Not safe for consumption: Synthetic cannabinoids causing fatal acute rhabdomyolysis in two young men

Anthea B. Mahesan Paul, Lary Simms, Abraham Ebenezer Paul, Christopher Schmidseeder, Andrew A. Mahesan, Jojo Yorke

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Case Series: In this case series, we report two cases of fatal acute rhabdomyolysis associated with synthetic cannabinoid use in previously healthy young men. The strong correlation found by detailed history, clinical evaluation, and laboratory tests including the negative universal drug screen strongly suggests an association between synthetic cannabinoid use and fatal acute rhabdomyolysis in both cases.

Conclusion: Synthetic recreational drug use, including synthetic cannabinoids should be included in the differential diagnosis for acute rhabdomyolysis in young people with negative universal drug screens and initiatives should be taken to educate physicians and the general public of the serious consequences of synthetic cannabinoid use.

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CASE SERIES

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public of the serious consequences of synthetic cannabinoid use.

Keywords: Synthetic cannabinoids, Spice, Rhabdomyolysis

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INTRODUCTION

Synthetic cannabinoids (SC) are a blend of herbal and chemical compounds used as a recreational drug that imitates the effects of marijuana. Synthetic cannabinoids have been sold in enticing packaging mislabeled as potpourri or herbal mixtures. The packages often labeled with, “not safe for consumption” have a variety of names including “Spice”, “K2”, “Nice Guy”, “NBT”, “Black Mamba” and “Crazy Monkey” [1]. Due to the relatively new advent of SCs, there is limited data available on the short-term and long-term effects of synthetic cannabinoid use. To our knowledge, this is the first case series of two fatalities that can be associated with acute rhabdomyolysis and synthetic cannabinoid use in the United States.

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There have not been randomized controlled trials for SC use in the US and thus the documented effects of SCs are the result of subjective patient reporting. The commonly reported adverse effects of SC use by the CDC are drowsiness or lethargy (26.3%), emesis (16.4%), confusion (4.2%), tachycardia (29.0%), and agitation (35.3%) [2]. Spaderna et al. have summarized the less common adverse effects reported in the literature affecting a large range of organ systems including neurological, cardiovascular, psychological, and gastrointestinal adverse effects [3].

Physicians and healthcare personnel should be aware of the possibility of potentially fatal rhabdomyolysis in patients that use synthetic cannabinoids.

CASE SERIES

Case 1

A 30-year-old Caucasian male presented to the emergency room unconscious and unresponsive after being on an 8-day synthetic cannabinoid binge (NBT brand). According to his fiancé, he experienced nausea and vomiting for approximately six days before hospital admission accompanied by abdominal pain and difficulty urinating. His urine was described as dark brown. In addition he complained of muscle cramps, and soreness. The patient had a history of spice use for the past two years, and was a 1/2 pack a day smoker. He had no history of other drug use, or any relevant medical or surgical history. On admission, He exhibited hypertension, oliguria, muscle tenderness accompanied with creatinine phosphokinase levels of 47,000 IU, hyperkalemia, BUN: 51 mg/dL, abnormal liver function tests, creatinine: 5.15

mg/dL, hypocalcaemia and hypoalbuminemia consistent with severe rhabdomyolysis. Universal drug screen was negative. Despite aggressive intravenous hydration, forced diuresis, and hemodialysis, the oliguria persisted and the patient died 5 days after admission with renal failure and ventilator associated bilateral pneumonia. (Figure 1)

Case 2

A 23-year-old African-American male with history of substance abuse, and no other significant past medical history, presented to the emergency room complaining of nausea, vomiting, chest pain, generalized weakness, generalized body aches and muscle cramps that began approximately four days before admission. He had a history of exclusive spice use for the past five days. He also complained of sharp retrosternal chest pain, muscle pain being unable to walk for three days prior, accompanied with low urine output. The patient was a former occasional smoker and occasional alcoholic, last use of both cigarettes and alcohol was 1 week prior. On admission, the patient was hypertensive with a blood pressure of 170/82 mmHg. Laboratory findings showed abnormal findings consistent with dehydration and rhabdomyolysis with creatine kinase level of 37,200 IU, CK-MB: 113.7 ng/mL, abnormal liver function tests, hyponatremia with sodium of 105 mmol/L, creatinine: 4.26 mg/dL, hypocalcaemia, hyperkalemia, BUN: 120 mg/dL, and elevated Troponins. Universal drug screen was negative. Despite aggressive intravenous hydration, forced diuresis, hemodialysis, and supplementation the patient rapidly deteriorated and died three days after admission. (Figure 2) (Table 1).

Table 1: Laboratory Values for Patient 1 and Patient 2 on Admission

Test	Patient 1		Normal Values	Patient 2	
CPK	47,000	H	(52-336) U/L	37,200	H
Potassium	2.5	H	(3.5-5.5) mmol/L	4.9	*
BUN	51	H	(7-18) mg/dL	120	H
SGOT/AST	1044	H	(15-37)	5053	H
SGPT/ALT	241	H	(12-78)	2228	H
Creatinine	5.15	H	(0.52-1.23) mg/dL	5.69	H
Calcium	6	L	(8.5-10.1) mg/dL	5.2	L
Albumin	3.2	L	(3.4-5.0) g/dL	3	L
Sodium	121	L	(136-145) mmol/L	105	L
Estimated GFR	18	L	mL/min	10	L
Drug screen	Negative	*		Negative	*

Abbreviations: H= High, L= Low, *= Normal

Clinical Course: (Case 1): 30-year-old Caucasian male

Figure 1: Clinical Course of Patient 1.

Clinical Course: (Case 2): 23-year-old African-American male

Figure 2: Clinical Course of Patient 2.

DISCUSSION

Unfortunately, young people are being victimized by the recreational synthetic drug epidemic sweeping the United States. Though the exact number of regular SC users is undetermined, according to a study at American high schools, 11% of 12th graders and 4% of 8th graders reported using SC products in the year 2013 [4]. In addition, the CDC reported a stark increase of calls regarding effects from SC use by 229% in 2015 from the same January–May period in 2014 [2]. Although it is apparent the prevalence of SC use is on the rise, Buser et al. found that young adults and adolescents appear to be unaware of the health risks associated with synthetic cannabinoids [5].

Since its debut in the United States in 2009, legislature has struggled to keep up with the growing epidemic of synthetic recreational drug use. In the summer of 2012, President Obama signed legislation to include 21 different synthetic cannabinoid compounds and five overall cannabinoid structural classes into Schedule I of the Controlled Substances Act (CSA) [6]. The legislature worldwide struggles to keep up with the synthetic manufacturing of these recreational drugs with the total number of identified SC compounds reaching over 84 as of May 2013 [7].

The major users of SCs have been suggested to be populations wishing to avoid drug detection such as parolees, students and military staff due to the inability of the drug to be detected through the standard urine drug screening [8]. Another hypothesis has been proposed that SC's may be used as an adulterant to unsuspecting consumers under the guise of marijuana, due to the relatively low price of about \$6-10 USD per

gram [9]. Regardless of the intentional or unintentional consumption of this drug, the dilemma remains that the general public remains ignorant of the dangerous and potentially fatal adverse effects of SC use.

A limitation of this case series is the inability to chemically confirm the presence of SCs at the time of admission. This association between SC use and acute fatal rhabdomyolysis was made after careful exclusion of other potential causes aided by a detailed history attained from the patients and patients' families, clinical evaluation, and laboratory tests including the negative universal drug screen. Through the universal drug screen it is apparent that our patients were not abusing other drugs at the time of admission and this supports our hypothesis that the history of SC use was the key contributing factor to the development of acute rhabdomyolysis. A number of recreational drugs commonly abused including benzodiazepines, ecstasy, heroin, ketamine hydrochloride, marijuana, lysergic acid diethylamide, methamphetamine, narcotics, phencyclidine, ethanol and cocaine have been associated with drug-induced acute rhabdomyolysis [10]. It is suggested that acute rhabdomyolysis could occur from muscle destruction by compression and ischemia due to muscular hyperactivity, extreme exercise, and catatonic states brought on by acute recreational drug intoxication [11].

CONCLUSION

With the legalization of medical marijuana in 23 states in the US it is easy to see how synthetic cannabinoids that feel, smell and look the same may be misleading to some individuals. Initiatives should be under taken to educate

physicians and the general public of the consequences and effects of SC use and synthetic recreational drugs as a whole.

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Author Contributions

Anthea B. Mahesan Paul – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Lary Simms – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Abraham Ebenezer Paul – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Christopher Schmidseider – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Andrew A. Mahesan – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Jojo Yorke – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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REFERENCES

1. Fattore L, Fratta W. Beyond THC: The New Generation of Cannabinoid Designer Drugs. *Front Behav Neurosci* 2011 Sep 21;5:60.
2. Law R, Schier J, Martin C, Chang A, Wolkin A; Centers for Disease Control (CDC). Notes from the Field: Increase in Reported Adverse Health Effects Related to Synthetic Cannabinoid Use - United States, January-May 2015. *MMWR Morb Mortal Wkly Rep* 2015 Jun 12;64(22):618–9.
3. Spaderna M, Addy PH, D'Souza DC. Spicing things up: synthetic cannabinoids. *Psychopharmacology (Berl)* 2013 Aug;228(4):525–40.
4. Johnston L, O'Malley P, Bachman J. Monitoring the Future: National Results on Adolescent Drug Use: Overview of Key Findings. *FOC* 2003;1(2):213–34.
5. Buser GL, Gerona RR, Horowitz BZ, et al. Acute kidney injury associated with smoking synthetic cannabinoid. *Clin Toxicol (Phila)* 2014 Aug;52(7):664–73.
6. Drug Enforcement Administration (DEA), Department of Justice. Establishment of drug codes for 26 substances. Final rule. *Fed Regist* 2013 Jan 4;78(3):664–6.
7. Canadian Community Epidemiology Network on Drug Use Bulletin: Synthetic Cannabinoids In Canada. Health Canada's Office of Research and Surveillance 2014;3:1–2.
8. Loeffler G, Hurst D, Penn A, Yung K. Spice, bath salts, and the U.S. military: the emergence of synthetic cannabinoid receptor agonists and cathinones in the U.S. Armed Forces. *Mil Med* 2012 Sep;177(9):1041–8.
9. Johnson LA, Johnson RL, Alfonzo C. Spice: a legal marijuana equivalent. *Mil Med* 2011 Jun;176(6):718–20.
10. Coco TJ, Klasner AE. Drug-induced rhabdomyolysis. *Curr Opin Pediatr* 2004 Apr;16(2):206–10.
11. Prendergast BD, George CF. Drug-induced rhabdomyolysis--mechanisms and management. *Postgrad Med J* 1993 May;69(811):333–6.

SUGGESTED READING

- Behonick G, Shanks K, Firschau D, Mathur G, Lynch C, Nashelsky M et al. Four Postmortem Case Reports with Quantitative Detection of the Synthetic Cannabinoid, 5F-PB-22. *Journal of Analytical Toxicology*. 2014; 38(8):559–562.
- Bernson-Leung M, Leung L, Kumar S. Synthetic Cannabis and Acute Ischemic Stroke. *Journal of Stroke and Cerebrovascular Diseases*. 2014; 23(5):1239–1241.
- Tse R, Kodur S, Squires B, Collins N. Sudden cardiac death complicating acute myocardial infarction following synthetic cannabinoid use. *Intern Med J*. 2014; 44(9):934–936.

- Kazory A, Aiyer R. Synthetic marijuana and acute kidney injury: an unforeseen association. Clinical Kidney Journal. 2013; 6(3):330-333.

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