Science of the Total Environment xxx (2013) xxx–xxx

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

Analysis of cocaine and nicotine metabolites in wastewater by liquid chromatography–tandem mass spectrometry. Cross abuse index patterns on a major community

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HIGHLIGHTS

- Cross abuse index patterns on licit and illicit drugs by means of sewage assessment
- Data about cocaine and nicotine consumption from a Portuguese population
- Co-evaluation of cocaine abuse estimates based on local drug purity levels

ARTICLE INFO

Article history:
Received 29 June 2013
Received in revised form 11 October 2013
Accepted 11 October 2013
Available online xxxx

Keywords:
Wastewater
Cocaine
Benzoylecgonine
Cotinine
Nicotine

ABSTRACT

A method based on sample preparation by solid phase extraction and analysis by liquid chromatography and mass spectrometry was validated and used for simultaneous analysis of cocaine, benzoylecgonine and cotinine in samples collected at the major wastewater treatment plant in the city of Lisbon. The aim was to estimate the consumption of both cocaine and nicotine in this community and establish an index involving both drugs supported by the relevance of nicotine as a significant anthropogenic marker. The study was made on two different weekdays during a month in order to evaluate patterns of consumption outside weekends. Cocaine and nicotine ingestion levels were back-calculated and expressed as mass of pure drugs consumed per day and per 1000 inhabitants (mean: 0.604 g and 5.860 g respectively). Cocaine was also expressed on the basis of local drug purity levels (33.7%) with a corresponding increase on dose assessments, and community drug abuse profiles. The authors sustain that this approach should always be included in drug studies of this kind allowing a better drug abuse assessment. No significant different patterns of consumption were obtained during the working days studied with the exception of one case coincident with a national holiday that showed an increased typical profile found on other non-working day studies, namely weekends. A fairly significant relationship was found between nicotine and cocaine consumption that should be further evaluated in future studies. Pharmacokinetic considerations were made and proposed for cocaine assessment based on the impact on back calculations after common simultaneous consumption of cocaine and ethanol.