Drug Use Pattern in Hair and Blood in Deceased Drug Addicts

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AIMS: The risk factors associated with opiate overdose death call for detailed characterization. In the absence of a biomarker of tolerance, hair analysis may be applied to disclose previous drug exposure and thus provide an estimate of the degree of tolerance. The aim of this study was to map the past and recent drug use profiles among drug addicts in the Stockholm area who were subjected to a medico-legal examination.

METHODS: We performed segmental hair analysis and compared the results with drug history information obtained from the police, relatives and medical charts as well as with toxicological results in postmortem blood. Out of 210 cases originally investigated, 166 turned out to be drug abusers. These 166 cases were classified as “opiate overdose cases” (O-cases), “control cases” (C-cases), or “miscellaneous cases” (M-cases). Opiate overdose death was based on the diagnosis made by the responsible pathologist. The C-cases comprised deceased drug addicts who, immediately prior to death, obviously were not incapacitated by drugs and the drugs found in their blood were not responsible for their demise. The M-cases also consisted of drug addicts that did not die of opiate overdose, but incapacitation could not be excluded. Most of these subjects died of natural diseases or conditions secondary to drug abuse.

RESULTS: Hair and blood analysis revealed extensive polydrug use, which was more pronounced among opiate overdose victims (O-cases) than in drug addicts dying of other causes (C- and M-cases). This is evident from Figure 1 which illustrates percent cases in each group with three or more drugs present in hair (black bars) and blood (grey bars). Blood analysis also showed that pure heroin intoxication was very rare, but typically the addicts presented with a number of drugs at the time for their demise. Segmental hair analysis revealed that in more than 80% of the fatal opiate overdose cases, no opiates were found in the most recent hair segment, supporting the notion that abstinence is an important risk factor for opiate overdose death. The toxicological results further suggest that opiate overdose death is more likely to occur if opiates are combined with benzodiazepines, but less likely if opiates are combined with stimulants such as amphetamines. A substantial overlap in mean blood morphine concentrations were observed between subjects with evidence of recent period of abstinence compared with subjects showing a continuous opiate use and neither was there a difference between cases with or without ethanol present in blood.

CONCLUSIONS: Our study provides extensive support for abstinence as a major risk factor contributing to acute opiate deaths, and that polydrug use as revealed by both hair and blood analysis, proved to be very frequent.

Keywords: Hair analysis, Morphine, Opiate overdose