K34 Methylenedioxymethamphetamine (MDMA)-Related Deaths in Ontario, Canada (1999-2002)

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Attendees will be provided a retrospective review of the role of MDMA (3, 4 methylenedioxymethamphetamine) in sudden unexpected deaths in the province of Ontario, Canada over the four-year period from 1999 to 2002.

This presentation will impact the forensic community and/or humanity by adding to the current database of knowledge regarding postmortem blood MDMA concentrations. Exemplar cases to be included in the oral presentation will also further understanding of the type of toxicities observed following MDMA overdose. One of the unique aspects of this research is that it provides information for a region (Ontario, Canada) that has not yet been documented in the scientific literature. However, this research shows that the data for Ontario concurs with previously published research from the U.S. and abroad.

Introduction: MDMA and its pharmacologically active metabolite methylenedioxyamphetamine (MDA) were initially synthesized for use in clinical practice as appetite suppressants but have evolved as popular street drugs. In particular, MDMA ("Ecstasy," "Love Drug," "E") has been associated with the dance music community and all-night rave parties as a result of its CNS stimulant effects, which allow users to resist fatigue; and its mild hallucinogenic properties that enhance the visual light shows at these venues. As a result of the current popularity of MDMA, it is often the role of the forensic toxicologist to interpret blood concentrations of this drug. It has been noted, however, that there are difficulties in interpreting postmortem concentrations of MDMA and MDA. Fatal MDMA concentrations have been shown to vary widely depending on the circumstances under which the drug is administered. This data will further the understanding of MDMA blood concentrations through (1) comparison of MDMA blood concentrations in deaths attributed solely to MDMA intoxication with blood concentrations in cases where MDMA was deemed incidental, (2) exemplar case histories, and characterization of the circumstances surrounding MDMA-related deaths and (3) review of the demographic characteristics of MDMA-related deaths in the current study and in the scientific literature.

Methods: MDMA-related deaths were retrospectively identified from the files of the toxicology sections of the Centre of Forensic Sciences and the Northern Regional Laboratory, which provide the sole toxicology testing for coroner's investigations in the province of Ontario (approx. population 12 million). Inclusion criteria were the: time periods between 1999 and 2002 and the detection of MDMA and/or MDA in postmortem blood. Further case history information pertaining to the circumstances of death, autopsy findings, and cause and manner of death was obtained from the Office of the Chief Coroner of Ontario.

Identification of MDMA and its major metabolite MDA (methylenedioxyamphetamine) were by GC-NPD and GC/MS following liquid-liquid extraction. Quantitation of MDMA and/or MDA was by GC-NPD after derivatization with acetic anhydride.

Results & Discussion: MDMA and/or MDA were detected in 37 postmortem cases in the province of Ontario for the years 1999 to 2002, inclusive. The typical MDMA-related death was young (mean age=26 years) and male (n=33). Although the range of ages observed was 16 to 50 years, 74% of individuals were found to be less than 30 years of age at the time of their death.

The mean blood MDMA concentration in deaths attributed solely to MDMA intoxication was 6.3 mg/L (n=11, range=0.4-27 mg/L) with corresponding MDA concentrations ranging from traces (<0.1 mg/L) to 3.8 mg/L. This concentration range was found to overlap with MDMA blood concentrations detected in traumatic deaths (e.g. GSW, MVA, drowning) where MDMA was considered an incidental finding (n=14, mean=0.7 mg/L, range=traces-2.5 mg/L). MDA concentrations ranged from undetectable to 0.1 mg/L. The remaining 12 MDMA-related deaths were attributed to overdose with a drug other than MDMA (e.g. heroin (n=3), methadone (n=1)) or were ruled to be mixed-drug intoxications by the investigating coroner. Blood MDMA concentrations in these cases were similar to concentrations observed in the traumatic deaths (mean=0.7 mg/L, range=undetectable-1.9 mg/L). MDA concentrations were also similar, with the exception of one, mixed-drug intoxication case, which was found to have a blood MDA concentration of 12 mg/L.

On an annual basis, the number of MDMA-related deaths over the time period studied did not change. However, a trend in the circumstances under which MDMA was taken was noted. For example, fatal MDMA intoxications in more recent years were less likely to be associated with rave parties (0/3 deaths in 2002). This observation may be due to the influence of harm reduction organizations as well as a decreasing trend towards all-night rave parties.

MDMA, Drug Concentrations, Postmortem

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