

ACUTE HUMAN TOXICITY OF NEWER CLASSES OF INSECTICIDES

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Introduction: Acute insecticide poisonings remain a major public health problem worldwide. Exposures to conventional insecticides, such as organophosphates, carbamates, and organochlorines, account for the majority of such poisonings and are frequently associated with severe toxic effects and/or mortality. Newer classes of insecticides have thus been developed over the past three decades to minimize the adverse health effects of insecticide exposures. However, little is known regarding their acute toxicity in humans.

Methods: English literature reports included in the Medline database were searched for acute human poisonings related to the following newer insecticides: anthranilic diamides (e.g. chlorantraniliprole), avermectins (e.g. abamectin, and emamectin), chitin synthesis inhibitors (e.g. diflubenzuron and hexaflumuron), chlorfenapyr, indoxacarb, neonicotinoids (e.g. imidacloprid and acetamiprid), phenylpyrazoles (e.g. fipronil), and pymetrozine. Abstracts presented in the North American Congress of Clinical Toxicology (NACCT), Annual Congress of the European Association of Poison Centres and Clinical Toxicologists (EAPCCT), and Asia-Pacific Association of Medical Toxicology (APAMT) between 2000 and 2009 were also searched using similar keywords. Data on human poisonings attributable to the above-noted insecticides were then reviewed and summarized.

Results: Case reports and/or case series of acute human poisonings related to avermectins, fipronil, indoxacarb, and neonicotinoids had been reported on few occasions. Central nervous system (CNS) depression (e.g. coma) was the main toxic effect of avermectin poisoning; while CNS excitation (e.g. seizures) was the key feature of fipronil poisoning. In contrast, neonicotinoid (mainly imidacloprid) exposures were associated with some nicotinic features and/or respiratory complications; and methemoglobinemia was found in a patient with indoxacarb poisoning. Although patients exposed to the aforementioned newer insecticides might develop major toxicity or even mortality, deaths were rarely encountered. Human poisonings attributable to anthranilic diamides, chitin synthesis inhibitors, chlorfenapyr, and pymetrazine were not identified.

Conclusion: Data on acute human toxicity of newer insecticides remain limited and more large-scale observational studies are needed to better understand the clinical features of human poisonings related to these insecticides. Given the existing literature reports, however it seems that newer insecticides are much less toxic as compared to the majority of conventional insecticides.