

Letter to the Editor Regarding the Article "Suicidal Death by Nicotine Poisoning" by Jun et al.

Joo-Young Na¹, Jeong-Woo Park¹, Dong-Woo Kim², Ji-Ye Lee³

¹Forensic Medicine Division, Gwangju Institute, National Forensic Service, Jangseong, Korea, ²Toxicology Division, Gwangju Institute, National Forensic Service, Jangseong, Korea, ³Scientific Investigation Section, Jeonnam Provincial Police Agency, Muan, Korea

Dear Editor,

The recent report by Jun et al. [1] is valuable in that it highlighted nicotine as a lethal toxic chemical, which can be used for suicide. A 20-year-old man who was a non-smoker and had no disease history was found dead in a head-down position on his bed in his room in the morning by his mother. Through meticulous investigation, death scene investigators found a drug bottle outside the window (Fig. 1). Writing on the bottle included the following: '10 mL,' '100% concentrated solution and not intended for direct use' and 'It should be properly diluted with other E-Liquid properties.' There was no ingredient information. According to a friend, the decedent had said about one month before his death that he had bought from overseas a drug that can kill someone quickly.

An autopsy was performed the next day. The deceased man's height was approximately 185 cm and

his weight was 116 kg. The postmortem external examination showed no injury. An internal examination revealed froth in the airway, congested internal organs, and edematous lung, but no abnormality in the mucosa of the esophagus and stomach. Blood samples from the heart and femoral vein, urine, and gastric contents samples were collected for toxicological tests. A liver sample was also collected. They were analyzed with gas chromatography-mass spectrometry and liquid chromatography tandem-mass spectrometry. Screening tests for various drugs and toxins were negative, but nicotine was detected in blood samples, urine, gastric contents, and the liver sample at a concentration of 123.0 mg/L (heart blood), 22.77 mg/L (peripheral blood), 1.73 mg/L (urine), and 597.31 mg/kg (liver). Cotinine was detected by gas chromatography-mass spectrometry at a less than quantifiable concentration in the liver. Finally, nicotine was detected from a drug bottle and cup found at the scene.

Authors assume these concentrations are lethal, and that the volume of nicotine in the bottle found at the scene was enough to induce a lethal outcome in the decedent (185 cm in height, 116 kg in weight) after oral ingestion. The concentration in heart blood was higher than that in the peripheral blood. Lardi et al. [2] reported contrasting results (0.19 mg/L in the heart

Received: April 17, 2015

Revised: April 28, 2015

Accepted: May 8, 2015

Correspondence to

Joo-Young Na

Forensic Medicine Division, Gwangju Institute, National Forensic Service, 687 Chungnyeong-ro, Seosam-myeon, Jangseong 515-822, Korea

Tel: +82-61-393-8442

Fax: +82-61-393-8440

E-mail: pdrdream@gmail.com



Fig. 1. A bottle was found at the death scene.

blood, 0.31 mg/L in the peripheral blood), and they explained this as a result of the location of nicotine patches found in that case. The decedent drank liquid nicotine, and the authors assumed postmortem redistribution and the position of the dead body as the cause of varying concentrations. It is known that heart blood can be influenced by postmortem redistribution, such as agonal flow towards the large vessels and the redistribution of basic lipophilic molecules from the lung parenchyma and stomach [3]. The urine concentration measured in the present case is much lower than that in the peripheral blood, and cotinine was only detected only in an unquantifiable concentration in the liver. The authors think that these results show the decedent died shortly before nicotine metabolism and urinary excretion and that he was a non-smoker. This is also supported by a much higher blood nicotine concentration in the present case than that in the previously reported case [2–4]. In the present case, the

liver concentration was much higher than the peripheral blood concentration, a finding similar to that of previous reports [5]. Urakawa et al. [5] reported that skeletal muscle is considered to be the most suitable tissue sample for toxicological examination of nicotine, when blood samples are not feasible. The most common mechanisms of death from nicotine intoxication are cardiovascular arrest and respiratory failure due to peripheral neuromuscular blockade [4]. In the present case, the pathological findings, including froth in the airway, congested internal organs, and edematous lungs, are consistent with death from cardiorespiratory failure secondary to drug poisoning.

We thank Jun et al. for providing a valuable report on the lethality of nicotine. We want to present another nicotine poisoning case with interpretations of laboratory results and additional investigations, including a drug bottle.

Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

References

1. Jun YJ, Kim H, Park S. Suicidal death by nicotine poisoning. *Korean J Leg Med* 2014;38:167-70.
2. Lardi C, Vogt S, Pollak S, et al. Complex suicide with homemade nicotine patches. *Forensic Sci Int* 2014;236:e14-8.
3. Moriya F, Hashimoto Y. A fatal poisoning caused by methomyl and nicotine. *Forensic Sci Int* 2005;149:167-70.
4. Solarino B, Rosenbaum F, Riesselmann B, et al. Death due to ingestion of nicotine-containing solution: case report and review of the literature. *Forensic Sci Int* 2010;195:e19-22.
5. Urakawa N, Nagata T, Kudo K, et al. Simultaneous determination of nicotine and cotinine in various human tissues using capillary gas chromatography/mass spectrometry. *Int J Legal Med* 1994;106:232-6.