

Case Report

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Pupillary Disorders in the Emergency Room: *Lupinus mutabilis* Intoxication

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Abstract

Lupinus mutabilis (LM) is a widespread species of lupin whose bean is consumed not only for its high caloric value but also as a homeopathic medicine, used for a diverse range of presumed clinical properties, including as an analgesic and an antidiabetic. The properties of lupine alkaloids are responsible for their anticholinergic toxicity in both the autonomic nervous system and the central nervous system (CNS). As this syndrome may vary in severity, lupinus toxicity should be suspected in patients with isolated symptoms as well, such as hyporeactive mydriasis.

We present a case of a 48-year-old male patient presented to emergency department complaining about blurred vision, dizziness and palpitations. Physical examination only reveal hyporeactive mydriasis. Urine drug screening was negative and labs were otherwise within normal ranges. Brain Computed Tomography did not identify any abnormality. During the examination patient admitted that he was taking homeopathic medication for his osteoarthritis pain that contains high amounts of LM. He received hydration with parenteral saline while maintaining an adequate diuretic rhythm. Twelve hours later, his mydriasis had completely resolved. Clinicians should consider the possibility of LM toxicity in cases of pupillary abnormalities without any clear alternative explanation.

Keywords: Anticholinergic syndrome; *Lupinus mutabilis*; Mydriasis

Introduction

Lupinus mutabilis (LM), also known as pearl lupin, chocho, tarwi, lupino, lupin or altamuz, is an extended species of lupine that is consumed in certain regions of South America and Australia (Figure 1).



Figure 1: *Lupinus mutabilis* (A. plant; B. seed).

LM has remarkable protein content, what makes it an excellent alternative for human and animal nutrition. Furthermore, is considered an extremely efficient legume, being resistant to adverse conditions such as pests, diseases, droughts and frost [1,2].

However, its use has been limited by the presence of toxic substances, particularly the content of quinolizidine alkaloids in the seeds.

The genus *Lupinus* belongs to the tribe Genisteeae, of the legume family of Fabaceae. This tribe has the particular property of producing quinolizidine alkaloids, secondary metabolites among which the most important in LM are lupanine ($C_{15}H_{24}N_2O$), sparteine ($C_{15}H_{26}N_2$) and 13-Hydroxylupanine ($C_{15}H_{24}N_2O_2$) [3]. These alkaloids (organic nitrogen bases derived from the products of primary amino acid metabolisms) give them a defense against insects or predators. However, these hinder their use as edible grain, as they give bitter taste to the seed and potential toxicity. Through the firing and distillation process, LM loses approximately 90% of its total alkaloids. As a result, human intoxication is certainly infrequent, with few cases reported in the literature, most of them were caused by drinking water for cooking [4-7].

In the last decades, LM has been used as folk or homeopathic medicine for diverse medical purposes because of its presumed pharmacological properties. A clear example is diabetes, where it is believed that it may provoke early satiety and consequently reduces caloric intake and glycemic values [8-10]. In addition, it has been used for musculoskeletal pain and for prevention purposes like cancer and cardiovascular diseases, because of its isoflavonoid content [11].

Pupillary abnormalities present a clinical challenge in the emergency room. The wide spectrum of differential diagnoses range from toxic-metabolic processes to structural alterations in the head and neck causing compromise of the sympathetic or parasympathetic pathways, with each differential resulting in a different prognosis and

therapeutic approach [12]. We present a patient with LM intoxication manifested by bilateral hyporeactive mydriasis.

Case

A 48-year-old male with a history of osteoarthritis, presented to the emergency room (Buenos Aires, Argentina), complaining about blurred vision, dizziness and palpitations of 6 h of evolution. Physical examination was notable only for hyporeactive mydriasis. Ophthalmological examination was otherwise normal, including fundoscopy. Electrocardiogram showed normal sinus rhythm and regular rate at 97 beats per minute. The patient denied any recent use of medications or any other drugs. Drug screening of urine, including cocaine and amphetamines, was negative. Laboratories were otherwise within the normal range. Computed tomography (CT) of the brain did not reveal any abnormality.

With a high suspicion for intoxication, the physician asked again about any potential toxic substance or food he may have ingested. The patient revealed that he had been taking homeopathic medication for his osteoarthritis that contained high levels of LM. He received hydration with parenteral saline while maintaining an adequate diuretic rhythm. 12 h later, his mydriasis had completely resolved.

Discussion

Alkaloids are a heterogeneous group of substances with a diverse activity on the CNS. Some of these substances act on the sympathetic nervous system, while others do on the parasympathetic. Furthermore, some alkaloids like opioids, have depressant effects on the CNS accompanied by miosis, while others such as cocaine, cause euphoric effects associated with mydriasis [13].

Pupillary disorders manifested by acute symmetrical hyporeactive mydriasis should alert and force to rule out the possibility of intoxication.

Toxicants that may cause pupillary disorders can be classified according to pathophysiological mechanisms in sympathomimetic or anticholinergic substances [12].

LM intoxication presents as anticholinergic syndrome that may include neurological symptoms such as mydriasis, ataxia, confusion, psychosis and coma [9]. Intoxication in humans is infrequent and there are few reported cases in the literature [4,9-11], mainly due to the consumption of cooking water, which have high concentrations of alkaloids.

Our patient differs from those previously described in its monosymptomatic presentation, exhibiting only a single hyporeactive mydriasis that could be explained by the low amount of alkaloids consumed.

The diagnosis of LM intoxication is based on the characteristic toxicological syndrome and the history of exposure. There are no standardized laboratory diagnostic tests. Its treatment is essentially supportive and the main goal is to prevent the absorption with gastric lavage and activated charcoal, mainly [14] during the first 2 h. However, observation for any other anticholinergic complication that

may require a different therapeutic approach as cardiovascular (dysrhythmias), neurological (weakness, dizziness, blurred vision, mydriasis, loss of coordination), gastrointestinal (nausea and vomiting) is crucial.

In our case, as it had passed more than 6 h from the consumption, the support measures were privileged, maintaining a correct parenteral hydration. The prognosis of this type of intoxication generally is favorable. Currently, no cases with severe complications or death have been reported.

Conclusion

Considering the increasingly widespread use of LM as a folk or homeopathic medicine, LM intoxication should be contemplated in patients who present to the emergency room with acute symmetrical hyporeactive mydriasis, where is no clear alternative explanation.

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