MO-17

Interpreting alcohol concentrations in toxicology reporting: under the influence or post-mortem artefacts?

Daniel Chong [1], Kate Chitty[1], Jennifer Pilgrim[2], Nicholas Buckley[1]
[1]Translational Australian Clinical Toxicology (TACT) Group, The University of Sydney, Australia
[2] Drug Harm Prevention Unit, Department of Forensic Medicine, Monash University, Victorian Institute of Forensic Medicine, Australia

Objective: There are several challenges in the interpretation of alcohol levels in the deceased, including the presence of putrefaction, the anatomical sampling site, and the type of tissue collected. The aim of this study was to develop an *ad hoc* tool for interpreting alcohol concentrations between toxicology samples obtained from various anatomical sites.

Methods: Toxicology data for deaths classified as intentional self-harm (ICD-10) by the coroner in the National Coronial Information System (NCIS) from 2010-2014 inclusive were coded. A literature review was used to evaluate post-mortem alcohol levels obtained from different anatomical sites. *Post hoc* Bland-Altman analyses of NCIS data were used to determine the agreement between sample alcohol measurements.

Results: 10,832 intentional-self harm cases (75.7% male) were coded, of which n=9,547 were 15+ years old with alcohol analysis. Over 30 ante- and post-mortem sample types were identified. Toxicology guidelines recommend using femoral vein blood, vitreous humour, and urine for post-mortem alcohol analysis [1-3]. A general rule of thumb is peripheral site sampling is preferred over central sites as decomposition usually occurs in the central organs first. However, factors such as the duration since death, trauma, and environment are also considered. Measurements for vitreous humour and urine alcohol concentrations compared with femoral blood alcohol had biases (95% Confidence Interval [CI]) of -0.01 (-0.05, 0.03) and -0.02 (-0.11, 0.07) respectively. 155 cases (1.6%) had insufficient evidence for alcohol level validity.

Conclusion: No standard guidelines currently exist for sample labelling in toxicology reporting, which presents challenges in post-mortem studies. As putrefaction generally occurs at a faster rate in central organs, taking measurements from peripheral sites may offer a better estimation of alcohol levels before death. Evidence for alcohol in vitreous humour is closely associated with measurements in femoral blood. Variations between femoral blood and urinary alcohol may be explained by the rate of elimination and post-mortem duration. The *ad hoc* tool provides an evidence-based means for interpreting the viability of samples for the interpretation of post-mortem alcohol levels.

References: (1) Gilliland MG, Bost RO. Alcohol in decomposed bodies: postmortem synthesis and distribution. J Forensic Sci. 1993; 38:1226-1274. (2) Honey D, Caylor C, Luthi R, et al. Comparative alcohol concentrations in blood and vitreous fluid with illustrative case studies. J Anal Toxicol. 2005; 29:365-369. (3) Kugelberg FC, Jones AW. Interpreting results of ethanol analysis in postmortem specimens: a review of the literature. Forensic Sci Int. 2007; 165:10-29