

Editorial

Novel Psychoactive Substances - The Growing Threat

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Editorial

Nowadays, we can observe an increased abuse of substances changing moods, especially among young people. Historically, these substances have been used occasionally, usually during religious ceremonies. However, today they are used primarily among people bored with daily routine or wanting establish contacts with other people. Therefore, people resort to chemical substances, e.g. legal highs (designer drugs, herbal highs) which are products containing natural or synthetic psychoactive substances. Drug dealers offer them as collector's items that are not for human consumption [1]. Other names of these drugs are bath salts, pond cleaner, room odouriser, incense, cream dispenser refills or 'souvenirs' and 'research chemicals'. However, legal highs are the substances that alter the normal function of the Central Nervous System (CNS) by interfering with the release of neurotransmitters. For many years, the term "legal highs" had been defined as not licensed for legal use chemicals (in contrast to alcohol and tobacco among others), which had mimicked the effects of popular controlled drugs. Nowadays "legal high" has become replaced by "Novel Psychoactive Substance" (NPS) because possession and trafficking of most of these drugs is prohibited by the governments [2].

Abuse of the NPS is a complex problem. There are many sources indicating the degree of their rotation, although evidence is largely based on controlled NPS, mainly mephedrone. The market is very dynamic, little is known in relation to the scale and participation of organized crime. Users obtain NPS via three ways: (1) online, via website distributors; (2) retail vendors in stores; (3) and dealers such as family, friends or dealers who distribute drugs at concerts, in clubs, or on the street [4]. The *European Monitoring Centre for Drugs and Drug Addiction (EMCDDA)* report that in 2013 there were 651 online shops selling NPS and shipping to at least one European Union (EU) [3].

The easy synthesis of most of NPS means that an increasing number of new substances are available. Therefore, there has been observed an increase in the number of novel NPS detected, but it is important to note that most of them are substances similar to well known drugs of abuse or their derivatives (e.g. Cathinones) or substances that produce similar effects (e.g. synthetic cannabinoids), rather than completely new types of drugs [4].

The general NPS division includes the following groups: psychostimulants, hallucinogens and synthetic cannabinoids.

However, the *United Nations Office on Drugs and Crime (UNODC)* report [5] identifies 7 groups of NPS:

- Synthetic cannabinoids (e.g. Spice);
- Synthetic cathinones (e.g. mephedrone);
- Ketamine;
- Phenethylamines (e.g. benzofury);
- Piperazines (e.g. benzylpiperazine (BZP));
- Plant based substances;
- Miscellaneous substances that contain recently identified NPS (e.g. tryptamines) that don't fit into any of previous groups.

Synthetic cannabinoid receptor agonists act as potent and efficacious agonists of the cannabinoid receptor type 1 (CB₁) and hence exerts effect similar to natural cannabinoids e.g. Δ⁹ Tetra Hydro Cannabinol (THC) [6].

The cathinones are synthetic ring-substituted phenylethylamines with substitution of a keto group at the beta carbon. Forty four cathinones are identified in NPS market, but the toxicological and clinical data concerning acute and long-lasting effects of abuse of these drugs are still limited [7].

Ketamine (2-chlorophenyl-2-methylamine-cyclohexanone) is a derivative of phencyclidine. Ketamine induced analgesic and dissociative effects resulting from inhibition of glutamate receptors. This drug is recreationally used in combination with ethanol [8].

Phenethylamines are amphetamine derivatives and exert empathogenic, stimulant, psychedelics, and anxiolytic and entactogenic effects [9].

The piperazine derivatives include e.g. 1-Benzylpiperazine (BZP), 1, 3-Trifluoromethylphenylpiperazine (TFMPP), 1-(3-Chlorophenyl) Piperazine (mCPP) and 1-(4-Methoxyphenyl) Piperazine (MeOPP). These drugs increase dopamine, serotonin and noradrenalin neurotransmission in the CNS. BZP mainly increase the level of dopamine, whereas TFMPP activate serotonergic neurotransmission. Both substances are often taken in combination [10].

Plant based substances contain natural resources with psychoactive properties used for centuries in religious ceremonies. These sources are: *Salvia (Salvia divinorum)*, kratom (*Mitragyna speciosa*), Hawaiian baby woodrose seeds (*Argyreia nervosa*) or fly agaric (*Amanita muscaria*) [11].

The last one group include (1) methoxetamine, ketamine derivative N-Methyl D-Aspartate (NMDA) receptor antagonist and dopamine reuptake inhibitor (2) Dimethylamylamine (DMAA) structurally similar to amphetamine (3), dimethocaine and (4) 4-fluorotropacocaine derivatives of cocaine [12].

Researches on the health implications of most NPS are very limited. However, existing evidences suggest that the adverse effects can be even life-threatening. The effects of intake of these substances depend on the dose taken and the presence of other psychoactive compounds, often being contained in the mixture. It has been proven that the negative health and social effects may occur in people taking NPS chronically as well as occasionally. Clinical and toxicological data indicate the increasing problem concerning abuse of NPS [13]. However, treatment of intoxication of with these drugs remains insufficient.

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