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*Case Report*

# Anticholinergic Toxicity Associated with Lupine Seeds Ingestion—A Case Report

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***Abstract***

*Lupine, a member of the legume family, is also known as lupines in the USA and as Turmus in the Middle East. Lupine seeds are consumed as an appetizer and in herbal therapy for diabetes mellitus in the Middle East. Quinolizidine alkaloids are found in various plants belonging to the Lupinus genus although the nature and level of these alkaloids are highly variable between species; these compounds are known to cause anticholinergic symptoms. We present a case for a 40-year old woman who presented with blurry vision, nausea, abdominal pain, dizziness, disorientation, and severe mouth dryness for one hour prior to presentation. She ate partially debittered lupine seeds about an hour prior to her complaints. On physical exam, she was found to have sinus tachycardia, bilateral fixed dilated pupils and facial flushing. Lab tests and brain imaging were unremarkable, and the lupine seeds ingestion was presumed to be the cause of her complaints. She was admitted for observation for 24 hours and her symptoms resolved spontaneously.*

***Keywords***

*Lupine seeds, food toxicity, Quinolizidine alkaloids, anticholinergics, anticholinergic syndrome*

## 1. Introduction

Lupine, a member of the legume family, is also known as lupines in the USA and as Turmus in the Middle East (Information resource portal for lupins, 2018). The genus includes over 200 species (Drummond et al., 2012). Lupine seeds are consumed as an appetizer (Luque Marquez, Gutierrez-Rave, & Infante Miranda, 1991) and in herbal therapy for diabetes mellitus (Díez-Láiz, García-Vieitez, Diez-Liébana, Sierra-Vega, Sahagún-Prieto, Calle-Pardo, & Fernández-Martínez, 2015) in the Middle East.

Lupine has remarkable protein content, which makes it an excellent alternative for human nutrition. It is also known to be resistant to adverse conditions such as pests, diseases, droughts, and frost (Duranti, Consonni, Magni, Sessa, & Scarafoni, 2008).

Quinolizidine alkaloids are found in various plants belonging to the Lupinus genus although the nature and level of these alkaloids are highly variable between species; these compounds are known to cause anticholinergic symptoms (Australia New Zealand Food Authority, 2001).

The proper consumption of Lupine seeds requires eliminating the toxic substances that it contains. It is known as the debittering process and includes cleaning the seeds of impurities, then soaking for a day, cooking in water for an hour, placing in an appropriate container, and exposing to running water for 4-5 days (http://www.beisa.dk/Publications/BEISA%20Book%20pdfer/Capitulo%2028.pdf).

We describe a woman who presented with typical anticholinergic toxicity symptoms after eating about 60 grams of improperly prepared lupine seeds.

## 2. Case Report

A 40-year-old previously healthy woman presented to our emergency department complaining of blurry vision, nausea, abdominal pain, dizziness, disorientation, and severe mouth dryness for one hour prior to presentation. The symptoms developed insidiously over the course of 30 minutes. She had not had access to any poisons, insecticides, or herbicides.

After further questioning about food ingestion, we found that she had taken about 20 bitter lupine seeds (60 grams) that were boiled once for about 15 minutes one hour prior to the development of her symptoms.

She denied taking any medications and had no allergy, she had never had surgery and her family history was unremarkable. She did not smoke, drink alcohol or use illicit drugs. No history of skin contact with any plants.

On physical examination; the patient was alert, conscious, oriented and found to have tachycardia (110/min), her other vital signs were within normal limits, she appeared agitated with obvious facial flushing and dry oral mucosa.

Cardiovascular exam only revealed sinus tachycardia, respiratory and abdominal exams were unremarkable except for markedly decreased bowel sounds. Her complete blood count, electrolytes, venous blood gases, and glucose level were within normal limits, her EKG showed sinus tachycardia. She had a negative urine toxicology screen and her brain CT scan was unremarkable.

The eyes examination revealed fixed dilated, nonreactive pupils bilaterally, and visual acuity was 20/20 in both eyes for far vision, but she had severe blurring for near vision, otherwise, slit-lamp examination, fundus exam, and eyes motility were within normal limits.

The patient was admitted for observation and symptomatic management, though she did not need any treatment and her entire symptoms resolved within 24 hours.

## 3. Discussion

The Quinolizidine alkaloids are produced by lupine plants to protect it against insects and herbivores (Wink, 1998). Quinolizidine may have a role in insulin secretion and can be used in the management of type 2 diabetes which increased lupine use recently (García López, de la Mora, Wysocka, Maiztegui, Alzugaray, Del Zotto, & Borelli, 2004). Lupine loses approximately 90% of its total alkaloids by undergoing the firing and distillation process so human intoxication is usually infrequent.

Our patient mentioned that she ate about 20 lupine seeds that were partially cooked, as she liked their pleasant bitter taste. Initially, there was a concern that she might have a neurological insult. Her brain CT scan was normal and the ophthalmological team evaluated her because she had fixed dilated pupils. There was a suspicion that she could have ingested a toxic substance, as we found that she was flushed and had a dry mouth. We determined that the lupine beans were the only things the patient had consumed in the few hours before the onset of her symptoms.

Pupillary abnormalities are difficult to deal with in the emergency room because of the wide spectrum of differential diagnoses that could be metabolic or structural. Each cause has distinct management and prognosis (Kaeser & Kawasaki, 2010). The main presenting symptoms of lupine seeds ingestion are mydriasis and dryness of the mouth, the symptoms started as soon as 15 minutes after the ingestion of lupine seeds and up to 12 hours, most cases resolved spontaneously within hours without any management (Di Grande, Paradiso, Amico, Fulco, Fantauzza, & Noto, 2004; Daverio, Cavicchiolo, Grotto, Lonati, Cananzi, & Da Dalt, 2014).

This case was distinguished by the ingestion of a small amount of partially debittered lupine seeds, even though the patient presented with symptoms that have been described in this type of intoxication. Diagnosis is usually established clinically; gas chromatography and mass spectrometry can be used to identify alkaloids present in serum and urine (Díaz, Durruty, Tapia, Carrasco, Riesco, & Durruty, 1990). No specific laboratory tests are necessary if not indicated clinically.

Although most of the symptoms resolved spontaneously without farther management, some patients with a large amount of lupine seeds ingestion within 1 to 2 hours of the presentation can undergo gastric lavage or charcoal administration. If the patient developed sinus tachycardia, he/she can be observed only, but if therapy is required, a short-acting cardioselective B-blocker like esmolol can be used (Tsiodras, Shin, Christian, Shaw, & Sass, 1999). Physostigmine (0.02mg/Kg intravenously) can be used to control seizure, delirium, or severe agitation as it is more effective and safer than benzodiazepines in these cases (Burns, Linden, Graudins, Brown, & Fletcher, 2000). Benzodiazepines can be used to relieve anxiety.

There are few data in the literature about the metabolism of alkaloids in human; lupine beans are excreted unchanged in the urine with a half-life of 6 to 7 hours (Petterson, Greirson, Allen, Harris, Power, Dusci, & Ilett, 1994), and with this rapid excretion, chronic toxicity is unlikely in humans. Even though, there is no specific evidence to prove this assumption.

In our case, we admitted the patient for observation, and supportive management, and her symptoms resolved spontaneously over the next 24 hours. This type of intoxication has usually a favorable prognosis.

## 4. Conclusion

We have to take into consideration the increased use of lupine in our communities, so physicians should question patients who present with symptoms of the anticholinergic syndrome, about their recent food consumption, especially lupine ingestion. We should recognize that anticholinergic syndromes could vary in their severity, so we have to consider it when we have any combination of anticholinergic symptoms. In patients presented with a blurring of vision and dilated pupils, we have to put lupine seeds ingestion into consideration. We have to increase awareness among our community about the toxicity of the bitter lupine.

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