

S.R. MORLEY, A.R.W. FORREST, J.H. GALLOWAY

Toxicology Section, Sheffield Teaching Hospital Foundation Trust, Sheffield, S10 2JF, United Kingdom

AIM: We wish to report 14 cases involving the detection of levamisole in illicit cocaine-positive coroners' cases between April 2005 and 2006. Adulteration may occur as part of the refining process, by addition of bulking agents or deliberately to improve pharmacological effect. The commonest adulterants found in samples in Europe are lidocaine and caffeine and sugars. Levamisole is primarily a broad spectrum antihelminth.. It is not presently licensed in the Great Britain. Levamisole would not be expected to have any additional direct pharmacological effect alongside cocaine.

METHODS: Urine underwent extraction into butyl acetate after the addition of concentrated ammonia and butyl acetate. GCMS analysis was performed in splitless mode utilising an HP-5M column. The temperature gradient is from 85°C to 280°C. The mass spectrometry was performed in scan mode with a window of 40 to 550 m/z.

Blood levamisole concentrations were determined by extraction as above and GCMS in Selected Ion mode. The target ion for levamisole was m/z 143 with qualifier ions of m/z 204 and m/z 73.

RESULTS: 2321 coroners' samples were analysed between April 2005 and April 2006. 101 were positive for cocaine in urine (4.4%). 14 cocaine positive cases were positive for levamisole (13.9%) April 2005 was the first time we detected levamisole, and a literature review revealed no previous reports. Personal communications from the Clandestine Laboratory Investigating Chemists Association indicated levamisole-contaminated illicit cocaine seizures in Europe, North America and Australia. We thus believe our findings reflect the use of illicit cocaine adulterated with Levamisole.

13/14 were male. The age range was 20-53 years. All decedents were known drug abusers. Each case was separated both temporally and geographically.

The concentrations of cocaine ranged from <25µg/L to 5788µg/L, benzoylecgonine 68µg/l to 6771µg/L and levamisole <5µg/l to 1589µg/L (therapeutic range 700 to 1500µg/L). 6/14 cases were suspected of having died directly from cocaine use. The other 8 cases all had evidence of cocaine use, but not at levels expected to be fatal on purely toxicology grounds.

In addition, over a 1 week period, 50 urine samples from individuals undergoing drug rehabilitation that were positive for cocaine on immunoassay screen were screened for levamisole using the method described above. There were no levamisole-positive samples.

CONCLUSIONS: Seizures of levamisole-adulterated cocaine are being encountered more frequently worldwide. Due to temporal and geographical differences, the levamisole-adulterated cocaine is unlikely to be from a single batch. The most likely site for contamination is at source where it may be available and be perceived to be a suitable diluent.

The low blood levamisole concentrations in the post-mortem samples may be partly explained by the pharmacokinetics of levamisole. Levamisole has a short elimination $t_{1/2}$ of 2 hours. Blood levamisole concentrations will fall more rapidly than cocaine, although levamisole may still be detected in urine.

The failure to detect of levamisole in urine samples donated by living cocaine users may simply be a statistical effect reflecting the low frequency of batches of levamisole-adulterated cocaine. The patients also may not have abused cocaine for 48 hours or more before the donation of the sample.

The clinical and forensic significance of this finding is uncertain, but the situation merits careful monitoring.

KEYWORDS: *Levamisole, Cocaine, Adulterant*

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Corresponding author: stephen.morley@sth.nhs.uk