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Synthetic Cannabinoid Use Among Patients in Residential Substance Use Disorder Treatment: Prevalence, Motives, and Correlates

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Abstract

Background—The abuse of synthetic cannabinoids has emerged as a public health concern over the past few years, yet little data exist characterizing the use of synthetic cannabinoids, particularly among patients seeking substance use disorder (SUD) treatment. In a sample of patients entering residential SUD treatment, we examined the prevalence of and motivations for synthetic cannabinoid use, and examined relationships of synthetic cannabinoid use with other substance use and demographic characteristics.

Methods—Patients (N = 396; 67% male, 75% White, M_{age}=34.8) completed self-report screening surveys about lifetime prevalence of synthetic cannabinoid use, route of administration, and motives for use.

Results—A total of 150 patients (38%) reported using synthetic cannabinoids in their lifetimes, primarily by smoking (91%). Participants chose multiple motives for use and the most commonly

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endorsed included curiosity (91%), feeling good/getting high (89%), relaxation (71%), and getting high without having a positive drug test (71%). Demographically, those who used synthetic cannabinoids were younger and more were White. They had higher rates of other substance use and higher scores on measures of depression and psychiatric distress.

Conclusions—Lifetime synthetic cannabinoid use was relatively common in SUD patients and many of those who used it reported doing so because they believed it would not cause a positive drug test. Further research is needed to characterize the extent of synthetic cannabinoid use among SUD treatment samples, and to establish understanding of the longitudinal trajectories of synthetic cannabinoid use in combination with other substance use, psychiatric distress, and treatment outcomes.

Keywords

Synthetic Cannabinoids; Substance Abuse Treatment; Motivations

1. INTRODUCTION

Use of synthetic cannabinoids, often called Spice or K2, has emerged in recent years (Camp, 2011; Vardakou et al., 2010; Wells and Ott, 2011). Poison Control Center data indicate increases in treatment for synthetic cannabinoids' acute effects from 2009-2011 (Wood, 2013). Synthetic cannabinoids are often smoked and purportedly produce cannabis-like effects, though less is known systematically about their psychoactive and health effects (Vardakou et al., 2010). Poison center and case reports demonstrate that synthetic cannabinoids produce significant health effects (e.g., tachycardia, seizures, hallucinations, hypertension, nausea, kidney injury, and memory impairment; Centers for Disease Control and Prevention (CDC), 2013a; Forrester et al., 2012; Seely et al., 2012). Additionally, the toxicity and sequelae can be more severe than for natural cannabis (Fantegrossi et al., 2014; Forrester et al., 2012). Initially considered a legal alternative to cannabis, regulation of synthetic cannabinoids has recently increased and the most common are now classified as Schedule I Controlled Substances (Department of Justice, 2013; Seely et al., 2012). Regulation of synthetic cannabinoids is hindered by a lack of standardized lab tests for their constantly changing composition and derivatives (CDC, 2013b; Fantegrossi et al., 2014; Hudson and Ramsey, 2011; Seely et al., 2012), which may include classic cannabinoids or a range of other compounds (e.g., cyclohexylphenols, benzoylindoles, etc.; Fantegrossi et al., 2014).

Research on synthetic cannabinoid use is lacking, including national prevalence data among adults. Monitoring the Future reports that 7.9% of 12th-graders used synthetic cannabinoids in 2013 (Johnston et al., 2014). A survey of 852 U.S. college students found 8% had ever used synthetic cannabinoids, which was more common in males and younger students (Hu et al., 2011). Many who use synthetic cannabinoids report side effects (e.g., motor impairment, tachycardia, hangovers, paranoia) to a greater extent than natural cannabis, prefer natural cannabis to synthetic, and report lifetime use of other illicit drugs (Barratt et al., 2013; Vandrey et al., 2012). Among 168 people reporting lifetime synthetic cannabinoid use, 37% met DSM-IV criteria for substance abuse and 12% met substance dependence criteria for synthetic cannabinoids (Vandrey et al., 2012).

Studies have begun assessing motives for synthetic cannabinoid use; curiosity, liking the effects, and legality are common (Barratt et al., 2013; Vandrey et al., 2012). Some individuals may consume synthetic cannabinoids because they believe that a positive drug test (e.g., for work, treatment, or probation) can be evaded when using synthetic cannabinoids instead of other drugs (Barratt et al., 2013; Vandrey et al., 2012; Winstock and Barratt, 2013). This belief may persist due to the lack of standard tests for synthetic cannabinoids (CDC, 2013b; Fantegrossi et al., 2014; Hudson and Ramsey, 2011; Seely et al., 2012). Evaluation of synthetic cannabinoid motives and use among substance use disorder (SUD) treatment patients would provide new information among individuals who undergo frequent drug screening. SUD patients often have more complex psychiatric and substance use histories than the samples previously examined, and understanding synthetic cannabinoid use in this population may inform treatment approaches. Thus, this study examines the prevalence, correlates, and motives for synthetic cannabinoid use among SUD treatment patients.

2. METHOD

2.1 Participants and Procedures

Patients 18 years and older were recruited from a large residential SUD treatment program serving a large metropolitan region in the Midwestern United States. The program accepts private pay, Medicaid, and patients referred through block grants from specific counties and contracts with the Department of Corrections. Announcements were made every 4-8 weeks at daily meetings of all patients stating that, if interested, patients could approach study staff that same day to complete a screening survey that was the first step in recruitment for a randomized controlled trial. Interested patients received additional study information, were assessed for eligibility (able to read English and provide informed consent), and provided written consent. Participants self-administered several surveys for the screening and received compensation for their time. Data reported were collected from 12/2012-01/2014. Study procedures were approved by the University of Michigan Institutional Review Board.

2.2 Measures

2.2.1 Synthetic Cannabinoid Use—Items assessing synthetic cannabinoid use were preceded by the statement, “These next questions are about Synthetic Marijuana (NOT medical marijuana or Marinol). Synthetic Marijuana is often called ‘Spice’ or ‘K2’.” Lifetime (yes/no) and past 12-month use were assessed (response options modeled after Monitoring the Future; Johnston et al., 2010). Based on prior literature (Hu et al., 2011; Vandrey et al., 2012), participants selected all the ways they had ever used synthetic cannabinoids (e.g., smoking, vaporization, oral). Lifetime motives were assessed with a checklist of 13 items developed by combining motives from Monitoring the Future’s marijuana motives questions and prior research on synthetic cannabinoid use (Vandrey et al., 2012).

2.2.2 Substance Use—Lifetime use (yes/no) of alcohol, tobacco and other drugs was assessed with items from the Addiction Severity Index (McLellan et al., 1980).

2.2.3 Psychiatric Distress—The Beck Depression Inventory (Beck et al., 1993) measured symptoms of depressed mood over the past two weeks using total scores ranging from 0-63; higher scores indicate more severe symptoms. The Global Severity Index (GSI) of the Brief Symptom Inventory (BSI; Derogatis and Melisaratos, 1983; Derogatis and Spencer, 1982) assessed past-week psychiatric distress. We also examined the Paranoid Ideation and Psychoticism subscales, given research supporting associations between cannabis and psychosis (McLaren et al., 2010). Mean scores on the GSI and subscales range from 0-4; higher scores indicate higher levels of distress.

2.2.4 Demographics—Participants reported age, gender, race/ethnicity, and marital status.

2.3 Data Analysis

Data analyses employed SAS version 9.3. Frequencies and descriptive statistics were calculated for all variables. Chi-square tests and t-tests compared those reporting lifetime synthetic cannabinoid use with those who did not report use.

3. RESULTS

Participants were 396 SUD treatment patients (Table 1 displays descriptive information) with a mean age of 34.8 years (*SD*=10.7); 67% were male, 75% were White, and 15% were currently married/partnered. The substances with the most commonly endorsed lifetime use were alcohol, tobacco, cannabis, and prescription opioids.

Of those surveyed, 150 (38%) reported ever using synthetic cannabinoids, and 119 (79%) reported past-year use. Table 2 displays frequency, route of administration, and motives. About half of those with past-year use reported fewer than 10 occasions of use (54%); 21% used more than 40 times. Smoking was the most common route of administration (91%); 27% also used a vaporizer, water pipe, bong, or hookah. Nearly all participants with lifetime use chose multiple motives, the most common being: curiosity/experimentation (91%), to feel good/get high (89%), relaxation (71%), and to get high without having a positive drug test (71%). Being “hooked” (16%), seeking deeper insights (23%), and believing it is safer than other drugs (30%) were less frequently chosen.

Analyses showed several significant differences when comparing those with and without lifetime synthetic cannabinoid use (see Table 1). Those with lifetime use were younger (*M* = 30.0 vs. 37.7 years), a larger proportion were White (81% vs. 71%), and they were more likely to report use of several other substances (heroin, methadone, prescription opioids, prescription sedatives, amphetamines, ecstasy, cannabis, hallucinogens, inhalants, and tobacco), but not alcohol, barbiturates, cocaine, or PCP. Individuals reporting lifetime use had more severe symptoms of depression (*M* = 24.9 vs. 20.0), and higher levels of general psychiatric distress (*M* = 1.26 vs. 0.94), paranoid ideation (*M* = 1.43 vs. 0.99), and psychoticism (*M* = 1.29 vs. 0.97).

4. DISCUSSION

Synthetic cannabinoid use among patients in this SUD treatment sample was relatively common. Individuals with lifetime use endorsed several motivations; the most common being to get high and experimentation. Over two-thirds reported using synthetic cannabinoids to avoid having a positive drug test. This motive has been reported, but less commonly endorsed, in other samples. For example, 30% reported this motive among 168 individuals with lifetime synthetic cannabinoid use in a web-survey (Vandrey et al., 2012). Additionally, 8% of Australian individuals in a web-survey endorsed this as a motive for first use (Barratt et al., 2013). This is relevant for treatment providers because frequent urine drug testing is often integral to SUD treatment and probation. Thus, consuming synthetic cannabinoids can complicate the treatment process, especially when urine tests do not identify all synthetic cannabinoids (CDC, 2013b; Fantegrossi et al., 2014; Hudson and Ramsey, 2011; Seely et al., 2012).

A sizable minority (30%) of individuals with synthetic cannabinoid use endorsed the motive that it is safer than other drugs. This belief persists despite evidence indicating that it may pose more risks than natural cannabis (Fantegrossi et al., 2014; Forrester et al., 2012). Perceived safety of synthetic cannabinoids could be addressed in treatment during routine psycho-education about substance effects. About one-third used synthetic cannabinoids to counter-act or enhance the effects of other drugs, and research is lacking on the consequences of co-ingestion with other substances. Further, 16% indicated they were “hooked” as a motive for use. This could reflect dependence on synthetic cannabinoids, substitution of synthetics for natural cannabis, or attempts to treat withdrawal symptoms from other drugs by using synthetic cannabinoids. Because nearly all of those with lifetime use reported multiple motives, further research could clarify the relative importance of each motive which could influence treatment planning. For example, if pain management is a primary motive, this would be addressed differently than motives of boredom or fitting in with peers.

Patients who ever used synthetic cannabinoids, compared to those who did not, had higher rates of lifetime use of many other substances. Causality of synthetic cannabinoid use is unclear; it may be that those with more extensive substance use histories have a broader exposure to different drugs and, thus, more opportunities and inclinations to try different substances, such as synthetics. Those with extensive drug use histories may have more experience with treatment and/or the legal system and may be more attuned to the requirement of clean urine screens. Measures of psychiatric distress were also higher among synthetic cannabinoid users. One possible explanation is that synthetic cannabinoid use represents an attempt to medicate distress symptoms; alternatively, the increased symptoms could result from synthetic cannabinoid use. This remains speculative and longitudinal research on synthetic cannabinoid use, other substance use, and psychiatric distress may clarify temporal relationships.

Although this study provides novel data on synthetic cannabinoid use among SUD treatment patients, limitations must be considered. These include the cross-sectional design which prohibits causal assumptions and recruitment from a single treatment center which affects

generalizability. Using retrospective self-report is also a potential limitation; our study lacked toxicology screening to verify recent substance use or whether the substances patients reported were synthetic cannabinoids were actually synthetic cannabinoids and not another substance. Cohort effects are another potential concern because several policy changes occurred during data collection (e.g., the Synthetic Drug Abuse Prevention Act (2012), the DEA emergency reclassifications of additional synthetic cannabinoids of 2013 and 2014). Michigan banned seven synthetic cannabinoids in 2010, prior to study initiation, although a general class ban was instituted in 2012. Given legal changes presumably resulting in less availability, our data may not accurately represent the current pattern of synthetic cannabinoid use among SUD treatment patients.

Despite these limitations, this study provides new information regarding synthetic cannabinoid use among SUD treatment patients which can inform research and treatment. Because many SUD patients had experience with synthetic cannabinoids, inquiring about these drugs in clinical assessments would provide a more complete substance use history and would inform treatment planning. Also, clinicians should be aware that synthetic cannabinoid use could complicate urine screening because it is not always detected, yet has been used by many patients. Further research is needed to develop effective and accessible urine screening for the different types of synthetic cannabinoids, understand the effects of co-ingestion with other drugs, and characterize the long-term impact of synthetic cannabinoids on psychiatric distress. Additionally, motives for synthetic cannabinoid use may become a treatment target; clinicians could help patients generate adaptive methods of achieving some of the same desired effects without substance use. This study was limited to adults and future research should characterize synthetic cannabinoid use among adolescent treatment samples. In addition, data are needed on the nature and scope of synthetic cannabinoid use among other treatment settings and on how use and motives relate to treatment outcome.

In conclusion, many patients in this SUD treatment sample reported lifetime synthetic cannabinoid use. Consuming these substances can complicate treatment, particularly urine testing, and clinicians should be aware that some patients may use synthetic cannabinoids to evade a positive urine test. Clinicians should inquire about and target synthetic cannabinoid use, integrating psycho-education as needed, especially given that those who use synthetic cannabinoids may have a more complicated substance use and psychiatric history.

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Table 1

Differences between patients who reported lifetime synthetic cannabis use compared to those who did not on demographics, substance use, and psychiatric distress

	Total N	No Lifetime Synthetic Cannabinoid Use	Lifetime Synthetic Cannabinoid Use	p-value
N	**396**	**246 (%)**	**150 (%)**	
Demographics				
Age (M, SD)	34.8 (10.7)	37.7 (10.2)	30.0 (9.8)	<.001***
Male (n, %)	265 (67.4%)	172 (70%)	93 (62%)	.10
White (vs. Non-White) (n, %)	297 (75%)	176 (71%)	121 (81%)	.04*
Currently married/partnered (n, %)	58 (15%)	36 (15%)	22 (15%)	.99
Substance use history				
Alcohol (lifetime: n, %)	377 (96%)	232 (95%)	145 (99%)	.07
Heroin (lifetime: n, %)	216 (56%)	119 (49%)	97 (67%)	<.001***
Methadone (lifetime: n, %)	164 (43%)	89 (37%)	75 (53%)	<0.01**
Rx Opioids (lifetime: n, %)	309 (79%)	178 (73%)	131 (88%)	<.001***
Rx Sedatives (lifetime: n, %)	272 (70%)	144 (60%)	128 (86%)	<.001***
Barbiturates (lifetime: n, %)	92 (23%)	50 (21%)	42 (28%)	.09
Cocaine (lifetime: n, %)	297 (76%)	179 (74%)	118 (80%)	.20
Amphetamines (lifetime: n, %)	217 (55%)	114 (46%)	103 (69%)	<.001***
Ecstasy (lifetime: n, %)	192 (49%)	97 (40%)	95 (64%)	<.001***
PCP (lifetime: n, %)	95 (25%)	53 (22%)	42 (29%)	.15
Cannabis (lifetime: n, %)	328 (84%)	188 (77%)	140 (95%)	<.001***
Hallucinogens (lifetime: n, %)	235 (61%)	126 (52%)	109 (75%)	<.001***
Inhalants (lifetime: n, %)	143 (37%)	71 (29%)	72 (49%)	<.001***
Tobacco (lifetime: n, %)	353 (89%)	211 (86%)	142 (95%)	<0.01**
Psychiatric symptoms				
BDI score (M, SD)	21.9 (12.6)	20.0 (12.8)	24.9 (11.8)	<.001***
BSI global severity (M, SD)	1.06 (0.81)	0.94 (0.79)	1.26 (0.79)	<0.001***
BSI paranoid ideation (M, SD)	1.16 (0.95)	0.99 (0.89)	1.43 (0.99)	<.001***
BSI psychoticism (M, SD)	1.09 (0.95)	0.97 (0.94)	1.29 (0.94)	<.001***

* $p<.05$,

** $p<.01$,

*** $p<.001$

Table 2

Frequency of, methods of, and motives for synthetic cannabis use among N=150 patients reporting lifetime synthetic cannabis use

	N (%)
Past 12 month (before treatment) frequency †	
No times	30 (20%)
1-2 times	25 (17%)
3-4 times	28 (19%)
6-9 times	12 (8%)
10-19 times	12 (8%)
20-39 times	11 (7%)
40 or more times	31 (21%)
Method of Use	
Smoking in a cigarette or blunt	136 (91%)
Vaporization, water pipe, bong, or hookah	41 (27%)
Orally/eating	4 (3%)
Other	5 (3%)
Motives	
Curiosity or to experiment or see what it's like	136 (91%)
To feel good or get high	133 (89%)
To relax or to relieve tension	107 (71%)
To get high without having a positive drug test	106 (71%)
Liked the effects	94 (63%)
Boredom, nothing else to do	89 (59%)
To have a good time with friends or to fit in	88 (59%)
Anger or frustration, or to get away from problems or troubles	72 (48%)
To help deal with pain	59 (39%)
To increase or decrease the effects of some other drugs	48 (32%)
Because it is safer than other drugs	45 (30%)
To seek deeper insights and understanding	34 (23%)
Because I am "hooked", have to have it	24 (16%)
Other reasons	21 (14%)

† N=1 participant refused to answer.