

Homicidal Pesticide Poisoning — An Overview

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ABSTRACT: Pesticides are chemical or biological agents used to repel or kill pests. Pesticides are potent and lethal toxic substances that are also being infamously used for homicidal purposes due to their easy availability and rapid action. In this review, we look at 21 articles related to homicidal pesticide poisoning in the literature with an emphasis on fatal doses, routes of administration, and profiles of victims and perpetrators. Organophosphates and carbamates were the most commonly used classes of pesticides, and ingestion was the most common route of administration; however, other modes of administration, such as through intraperitoneal injection, were also reported. Interestingly, we have noticed that victims involved in homicidal poisoning were mostly in close relationships with perpetrators. Most perpetrators were either spouses or other immediate family members. Awareness, proper handling, strict observation, and abiding by regulations can help control the prevalence of homicidal pesticide poisoning. Recognition of the distinct morbid anatomy of the poisoning cases, alongside a high index of suspicion in cases that fit the profile, is essential for forensic analysis.

KEYWORDS: Analytical toxicology, chemical toxicology, forensic toxicology, homicidal poisoning, pesticides.

INTRODUCTION

Pesticides are chemical or biological agents deployed to prevent, mitigate, and kill pests [32]. According to the World Health Organization (WHO), they are defined as “biocides: designed to kill, reduce or repel insects, weeds, rodents, fungi or other organisms that can threaten public health and the economy” [36]. They are extensively used in the public health sector, agriculture, and household remedies due to their numerous beneficial effects such as prevention of vector-borne diseases, crop protection, and preservation of food [36].

They can be classified in a variety of ways such as by the target organism (e.g., herbicide, bactericide, and fungicide), chemical structure (e.g., organic, inorganic, and synthetic) or can be grouped into chemical families (e.g., carbamates, organophosphates, and organochlorines or organochloro compounds) [15]. They also include insecticides, which are a type of pesticide specifically targeted to kill insects (e.g., wasp killer, ant killer, and snail bait).

Pesticides are beneficial because by controlling pests and plant disease vectors, they not only improve crop and livestock yield and quality, but also control invasive species and diseases such as malaria. However, pesticides have many drawbacks, such as potential toxicity to humans, causing acute and delayed health effects ranging from irritation of the skin and eyes to causing neuromuscular damage, reproductive problems, and cancer. They also have various adverse environmental effects such as air, soil, and water contamination [21]. Therefore, their use and disposal should be regulated.

Homicidal poisoning signifies the killing of humans by substances known to have debilitating effects on human health. It constitutes a very minute proportion of homicides committed in the US with a total of 523 cases and a rate of

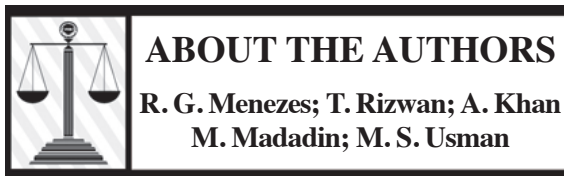
0.26/million recorded from 1999 to 2005 [23]. However, in recent years, rates have been trending upward, particularly among the elderly, males, and blacks [23]. Some of the most effective and noxious substances employed for this purpose include botulinum toxin, arsenic, thallium, strychnine, cyanide, and ethylene glycol (antifreeze). Additionally, pesticides such as organophosphates, due to their rapid action and easy availability, are increasingly being used for both homicidal and suicidal purposes [15].

The most common natures of exposure to pesticide poisoning are suicidal and accidental [10]; homicidal poisoning cases are far less in number. In this review, our aim is to highlight the prevalence and the recent trends related to the use of pesticides in homicidal poisonings with special emphasis on fatal doses, routes of administration, profiles of victims as well as perpetrators, and toxicological analysis of cases.

Historical aspect

Pesticides have long been used in the agricultural sector for the protection of crops against harmful pests and insects. Their use flourished in the 19th century following the development of mineral and organic industries along with the first acknowledged scientific works on the use of chemicals in agriculture [11].

Of the various classes of pesticides, organochlorine insecticides (particularly DDT, i.e., dichloro-diphenyl-trichloroethane) [11] gained popularity and were used successfully in controlling a number of diseases such as malaria and typhoid, but were banned after the 1960s [4]. Pest control and agricultural output were greatly enhanced by the introduction of other synthetic insecticides such as organophosphates (the 1960s), carbamates (1970s), pyrethroids (1980s), and herbicides and fungicides (1970s–1980s) [4].



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