K53 Adverse Effects of Synthetic Cannabinoids: A Case-Oriented Review

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After attending this presentation, attendees will be able to describe the adverse effects reported in humans who have taken synthetic cannabinoids.

This presentation will impact the forensic science community by providing a review of internationally reported cases. It will highlight the importance of performing quantitative analysis on synthetic cannabinoid samples in order to gain a full understanding of the effects of this class of drug and of the individual compounds.

The term "synthetic cannabinoids" refers to artificial substances which are intended to mimic the physiological effect of cannabis. A wide variety of such compounds have been developed, partly in an attempt to avoid the legal penalties associated with the manufacture, distribution, and use of cannabis. These drugs differ in their chemical composition and, therefore, also differ in their effects on humans and their likelihood of detection by toxicological methods. The scientific understanding of synthetic cannabinoid compounds is hampered by a lack of awareness of this variety and, in practical terms, it is important to be able to correlate observed clinical effects with their likely toxicological causes. The reports presented will include data from small (<11 people) and large (>168 people) populations without toxicology confirmation, in addition to reports with qualitative confirmation and reports with quantitative analysis.

Synthetic cannabinoid drugs were first produced for research purposes in 1980. Since then, synthetic cannabinoid drugs have been manufactured in clandestine laboratories internationally, and sold in the United States in the form of smoking mixtures. Common brands of synthetic cannabinoids have been marketed, including Spice and K2. The first report of synthetic cannabinoid drugs in the United States was in 2008, when a synthetic cannabinoid compound was found in botanical material. Since then, the popularity of synthetic cannabinoids use has increased, as has the number of compounds which have been developed. With these different compounds and new compounds emerging onto the market, it has been challenging for forensic toxicologists to identify the individual drugs and metabolites in samples. Without quantitation of these drugs, it is difficult to understand the true effects these drugs are having on the user. This is why reports which include this data and dose response information are beneficial to the understanding of the adverse effects of these drugs. The adverse-effect profile of these drugs has not been studied in humans, and only infrequently in animal models; thus, much of the information about their toxicity comes from emergency department treatment reports and forensic case studies.

Case reports have been published describing adverse effects including data collected from emergency department admissions, mental health admissions, and clinical and forensic case reports. The current state of knowledge of adverse effects, both clinical and forensic in humans, includes non-serious physiological effects similar to smoking marijuana, and adverse effects including kidney damage, pulmonary dysfunction, cardiovascular effects, central nervous system effects, seizures, and psychosis. Reports to date include samples which have single synthetic cannabinoid compounds and mixtures of multiple compounds. With so many different synthetic cannabinoid compounds emerging and on the market, it is challenging to determine if these adverse effects are associated with specific compounds or with the class of drug. There is growing toxicological and pharmacological evidence of impairment, psychosis, tissue injury, and isolated deaths attributable to this emerging class of drugs.

Designer Drugs, Synthetic Cannabinoids, Adverse Effects