



Research paper

Online test purchased new psychoactive substances in 5 different European countries: A snapshot study of chemical composition and price



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ABSTRACT

Background: New psychoactive substances (NPS) are on offer worldwide online, in order to shed light on the purity and price of these substances in the European Union, a research collaboration was set up involving France, United Kingdom (UK), the Netherlands, Czech Republic and Poland.

Methods: Per country, around 10 different NPS were test purchased from different webshops. Then, chemical analysis of NPS was done with according reference standards to identify and quantify the contents.

Results: In contrast to what is generally advertised on the webshops (>99%), purity varied considerably per test purchased NPS. Several NPS were mislabelled, some containing chemical analogues (e.g. 25B/C-NBOMe instead of 25I-NBOMe, pentadron instead of 3,4-DMMC). But in some cases NPS differed substantially from what was advertised (e.g. pentadron instead of AMT or 3-FMC instead of 5-MeO-DALT). Per gram, purity-adjusted prices of cathinones differed substantially between three countries of test purchase, with Poland being the least expensive. Synthetic cannabinoids were relatively the most expensive in the Czech Republic and least expensive in the UK.

Conclusion: The current findings provides a snapshot of the price and chemical contents of NPS products purchased by different countries and in different webshops. There is a potential danger of mislabelling of NPS. The great variety in price and purity of the delivered products might be the result of the market dynamics of supply and demand and the role of law enforcement in different European countries.

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Introduction

In recent years, the worldwide illicit drug market is characterized by a continuous emergence of the marketing and sale of newly designed psychoactive substances mimicking the effects of internationally controlled substances (such as cocaine, ecstasy or amphetamine). These new psychoactive substances (NPS) arise from entrepreneurial endeavours where ideas for their creation are inspired by patents, scientific literature,

existing controlled drugs of abuse and medicines known to have psychoactive properties (Brandt, King, & Evans-Brown, 2014). For instance, some NPS follow similar molecular scaffolds as their illicit counterparts but might slightly differ in chemical composition of the molecule (Saha et al., 2015; Simmler et al., 2013). These alterations can impact greatly on the specific activities of a compound. For instance, neurotransmitter transporter affinity could be significantly altered, resulting in substances that block serotonin or dopamine reuptake more effectively (Baumann et al., 2014; Marusich et al., 2014; Saha et al., 2015). Whereas many of these alterations were designed to circumvent law enforcement, they could have a grave impact on the health of the drug user, like an increased risk of overdosing.

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Increasing awareness about harms associated with NPS use also requires a multi-disciplinary and targeted approach (European Monitoring Centre for Drugs and Drug Addiction, 2016a). The diversity of substances has increased dramatically in the last few years. This is reflected in the number (>560) and nature of substances currently monitored by the European Union's Early Warning System that is coordinated by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). Among a range of other substances, types of compounds frequently recorded include cathinones, opioids, benzodiazepines or synthetic cannabinoids (a chemically highly diverse groups of compounds) (EMCDDA Euro-pol, 2016).

The sale of these substances is mostly facilitated through freely accessible Internet shops (webshops). In 2013, the EMCDDA conducted a snapshot study which revealed 651 different webshops offering a variety of NPS globally (European Monitoring Centre for Drugs and Drug Addiction, 2016b). Some of these substances are also being sold by vendors through the dark web, an Internet space not accessible with standard search engines (Barratt et al., 2016). Recent research identified 1031 different vendors on the dark web selling substances and 10,927 individual drug listings (Aldridge et al., 2016). However, vendors on the dark web also offer many other substances too, including illicit substances, and most of the 10,927 drug listings fell into either of six categories: psychedelics, stimulants, opioids, cannabis, ecstasy and prescription drugs. NPS were mainly found under psychedelics or stimulants.

From a health policy and clinical perspective, there is great concern surrounding the rapid emergence of NPS, their lack of regulation, open sale and a lack of evidence on their effects and harms (Coulson & Caulkins, 2012; European Monitoring Centre for Drugs and Drug Addiction, 2015; Seddon, 2014; UNODC, 2013; van Amsterdam, Nutt, & van den Brink, 2013). Besides this, there is the risk of mislabelling with NPS available through freely accessible websites which are virtually uncontrolled and unlimited. Well-known examples of false and misleading labelling is by giving these drugs meaningless and generic brand names, like "spice" or "K2" (Baumann, Partilla, & Lehner, 2013; Baumann et al., 2014; Seely et al., 2013; Spaderna, Addy, & D'souza, 2013). However, mislabelling by selling one compound as another also occurs and can be equally or more dangerous. Several recent cases have been noted where very potent compounds were sold as less potent analogues, increasing the risk of dosage-related adverse effects (Gee, Schep, Jensen, Moore, & Barrington, 2016; Walterscheid et al., 2014).

As a result, stakeholders associated with healthcare, forensics and policy-making are continuously faced with the challenge of collecting evidence for risk assessments of these unknown substances (Zamengo, Frison, Bettin, & Sciarrone, 2014). Another issue that has been raised in recent years is the difficulty in the identification of NPS in seized samples or biological specimens, as their variation is ever-increasing and routine toxicological laboratory screenings are not always up to the challenge of keeping track of the rapid emergence of these new substances or their metabolites (Favretto, Pascali, & Tagliaro, 2013). Standard immunoassay methodology often does not discriminate between all these molecular variants of chemical classes of NPS. In addition, absence of appropriate reference material and scarce analytical information about newly encountered NPS adds challenges even in the presence of state-of-the-art instrumentation. Furthermore, such systems may be out of reach for laboratories that are situated in economically less privileged countries, meaning that many NPS go undetected and are not reported to early warning systems operating worldwide (UNODC, 2013).

The availability of substances, popularity, prevalence of use and distribution of NPS, however, is not necessarily identical in each

country and reasons for this might include cultural differences, geographical location and different legislation (UNODC, 2013). In order to shed light on the diverse nature of NPS distribution and newly emerging drugs that are being offered through online shops across European countries, an international research collaboration was supported by the European Commission to investigate the online NPS market. Entitled the Internet Tools for Research in Europe on New Drugs (I-TREND, www.i-trend.eu), the project involved five collaborating institutions in different countries: Observatoire français des drogues et des toxicomanies (OFDT) in France, Liverpool John Moores University (LJMU) in the United Kingdom (UK), the Netherlands Institute of Mental Health and Addiction (Trimbos institute) in the Netherlands, the Charles University in Prague (CUNI) of the Czech Republic and the SWPS University of Social Sciences and Humanities (SWPS) in Poland. This collaborative endeavour was undertaken between 2014 and 2015 and collected a variety of data on NPS, such as availability and marketing of NPS via online European webshops and the chemical analysis of NPS that were purchased online (for more details of the general scheme, see http://www.emcdda.europa.eu/system/files/publications/2155/TDXD16001ENN_FINAL.pdf). In the present study, the chemical analysis part of the project is described to identify the contents of the ten most relevant NPS purchased per country. This is followed by an analysis of average purity, price and adulteration of the test purchased NPS products and identification of potential mismatch between contents and the product advertised (mislabelling).

Methods

Selection of NPS and webshops

Each partner country selected about ten NPS (aka the Top List) on the basis of available information sources. Firstly, data from the national Reitox European Union Early Warning System (EU EWS) were consulted. It reports on police seizures, fatal and non-fatal intoxication data, as well as forensic and toxicological data when available. Secondary, when the EWS data was not considered useful or retrieved too little information, extensive data were collected from national poisoning information centres (e.g. National Poisons Information Service, UK), national (e.g. British Crime Survey in the UK), international drugs surveys (the Global Drug Survey), drug user forums and drug sampling data from nationally imbedded drug testing systems (e.g. DIMS in the Netherlands or SINTES in France) (Brunt & Niesink, 2011; Giraudon & Bello, 2009; Global Drug Survey, 2016; Office for National Statistics, 2016).

Then, webshops were selected for ordering the NPS. Server location and IP address were not the most reliable criteria for the selection of webshops for the different partner countries, as various webshops hold servers abroad and due to the nature of the online market, which is unbound and not restricted by the same rules that apply to the domestic wholesale market. Therefore, the criteria for webshop selection were the language in which the webshop presented itself, advertised its products and its shipment constrictions, which indicated at which consumer market it was predominantly targeted. Also, only webshops that were accessible on the surface web were selected, cryptomarkets on the dark web were excluded. Another selection criterion was that the webshops would sell and promote one of the NPS selected, this confined the search to a proportion of available webshops. The largest and highest google-indexed webshops were chosen on the basis of this. In order to avoid legal problems with purchasing substances, it was decided to preferably order NPS not controlled at the time of purchase.

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