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Identifying Factors Predictive of Severity in Glufosinate Herbicide Poisoning: A Taiwan Poison Control Center Study

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Background: There is growing concern that glufosinate poisoning has become more prevalent following the early ban on paraquat in 2018. The aim of this study is to investigate the prevalence, risk factors, and impact of glufosinate poisoning in Taiwan, taking into account the growing concern and the limited number of previous research cases.

Methods: We conducted a retrospective study with the aim of identifying all cases of glufosinate intoxication reported to the Taiwan National Poison Control Center (PCC-Taiwan) between 1993 and 2022. The demographic and clinical data of the patients were then analyzed to identify potential predictors of severe effects after acute glufosinate poisoning using Fisher's exact test, Chi-square test, Wilcoxon's rank sum test and ordinal logistic regression analysis.

Results: Four hundred patients, including 345 oral and 55 nonoral exposures, were eligible for analysis. Among patients with oral exposure,86.7% of the cases were intentionally ingested, and 51 patients unfortunately died following glufosinate ingestion, resulting in a fatality of 14.8%, while the 55 patients with nonoral exposure did not exhibit severe toxicity and all cases in this group were accidental. Patients with oral exposure to glufosinate were included in further analyses to assess prognostic factors. In the final multivariate logistic regression model, age older than 65 years (OR 5.8, 95% CI 1.8 – 18.5), dose ingested greater than 19 grams (OR 5.0, 95% CI 2.1 – 12.0), agitation (OR 9.2, 95% CI 1.4 – 62.1), seizures (OR 5.2, 95% CI 1.4 – 17.8), dyspnea or desaturation (OR 6.2, 95% CI 2.2 – 17.8), bradycardia (OR 5.4, 95% CI 1.9 – 15.1), hypotension (OR 28.4, 95% CI 5.4 – 149.1), leukocytosis (OR 14.1, 95% CI 3.1 – 64.4), and hyperammonemia (OR 3.6, 95% CI 1.3 – 10.1) were significantly associated with the development of a poor outcome. Furthermore, activated charcoal may have a protective effect (OR 0.4, 95% CI 0.2 – 0.9).

Conclusion: The ban on paraquat may lead to an inevitable increase in the incidence of glufosinate poisoning. Potential predictors of severity have been identified as old age, ingested dose (≥ 19 grams), agitation, seizures, dyspnea or desaturation, bradycardia, hypotension, leukocytosis, and hyperammonemia. Recognizing these predictors can help healthcare professionals assess the severity and prognosis of patients with glufosinate poisoning and guide appropriate management strategies, with the ultimate aim of reducing glufosinate-related fatalities in Taiwan.

Keywords: glufosinate, herbicide, poisoning, suicide, prognosis