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CASE REPORT

The development of new psychoactive substances in France

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Summary If our European neighbours have been involved in the fight against new psychoactive substances (NPS) for several years, the seizures from our police forces have been rare. Only the laboratories of French customs analysed large amounts of NPS. Nevertheless, in the last three years, an increased number of French toxicologists have reported detection of NPS use. On the ground, because of the posed problems, police officers attempt to make it part of their jurisdiction and seize the substances. Thus, from our laboratories, the seizures could bring much information about the NPS phenomenon. From seizures submitted to our laboratory, all were analysed according to standard analytical strategy defined in our quality plan. Between 2013 and 2014, 62 seizures of NPS were analysed in our laboratory: 4 seizures in 2013 and 58 seizures in 2014, showing a sudden increase. Synthetic cannabinoids were the main substances identified (15 different compounds detected), five different phenylethylamines, four different cathinones, two tryptamines, two new benzodiazepines, methoxetamine, methiopropamine, mCPP and dimethylaminoethanol were also found. If the proportion of NPS seizures remains low in comparison with the more ''classical'' drugs of abuse in our laboratory, the dramatic increase in requests from investigators expresses the expansion of NPS throughout France in all likelihood.

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Introduction

Detection of new psychoactive substances (NPS) in seizures remains uncommon even for French forensic laboratories that annually analyse thousands of forensic drug exhibits. Only the French customs have reported identification of these items on a more regular basis. [1,2]. Since 2000, Système d'identification national des toxiques et substances: National System of Identification of Poisons and Substances (SINTES/NSIPS) from the Observatoire français des drogues et toxicomanies/French Monitoring Centre for Drugs and Drug Addiction (OFDT/FMCDDA) has reported the arrival of new identified substances in France [3,4]. However, the full extent of the NPS problem remains unknown and continues to be difficult to assess. In this context, the emergence of synthetic cannabinoids (SC) in Mayotte [5] surprised us at the beginning of 2014 but made us aware of the existence of a NPS market in France.

For the forensic science laboratories of the French police forces (French police and French gendarmerie), all the materials analysed consisted of sealed exhibits. These seizures were either directly obtained by the investigators after arrest of a potential trafficker or user, or found beside an intoxicated person or, in some cases, submitted by the customs officers as part of legal proceedings. These submissions do not fully represent the reality of the French NPS market but the findings from the analyses have aided in obtaining a prosecution.

Alongside colleagues from the French police, the Forensic Toxicology Unit (FTU) of the Forensic Science Laboratory of the French Gendarmerie (Institut de recherche criminelle de la gendarmerie nationale) plays its part in the analyses of suspected narcotic seizures and consequently in the detection of suspected NPS seizures. Because the FTU's influence is more national than regional as we receive requests from all over France, establishing the number of NPS cases submitted to our laboratory and the discussion on their possible or observable trends seemed an interesting factor warranting investigation. These findings will complete the previously reported observations in Mayotte [5].

Equipment and methods

Materials

The 63 seizures consisted of powders of different colours (see Fig. 1), tablets, and finely chopped material.

Equipment and reagents

An Ionscan 400B (Smiths Detection, Vitry-sur-Seine, France) and an Agilent 5975 GC/MSD System (Agilent Technologies, Les Ulis, France) equipped with a ZEBRON ZB-5MSi 30 m × 0.25 mm × 0.25 μm purchased from Phenomenex (Le Pecq, France) were employed in this work.

Methanol and acetonitrile of analytical grade were purchased from Carlo Erba (Val de Reuil, France), Sil-Prep™ Alltech™ Silylation Reagents from Chromoptic (Courtaboeuf, France).

Methods

The seizures were analysed, following our standard analytical strategy and the test methods employed were compliant within the scope of our accreditation (N° 1-1916 rev.4). Powders were dissolved in methanol and in acetonitrile at 1 g/L; plant materials were incubated at 1 g/L in methanol. Supernatants were split for multiple analyses and an aliquot was dried and derivatised by Sil-Prep™.

The methanolic supernatants were analysed by the ion mobility spectrometer (IMS). For this screening, 5 μL of the methanolic solutions were transferred to a swab, dried and analysed with IMS by following the manufacturer's instructions. Because of the nature of the seizures, and consequently the lack of identification in this first step using IMS, the second step consisted of a general unknown screen by GC—MS.

For this screening, the methanolic and acetonitrile supernatants as well as the derivatised solutions were used. Only 1 μL of each of the solutions was injected and analysed using the instrument parameters previously reported. The observed mass spectra were compared to the spectral libraries from the drug working group of ENFSI (ENFSI-DWG) and the scientific working group for the analysis of seized drugs (SWGDRUG [6]). Methods have been previously reported [5].

Results

Between 2013 and 2014, 62 seizures of NPS were analysed in our laboratory: 4 seizures in 2013 and 58 seizures in 2014, showing a dramatic increase in the last year. Synthetic cannabinoids (SC) were the main substances identified (15 different compounds detected (see Table 1); 3 seizures in 2013 and 21 in 2014, SC are mainly alone, sometimes associated with other SC and once with ethylphenidate [IUPAC name: 2-phenyl-2-piperidineacetic acid, ethyl ester]), we also identified five different phenylethylamines (ethylphenidate, MDAI [6,7-dihydro-5H-indeno[5,6-d]-1,3-dioxol-6-amine], 3,4-dichloromethylphenidate [(2R)-2-(3,4-dichlorophenyl)-2-piperidineacetic acid, methyl-ester], camfetamine [N-methyl-3-phenylbicyclo[2.2.1]heptan-2-amine], fencamfamine [N-ethyl-3-phenyl-norbornan-2-amine]; 15 seizures in 2014, mainly alone, sometimes associated with other phenylethylamines and once with 5F-AKB-4), four cathinones (MDPV [1-(1,3-benzodioxol-5-yl)-2-(1-pyrrolidinyl)-1-pentanone], methylone [1-(1,3-benzodioxol-5-yl)-2-(methylamino)-1-propanone], ethcathinone [2-(ethylamino)-1-phenyl-1-propanone], 4-methylethcathinone [2-(ethylamino)-1-(4-methylphenyl)-1-propanone]; 1 seizure in 2013 and 6 in 2014, mainly alone, although once identified as a mixture and once with methoxetamine [2-(ethylamino)-2-(3-methoxyphenyl)-cyclohexanone]), two tryptamines (5-MeO-DALT [5-methoxy-N,N-di-2-propen-1-yl-1H-indole-3-ethanamine] and αMT [2-methyl-1H-indole-3-ethanamine]; 2 seizures in 2014), two benzodiazepines (etizolam [4-(2-chlorophenyl)-2-ethyl-9-methyl-6H-thieno[3,2-f][1,2,4]-triazolo[4,3-a][1,4]diazepine] and diclazepam [7-Chloro-5-(2-chlorophenyl)-1-methyl-1,3-dihydro-2H-1,4-benzodiazepin-2-one];

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