Case Report

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A Diagnostic Conundrum: The Spice Sensation

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Abstract

Synthetic cannabinoids (SCBs) are recreational drugs that are readily available and marketed under various disingenuous brand names. They have gained increasing popularity among young adults, including military soldiers. Initially designed to study effects on pain and brain functioning, these drugs have evolved rapidly and are often used for their lasting euphoric effects. Their relatively cheap cost, easy availability and lack of detection in commercial urine drugs screening tests, has led to an increase in use of SCBs. Due to their unpredictable toxicity and abuse potential, they continue to pose a large public health concern. Treatment, even though not clearly defined, often involves supportive care and symptoms management. Additional studies are required to better understand the various risks and adverse health outcomes that SCBs pose to the general public.

Keywords: Synthetic cannabinoids (SCBs); Spice; Young adults

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Case Presentation

A 19 year old male, with no past medical history, presented to the emergency department with a witnessed episode of generalized tonic-clonic seizure. The seizure lasted approximately 7 minutes. The episode was associated with tongue biting, loss of urinary sphincter control and a prolonged postictal state. On recovery, the patient denied any previous seizures or a family history of seizure. His review of symptoms was negative for syncope, headaches, chest pain or fevers. He lived in Florida, had no pets and was monogamous. On further questioning, he finally admitted to smoking SCBs at a social gathering at this friend's house.

He was afebrile on admission with normal vital signs. His physical examination revealed over-all generalized weakness, with normal cranial nerves II to XII and no focal neurological deficits. He was able to ambulate with some support. Laboratory studies showed a normal complete blood count (CBC) and thyroid stimulating hormone (TSH), but his complete metabolic panel (CMP) revealed an elevated creatinine level at 1.4 mg/dl. Serum and urine toxicology were reported at negative. Computerized tomography of his head failed to show any abnormalities. An electroencephalography was later pursued and showed normal epileptiform activity.

His hospital course was complicated by worsening renal function; creatinine of 3.0 mg/dl, despite adequate intravenous hydration. Hypertensive episodes were noted with systolic blood pressures ranging in the 170's. He also complained of intractable nausea, vomiting, diarrhea. The nursing staff reported significant random personality changes, associated with episodes of agitation and insomnia. A creatinine kinase (CK) was measured at 4000 U/L with no pigment cast. A urinalysis showed trace protein with no red blood cell, myoglobin or casts on microscopy. Urine eosinophils were not detected. A bilateral renal ultrasound revealed increased cortical echogenicity without hydronephrosis. Stool cultures were negative for Escherichia Coli O157:H7 and other pathogens. A peripheral smear failed to reveal any schistocytes or other red cell deformities. Ironically, all his symptoms, including his renal function seemed to improve on hospital day number 3, with resolution of all symptoms on hospital day number 6.

Discussion

Synthetic cannabinoids (SCBs) are a group of substances that are structurally and chemically related to delta 9-tetrahydrocannabinol or THC. They were initially invented in the 1960s for research purposes, but now are commercially produced for recreational abuse [1]. At present, there are approximately 150 synthetic cannabimimetics, mostly manufactured in China and the list seems to be gradually growing [2, 3]. SCBs are commercially available both legally and illegally, in shops and over the internet,

and often called by various street names including, but not limited to: “Spice”, “Mojo”, “K2”, ”Cloud 9”, “Aroma”, “Dream”, “Green Buddha”, Blaze”, Kronic” and “Herbal incense” **(Figures 1 and 2)** [1-4]. SCBs are often manufactured by dissolving the powdered form in acetone or ethanol. Various plants materials are soaked and saturated, thereafter slowly dried allowing the solvent to evaporate. The amount of SCBs left on the plant is variable, hence leading to the different potencies and formulations [1-3]. To hamper the analysis of the active cannabinoids, large amounts of vitamin E use has been reported [2].

Young Caucasian males, with at least a high school education, remain the primary users of the drug [1, 2, 4]. SCBs are the second most widely used illicit drug in high school seniors in the United States [3]. Smoking seems to be the most preferred method of using the drug [3, 4]. Cases of SCBs use have also been reported in military soldiers [5].

Both THC and SCBs bind to cannabinoid receptors 1 (CB1) and cannabinoid receptors 2 (CB2). However, CB1 are more stimulated than CB2. CB1 found on the axon terminals of neurons, are abundantly expressed in the cerebral cortex, hippocampus, basal ganglia, cerebellum and hypothalamus. These areas of the brain are associated with cognition, memory, pain and motor coordination. CB1 are also expressed in the peripheral nervous system, including the autonomic nervous system and on sensory nerves. CB2 are found peripherally in the spleen, tonsils, thymus and various lymph nodes [1, 2].

Figure 1 Commercially available SCBs.

Figure 2 Commercially available SCBs with street name Spice.

SCBs act mainly as agonists to the cannabinoid receptors in the human brain after being converted to several metabolites including: JWH-018, JWH-073 and CP47-497. JWH compounds are the largest structural group of synthetic receptor agonist and named after an organic chemist from Clemson University; John W. Huffman [2, 6]. JWH-018 is a full agonist and when compared to THC, has a 4 times the affinity for CB1 and 10 times the affinity for CB2. Due to its high pharmacological activity and ease of synthesis, JWH-018 remains the most studied and characterized cannabinoid [1, 2, 6-8].

Acute effects of SCBs usually last anywhere between 30-120 minutes, but symptoms may also persist for 24 hours [3]. SCBs are more potent, unpredictable and toxic than the natural substances and hence pose a greater risk towards the general population. Detection of SCBs continues to remain a challenge due to the unavailability of an accurate and reliable testing and screening method. The detection of SCBs metabolites is experimentally possible, but at this time, not commercially available [9, 10].

Several cardiovascular, gastrointestinal and neurological symptoms have been reported with SCBs abuse. The most common symptoms reported include: tachycardia, drowsiness, agitation, vomiting, hallucinations, nausea, confusion, hypertension, chest pain and vertigo/dizziness [1, 3, 11]. Psychosis and seizures have been described in various case reports, however, the mechanism by which SCBs acts as a pro-convulsant remains unclear [1, 3, 10, 11].

Apart from supportive measures, there are no specific guidelines to treat SCB related seizures. Death, including suicides have also been reported, usually with the concomitant use of other substances such as amphetamines [1, 3, 11].

Acute kidney injury has been described in SCBs abuse. Acute tubular necrosis with a steady decline in kidney function is often seen. The exact mechanism remains unclear with some thought of a toxic rather than an ischemic type of insult playing a role. Hydration provides some benefit in improving renal function, although 25% of the affected patients may require limited hemodialysis [12, 13].

Conclusion

Synthetic cannabinoids are common street drugs of abuse that can cause various unintended and sometimes serious side effects. They have become popular due to their ease of availability, cheap price and lack of detection on commercial urine testing. In patient presenting with seizures, psychosis, agitation and/or acute kidney injury, use of SCBs should always be considered. A good history and a high index of suspicion are required to accurately make the diagnosis. Our patient recovered well with no sequela. Prior to discharge, he received extensive counselling on the use of SCBs and other recreational drugs.

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