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Case Report

# Acute intoxication caused by synthetic cannabinoids 5F-ADB and MMB-2201: A case series

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ABSTRACT

Synthetic cannabinoids are relatively new substances of abuse. Recently, abuse of synthetic cannabinoids has been increasingly reported in the lay press and medical literature. When new compounds are introduced, their use is initially not restricted by prohibition therefore their consumption cannot be verified by standard drug tests. The use of these compounds among adolescents and young adults is constantly growing, making it important for emergency services to be familiar with the signs and symptoms of intoxication present.

Overdose and chronic use of these substances can cause adverse effects including altered mental status, tachycardia, and loss of consciousness.

Here, we report five cases of acute intoxication by synthetic cannabinoids 5F-ADB and MMB-2201 with analytical confirmation.



## 1. Introduction

In the recent past, cannabimimetic compounds, have been synthetically produced and initially offered commercially as a legal alternative to cannabis [1]. They are often inhaled via a pipe or rolled into a cigarette [2]. A variety of formulations of these "synthetic cannabinoids" are available on Internet web stores or in specialized "smart shops", smoke shops and gas stations [2].

Whereas some of them are now classified as scheduled controlled substances in many countries, many others are not and can be freely misused by individuals unaware of any eventual harmful health effect.

The symptoms of synthetic cannabinoid intoxications are similar to the euphoric and psychoactive effects of cannabis with additional sympathomimetic symptoms, including diaphoresis, agitation, and restlessness [2].

Up to date, many cases of severe acute intoxication and fatalities involving different synthetic cannabinoids have been highlighted [3].

The principal problem at Emergency Departments is that synthetic cannabinoids do not result in a positive toxicology screening for the psychoactive cannabis alkaloid Δ9-tetrahydrocannabinol [4].

The recognition of signs and symptoms of synthetic cannabinoid intoxications together with circumstantial data are necessary in order to make a correct diagnosis. However, the objective assessment of the presence of a certain substance and/or metabolites in the biological fluids of the person intoxicated is an essential tool in confirming the diagnosis and in providing analytical and diagnostic information on these new psychoactive substances, which can cause severe intoxication.

In this concern, recently AMB-FUBINACA, an example of the emerging indazole-3-carboxamido class of "ultrapotent" synthetic

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cannabinoids caused a mass intoxication of 33 people in New York City, NJ, US [5]. The timely identification of the compound was obtained by collaboration among clinical laboratory staff, health professionals, and law enforcement agencies allowing health authorities to take appropriate action.

We here report the cases of four teenagers and one young adult from Mallorca Island, Spain with suspected intoxication by new synthetic cannabinoids from indazole and indole carboxamido families: 5F-ADB and MMB-2201 (Fig. 1). Gas chromatographic mass spectrometric (GC–MS) analysis identified the smoked substances and their consumption was confirmed by the detection of their metabolites in urine collected from the four subjects and analysed by a fast and simple ultra high performance liquid chromatography tandem mass spectrometry (UHPLC–MS/MS) method.

## 2. Case report

### 2.1. Cases 1, 2 and 3

Three 17-year-old male adolescents were transferred together to a tertiary care Emergency Department (ED) because of psychomotor agitation. The three boys reported that they had smoked a joint of what they thought was 'Spice' about one hour before in the courtyard of their high school. Before arriving at the ED, they all presented psychomotor agitation, confusion, anxiety and psychosis and tachycardia as evidenced by ambulance staff. They believed they were possessed and had super powers. They suffered from temporary amnesia and a loss of consciousness. They did not present nausea or vomiting and their medical history was unremarkable.

On arrival, the vital signs of the 3 adolescents were normal. Physical examination showed a good general condition. Neurological, cardiac, abdominal and pulmonary exploration was normal in the three cases, except for mydriasis in *Male* 2.

The electrocardiogram (ECG) performed upon admission showed: *Male 1*: normal sinus rhythm; *Male 2*: a HR of 115 beats per minute consistent with sinus tachycardia; *Male 3*: normal sinus rhythm. In the three cases PR, QRS, and QT/QTc intervals were normal. A urine toxicology screening was requested in all three cases and resulted negative for opioids, cocaine, cannabis and amphetamines.

Progressively, the patients calmed down with verbal reassurance. *Male 1* psychotic symptoms subsided and *Male 2* presented an adequate recovery in presence of his parents. Vital signs of these two patients on discharge, 4 h after ED admission, were normal. *Male 3* discharged himself in his father's presence without advising medical staff so no follow-up vital signs could be taken. At telephone follow-up, the young male was feeling well. None of the three patients required medical treatment.

### 2.2. Case 4

A 14-year-old female was also taken to the same ED for altered consciousness and a headache. The young female was hypoactive, but reactive to stimuli. Friends, who were with her, admitted that they had all smoked marijuana mixed with a herbal preparation called 'Cherry Bomb, formula 6A' given to them by other friends a few hours before admission. A residual of this herbal preparation was given to one of the ED doctors by the girl's friends, who referred that she had been accompanied to the ED after having suffered an apparent seizure. She was conscious and oriented at all times, with no loss of bladder or bowel control. The patient described that a few minutes after smoking she had noticed discomfort, severe headache and dizziness. The patient had no previous medical history and no known allergies and she was not taking any prescription or over-the-counter medications.

On arrival, her vital signs were normal. She was afebrile, without vomiting or diarrhea. No further symptoms were present. Skin showed abrasions on right elbow and both legs secondary to a fall to the ground. The Pediatric Assessment Triangle was apparently altered. Cardiac, abdominal and pulmonary examination were normal. The neurologic examination showed a tendency to stupor. The patient was reactive to stimuli, with Glasgow 15, bilateral reactive mydriasis, normal cranial nerves, with preserved strength and sensitivity.

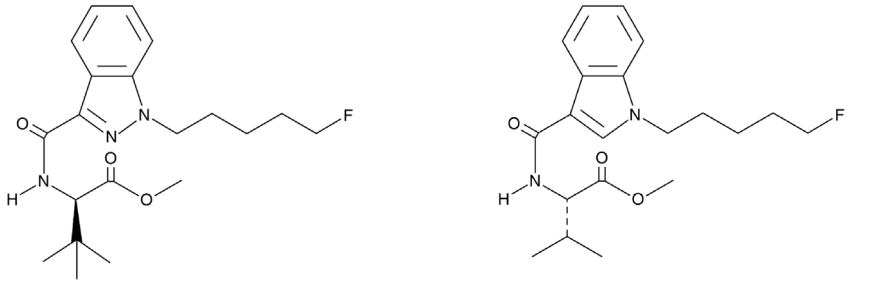
Laboratory values were all in normal ranges. The patient's ECG showed a normal sinus rhythm with normal PR, QRS, and QT/QTc. A urine toxicology screening was requested and yielded positive to THC.

She was treated with routine maintenance intravenous fluid therapy. After 4 h, her vital signs were: HR: 66 bpm; BP: 107/71 mmHg; temperature: 36.5 °C, RR 19 bpm. She was discharged at her baseline neurological status.

### 2.3. Case 5

A 21-year-old male was transferred to the ED due to psychomotor agitation and attempted suicide. He admitted that he had smoked cannabis and "Spice" the night before. He referred to daily consumption of cannabis and occasionally "Spice" and presented vomiting, agitation, altered language, bradypsychia and mydriasis. Physical examination showed good general condition. Cardiac, abdominal and pulmonary exploration were normal.

Laboratory values were all in normal ranges. The patient's ECG showed a normal sinus rhythm with normal PR, QRS, and QT/QTc.




**5F-ADB**
**5F-MDMB-PINACA**
methyl (S)-2-[1-(5-fluoropentyl)-1H-indazole-3-carboxamido]
-3,3-dimethylbutanoate)

**MMB-2201**
**5F-MMB-PICA, 5F-AMB-PICA,**
(S)-methyl 2-[1-(5-fluoropentyl)-1H-indole-3-carboxamido-3-methylbutanoate

**Fig. 1.** Molecular structures of the synthetic cannabinoids 5F-ADB and MMB-2201.