K-Holes and Weekend Highs: Emerging Recreational Patterns of the Anaesthetic Drug Ketamine in Wastewater

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Introduction: Over the past four years, there has been increasing interest in the recreational use of ketamine internationally, with surveys and online web monitoring reporting its co-consumption with MDMA [1, 2]. Police seizures of ketamine are increasing with some material comprising of mixtures of ketamine with MDMA or cocaine [3]. The aim of this study was to interrogate the changing patterns in ketamine loads found in wastewater and compare data with other sources of information including population characteristics and trends in ketamine use determined by surveys.

Methods: Wastewater samples were collected from 56 wastewater treatment plants across capital city and regional sites in Australia over a 3-year period (December 2020 until December 2023) and were analysed to determine the concentration of the ketamine metabolite, norketamine, using liquid chromatography tandem mass spectrometry. Sites were also characterised by level of remoteness and socioeconomic status using Census 2021 data.

Results: The trends in ketamine use showed typically flat excreted loads across the week when monitoring began in 2020, changing to a distinct rise in use over weekends more recently. This observation is characteristic of recreational use given ketamine is primarily a clinical therapeutic. The peak loads observed on weekends were approximately 3-fold higher than the other days of the week for some sites. The excreted load of ketamine matched the trend for MDMA in some jurisdictions. Nationally, ketamine use was significantly associated with remoteness, with major cities showing higher excreted loads compared to other regional areas ($p < 0.0001$). Sites with high socioeconomic status had higher excreted loads of ketamine ($p < 0.0001$).

Discussions and Conclusions: The excreted loads of ketamine quantified in wastewater are displaying a recreational pattern of use across the sampling week. Ketamine use in shows distinct spatiotemporal patterns in addition to higher excreted loads related to higher socioeconomic status.

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