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Pediatricians are actively involved in many efforts to decrease harmful exposures to children. In recent years, exposure to marijuana and other cannabinoids has become an increasing challenge. Legalization of marijuana for both medical and recreational use has already happened in some states, and more states are considering this. This has raised critical questions for pediatricians and others who provide care for children and adolescents. What is the risk of use or secondary exposure, including accidental ingestion, to marijuana or synthetic cannabinoids? What factors are associated with use or secondary exposure? What are the implications for children and teens who use marijuana or synthetic cannabinoids?

In March 2015, the AAP updated their statement on the impact of marijuana policies summarizing the evidence to date and offering recommendations for pediatricians to implement in their offices, communities, and even at a state and national level. In 2017, the AAP issued a revised statement on marijuana. However, pediatricians and other child health care providers need more information to help understand this quickly changing landscape. We have compiled articles from the past 3 years of AAP publications into a custom collection, including the revised AAP policy statement and clinical report. This collection will continue to be updated with new articles that are published on this topic in the months and years ahead, making it a go-to reference for every child health professional. Check back frequently online for articles that you can share with patients, families, and even legislators who turn to you for the health information they need when deciding whether to legalize marijuana in your state. This collection will likely have the information you need, especially when it comes to learning more about the risks of recreational marijuana use, and will also help you understand what we know and do not yet know about its medical use.

—Lewis R. First, MD, MS
Editor in Chief, Pediatrics
Health Risk Behaviors With Synthetic Cannabinoids Versus Marijuana

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abstract

BACKGROUND AND OBJECTIVES: Data are limited on the behavioral risk correlates of synthetic cannabinoid use. The purpose of this study was to compare the behavioral risk correlates of synthetic cannabinoid use with those among marijuana users.

METHODS: Data from the 2015 Youth Risk Behavior Survey, a cross-sectional survey conducted in a nationally representative sample of students in grades 9 through 12 (N = 15,624), were used to examine the association between self-reported type of marijuana use (ie, never use of marijuana and synthetic cannabinoids, ever use of marijuana only, and ever use of synthetic cannabinoids) and self-report of 36 risk behaviors across 4 domains: substance use, injury/violence, mental health, and sexual health. Multivariable models were used to calculate adjusted prevalence ratios.

RESULTS: Students who ever used synthetic cannabinoids had a significantly greater likelihood of engaging in each of the behaviors in the substance use and sexual risk domains compared with students who ever used marijuana only. Students who ever used synthetic cannabinoids were more likely than students who ever used marijuana only to have used marijuana before age 13 years, to have used marijuana ≥1 times during the past 30 days, and to have used marijuana ≥20 times during the past 30 days. Several injury/violence behaviors were more prevalent among students who ever used synthetic cannabinoids compared with students who ever used marijuana only.

CONCLUSIONS: Health professionals and school-based substance use prevention programs should include strategies focused on the prevention of both synthetic cannabinoids and marijuana.

WHAT’S KNOWN ON THIS SUBJECT: Although the effects of synthetic cannabinoids are similar to marijuana, synthetic cannabinoids can be more potent and may result in adverse health effects not commonly observed with marijuana. Information on synthetic cannabinoid use among high school students is limited.

WHAT THIS STUDY ADDS: This study contributes to the limited epidemiologic data on synthetic cannabinoid use among high school students. Furthermore, this study shows that synthetic cannabinoid use is associated with a higher prevalence of health risk behaviors than observed with marijuana use alone.

Synthetic Cannabinoid Use Among High School Seniors

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OBJECTIVES: In this study, we examined the prevalence and correlates of current synthetic cannabinoid (SC) use among high school seniors in the United States.

METHODS: Monitoring the Future, an annual nationally representative survey of high school seniors, began querying current (30-day) SC use in 2014. Data were examined from the 2 most recent cohorts (2014–2015; N = 7805). Prevalence of self-reported use was examined and differences in demographics and recency and frequency of other drug use was compared between current marijuana-only users and current SC (plus marijuana) users using χ² and generalized linear model using Poisson.

RESULTS: We found that 2.9% of students reported current SC use; 1.4% of students (49.7% of users) reported using SCs on ≥3 days in the past month. SC users were more likely to report more recent (and often more frequent) use of lysergic acid diethylamide, cocaine, heroin, and/or nonmedical use of opioids compared with marijuana-only users. Compared with current marijuana-only users, SC users were more likely to report lower parent education (P < .05) and current use of a higher number of illegal drugs other than marijuana (Ps < .001). Students using SCs ≥10 times in the past month were more likely to be boys, frequent marijuana users (Ps < .01), African American, and users of multiple other illegal drugs (Ps < .001).

CONCLUSIONS: SC use is typically part of a repertoire of polydrug use, and polydrug use is less prevalent among marijuana-only users. Current SC users are at risk for poisoning from use of the newest generation of SCs and from concurrent drug use.

WHAT’S KNOWN ON THIS SUBJECT: Synthetic cannabinoids are potent new psychoactive compounds that can result in adverse health outcomes, and marijuana users are at high risk for use. Researchers have examined use among high school students, but research is lacking regarding current (past 30-day) use.

WHAT THIS STUDY ADDS: This is the first nationally representative study in which current use of synthetic cannabinoids is examined. In this study, we found that 3% of high school seniors reported current use, and current users also tend to be current users of other drugs.
Synthetic cannabinoids (SCs), also known as SC receptor agonists, form a heterogeneous group of psychoactive substances that bind to one of the 2 known cannabinoid receptors. Though some of these compounds may resemble Δ⁹-tetrahydrocannabinol, the main psychoactive component in marijuana, SCs with completely different chemical structures have been identified. There are at least 14 chemically diverse families of SCs, and they appear to be increasing in potency. The number of such compounds discovered has increased incrementally every year. Although these compounds are commonly marketed as being similar to marijuana (often under names such as Spice and K2), the potency is 2 to 100 times stronger than that of marijuana and does not contain the anxiolytic and antipsychotic component of marijuana, cannabidiol; therefore, these compounds typically do not mimic effects of natural marijuana as widely thought. SCs are sprayed onto dried plant matter, and sold as “herbal incense,” sold as “legal” marijuana labeled “not for human consumption,” or alternatively are available as powders and sold as “research chemicals.”

The high potency of SCs and overactivation of CB1 receptors are a likely cause of wide-ranging adverse effects commonly associated with use. A systematic review of 106 studies revealed 4000 cases of SC use in medical literature and poison center data. Common adverse effects included tachycardia (37%–77%), agitation (16%–41%), nausea (13%–94%), generalized tonic-clonic seizures (4%–15%), 27 deaths, and psychiatric problems such as first-episode psychosis. Additionally, SCs were analytically confirmed in 2 cases of convulsions, 9 seizures, acute kidney injury, acute cerebral ischemia, and myocardial infarction. The rate of emergency medical treatment seeking after use has been estimated to be 30 times the rate of emergency medical treatment after marijuana use. In a study in which presentations during emergency department visits are compared, SC cases were found to have more “pronounced neurotoxicity and cardiotoxicity” compared with marijuana cases.

SC use has been found to be strongly associated with marijuana use, with some studies revealing ≥95% of past-year SC users reporting lifetime marijuana use. Almost all past-year users have also been, or currently are, marijuana users, and a recent longitudinal study of adolescents revealed that marijuana use predicted SC use, but SC use did not predict marijuana use, suggesting marijuana use usually precedes SC use. In addition, frequency of marijuana use has been found to be one of the strongest correlates of SC use. However, 1 study revealed that 93% of users preferred marijuana over SCs, and users rated SCs more highly regarding negative effects. Although previous studies have revealed robust associations between lifetime use of other drugs and past-year and lifetime use of SCs, more information is needed regarding how recency of use of other drugs relates to SC use to better inform prevention.

The prevalence of SC use has been found to be relatively high in young US populations. A study in which data were examined from Monitoring the Future (MTF), a nationally representative sample of high school students in the United States, revealed that from 2011 to 2013, 10.1% of high school seniors reported past-year use of SCs, with 3% of high school seniors reporting more frequent use (used ≥6 times). A steady decline in the prevalence of past-year use among high school seniors has been observed, with 11.4% reporting use in 2011 and 3.5% reporting use in 2016. However, SCs still appear to be relatively attractive to some younger people; past-year use in 2016 was reported by 2.7% of eighth-graders, 3.3% of 10th-graders, and 3.5% of 12th-graders. Because of the potential harms associated with SC use, data on prevalence of use are necessary to understand which users are still at risk. To date, all national prevalence

**FIGURE 1**
Percentages of current use of marijuana-only and SC and marijuana use among the full sample, and use of SC and marijuana among the marijuana-using subsample.
Neurologic Effects on a Newborn Exposed to Marijuana in Pregnancy

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PRESENTATION

An early term male neonate was born at 38 weeks of gestation by cesarean delivery due to a category 2 fetal heart tracing found in his 22-year-old mother, who did not receive prenatal care. Prenatal history is significant for maternal marijuana use, cigarette smoking, and group B Streptococcus colonization. At delivery, the infant is vigorous with Apgar scores of 9 and 9 at 1 and 5 minutes, respectively, birthweight of 2,640 g, and no dysmorphic features noted on physical examination. Prenatal marijuana exposure is confirmed by maternal and infant urine toxicology results. In the first postnatal day, despite several attempts at feeding, a poor suck and feeding pattern are noted. The neonate is transferred to the NICU for feeding and further evaluation. In the NICU, the infant receives intravenous fluids for the first 3 days after birth along with ongoing trials at oral feedings. Sepsis is ruled out based on negative findings. Chromosomal analysis, microarray, and acyl carnitine profile are negative. Brain ultrasonography and magnetic resonance imaging, performed to rule out any hemorrhage or structural anomalies, are also negative. Gradually with oral stimulation therapy, the infant’s sucking and oral coordination improved. Seventeen days after birth, he is feeding 75 to 80 mL every 4 hours and is discharged from the hospital. Meanwhile, the infant also has mild prolonged neonatal indirect hyperbilirubinemia related to glucose-6-phosphate dehydrogenase deficiency with maximum bilirubin of 15.5 mg/dL (265.05 μmol/L). The result of New York State newborn screening test is negative and the infant passed the hearing screen. On follow-up health supervision visits, the infant is noted to be feeding and growing well.

DISCUSSION

Widespread legalization of marijuana use in the United States has occurred in tandem with a rising trend in marijuana use during pregnancy. Research studies are being conducted on the effect of marijuana alone and its concomitant use with other drugs or substances during pregnancy and lactation.

Marijuana is one of the most common illicit drugs used in pregnancy. (1) Delta 9 tetrahydrocannabinol, the major chemical compound found in marijuana, is highly lipophilic, readily crosses the placenta, and is found in human milk. Cannabinoid receptors are found in the brain and in the uterine decidua. (2) Maternal urine testing continues to remain the most popular method of...
Clinical Presentation of Intoxication Due to Synthetic Cannabinoids

abstract

Synthetic cannabinoids are relatively novel substances of abuse. The use of these compounds among adolescents and young adults has been increasing, making it important for pediatric providers to be familiar with the presenting signs and symptoms of intoxication. We describe three case presentations of reported synthetic cannabinoid intoxication and provide a brief discussion of these compounds. *Pediatrics* 2012;129:e1064–e1067

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KEY WORDS

cannabinoids, intoxication, substance abuse, K2, Spice

ABBREVIATIONS

CB1 and CB2—cannabinoid brain receptors 1 and 2
ED—emergency department
IV—intravenous
THC—Δ9-tetrahydrocannabinol

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