Master's Thesis

Estimation of alcohol consumption in Spain through the analysis of sewage waters

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Abstract

Alcohol use disorder is a leading cause of preventable death with significant social and economic consequences. In this study, an alternative and complementary method to those approaches currently used to estimate alcohol consumption by the population is described. This method, wastewater-based epidemiology (WBE), allows back-calculating the alcohol consumption rate in each population from the concentrations of a selected biomarker measured in sewage waters.

A total of 23 wastewater treatment plants (WWTPs) were sampled in 17 Spanish cities for seven days in Spring of 2022 to collect composite (24-h) samples. Approximately 20% of the Spanish population was sampled. Using ethyl sulfate (EtS) as a biomarker, it was possible to calculate alcohol consumption from the measurement of its concentration in the wastewater samples. For this purpose, an analytical method based on ion-pair reversed-phase liquid chromatography-tandem mass spectrometry (LC-MS/MS) was used.

The alcohol consumption estimated from levels of EtS in the analyzed samples ranged from 1.9 to 31 mL/day/inhabitant. We found differences in consumption among the investigated cities, as well as between weekdays and weekends. WBE-derived estimates of alcohol consumption were comparable to previous studies and the values reported by the Spanish Ministry of Health, Consumption and Social Welfare in collaboration with the National Institute of Statistic (INE).

In conclusion the study finds that the WBE approach is a very useful tool, complementary to traditional methods, to estimate the consumption of alcohol in a population.

Keywords: *Alcohol abuse, alcohol consumption, sewage epidemiology, ethyl sulfate (EtS), wastewater.*