

DEATHS ON METHADONE: ANALYSIS OF DEMOGRAPHICS AND CONCENTRATIONS OF METHADONE AND EDDP IN POST-MORTEM FEMORAL BLOOD SAMPLES COLLECTED OVER AN EIGHTEEN-YEAR PERIOD IN WESTERN SWITZERLAND AND THEIR RELATIONSHIP TO THE CAUSE OF DEATH

Authors:

Pecev G¹, Magliocco G¹, Augsburg M¹, Girardin F², Thomas A^{1,3}

¹Forensic Toxicology and Chemistry Unit, University Center of Legal Medicine Lausanne-Geneva, Lausanne University Hospital, Geneva University Hospital, Lausanne, Switzerland ²Division of Clinical Pharmacology, Department of Laboratory Medicine and Pathology, Lausanne University Hospital, Faculty of Medicine, University of Lausanne, Lausanne, Switzerland ³Faculty Unit of Toxicology, CURML, Faculty of Biology and Medicine, University of Lausanne, Lausanne, Switzerland

Background:

Methadone is a synthetic opioid indicated for opioid withdrawal treatment. Its main metabolite is 2-ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine (EDDP). Since methadone is a potent drug with a low therapeutic index, this study aims at determining the post-mortem blood concentrations of methadone and EDDP in methadone-related deaths caused by either methadone intoxication or by other causes with concomitant presence of methadone.

Methods:

Methadone and EDDP concentrations were measured by GC-NPD, HPLC-DAD, GC-MS and LC-MS/MS in the post-mortem blood of cases under methadone collected from 2000 to 2017 in Western Switzerland. For each case, a full autopsy was conducted to establish the cause of death. All statistical analyses were performed using R Statistical Software.

Results:

The dataset consists of 285 individuals (84 women and 201 men). The average methadone blood concentration is 650.53 ± 724.67 ng/mL, with 684.46 ± 710.73 ng/mL for women and 636.20 ± 731.77 ng/mL for men ($P = 0.606$). The average EDDP concentration is 179.96 ± 515.40 ng/mL, with 103.21 ± 114.61 ng/mL for women and 211.23 ± 605.13 ng/mL for men ($P = 0.078$). 78.6 % of deaths are due to methadone intoxication, including a majority of polyintoxications, and 21.4% of deaths are due to other causes (self-aggression, hetero-aggression, trauma, pathologies) with concomitant methadone use. Between these two groups, methadone concentrations are significantly higher in subjects who died of intoxication (675.76 ± 767.87 ng/mL) compared to those who died of another cause while on methadone (509.68 ± 430.20 ng/mL) (Welch Two Sample t-test, $P < 0.05$). We did not find any significant difference in EDDP levels for these same two groups.

Conclusion:

We found higher methadone blood concentrations in patients who died of methadone intoxication compared to patients who died of another cause while on methadone.

Disclosure of Interest Statement:

The authors declare no conflict of interest.