


# Anticholinergic toxidrome: a rare consequence of lupin ingestion - a case report and literature review

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## ABSTRACT

**Background:** Lupin beans, a yellow legume seed from the *Lupinus* plant, are commonly used in Southern Europe, Latin America, and the Middle East. Despite their bitter taste, lupin beans are highly nutritious and rich in protein, making them popular snacks. The bitter taste is due to the presence of over 150 quinolizidine alkaloids, with Lupanine being the predominant alkaloid. If not properly debittered before ingestion, lupin toxicity and anticholinergic symptoms can occur.

**Case Presentation:** A 49-year-old healthy Egyptian man presented with symptoms such as dry mouth, unsteadiness, constipation, and urinary retention for 6 hours. After investigation, it was discovered that he had consumed 400 g of bitter lupin beans within a 1-hour period, around 4-6 hours before the symptom onset. The patient was oriented, conscious, and alert, showing no signs of pain or distress. His vital signs were normal, and he had normal cardiovascular, pulmonary, gastrointestinal, and neurological examinations. His eye examination revealed fixed, dilated pupils bilaterally, blurry vision, and normal eye movement bilaterally. Laboratory tests were normal. The patient received Ringer's lactate intravenously and was closely monitored in the emergency department. Over a 3-hour period, all symptoms and signs resolved with fluid management alone, and the patient was discharged home following his improvement.

**Conclusion:** This report highlights the importance of history taking in diagnosing food-related diseases and emphasizes that physicians should consider lupin toxicity as a differential diagnosis in cases presenting with anticholinergic symptoms.

**Keywords:** Anticholinergic syndrome, cholinergic antagonists, lupinus, quinolizidine alkaloids, toxicity.

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## Background

Lupin or lupini beans, a type of yellow legume seed derived from *Lupinus* plant, belongs to Leguminosae family [1,2]. The specific genus of the beans is known as *Lupinus* and contains over 500 species that are distributed worldwide [1]. They are commonly used in Southern Europe, Latin America, and Middle East [2,3]. In the Middle East, these beans are commonly referred to as turmus [3]. Despite the bitter taste of lupin beans, they are highly nutritious and rich in protein. Hence, they are commonly used as snacks due to their nutritional value [3]. The bitter taste of lupin beans can be attributed to the presence of over 150 quinolizidine alkaloids. The predominant alkaloid in the beans is Lupanine, which is known for its high anticholinergic effects [3]. If the lupin beans are not appropriately debittered before ingestion, which involves removing the toxic alkaloids through cooking, washing, and rinsing for several days, it can result in lupin toxicity and the development of anticholinergic symptoms [1,3]. Based on a comprehensive literature search, this report is the

first documented case of anticholinergic toxidrome after lupin bean ingestion in Saudi Arabia. Thus, we present a case of a 49-year-old man who developed anticholinergic symptoms following lupin bean ingestion and came to our emergency department in a university hospital. We also present a brief review of the relevant literature.

## Case Description

A previously healthy 49-year-old Egyptian man presented to the emergency department with dry mouth, unsteadiness, constipation, and urinary retention for 6 hours. He was healthy with no medical conditions, allergies, or medications. He denied any history of trauma, recent alcohol consumption, or drug use. After further investigation into his food ingestion or poisoning, it was discovered that he had ingested around 400 g of bitter lupin beans as a snack within a 1-hour period, approximately 4-6 hours prior to the symptom's onset.

On physical examination, the patient was oriented, conscious, and alert, showing no signs of pain or distress.

His vital signs were all normal, as follows: temperature: 36.5°C, respiratory rate: 18 breaths per minute, oxygen saturation: 98%, blood pressure: 130/84 mmHg, and heart rate: 91 beats per minute (bpm). Cardiovascular, pulmonary, gastrointestinal, and neurological examinations were all normal. Eye examination revealed fixed, dilated, non-reactive pupils bilaterally, blurry vision for near objects in both eyes, and normal eye movement bilaterally. Laboratory test results were normal, including venous blood gas, complete blood count, liver function test, and random blood glucose.

The patient received one l of Ringer’s lactate intravenously and was closely observed in the emergency department with continuous monitoring of vital signs. Gradually, over a 3-hour period, all of the patient’s symptoms and

signs resolved with fluid management alone. Hence, the patient was discharged home following his improvement.

**Discussion**

Lupanine, the predominant alkaloids in lupin beans, can induce anticholinergic toxidrome [3]. Alkaloid-rich lupin beans produce systemic manifestations by inhibiting both nicotinic acetylcholine receptors and muscarinic receptors [2]. Consequently, anticholinergic symptoms such as mydriasis, dry mouth, tachycardia, and constipation may develop [2].

We conducted a comprehensive search in PubMed and all the databases available in Clarivate to identify all case reports published in English on March 9, 2024. Then, we reviewed a total of 12 cases of anticholinergic syndrome

**Table 1.** Summary of the review of literature.

CASE	REFERENCE	AGE (IN YEARS), GENDER	CLINICAL FEATURES	MANAGEMENT	PATIENT'S CONDITION PRIOR TO PRESENTATION	OUTCOME	METHOD OF TOXICITY
1	Ozkaya et al. [2]	12, male	<ul style="list-style-type: none"> <li>• Generalized tonic-clonic seizure</li> <li>• Vomiting</li> <li>• Bilateral mydriasis</li> <li>• Dry oral mucosa</li> <li>• Flushing</li> <li>• Piloerection</li> <li>• Increased muscles tone</li> <li>• Bilateral Babinski reflexes were observed</li> </ul>	Antiepileptic medications Intensive care unit admission.	Healthy	Discharged	Lupin beans ingestion
2	Lahoud et al. [3]	50, female	<ul style="list-style-type: none"> <li>• Bilateral mydriasis</li> <li>• Dry oral mucosa and eyes</li> <li>• Anxious</li> </ul>	Supportive management	Healthy	Discharged	Lupin beans ingestion
3	Al-Abdoh, Md et al. [10]	40, female	<ul style="list-style-type: none"> <li>• Bilateral mydriasis</li> <li>• Dry oral mucosa</li> <li>• Nausea</li> <li>• Abdominal pain</li> <li>• Dizziness</li> <li>• Disorientation</li> <li>• Agitation</li> <li>• Facial flushing</li> </ul>	Supportive management	Healthy	Discharged	Lupin beans ingestion
4	Li et al. [6]	63, male	<ul style="list-style-type: none"> <li>• Bilateral mydriasis.</li> <li>• Dry skin</li> <li>• Generalized weakness</li> <li>• Vomiting</li> <li>• Confusion</li> <li>• Visual hallucinations</li> <li>• Urinary retention</li> </ul>	Supportive management	NA	Discharged	Ingestion of water containing lupin bean extract
5	Daverio et al. [4]	6, female	<ul style="list-style-type: none"> <li>• Bilateral mydriasis</li> <li>• Dry oral mucosa</li> <li>• Headache</li> <li>• Photophobia</li> <li>• Nausea</li> </ul>	Supportive management	Healthy	Discharged	Lupin beans ingestion
6	Jamali [5]	44, male	<ul style="list-style-type: none"> <li>• Bilateral mydriasis</li> <li>• Dry oral mucosa</li> <li>• Warm dry skin and mucous membrane</li> <li>• Urinary retention</li> <li>• Dizziness</li> </ul>	Supportive management	NA	Discharged	Lupin beans ingestion

*Continued*

CASE	REFERENCE	AGE (IN YEARS), GENDER	CLINICAL FEATURES	MANAGEMENT	PATIENT'S CONDITION PRIOR TO PRESENTATION	OUTCOME	METHOD OF TOXICITY
7	Pingault et al. [7]	73, female	<ul style="list-style-type: none"> <li>• Dry oral mucosa</li> <li>• Lethargy</li> <li>• Difficulty mobilizing</li> </ul>	NA	NA	NA	Eating scones prepared with lupin flour
8	Pingault et al. [7]	66, female	<ul style="list-style-type: none"> <li>• Bilateral mydriasis</li> <li>• Dry oral mucosa</li> <li>• Lethargy and lightheadedness</li> <li>• Urinary retention</li> </ul>	NA	NA	NA	Eating pancakes prepared with lupin flour
9	Litkey & Dailey [9]	46, female	<ul style="list-style-type: none"> <li>• Bilateral mydriasis</li> <li>• Dry oral mucosa</li> <li>• Skin flushing</li> <li>• Confusion</li> </ul>	Supportive management	Hyperlipidemia	Discharged	Lupin beans ingestion
10	Di Grande et al. [1]	51, female.	<ul style="list-style-type: none"> <li>• Bilateral mydriasis</li> <li>• Dry oral mucosa</li> <li>• Weakness</li> <li>• Anxiety</li> <li>• Lid drop</li> </ul>	Supportive management	NA	Discharged	Lupin beans ingestion
11	Tsiodras et al. [8]	72, female	<ul style="list-style-type: none"> <li>• Bilateral mydriasis</li> <li>• Nausea</li> <li>• Vomiting</li> <li>• Diaphoresis</li> <li>• Generalized weakness</li> </ul>	Supportive management	Diabetes mellitus	Discharged	Lupin beans ingestion
12	Lowen et al. [11]	35, female	<ul style="list-style-type: none"> <li>• Bilateral mydriasis</li> <li>• Dry oral mucosa</li> <li>• Generalized weakness</li> <li>• Difficulty swallowing</li> <li>• Muscular weakness</li> <li>• Urinary retention</li> <li>• Feelings of impending doom</li> </ul>	Supportive management	NA	Discharged	Lupin beans ingestion

following bitter lupin consumption, as presented in Table 1. The cases included ranged from the first case report published in 1995 to the most recent case in 2021. The average age of the cases was 46.5 years. Most cases were adults, while two cases were of pediatric age, specifically 6 years and 12 years old [2,4]. Of the 12 cases reviewed, only 3 were male [2,5,6]. The most commonly reported clinical features were bilateral mydriasis and dryness of the oral mucosa and skin. The majority of cases were stable. Hence, supportive management, observation, and discharge were done in most cases. However, there was one severe case where the patient was administered antiepileptic medication for a continuous generalized tonic-clonic seizure. Then, the patient was admitted to the intensive care unit for further care [2]. Most cases reported lupin toxicity from ingesting the beans themselves, except 4 cases involved different methods of consumption of lupin [6-8].

The diagnosis of lupin toxicity is primarily based on history taking and physical examination [9]. Therefore, in cases where there is a strong suspicion of food poisoning or ingestion of a toxin, a significant focus on food history is crucial.

The management is based on supportive treatment and observation. When a patient presents early, within 1-2 hours of ingesting the beans, activated charcoal or gastric lavage

may benefit the patient [9]. Although asymptomatic hypertension or sinus tachycardia does not require treatment in most cases, beta-1 cardioselective beta-blockers such as metoprolol or esmolol can be used when required [9]. Agitation and anxiety associated with anticholinergic toxidrome can be managed with benzodiazepines [5,9]. Whereas physostigmine is used in cases of severe seizure refractory to benzodiazepines and hypotension with dysrhythmia [1,9].

In our case, the patient presented to the emergency department 4-6 hours after ingesting lupin beans. Prior to this event, he was healthy with no medical conditions. He presented with anticholinergic features such as dry mouth, unsteadiness, constipation, urinary retention, and bilateral mydriasis. He was closely monitored and managed conservatively. As his clinical status improved, he was discharged home.

## Conclusion

We report the first case in Saudi Arabia of an unusual presentation of anticholinergic toxidrome after lupin bean ingestion. The bitter taste of lupin bean is due to the presence of more than 150 quinolizidine alkaloids. Lupanine, the most prevalent alkaloid in lupin beans, is known for its high anticholinergic effects. Therefore, bitter lupin should be debittered before consumption to avoid lupin toxicity.

The diagnosis of such a condition can be challenging; thus, a detailed history taking of suspected food-related diseases should be done to reach the correct diagnosis.

**What is new**

Bitter lupin beans can cause an anticholinergic toxidrome, so proper debittering before consumption is vital to avoid lupin toxicity. A detailed history is key to diagnosing such food-related conditions, as the presentation can be challenging. #LupinSafety #FoodToxicity.”

**List of Abbreviation**

NA Not Available

**Conflict of interests**

The authors declare that there is no conflict of interest regarding the publication of this article.

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**Consent for publication**

Written informed consent was obtained from the patient.

**Ethical approval**

Ethical approval is not required at our institution to publish an anonymous case report.

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**References**

1. Di Grande A, Paradiso R, Amico S, Fulco G, Fantauzza B, Noto P. Anticholinergic toxicity associated with lupin seed ingestion: case report. *Eur J Emerg Med*. 2004 Apr;11(2):119–20. <https://doi.org/10.1097/00063110-200404000-00014>
2. Ozkaya PY, Ari HF, Turanli EE, Koc G, Karapinar B. Severe lupin bean intoxication: an anticholinergic toxidrome. *Pediatr Emerg Med J*. 2021 Dec 30;8(2):108–11. <https://doi.org/10.22470/pemj.2021.00262>
3. Lahoud C, Hanna NG, Jalkh A, Azar G. Acute bilateral fixed mydriasis caused by lupini bean intoxication. *Wilderness Environ Med*. 2021 Jun;32(2):217–20. <https://doi.org/10.1016/j.wem.2021.01.003>
4. Daverio M, Cavicchiolo ME, Grotto P, Lonati D, Cananzi M, Da Dalt L. Bitter lupine beans ingestion in a child: a disregarded cause of acute anticholinergic toxicity. *Eur J Pediatr*. 2014 Dec;173(12):1549–51. <https://doi.org/10.1007/s00431-013-2088-2>
5. Jamali S. Dilated pupils, dry mouth and dizziness - a case study. *Aust Fam Phys*. 2011 Oct;40(10):789–90.
6. Li K, van Wijk XMR, Hayashi S, Lynch KL, Wu AHB, Smollin CG. Anticholinergic toxicity associated with ingestion of water containing lupini bean extract. *Clin Toxicol (Phila)*. 2017 Aug;55(7):687–8. <https://doi.org/10.1080/15563650.2017.1315821>
7. Pingault NM, Gibbs RA, Barclay AM, Monaghan M. Two cases of anticholinergic syndrome associated with consumption of bitter lupin flour. *Med J Aust*. 2009 Aug 3;191(3):173–4. <https://doi.org/10.5694/j.1326-5377.2009.tb02732.x>
8. Tsiodras S, Shin RK, Christian M, Shaw LM, Sass DA. Anticholinergic toxicity associated with lupine seeds as a home remedy for diabetes mellitus. *Ann Emerg Med*. 1999 Jun;33(6):715–7. [https://doi.org/10.1016/S0196-0644\(99\)70203-9](https://doi.org/10.1016/S0196-0644(99)70203-9)
9. Litkey J, Dailey MW. Anticholinergic toxicity associated with the ingestion of lupini beans. *Am J Emerg Med*. 2007 Feb;25(2):215–7. <https://doi.org/10.1016/j.ajem.2006.08.004>
10. Md Al-Abdoun A, Md Alrawashdeh HM, Md Khalaf A, Alnawaiseh I. Anticholinergic toxicity associated with lupine seeds ingestion-a case report. *RHS*. 2020 Jan 16;5(1):22. <https://doi.org/10.22158/rhs.v5n1p22>
11. Lowen RJ, Alam FKA, Edgar JA. Lupin bean toxicity. *Med J Aust*. 1995 Mar;162(5):256–7. <https://doi.org/10.5694/j.1326-5377.1995.tb139879.x>

**Summary of the case (Sample)**

1	<b>Patient (gender, age)</b>	49 years, male
2	<b>Final diagnosis</b>	Anticholinergic toxidrome secondary to lupin toxicity
3	<b>Symptoms</b>	Dry mouth, unsteadiness, constipation, and urinary retention
4	<b>Medications</b>	One liter of Ringer’s lactate intravenously
5	<b>Clinical procedure</b>	None
6	<b>Specialty</b>	Emergency medicine