

LETTER TO THE EDITOR

Factors influencing variability in clinical outcomes from imidacloprid self-poisoning

To the Editor:

The recent retrospective study of neonicotinoid insecticide imidacloprid from Taiwan¹ presents results that are consistent with the results of our recent prospective case series of 68 patients with assay-confirmed ingestion of imidacloprid.² Both studies describe predominately mild to moderate gastrointestinal and central nervous system toxicity. However, in slight contrast to our study, the Taiwan study reports two deaths. Previous publications were restricted to a small number of case reports focused upon severe poisoning and death; this led to a suggestion that the spectrum of toxicity in the series from Sri Lanka differed from reports elsewhere.³

Toxicologists are commonly presented with this inverse pyramid of signals that rests shakily upon a few case reports, then poison center series, then prospective cases series from single or multiple centers. This progression of signals should be associated with decreasing bias but regardless of bias all of this information is important and should be included in any iterative synthesis of the risk of toxicity.

Turning the pyramid upright provides a firm base and suggests a range of factors that may influence outcomes in imidacloprid self-poisoning, in particular the amount ingested, formulation, and patient variables. The median volume of imidacloprid pesticide ingested was 15 mL (IQR = 10–15 mL) in our study, 75 mL (range = 30–200 mL) in severe group of Phua's study, whereas the median amount ingested in the case reports was 150 mL (IQR = 65–250 mL). Increasing age has been shown to correlate with clinical toxicity of self-poisoning previously.⁴ Our patients were younger (median age = 28, range = 13–72) compared to the Taiwanese study (median age = 58, range = 1.7–84) and 50 years (IQR = 33–66) for the single case reports. Other contributory factors include aspiration pneumonia (five patients by Phua et al.; this was not a prominent feature in the single reports) and unknown co-ingestants. Co-formulants may also contribute to the toxicity of a product, which is well established in the case of glyphosate.⁵ *N*-methyl pyrrolidone (NMP) was hypothesized to contribute mild gastrointestinal and central nervous system effects to the toxicity of imidacloprid formulations in Taiwan.⁶ We attempted to determine the co-formulants contained in imidacloprid products available in Sri Lanka but, disappointingly, these were not made available by the distributing agent for commercial reasons.

Our study had advantages over other studies including that it was prospective and that we measured the plasma concentration of imidacloprid, thereby confirming and quantifying exposure to this pesticide. The concentration of imidacloprid was not quantified in other publications of imidacloprid self-poisoning. A forensic study determined the post-mortem imidacloprid concentration in two patients (12.5 and 2.05 ng/L),⁷ which was less than the median [10.58 ng/L (IQR 3.84–15.58 ng/L)] concentration observed in our patients.²

The two case series from Taiwan and Sri Lanka are the largest that have been published and clinical outcomes were reassuringly similar. Methodology that allows the pooling of such early signal data from different sources and countries needs to be considered to conduct a risk assessment and inform regulatory authorities. More research is required to define factors that contribute to the variability in clinical outcomes from acute imidacloprid self-poisoning. Particularly, the influence and worldwide variability in co-formulants should be considered but this will require cooperation with manufacturers of these products.

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