**Toxicity From Blue Lotus (Nymphaea caerulea) After Ingestion or Inhalation: A Case Series**

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**ABSTRACT**

Plant extracts and other novel psychoactives can be ingested, vaped, injected, or insufflated. This includes products such as extracts from the blue lotus flower (*Nypmhaea caerulea*), which is known to produce euphoria and hallucinations at high doses. Blue lotus is sold in several forms, including dried plant material, teas, and extracts for use in electronic cigarettes. Because newer generations of electronic cigarettes can deliver a variety of substances, practitioners need to be mindful of toxicity from a growing number of psychoactives, some of which are not detectable by standard urine drug screens. This case series describes five active duty patients who presented to the emergency department with altered mental status following the use of blue lotus products, four after vaping and one after making an infused beverage. Patients displayed similar symptoms, including sedation and perceptual disturbances. The patients in our series were successfully managed with supportive measures without the need for sedating agents. Recognizing and identifying new trends in substance use can help to provide directions in undifferentiated altered mental status.

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**INTRODUCTION**

The presentation of intoxication following substance use is a challenge for Emergency Medicine providers, with both new substances and new methods of consumption arising. As the use of electronic cigarettes and vaping products continues to grow into a nationwide epidemic, more and more complications are presenting to emergency departments (EDs) across the country.[1](javascript:;) Complications of electronic cigarette use that are well documented in the literature include electronic-cigarette-associated lung injury and nicotine poisoning.[2](javascript:;) However, the increasing modifiability of modern vaping devices by the end user has enabled experimentation with non-traditional products, for which there is limited literature to provide guidance to healthcare providers.[3](javascript:;)

Given the rising use of vaping devices among soldiers and the desire of soldiers to use substances that will not show up on a urine drug screen (UDS), this topic is of particular to military Emergency Medicine providers.[1](javascript:;) We present five cases of altered mental status that presented to our ED after the use of blue lotus, *Nymphaea caerulea*. This plant extract has been used as a sleep aid and for anxiety relief but is known to cause euphoria and hallucinations at higher doses. Providers should be mindful of new psychoactive substance exposures, including those which can be used with electronic cigarettes, as a cause of altered mental status.

**CASE SERIES**

**Case 1**

An otherwise healthy 27-year-old active duty male presented to the ED by Emergency Medical Services (EMS) for altered mental status. As per EMS report, his friends found him leaning unsteadily against a wall and staring out into space at his barracks just before arrival. The patient’s friends reportedly had found him in similar states several times over the past few weeks. Before these unexplained events, he had no antecedent illness and no chronic medical problems. When initially found, the patient’s pulse oximetry was 85%, but this resolved following a few deep breaths with EMS.

Upon arrival to the ED, the patient had normal respiratory effort with an oxygen saturation of 100% on room air, a heart rate of 97 beats per minute (bpm), and a blood pressure 138/73 mmHg. He was alert on presentation but not oriented to location and persistently believed he was still in the barracks. He had a flat affect and would answer questions with short, simple, and sometimes delayed responses. His pupils were dilated, but equal and reactive. Neurologic examination was otherwise unremarkable except for a persistent erection. He did not have clonus or hyperreflexia. An electrocardiogram (ECG) was normal sinus rhythm without ectopy. Initial laboratory studies revealed mild leukocytosis (11,200 mm3/mcL). Our institution’s in-house UDS by immunoassay assesses for barbiturates, benzodiazepines, cocaine, opiates, amphetamines, cannabinoids, 3,4-Methylenedioxymethamphetamine (MDMA), phencyclidine, propoxyphene, oxycodone, and methadone. This patient’s UDS was negative.

The patient reported ordering blue lotus liquid online to use in a vaping device. According to the patient, this liquid was “only available in Europe,” and he had been using it for the past 2 weeks. Before vaping blue lotus, he reported vaping nicotine products for several years with no similar episodes. He was otherwise not forthcoming with information and was paranoid, seemingly responding to visual stimuli in the room. Following a 3-hour and 45-minute observation period in the emergency room, the patient’s symptoms resolved; he was fully alert and oriented and was discharged after consultation with our regional poison center.

**Case 2**

An otherwise healthy 29-year-old active duty male presented to the ED by EMS for decreased responsiveness. As per the EMS report, his family noted strange behavior and suspected hallucinations after the patient had vaped an unknown cartridge. His initial agitation and strange behavior was improving by the time EMS arrived.

In the ED, his oxygen saturation was 98% on room air, heart rate 76 bpm, and blood pressure 117/62 mmHg. He was oriented but drowsy, needing to be awakened by voice at times. The neurologic examination was otherwise unremarkable. His ECG demonstrated normal intervals and morphology. Laboratory tests showed a creatinine 1.3 mg dL−1, aspartate transaminase (AST) 69 IU/L, alanine transaminase (ALT) IU/L 81, and creatine kinase (CK) of 3215 U L−1. UDS was negative.

Upon further interview, the patient stated that he vaped blue lotus. He was discharged after a 4-hour period of observation, during which his symptoms resolved.

**Case 3**

An otherwise healthy 22-year-old active duty male presented to the ED for bizarre behavior. As per EMS report, he was found sitting on a fence by the motorpool just after midnight. At that time, he was able to answer questions appropriately but had flights of ideas about love and money. He reported drinking alcohol several hours earlier in the night but initially denied any other drug use except a remote history of marijuana use.

On arrival at the ED, his oxygen saturation was 98% on room air, heart rate 76 bpm, and blood pressure 133/72 mmHg. He was continually having flights of ideas but an otherwise normal neurologic examination. His EKG showed normal sinus rhythm. Basic laboratory tests were unremarkable. His UDS was negative. Although he reported of drinking alcohol several hours ago, his ethanol level was negative.

The patient later admitted to ingesting wine infused with blue lotus flowers that evening. He reported that he purchased the blue lotus on eBay. He was discharged after a 2-hour and 45-minute observation period.

**Case 4**

An otherwise healthy 19-year-old active duty male presented to the ED with chest pain. This pain started around 3 hours before arrival after taking four “hits” of a “spiked vape juice” he acquired from a friend that he believed to have been blue lotus.

On arrival at the ED, his oxygen saturation was 100% on room air, heart rate 121 bpm, and blood pressure 144/77 mmHg. The patient was visibly anxious, but his neurologic examination was otherwise unremarkable. His ECG showed sinus tachycardia with otherwise normal intervals. Chest X-ray did not show acute changes. Laboratory studies were unremarkable, and UDS was negative. His tachycardia resolved following administration of intravenous fluids and he did not require benzodiazepines. The patient’s chest pain improved without intervention. Following a 3-hour and 40-minute observation period in the ED, he was discharged with primary care follow-up. Of note, the patient returned to the emergency room the next day for chest pain and anxiety and had an unrevealing workup.

**Case 5**

A 20-year-old active duty male was brought to the ED for bizarre behavior and “thrashing his extremities” after taking a deep inhalation of an electronic cigarette filled with blue lotus. His initial vital signs were heart rate 139 bpm, blood pressure 94/52 mmHg, and respiratory rate 22 breaths per minute, with normal oxygen saturation and temperature. His physical examination revealed superficial abrasions to his extremities and tachycardia with an otherwise normal cardiopulmonary exam. Neurologically, he was drowsy with slurred speech but had normal reflexes and no other neurologic deficits. Laboratory evaluation revealed leukocytosis (18.6 mm3/mcL), decreased potassium (3.1 mEq L−1) and bicarbonate (12 mEq L−1) with anion gap of 16; he had otherwise normal electrolytes and renal function. His UDS was negative. His mental status and vital signs returned to normal after intravenous fluid administration and observation for 3 hours, and he requested discharge before re-evaluation of laboratory studies. As instructed, he followed up with his primary care manager for reevaluation, at which time, his comprehensive metabolic panel was normal.

**DISCUSSION**

Patients can purchase both legal and illegal substances for use, often discussed in internet forums.[3](javascript:;) Websites such as Erowid, Bluelight, and Drugs-Forum include communications on experiences regarding vaporizing substances other than nicotine.[4](javascript:;) These include extracts from plants such as wild dagga (*Leonotis leonorus*), Kanna (*Sceletium tortuosum*), and wild lettuce (*Lactuca virosa*), with reported relaxing, hypnotic, or psychedelic effects. When compared with inhalation, oral ingestion of such substances would require higher doses to overcome incomplete absorption and first-pass metabolism, making inhalation a rapid and cost-effective method of consumption.[3](javascript:;) Likely responding to this growing demand, there has been growing production of attachments for traditional electronic cigarettes that are designed to more effectively vaporize various other liquid additives.[4](javascript:;) The military population, consisting largely of young adults, has not been immune to this rising trend. Eleven percent of service members report daily electronic cigarette use; among the enlisted ranks, this number rises to nearly 20%.[5](javascript:;) This prevalence makes knowledge regarding their potential complications paramount for the military medical provider.

The blue lotus flower (*Nypmhaea caerulea*) has recently been observed to be one such alternative substance being consumed. The depiction of the blue lotus flower has been found on Egyptian papyri and tombs dating back to the 14th-century B.C., where it was thought to have been part of healing and shamanistic rituals.[6](javascript:;) Today, the blue lotus flower has been used primarily as a sleep aid and anxiety reliever. However, at higher doses achieved by inhalation, users can experience euphoria and hallucinations.

The psychoactive effects of the flower are attributed to two aporphine alkaloids, apomorphine and nuciferine. Apomorphine is a non-selective dopamine agonist and a serotonin modulator, with activity as a partial agonist at 5-HT1A and an antagonist at 5-HT2A. It additionally is an alpha-antagonist.[7](javascript:;) Proposed uses of this compound include treatment of depression, insomnia, schizophrenia, Parkinson’s disease, and erectile dysfunction. Nuciferine has mixed effects at serotonin and dopamine receptors. It demonstrated antagonism at 5HT-2A receptors; partial agonist effect at D2, D5, and 5-HT6; and inhibition at the dopamine transporter.[8](javascript:;) One of nuciferine’s metabolites, atherosperminine, was associated with dopaminergic agonism as well.[9](javascript:;) Proposed uses of this compound include as an antipsychotic and in the treatment of alcohol use disorder. It has additionally been used to induce vomiting in animals.[10](javascript:;) Poklis et al. analyzed various blue lotus products purchased on the internet, and all were found to have nuciferine, although only a few samples in their study contained apomorphine as well.[6](javascript:;)

Blue lotus products are labeled as natural dietary supplements and are therefore not regulated in the United States by the FDA. The blue lotus flower is easily available for purchase on the internet in the form of extracts, resins, oils, powders, and electronic cigarette refill liquids. The suggested means for ingesting on internet drug forums and blogs includes drinking in teas, dissolving in ethanol-containing beverages, or vaping in electronic cigarettes.[6](javascript:;) Four of our patients used electronic cigarettes, while the fifth used blue lotus infused wine. Three were not forthcoming about the source of the substance, while the other two reported ordering it online.

All of our patients were active duty males between the ages of 19 and 29 years. They presented with symptoms ranging from altered mental status to anxiety and chest pain. Two presented with tachycardia and one was briefly hypoxic while en route with EMS. Significant exam findings include decreased alertness following reported hallucinations, and one was disoriented to his location. Interventions provided in the ED were supportive. While one patient’s CK was mildly elevated at 3215 U/L with a creatinine of 1.3, he did not have symptoms of rhabdomyolysis. No other patient in our series had CK measured. One presented with an anion-gap metabolic acidosis. There was also one patient who presented with priapism during the course of his stay. Our patients were observed until achieving clinical sobriety, which ranged from 2 hours and 45 minutes to 4 hours. None of our patients required sedating agents in the course of treatment, and observation alone was sufficient. From our limited observations, it appears that blue lotus consumption has the potential to cause a wide variety of presentations, with altered mental status and agitation being the most common presenting symptoms.

Limitations to this series include that the blue lotus use was self-reported in these cases, and we have no analytical confirmation of this substance in biologic samples from the patients. Their symptoms, however, are consistent with a mild psychoactive substance without frank sympathomimetic, serotonergic, or opioid effects.

The American Association of Poison Control Centers has tracked electronic cigarette and liquid nicotine exposures since 2011; however, there is typically minimal guidance from poison centers in very specific compounds such as blue lotus due to the rare and recently emerging use in the USA.[10](javascript:;) It would be nearly impossible for poison centers to stay abreast of all the potential substances found in vaping liquid, highlighting the importance of reporting such cases to the local center.

This case series is one of a small number of reports on the use of alternative substances in electronic cigarettes and, to the authors’ knowledge, the first regarding blue lotus inhalation in these devices. While the known effects on human health have lagged behind the booming popularity of electronic cigarettes, even less is known about alternatives to commercially purchased vaping products such as blue lotus. Our patients who consumed blue lotus had varying but largely self-resolving symptoms. Factors complicating the effects observed in these patients include variable composition of products purchased online and available methods of delivering the substance. While the patients in this series had no known sequelae of their exposures, the dangers of blue lotus use have not been thoroughly elucidated. More information will be needed before making firm treatment recommendations, although our experience shows that supportive care is generally sufficient.

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