

Prevalence of anticoagulant rodenticide poisoning in France: human and animal data

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Abstract

Anticoagulant rodenticides have been used for over 50 years to control rodent populations. Since their first introduction, resistance developed in rodents, and second generation products, more active but also more toxic, have been marketed. These compounds are currently being reviewed under the European Regulation and the purpose of this work was to describe anticoagulant poisoning based on the retrospective data from French human and animal poison control centers. Cases from 2004 to 2007 were collected. Overall, the proportion of anticoagulant exposure as reported to Lyon's Poison Control Center appeared very limited and mostly occurred in young children, with no or very limited clinical severity. Some cases also occurred after the intentional use of anticoagulants in adults. But circumstances of exposure are usually accidental in human beings (77%).

In animals, both domestic and wild species, anticoagulant exposure is more common and often accompanied by clinical signs. Among domestic species, dogs represent over 60% of the cases: in wildlife hares and rabbits account for almost 50% of the submitted cases, followed by predators and scavengers. The compounds involved are quite representative of the market share of anticoagulants, at least for human beings and domestic animals. In wildlife, bromadiolone and chlorophacinone were by far the most important products, being the only ones registered for field use (until 2011). There is no report of mortality in the human data, and less than 1% of all exposure cases in domestic animals.

Keywords: animal exposure, anticoagulant, human exposure, rodenticide, secondary poisoning, toxicity

Introduction

In France, rodenticides are currently licensed for use against household and field rodent species. All anticoagulants are available against household rodents. Only chlorophacinone and bromadiolone were licensed for use outdoors and in the field in France (prior to 2011). Anticoagulants are toxic to human beings as well as to many vertebrate species and very thorough reviews of their toxic doses and effects are available (Petterino and Paolo, 2001). Few surveys or reports are available, unfortunately, to evaluate the reality of poisoning or exposure to these compounds in humans as well as in animals.

Materials and methods

A retrospective survey of human and animal poisoning cases with anticoagulant rodenticides recorded between January 1st, 2004 and December 31st, 2008 was conducted. Three different sources of data were used to retrieve suspected and confirmed anticoagulant poisoning incidents (anticoagulant drugs excluded):

- 1) human data were accessed via the Lyon Poison Control Center, which accounts for 16% of all calls in France,
- 2) domestic animal data from the CAPAE-Ouest (Nantes College of Veterinary Medicine) were retrieved,
- 3) wild animal toxicovigilance data were obtained from the Toxicology Laboratory of VetAgro Sup, which is part of the SAGIR network (for wildlife disease surveillance).

Results

Among the 124,897 calls received regarding suspected poisoning cases in humans, only 770 concerned anticoagulant rodenticides (0.6%), and only 280 were considered as potential poisoning cases. In domestic animals, anticoagulant rodenticides (n=1,269) represented 9% of all cases (n=14,145) and

severe cases represented 8.5% of these calls (n=105). Mortality was reported in 8 cases. Dogs represented 75.1% of all cases, cats 9.1%. In the laboratory, 1,750 wildlife suspected poisoning cases were reported and 476 were suspected anticoagulant poisoning cases (27.2%). Anticoagulant poisoning was eventually confirmed in 185 cases (10.6%). Hares and rabbits represented almost 40% of the cases; predators, scavengers were also commonly found (22%).

In humans, circumstances of exposure were mostly accidental, but 20% of the cases related to voluntary exposure (suicidal attempts). The active substances involved were mostly 1) difenacoum, chlorophacinone in human beings, 2) difethialone, difenacoum, brodifacoum in domestic animals, 3) bromadiolone and chlorophacinone in wildlife. The outcome is seldom known (except in wildlife, but only dead animals are collected). In the 280 cases considered as potential poisoning problems in humans no death was reported. In animals, 0.6% mortality was observed at the time of call.

Discussion

Anticoagulant poisoning in human beings appears to be of moderate importance in our sample (less than 1% of the cases recorded), as it is commonly observed in many countries around the world. Children under the age of 4 years are most commonly exposed. In France, regulatory authorities request the use of bittering agents to reduce accidental bait intake by children (Bronstein et al., 2007; Bronstein et al., 2008; Watson et al., 2005). The situation is completely different in animals: anticoagulant poisoning is a major issue in veterinary clinical toxicology, as described elsewhere (Wang et al., 2007). Highly susceptible species appear more at risk: dogs, hares/rabbits, wild boars and foxes (Petterino and Paolo, 2001; Berny et al., 1997). In domestic species, the most toxic 2nd generation anticoagulants (brodifacoum, difethialone) are more involved than their market share would suggest over other compounds such as bromadiolone, or difenacoum. Since many cases are reported only when clinical signs occur, logically more toxic compounds will be overrepresented.

In wildlife, only bromadiolone and chlorophacinone were licensed for use against field rodents in France (prior to 2011). Most cases of exposure in human beings are not severe and do not result in any harmful outcome (98% in a review of US poison control center data (Bronstein et al., 2007; Bronstein et al., 2008; Caravati et al., 2007; Watson et al., 2005). It has recently been stated that anticoagulants do not necessitate systematic gastric decontamination or prophylactic Vitamin K administration (Caravati et al., 2007; Ingels et al., 2002), and follow-up is even considered optional for most cases received at the Lyon Poison Control Center. It is noteworthy that no case of death could be attributed to anticoagulant rodenticide exposure in this study. In animals, there is a general lack of information on the circumstances of poisoning and, with a delayed onset of signs, poisoning is often suspected in animals only when clinical signs occur, hence the severity.

As a conclusion, we would like to point out that anticoagulant exposure in France is quite uncommon in human beings and usually benign based on poison control center data and the potentially serious cases followed-up in this 5-year retrospective survey. In domestic animals, clinical cases are more common, especially because exposure is not detected early. In wildlife, our study reveals that products other than the licensed ones are sometimes detected and that inappropriate use of anticoagulants in the field exists.

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