BATH SALTS: SYNTHETIC CATHINONES

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Introduction
“Bath salts” emerged during 2010 and 2011 as popular drugs of abuse in the United States. They have been available for purchase on websites, in smoke shops and gas stations, and generally contain synthetic cathinone compounds including mephedrone (4-methyl-N-methylcathinone), MDPV (methylene-dioxypyrovalerone), methylone (3,4-methylenedioxy-N-methylcathinone) or others. Exposures to bath salts usually cause stimulant effects due to pharmacological similarities with amphetamines (Figure 1).1-4 Bath salts are often labeled “not for human consumption” but have reportedly been ingested, injected, snorted, smoked, and inserted rectally.3 In 2010, the American Association of Poison Control Centers (AAPCC) reported 303 calls to poison control centers nationwide regarding psychoactive bath salts, which increased to 4,720 calls between January 2011 and August 2011.6 Treatment of bath salt exposure is supportive and should be based on the clinical symptoms of the patient. Symptoms may last 6-8 hours or longer depending on the severity of intoxication.3,5,7

Pharmacology
Synthetic cathinone compounds such as MDPV, mephedrone and methylone are structurally derived from cathinone, a natural alkaloid found in fresh leaves from the Catha edulis or khat plant.1,7 Cathinone and synthetic cathinones, including methcathinone, are structurally related to amphetamines and cause stimulant signs and symptoms. Khat leaves are commonly used to promote wakefulness in Africa and the Middle East and may be chewed or brewed as tea. Mephedrone, MDPV, methylone and other substances may be present in bath salts even if not indicated on the product label. These substances have been best characterized to date in animal studies and are shown to modulate concentrations of dopamine, norepinephrine and serotonin and modify activities of serotonin and dopamine receptors.8,9

Clinical Presentation
Bath salt exposures generally cause sympathomimetic effects. The Kentucky and Louisiana poison control centers published a case series of 236 bath salt exposures reported between January 2010 to February 2011.3 The most common clinical effects were agitation (82%), combative violent behavior (57%), tachycardia (56%), hallucinations (40%), paranoia (36%), confusion (34%), myoclonus (19%), chest pain (17%), and hypertension (17%). Most patients were male (78%) with a mean age of 29 years of age (range 16-64 years).3 A letter in the New England Journal of Medicine by Ross et al. also describes the occurrence of hyperthermia, seizures, arrhythmias, myocardial infarction (cont. on pg. 3)
50TH ANNIVERSARY OF NATIONAL POISON PREVENTION WEEK

The 50th Anniversary of National Poison Prevention Week (NPPW) is March 18-24, 2012. NPPW is observed annually the third week of March. The goal of this week is to raise awareness of the risk for a poison exposure and to prevent poisoning.

On September 26, 1961, the 87th United States Congress passed a joint resolution (Public Law 87-319) requesting the President of the United States proclaim the third week of March National Poison Prevention Week. On February 7, 1962, President John F. Kennedy signed this legislation establishing NPPW and the first observance of NPPW occurred in March 1962.

Along with the efforts of individual poison centers, the American Association of Poison Control Centers (AAPCC) and the National Poison Prevention Week Council will be celebrating NPPW with its regularly planned activities including a press release, Presidential proclamation and announcement of the poster contest winners. In special recognition of the 50th anniversary, this year will include a mini-poster “50 Ways to Prevent Poisonings” and a social media campaign continued through the year. Check our website for more details.

The Utah Poison Control Center urges everyone to get involved during the week to raise awareness of poisoning hazards and prevention. Call the UPCC at 1-800-222-1222 to request free poison prevention education materials and posters. Don’t forget to program the number into your cell phone.

POISON PEARLS

The onset of symptoms can vary from 3 hours to 14 days post-ingestion of the toxin.

There are 3 types of botulism: food-borne, infant and wound botulism, each with a different mechanism to cause disease.

In foodborne botulism (15-20% of all cases), the source is commonly canned foods or uncooked fermented potatoes that already contain the pre-formed toxin. Once the toxin is ingested it enters circulation and prevents acetylcholine vesicle docking, fusion and release from the pre-synaptic peripheral cholinergic nerves. Treatment is with botulism antitoxin as soon as possible and acute airway management and monitoring. Mortality ranges from 5-11%.

Infant botulism (70% of cases) is often associated with consumption of honey or exposure to dust and dirt that contain the botulism spores. Until 6 months, and rarely up to a year of age, the GI tract remains immature and the spores tolerate ingestion and are subsequently able to generate toxin in the gut. The onset is slower than seen with foodborne botulism and treatment is with BIG (human botulism immunoglobulin). It has a low mortality of <1%.

Wound botulism is classically associated with users of black tar heroin (3-20% of cases). Spores get into an open wound and are able to reproduce in an anaerobic environment, releasing toxin into the circulation. Treatment includes antitoxin, antimicrobial therapy, and abscess debridement.

Confirmation of botulism rests on demonstration of the toxin in specimens of patient serum, gastric secretions, stool, wound culture or in a food sample. Bioassays involve intraperitoneal injection of toxin into mice and observation of the development of botulism-specific symptoms or death. Because the test takes several days, the antitoxin should be administered as soon as possible based on history and clinical suspicion.

During early 20th century in the United States, the mortality rate among patients with botulism was 60%–70%, even with antitoxin administration. It is now as low as 5%, likely due to improved intensive care techniques— principally, mechanical ventilation. Thus, persons with suspected botulism should be placed immediately in an intensive care setting. Paralysis due to botulism is protracted, lasting weeks to months, and meticulous intensive care is required during this period of debilitation.

BOTULISM

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Clostridium botulinum are anaerobic, gram-positive, spore-forming bacilli that are responsible for approximately 120 cases of botulism per year in the US. Signs and symptoms of botulism exposure are characterized by descending paralysis. Patients may present with dizziness, nausea or vomiting. Neurologic symptoms include diplopia, ptosis, mydriasis, dysphagia, and dysphonia, which can progressively descend to involve respiratory muscles. There are no sensory or mental status effects.
and death after bath salt exposures. Bath salts are rapidly absorbed when ingested or snorted and the desired stimulant effects generally peak within about 1.5 to 3 hours. Symptoms have been reported to last 6 to 8 hours, up to 12 to 24 hours and possibly 48 hours in some cases, likely dependent upon route and quantity used. Patient who injected and snorted MDPV initially presented with delirium and sympathomimetic effects, developed pulseless electrical activity requiring resuscitation and ultimately succumbed to multi-system organ failure. His exposure was confirmed by detection of MDPV in serum and urine. The Utah Poison Control Center (UPCC) consulted on 57 bath salt exposures during the end of 2010 and the first half of 2011. Agitation was the most common clinical effect documented in 65% of cases followed by tachycardia, hallucinations and hypertension. A moderate effect outcome was documented in 28 (49.1%) of cases and a major effect outcome (life-threatening) in 2 cases. No deaths were reported to the UPCC.

Treatment

Treatment of bath salt exposures is symptomatic and supportive. Goals of therapy include management of agitation and mitigation of cardiovascular effects. The mainstay of treatment includes sedation for agitation and combative behavior, and monitoring and treatment of dysrhythmias, seizures, and elevated core temperature. Benzodiazepines are the treatment of choice for stimulant overdoses and have been successfully used to control agitation and seizures from the synthetic cathinones. Some patients require admission or intensive care based on the severity of their symptoms. In the Kentucky and Louisiana poison center case series, most patients were treated and released from the emergency department (49%) although 21% of patients were admitted to an intensive care unit. One patient died from a self-inflicted gunshot after experiencing delusions related to bath salt abuse and several other patients also experienced severe paranoid delusions.

Laboratory Testing and Confirmation of Synthetic Cathinone Exposure

Routine drug of abuse screens do not detect synthetic cathinones. Specific tests for mephedrone, MDPV and methylene are not performed in Utah. Specialty laboratories may be able to test for these compounds, although the turnaround time for such a specialty laboratory test is usually 1-2 weeks and would not likely change the clinical management of the patient. In the published report from the Kentucky and Louisiana poison control centers, fifteen different bath salt products were obtained and tested and all were found to contain MDPV, mephedrone, and or methylene and occasionally caffeine. Even products with the same name from different stores had different ingredients upon analysis.

Legislation and Availability

Bath salts gained widespread attention in the US and many states took action to ban them. In Utah, House Bill 23, Controlled Substance Modifications was passed in February 2011, making the possession of bath salts a class B misdemeanor and distribution of bath salts a third-degree felony. On October 21, 2011, the Drug Enforcement Administration (DEA) exercised its emergency scheduling authority to make mephedrone, MDPV, and mephedrone Schedule I drugs. Emergency action is allowed when there is no imminent threat to public health and will hold for at least one year with the possibility of a six-month extension. This classification means that the “criminal, civil and administrative penalties, sanctions and regulatory controls of Schedule I substances will be imposed on the manufacture, distribution, possession, importation, and exportation of these synthetic cathinones.”

Conclusions

Psychoactive bath salts are dangerous drugs with varied ingredients often unknown to the seller and user. Patients will typically have stimulant symptoms that may last up to 8 hours or longer, depending on the individual exposure, and may include paranoid delusions. Treatment of bath salt exposures should be supportive and based on the patient’s clinical presentation. Local and federal regulation enacted in 2011 has decreased the accessibility and legality of bath salts, although people will likely continue to abuse these substances.

References

The amount of acetaminophen in infant products has recently changed. Both old and new formulations may be on store shelves temporarily. For questions about acetaminophen dosing, call your local poison control center.

National Prescription Drug Take-Back Day
Saturday, April 28, 2012
10:00 am to 2:00 pm
Check www.justice.gov/dea for locations.
In the last 13 months 995,185 pounds (498.5 tons) of medication has been removed from circulation for safe and proper disposal.

The FDA issued a safety alert that ondansetron may increase the risk of developing a prolonged QT interval, which can potentially lead to Torsade de Pointes.
The FDA issued a safety alert that citalopram causes dose-dependent QT interval prolongation and should no longer be prescribed at doses greater than 40 mg per day.

BRITTANIE HATCH, PHARMD, MS joined the Utah Poison Control in July 2011. She received a BS from the University of Utah. She received a Doctor of Pharmacy degree with a MS in clinical research from Campbell University in North Carolina. Brittanie was born in Arizona, but grew up in Utah. She has two sisters and three brothers. She loves an adventure and trying new things. In her spare time, she enjoys traveling, crossing things off her “bucket list”, learning to play golf, road trips, ballet, sports, and spending time with her family and friends. She loves working at the poison center and that there is always something new to learn. Her favorite calls are the ones that can be managed at home and no one has to go to the hospital. Her toxicology interests consist of acetaminophen, inhalants, serotonin syndrome, and dietary supplements.

The UPCC is recruiting for the Medical Director and Assistant Director-Clinical positions. For additional details, please see our website at www.utahpoisoncontrol.org/employment.