Suicidal inhalation of motorbike exhaust: adding new data to the literature about the contribution of gasoline to the cause of death

MARÍA A. MARTÍNEZ[1] and SALOMÉ BALLESTEROS[2]

1 Chemistry Department

2 Spanish Poison Control Center, National Institute of Toxicology and Forensic Sciences, Ministry of Justice, C/ Luis Cabrera 9, 28002 Madrid, Spain.

AIMS: To alert the importance of testing for gasoline, and in general for volatile hydrocarbons, in deaths involving inhalation of exhaust fumes in closed spaces with working motors. To highlight the need of a complete toxicological screening and to identify the role of all exhaust fumes in these circumstances of death, apart from carbon monoxide (CO).

METHODS: The carboxyhemoglobin (COHb) was measured using visible spectrophotometry. The following analytical method allows a comprehensive toxicological screening for solvents, and other petroleum distillates in which gasoline is included. This screening method is based in the pattern recognition methods widely applied in many areas of forensic science. Gasoline was isolated after liquid-liquid extraction of 3 mL of biological sample with 1 mL of diethyl ether (cold at 4 °C) using n-octyl-benzene as internal standard. The toxicological screening and quantitation of gasoline was performed by means of gas chromatography with flame ionization detector (GC-FID) and, although no doubt was maintained regarding gasoline as source of poisoning, confirmation was performed using gas chromatography-mass spectrometry (GC-MS) total ion chromatogram (TIC) mode. Both gas chromatographs were equipped with methylsilicone capillary columns and chromatographic conditions were as follows: injector temperature was 280°C, oven temperature began at 40°C for 3 min, increased at 10°C/min to 280°C, and detector temperature was 300°C. Under these conditions, gasoline components including n-octylbenzene (IS) eluted between 1 and 15 min. Quantitation of gasoline was undertaken by GD-FID using a four point blood calibration curve ranging from 1 to 100 mg/L and using m,p-xylene as reference peak for all gasoline calculations. R^2 value in the linear range was < 0.997. The limits of detection and quantitation were 0.3 and 1.0 mg/L. Accuracy was 77.6-98.3%, and intraday (n=6) and interday (n=10) precisions had a CV ≤ 5.4% between 1-100 mg/L.

RESULTS: The case consisted of the suicidal inhalation of motorbike exhaust, a mixture of CO and gasoline vapor, by a 38-year-old female. She was found in her home closed garage with a hose extending from the exhaust pipe of a motorbike through a cellophane plastic device into a closed tent in which the victim lied. She left two suicide notes nearby. Body examination revealed cherry red lividity in decline zones as a significant finding. Internal examination showed cherry colored lungs. Neither bone fractures nor visceral injuries were observed. There was no known drug-abuse history or a present natural disease to account for the death. The %COHb determined in blood was 73%. Gasoline heart blood and vitreous humor concentrations were 22.3 and 1.0 mg/L, respectively. Regarding alcohol and other volatiles, abuse and therapeutic drugs screens the results were negative for all of them.

CONCLUSIONS: In deaths involving CO there is also exposure to other toxics, such as the ones present in exhaust fumes which are usually underestimated. We would like to highlight the role of gasoline in the cause of death and add new quantitative data of this toxic to the scarce literature. According to our previously published work, the blood concentration of gasoline found in this case and considered alone has been lethal. Based upon the toxicological data along with the information provided by the medical examiner, the cause of death was determined to be CO and gasoline poisoning and the manner of death suicidal inhalation of morbike exhaust. This is the first time that a fatality with the combination of these two toxics has been reported in the literature with analytical data.

KEYWORDS: *Gasoline, Carbon monoxide, Inhalation, Fatality, Suicide*

Corresponding author: mariamart@terra