

Drowning due to an intoxication involving the designer drug methoxphenidine – a case report

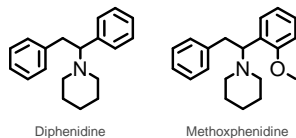
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Introduction



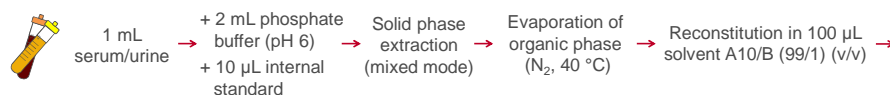
Methoxphenidine (MXP), the 2-methoxy derivative of diphenidine, is a dissociative anesthetic drug of the diarylethylamine type. MXP acts, like the classic dissociatives PCP and ketamine, as an NMDA receptor antagonist. The substance was first encountered in the European Union in 2013 being marketed as an alternative to dissociatives like 4-MeO-PCP or methoxetamine. MXP synthesis is known in the scientific literature since the late 1980's. [1] [2]

Case report

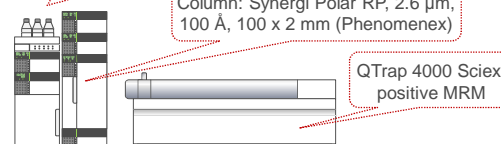
We report the case of a 21 year-old man, tested positive for methoxphenidine, found dead in a bathtub with his head and torso completely under water. The deceased was known as a frequent drug and alcohol consumer in the past, but allegedly stopped drug use a few years ago. Due to a history of deliberate self-injuring he was treated with psychotropic drugs. Drug blisters containing sertraline, mirtazapine and carbamazepine tablets were found in his room. During autopsy urine and femoral blood were obtained for post mortem toxicology.

Materials and methods

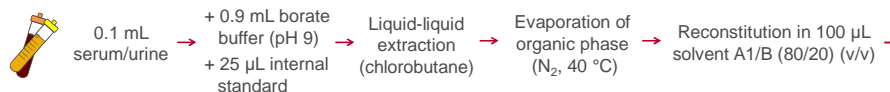
1. Screening for designer stimulants:



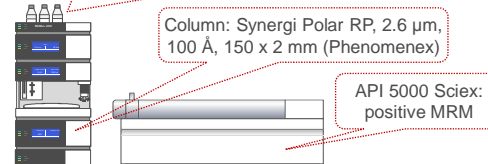
Solvent A10: 10 mM NH₄⁺HCOO⁻ + 0.1 % HCOOH
Solvent B: methanol + 0.1 % HCOOH



2. Screening for benzodiazepines:



Solvent A1: 1 mM NH₄⁺HCOO⁻ + 0.1 % HCOOH
Solvent B: methanol + 0.1 % HCOOH



3. Screening for other drugs and organic poisons:

GC-MS, LC-MS/MS (synthetic cannabinoids and medical psychotropic drugs), LC-MSⁿ (Toxtyper™), LC-QToF-MS (Toxscreeper™)
Sample preparation was done according to accredited standard procedures

Results and discussion

In femoral blood lorazepam was found at a concentration of 5.7 ng/mL and delorazepam at a concentration of 54 ng/mL as well as 64 ng/mL amphetamine, 2.1 ng/mL 4-fluoroamphetamine (4-FA), and 190 ng/mL methoxphenidine. These results were qualitatively confirmed by the results of the urine analysis (additional finding: lormetazepam). A screening for sertraline, mirtazapine and carbamazepine (due to the drug blisters found on site) and other drugs or organic poisons were negative. Blood alcohol concentration was determined to be 0.93 ‰. Autopsy findings revealed a puncture site at the crook of the left arm, compatible with i.v. drug administration, as well as superficial cuts crossing the inner side of both wrists and typical signs of drowning. Considering the circumstances of this case suicide can not be excluded, however, an accidental death due to loss of consciousness after use of MXP with subsequent drowning seems more plausible.

Conclusions

This case represents a mixed intoxication including relevant concentrations of the designer stimulant methoxphenidine and ethanol. Methoxphenidine, 4-FA and diclazepam (the typical metabolites lorazepam, delorazepam, and lormetazepam [3] were detected in the urine) are substances available from online vendors of 'legal high' products. The presented case illustrates that it is important to include new psychoactive substances in post-mortem toxicology screening, even those from drug classes with relatively low prevalence of use like dissociative anesthetics.

References

- [1] H. Morris, J. Wallach. From PCP to MXE: a comprehensive review of the non-medical use of dissociative drugs. *Drug testing and analysis* 2014, 6, 614-632
- [2] B.K. Cheng, N.M. Gray, Preparation of 1,2-diarylethylamines for treatment of neurotoxic injury, EU Patent No. EP346791A1, 1989
- [3] B. Moosmann, P. Biesel, V. Auwärter, Characterization of the designer benzodiazepine diclazepam and preliminary data on its metabolism and pharmacokinetics. *Drug testing and analysis* 2014, 6, 757-763

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