres, toxicologists and emergency physicians of the potential toxicity of edible lupins when cooking instructions are not followed.

**References**