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Yoshito Kamijo, Miyo Mekari, Kuniko Yoshimura, Tomomichi Kan'o, & Kazui Soma

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LETTER TO THE EDITOR

Glyphosate-surfactant herbicide products containing glyphosate potassium salt can cause fatal hyperkalemia if ingested in massive amounts

To the Editor:

Because glyphosate-surfactant herbicide (GlySH) is the most common nonselective herbicide, medical emergencies often include ingestion of GlySH products in suicide attempts.

A 69-year-old woman ingested about 500 mL of a GlySH product (Roundup Maxload 1L[®], Nissan Chemical Industries Ltd., Tokyo, Japan). Her husband found her fully conscious but vomiting several times and called for an ambulance; upon reaching the Emergency center, she suddenly lost consciousness and had no pulse. Electrocardiogram (ECG) revealed ventricular tachycardia (VT); the patient received cardiopulmonary resuscitation (CPR) with endotracheal intubation and cardioversions.

On admission, the patient had no pulse and an ECG demonstrating VT. CPR continued with repeated cardioversions and intravenous administration of antiarrhythmics. VT was refractory and responses to the treatments were only temporary, with the 12-lead ECG revealing tall, tapering T waves without P waves. Laboratory tests revealed extreme hyperkalemia (10.7 mEq/L) with normal renal function (BUN: 17.9 mg/dL, Cr: 0.51 mg/dL) and metabolic acidosis (pH: 7.005, PaCO₂: 41.6 mm Hg, BE: -20.7 mmol/L, HCO₃⁻: 10.1 mmol/L). Percutaneous cardiopulmonary support (PCPS) and continuous hemodialysis (CHD) were initiated and 50 g of activated charcoal was administered through a nasogastric tube. Chest x-rays showed a diffuse pulmonary infiltrate. The patient was then diagnosed with acute respiratory distress syndrome (ARDS); mechanical ventilation with high positive end-expiratory pressure and low tidal volume was induced.

After PCPS and CHD, the potassium serum concentration promptly decreased to normal levels and ECG showed a normal sinus rhythm; PCPS and CHD were terminated seven and 20 h after admission, respectively. Endoscopy revealed pharyngeal edema, as well as esophageal and gastric erosions. Both the ARDS and edema gradually improved; mechanical ventilation and intubation were terminated on Day 20. Serum glyphosate levels on admission and after 18 hours were 1625.74 and 100.44 µg/mL, respectively.

GlySH products typically contain glyphosate, a surfactant and other minor ingredients. Patients who ingest GlySH products often present with hyperkalemia.¹⁻³ However, hyperkalemia

is usually associated with renal dysfunction and not severe enough to cause fatal arrhythmias or cardiac arrest. The patient presented with refractory ventricular arrhythmia caused by extreme hyperkalemia shortly after ingestion of a GlySH product. Considering the normal renal function and ECG findings, the most probable cause of her hyperkalemia was an excessive intake of potassium.

Commercially available GlySH products generally contain glyphosate as an isopropylamine salt or partially as an ammonium salt. The product ingested by the patient has been available in Japan since 2006 and contains 48% glyphosate potassium salt. Our laboratory determined the specific gravity of the GlySH product to be about 1.1. Surprisingly, the product contained about 2.6 mEq/mL of potassium, and the patient took as much as 1300 mEq of potassium. We found only one case report of extreme hyperkalemia (9.22 mEq/L), in which a 65-year-old Japanese woman ingested the same GlySH product and showed ECG readings with absent P waves and tall, tapering T waves.⁴ It may be problematic that GlySH products containing much potassium can be easily purchased in retail stores throughout Japan. Physicians should be aware that GlySH products containing glyphosate potassium salt can cause fatal hyperkalemia if ingested in massive amounts.

*Yoshito Kamijo, Miyo Mekari, Kuniko Yoshimura,
Tomomichi Kan'o, and Kazui Soma
Emergency and Critical Care Medicine, School
of Medicine, Kitasato University, 1-15-1 Kitasato,
Minamiku, Sagamihara, Japan*

References

1. Lee HL, Chen KW, Chi CH, Huang JJ, Tsai LM. Clinical presentations and prognostic factors of a glyphosate-surfactant herbicide intoxication: A review of 131 cases. *Acad Emerg Med* 2000; 7:906-910.
2. Moon JM, Chun BJ. Predicting acute complicated glyphosate intoxication in the emergency department. *Clin Toxicol* 2010; 48:718-724.
3. Moon JM, Min YI, Chun BJ. Can early hemodialysis affect the outcome of the ingestion of glyphosate herbicide? *Clin Toxicol* 2006; 44:329-332.
4. Bando H, Murao Y, Aoyagi U, Hirakawa A, Iwase M, Nakatani T. Extreme hyperkalemia in a patient with a new glyphosate potassium herbicide poisoning: report of a case. *Chudoku Kenkyu* 2010; 23:246-249. (in Japanese).

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Address correspondence to Dr. Yoshito Kamijo, Emergency and Critical Care Medicine, School of Medicine, Kitasato University, 1-15-1 Kitasato, Minamiku, Sagamihara, 252-0374 Japan. E-mail: yk119@kitasato-u.ac.jp