

## Detection of the pharmaceutical agent glaucine as a recreational drug

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We would like to report a case of toxicity related to recreational use of the pharmaceutical product glaucine. A 23-year-old woman presented to the Emergency Department (ED) following ingestion of two tablets of “head candy”, marketed as a 1-benzylpiperazine (BZP)-free “herbal high”. She developed nausea and vomiting within 30 min of ingestion, followed by a period of dissociative-type symptoms, feeling detached and “in another world”. On arrival in the ED, she was agitated, vomiting, tachycardic (100 bpm) and tachypnoeic but with a normal blood pressure (135/82 mmHg) and temperature (36.8°C). Her pupils were dilated

(6 mm), although the remainder of her neurological examination was normal. Abdominal examination was unremarkable. She was treated with intravenous fluids and antiemetics (cyclizine 50 mg IV and prochlorperazine 12.5 mg IM) and admitted overnight for observation. She was discharged the following day once her symptoms had resolved.

Serum and urine samples collected at the time of admission were subsequently analysed by gas chromatography–mass spectrometry (GC/MS), and glaucine was detected in both the serum and urine samples. The sample and calibrators (250 µl) were prepared using liquid–liquid extraction and adjusted to an alkaline pH with 1 M sodium hydroxide. The solution was extracted with 4 ml methyl tertiary-butyl ether (MTBE). Following centrifugation the organic layer was transferred to 0.1 M phosphoric acid. After phase separation by centrifugation, the organic layer was removed to waste. Then, 1 M sodium hydroxide and MTBE were added to the remaining subnatant. The samples were then vortex-mixed, centrifuged and a 1-µl aliquot of the supernatant was injected onto the GC-MS system. GC-MS analysis was performed using a Shimadzu GC-MS-QP2010 with a Shimadzu AOC-20i autosampler. An HP-5 MS 30 m×0.25 mm, 0.5 µm; (5%-Phenyl)-methylpolysiloxane analytical column (Agilent, Palo Alto, CA, USA) was employed for separation. Helium was used as the carrier gas at a flow rate of 1 ml/min. The injector was maintained at 225°C and the detector at 200°C. The initial column temperature was set at 80°C and held for 4 min. It was then ramped by 25°C/min up to 290°C and held for 9.6 min (total run time 22 min). Positive electron impact ionisation (EI) mode was used, and data were collected using single ion monitoring (SIM). Glaucine and flurazepam (internal standard) were quantified monitoring their most abundant ion m/z: 354 and 86 and their retention times were 19.09 and 17.75 min, respectively. Due to the unavailability of a pure

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reference standard, glaucine was obtained in tablet formation (Glaudent 40 mg) from Sopharma, Bulgaria, for confirmation and quantification. The measured serum concentration of 0.7 mg/L should therefore only be considered an approximation. Extended toxicological screening did not detect ethanol or any other drugs, except for cyclizine, which was administered in the ED.

Glaucine is an antitussive agent used therapeutically in several countries in the European Union, such as Romania and Bulgaria, as well as neighbouring countries, including Iceland and Russia. Therapeutic use of glaucine has been reported to be associated with lethargy, fatigue, hallucinations and dissociative-type symptoms [1, 2]. Animal studies suggest that glaucine has central dopaminergic effects, particularly at D1 receptors, which could explain the features seen in our patient [3]. Glaucine is a marketed pharmaceutical; this is the first reported case of confirmed toxicity associated with its recreational use. In addition, this

case highlights that it is being included by manufacturers in legally sold BZP-free alternatives to established recreational drugs. In our view, legislative authorities should be aware of the potential diversion of this pharmaceutical into the recreational drug scene and adapt the licensing of this product.

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