



K17 HS/GC Determination of Volatile Substances in Antemortem and Postmortem Blood and Urine Samples of Volatile Substance Abusers

Salih Cengiz, PhD*, Sükriye Yıldızlı Karadayı, and Munevver Açikkol, PhD, Institute of Forensic Sciences, Istanbul University, Adli Tıp Enstitüsü, Cerrahpaşa, Istanbul, 34300, Turkey; Faruk Biçer, Ministry of Justice, Chemistry Department Council of Forensic Medicine, Cerrahpaşa, Istanbul, 34300, Turkey; Duran Çakmak, MD, Ministry of Health, Bakırköy Hospital of Neuro-Psychiatric Diseases, Bakırköy Ruh sinir hastanesi, Istanbul, 34740, Turkey; and Senol Korkut, Ministry of Justice, Chemistry Department Council of Forensic Medicine, Cerrahpaşa, Istanbul, 34300, Turkey

After attending this presentation, the results of Headspace Gas Chromatographic analyses for volatile substances in blood and urine from three groups represented by: 23 abusers of volatile substances which applied to volatile abusers hospital AMATEM-Istanbul; 6 cases of questionable death which were autopsied at the council of forensic medicine; and 10 non-abusers in Turkey will be available.

This presentation will impact the forensic community and/or humanity by providing data on volatile substance abuse in Turkey.

Volatile Substances are known to be inexpensive, easily and legally acquired and therefore have widespread use among youngsters. The mostly widely abused volatile substance in Turkey is toluene. Toluene is extensively used as an organic industrial solvent in paint thinner, detergents and glue. Chronic exposure to low concentrations of toluene causes impairment of the central nervous system. The recommended threshold limit value-time weighted average is 50 ppm for preventing such effects. Toluene is eliminated via exhaled air and as intact compound or its metabolites, hippuric acid and *o*-cresol, in urine. Therefore, indicators of toluene exposure are, beside toluene itself in exhaled air, blood and urine, urinary hippuric acid and *o*-cresol. Additionally, volatile substance abuse (VSA), including paint thinner abuse, represents an important health threat in Turkey. Some paint thinners used in Turkey are mixtures of solvents consisting of toluene as the major component in addition to benzene, hexane and heptane.

In this study, analysis of blood and urine for volatile substances from three groups: 23 abusers of volatile substances which applied to the Volatile Abusers Hospital (AMATEM)-Istanbul; 6 cases of questionable death which were autopsied at the Council of Forensic Medicine; and 10 non-abusers were carried out and compared by using Headspace Gas Chromatography.

The analyses of volatile substances were carried out in lithiumheparinized blood and unspiked urine for the solvents used by abusers according to the method described by Park SW. et al. (J. Forensic Sci. 43:888-890 [1998]). Blood toluene content of 23 antemortem blood samples, taken 24 hour after volatile substance sniffing, were 0.96, 1.49, not detected (ND), 1.33, ND, ND, 0.99, ND, ND, 2.80, 1.35, 2.39, 1.09, 6.56, 3.88, ND, ND, 5.49, 0.66, 0.81, ND, 0.38, 2.17 with the average being $1.61\mu\text{g/ml} \pm 1.01$ (SD) (range 0.38 to 3.88). Toluene and other solvents were not measurable in urine in the majority of cases; but in four cases, urinary toluene was measured as 0.89, 0.69, 0.32 and 0.35 $\mu\text{g/ml}$. None of the samples were found to contain measurable amounts of benzene, hexane or heptane. Toluene in postmortem samples was distinguishable from that in non-fatal abusers.

Conclusion: From the analysis of blood and urine for volatile substances by Headspace Gas Chromatography, three groups represented by: 23 volatile substances abusers which applied to the Volatile Abusers Hospital (AMATEM)-Istanbul; 6 cases of questionable death which were autopsied at the morgue of The Council of Forensic Medicine; and 10 nonabusers, showed only toluene. The amount of inhalation could not be calculated or explained since the chemical compositions of the abused thinners were not consistent.

Volatile Substance Abuse, Headspace GC, Toluene