LC-MS-MS Method Development and Analysis of Stimulants, Opiates, Synthetic Opiates, PCP, and Benzodiazepines in Wastewater: Preponderance of These Drugs During Football Games

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Methods were developed for the analysis of stimulant drugs, opiates, synthetic opiates, PCP, and benzodiazepines in wastewater samples using liquid chromatography coupled with tandem mass spectrometry (LC-MS-MS). A total of thirty-three compounds (stimulant-type drugs and metabolites of opiates, synthetic opiates, PCP, and benzodiazepines) were analyzed. These drugs included amphetamine (Amp) (1), methamphetamine (Meth) (2), methylenedioxyamphetamine (MDA) (3), methylenedioxymethamphetamine (MDMA) (4), methylenedioxyethylamphetamine (MDEA) (5), benzoylecgonine (BE) (6) cocaine (Coc) (7), 6-monoacetylmorphine (6-MAM) (8), codeine (9), hydrocodone (10), hydromorphone (11), morphine (12), norhydrocodone (13), oxycodone (14), oxymorphone (15), 2-ethylidine-1,5-dimethyl-3,3-diphenylpyrolidine (EDDP) (16), fentanyl (17), meperidine (18), methadone (19), norfentanyl (20), normeperidine (21), phencyclidine (PCP) (22), tramadol (23), alprazolam (24), temazepam (25), nordiazepam (26), chlordiazepoxide (27), flurazepam (28), oxazepam (29), a-OH-alprazolam (30), a-OH-triazolam (31), 2-OH-ethylflurazepam (32), and 7-NH2-flunitrazepam (33). These drugs were chosen because of their widespread abuse. Wastewater samples were collected at both the Oxford Waste Water Treatment Plant in Oxford, Mississippi (MS) and the University Wastewater Treatment Plant in University, MS. Samples were collected on weekends on which the Ole Miss Rebel football team held home games. The collected samples were analyzed using validated methods and found to contain Amp, Meth, MDMA, MDA, Coc, BE, codeine, hydrocodone, hydromorphone, morphine, norhydrocodone, oxycodone, oxymorphone, tramadol, EDDP, meperidine, normeperidine, methadone, alprazolam, a-OH-alprazolam, nordiazepam, oxazepam, and temazepam.

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