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BACKGROUND: This preliminary study compares the results of benzodiazepine analysis in scalp hair samples from ten post-mortem cases using a validated conventional solid phase extraction (SPE) system and an anti-diazepam molecularly imprinted polymer solid phase extraction (MISPE) system.

METHODS: The ten hair samples tested were from drug-related deaths in which a positive benzodiazepine blood result was obtained. The case samples were decontaminated with 0.1 % sodium dodecyl sulfate, distilled water and dichloromethane, incubated overnight in methanol/25 % ammonium hydroxide (20:1) and subsequently extracted by SPE or MISPE followed by LC-MS-MS analysis.

RESULTS: Diazepam, nordiazepam, oxazepam, temazepam and nitrazepam were detected in the samples using both extraction methods. The recovery values for diazepam, nordiazepam, oxazepam, temazepam and nitrazepam in MISPE and SPE methods were between 73-103 % and 69-91 %, respectively. LOD levels between 0.06-0.39 ng/30mg hair and 0.03-0.24 ng/30mg hair were obtained with the MISPE and SPE methods, respectively. Diazepam was detected in more case samples using MISPE due to the lower LOD values and higher extraction recovery, as a result of excellent molecular recognition of the template. The LOD and recovery values for diazepam by MISPE are 0.09 ng/30mg hair and 93 %, respectively compared to 0.13 ng/30mg hair and 69 % by SPE. Nitrazepam levels detected by both methods were very similar. The MISPE method however was less sensitive for temazepam, nordiazepam and oxazepam determination compared to the conventional SPE method.

CONCLUSION: The molecularly imprinted polymer used for this study demonstrated good selectivity for the 5 benzodiazepines tested, especially the template substance diazepam. The MISPE method could be used as an alternative to conventional SPE extraction for the analysis of benzodiazepine positive hair samples collected from chronic users.

KEYWORDS: *Benzodiazepines; Hair; SPE; MISPE; LC-MS-MS*

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