

Acceptance date: 14/02/2025

RETROSPECTIVE STUDY OF ACCIDENTS WITH VENOMOUS ANIMALS IN DOGS AND CATS REGISTERED AT THE TOXICOLOGICAL INFORMATION CENTER OF RIO GRANDE DO SUL (CIT-RS) BETWEEN 2014 AND 2023

Luciana Varella de Figueiredo

Federal University of Rio Grande do Sul,
Veterinary School. Porto Alegre - Rio Grande
do Sul

<http://lattes.cnpq.br/8326192279520561>

Ana Cristina Pacheco de Araújo

Federal University of Rio Grande do Sul,
Veterinary School. Porto Alegre - Rio Grande
do Sul

<http://lattes.cnpq.br/2599270947966957>

All content in this magazine is licensed under a Creative Commons Attribution License. Attribution-Non-Commercial-Non-Derivatives 4.0 International (CC BY-NC-ND 4.0).



Abstract: Accidents involving venomous animals are a public health issue due to their frequency of occurrence and severity, especially in rural areas, where access to the health service can be difficult and there is a delay in care. Severity varies according to the causative agent, among other factors, but accidents are always considered clinical emergencies due to the high risk of death in the event of late treatment. This study looked at the frequency of accidents reported to the Rio Grande do Sul State Toxicological Information Center from 2014 to 2023, with the aim of broadening the veterinarian's clinical view of these cases. During this period, the most common types of accident were snakebites (49%), accidents caused by spiders (27.3%) and bee attacks (10%), respectively. Snakes of the genus *Bothrops* spp topped the ranking for the highest number of cases (96.3%), probably due to their wide geographical distribution and aggressive defense behavior. The same happened with accidents caused by spiders, where *Phoneutria* spp were identified as the main causative agents (49%). Their peridomestic habit and aggressive behavior may be related to the higher frequency of accidents caused by this genus. Accidents with bees were quite frequent (10%), and the risk involved is mainly due to the chance of massive attacks and hypersensitivity reactions. There were also accidents involving scorpions, which accounted for 6.5% of all notifications, and 15 accidents involving stinging caterpillars (3.63%), which do not represent accidents of toxicological interest because they are species of low medical importance. The number of accidents involving unknown agents was significant and may reflect significant underreporting. It is extremely important for veterinarians to be able to recognize clinical syndromes and make a diagnosis as quickly as possible. The Toxicological Information Centre can be a very useful tool in identifying agents and guiding

standardized protocols, with the aim of optimizing patient prognosis.

Keywords: veterinary toxicology, venomous animals, ophidians, spiders, bees.

INTRODUCTION

Accidents involving venomous animals represent a significant public health problem, especially in rural areas (OLIVEIRA *et al.*, 2013). The severity of accidents varies according to the species involved, but they are of great medical importance and constitute clinical emergencies, as they require rapid and appropriate management. Veterinary medicine often faces the challenge of making a diagnosis based solely on clinical signs, without a comprehensive case history, because the animals are found or the clinical signs are noticed hours after the accident. In Rio Grande do Sul, the main accidents to dogs and cats are snakes, spiders and bees (CIT-RS).

Among the venomous ophidians, we can highlight three genera that occur in the state and are responsible for the majority of incidents: *Bothrops* spp. (jararacas), *Crotalus* spp. (rattlesnakes), and *Micrurus* spp. (true corals) (TOKARNIA; PEIXOTO, 2006; CARDOSO *et al.*, 2009). Accidents involving venomous ophidians in domestic animals are always considered serious and require the use of serotherapy for treatment. There are several types of antiophidic serum for animals on the market, so it is important to know the case and choose the appropriate therapy to treat the animals.

Spiders of medical importance in Brazil also belong to three distinct genera: *Loxosceles* spp. (brown spider), *Phoneutria* spp. (armadeiras) and *Latrodectus* spp. (black widows) (BLANCO; MELO, 2014). In Rio Grande do Sul, accidents are mainly caused by armadillos and brown spiders. Unlike in humans, there is no serotherapy available for veterinary use in cases of accidents involving venomous spiders.

Accidents with bees represent an emergency when the patient is hypersensitive or when several stings occur simultaneously in the same animal (CARDOSO *et al.*, 2009). Bees belong to the order *Hymenoptera*, along with other insects of medical importance, belonging to the suborder *Aculeata*, characterized by the presence of an aculeus or true sting (CARDOSO, FRANCA, WEN, 2003; VETTER *et al.*, 1999). The main families of medical importance in Brazil are *Apidae* (bees and honeybees), *Vespidae* (wasps and hornets) and *Formicidae* (ants).

Time is an extremely important variable in the treatment of accidents involving venomous animals. In humans, one study showed that cases of accidents with spiders treated within three hours had mild symptoms and a positive outcome (CHAGAS *et al.*, 2010). With snakes, Oliveira *et al.* (2010) observed that patients treated within 6 hours of the accident had mild symptoms and accidents classified as minor. In veterinary practice, the delay in noticing clinical signs, together with the difficulty of knowing which agent may have caused the accident, requires even greater speed in the management of cases.

Information on venomous animal accidents involving domestic animals is still quite scarce. The aim of this study was to carry out a retrospective study of accidents involving venomous animals in dogs and cats reported to the Toxicological Information Center of Rio Grande do Sul (CIT-RS) between January 2014 and December 2023.

MATERIALS AND METHODS

To carry out this study, we retrospectively analyzed data on accident cases voluntarily reported to the Rio Grande do Sul Toxicological Information Center (CIT-RS) from January 2014 to December 2023. The CIT-RS is a state agency linked to the State Health Department and aims to provide advice and guidance in cases of accidents involving toxic products and venomous animals in an emergency, whether involving people or animals. The cases were selected only for accidents with venomous animals involving pets, excluding accidents with poisonous animals or involving other species of animals.

RESULTS

Cases of accidents involving venomous animals involving dogs and cats were analyzed from January 2014 to December 2023. Of the total number of accidents reported for the different types of agents (413), we found 49.2% of snakebite accidents (203), 27.4% of cases of araneism (113), 13.3% of cases of accidents with venomous insects (55), 6.5% of cases of scorpionism (27) and 3.6% of accidents with stinging caterpillars (15) (Figure 1).

The most reported type of accident in the period was snakebite, 94.6% of which affected dogs (192) and only 5.4% cats (11). The second most common type of accident was araneism, accounting for 27.4% of cases, 87% of which were dogs (98) and 13% cats (15). Accidents involving venomous insects came third (13.3%), with dogs being the most affected species (87% - 48 cases). Of these, bees were responsible for the largest number of accidents, accounting for 76% of the total (42), 90% of which were dogs (38). In fourth place were accidents involving scorpions, accounting for 6.5% of all accidents, 89% involving dogs (24). Accidents involving other invertebrate species were also recorded over the period, but accounted for only 2% of cases

(10). The species involved were ants, bedbugs, wasps and insects of undefined species (unknown). There were also accidents involving stinging caterpillars, which are not of medical importance but are venomous animals. In these cases, dogs were again the most affected species. A total of 15 cases of accidents involving stinging caterpillars of undefined species were reported, 93% (14 cases) of which were dogs.

OPHIDISM

Of the ophidian accidents (Figure 2), there was a higher prevalence of botropic accidents (91.1% - 185), both in dogs (91.1% - 175 cases) and cats (90.9% - ten cases). Elapid accidents were the second most prevalent in both species (4.4%), accounting for 4.2% of accidents involving dogs (eight cases) and 9.1% of accidents involving cats (one case). Eight cases of accidents involving other unidentified venomous ophidians (3.9%) and one case of a crotid accident in dogs (0.5%) were reported. There were no reports of crotella accidents or accidents involving non-venomous species in cats. In all, 86% of the ophidian accidents reported were cases of *Bothrops* spp. bites in dogs (175). Elapid accidents in dogs account for 3.9% of the total reported and only 0.5% of cases in cats.

ARANEISM

Araneism was the second most common type of accident involving venomous animals, according to the notifications made to the CIT (Figure 3). Phoneutrism was the predominant type of accident in dogs (55.1% - 54 cases), followed by accidents involving unidentified spiders (unknown spiders) (15.9% - 18 cases). In cats, accidents involving spiders of low toxicological interest, non-venomous (spider - other) predominated (26.7% - four cases) along with accidents caused by unknown spiders (26.7% - four cases). Of the total number

of spider cases, phoneutrism in dogs accounted for 47.8% (54). *Loxoscelism* accounted for 9.7% of all accidents, of which 7% (eight cases) were in dogs and 3% (three cases) in cats. In addition, six cases of *Lycosa* spp. accidents were reported, five in dogs and only one in cats.

ACCIDENTS INVOLVING VENOMOUS INSECTS

Of the insect accidents recorded, bees are the main type of accident, mostly affecting dogs (Figure 4). Over the years, there have been 38 accidents involving dogs (69.1%) and only four involving cats (7.3%). Bee accidents reported to the CIT can be either single stings or massive accidents. In second place were cases of stings by unidentified insects (ignored). The other accidents reported represented a very low proportion, with less than one accident per year.

SCORPIONISM

Scorpionism was the least reported type of accident over the period analyzed, with the black scorpion (*Bothriurus bonariensis*) being the main causative agent (Figure 5). In all, three cases were reported in cats and 24 in dogs. Accidents caused by the black scorpion in dogs account for 55.6% of the total accidents reported. Other reported accidents involve the agents *Tityus costatus* (spotted scorpion), *Tityus bahiensis* (one case), five cases of unknown (unidentified) scorpions and no accidents caused by yellow scorpions (*Tityus serrulatus*).

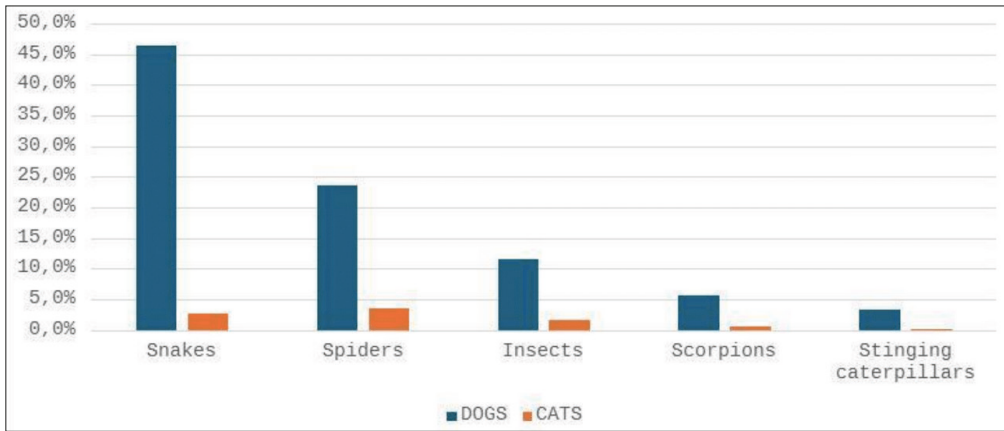


Figure 1 - Graph of the main accidents reported to CIT-RS from 2014 to 2023 involving dogs and cats, broken down by species .

Source: author (2024)

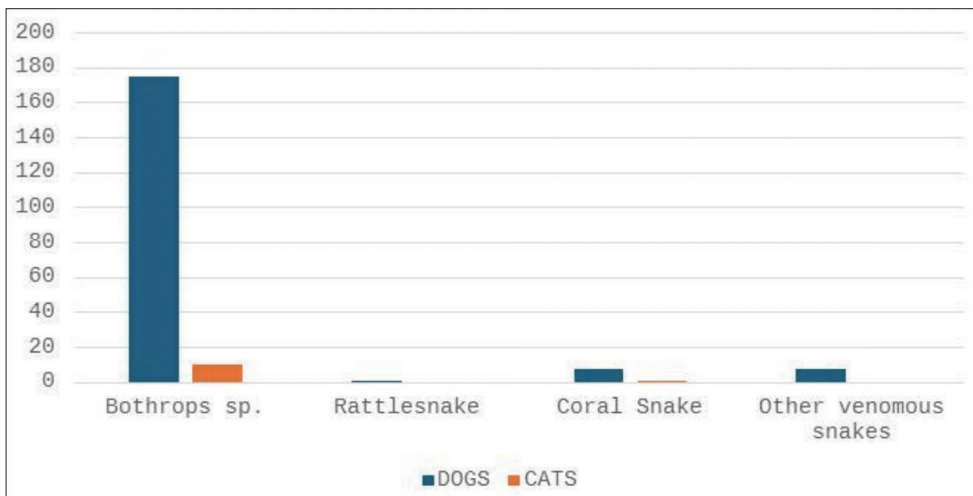


Figure 2 - Graph of venomous ophidian accidents reported to the CIT-RS from 2014 to 2023 involving dogs and cats.

Source: author (2024).

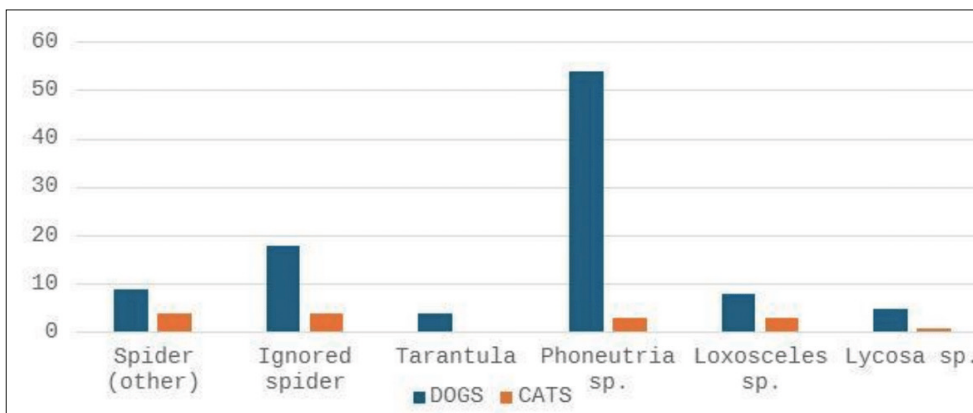


Figure 3 - Graph of cases of araneism reported to the CIT-RS from 2014 to 2023 in dogs and cats.

Source: author (2024)

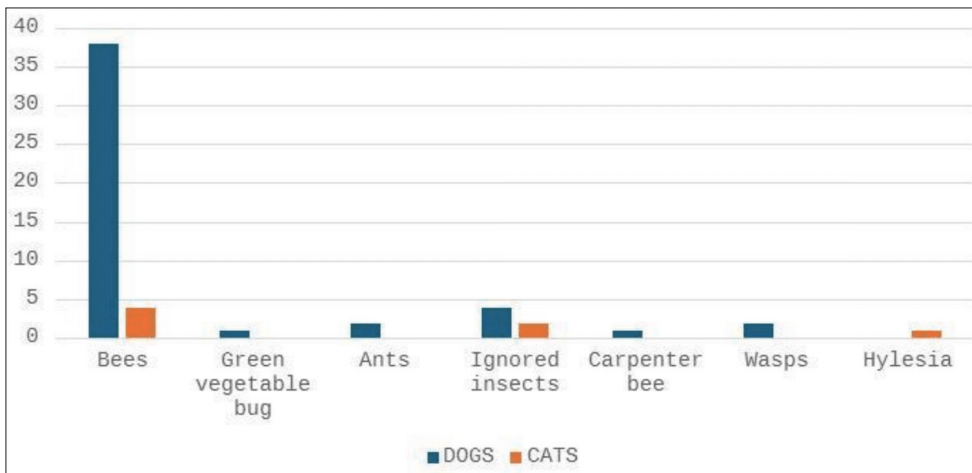


Figure 4 - Graph of cases of accidents involving dogs and cats involving venomous insects notified to the CIT-RS from 2014 to 2023.
Source: author (2024)

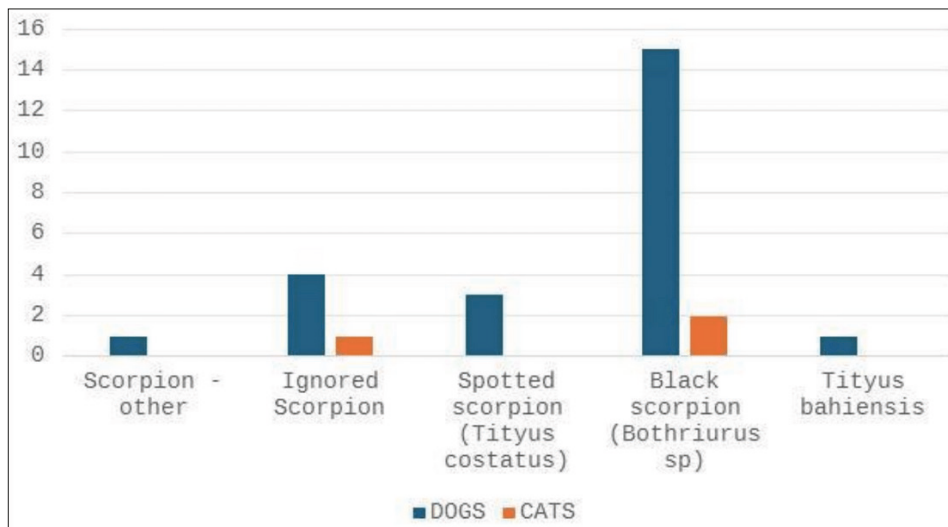


Figure 5 - Graph of scorpion accidents reported to the CIT-RS from 2014 to 2023 involving dogs and cats.
Source: author (2024)

DISCUSSION

Previous studies have shown that accidents involving venomous animals represent the fifth most common type of toxic accident in the state of Rio Grande do Sul (LAUREANO, 2021). The data from this study is consistent with the literature, showing a higher prevalence of snakebite accidents in dogs (NOGUEIRA *et al.* 2019), followed by cases of araneism, also in dogs.

The high incidence of botanical accidents may be a reflection of their high prevalence throughout the state and their aggressive

defense behavior (NOGUEIRA *et al.* 2019), culminating in bites to the animals' heads (NASCIMENTO, 2014). The low incidence of crotalic accidents may also be related to their behavior. This species prefers to avoid conflict, opting for escape when possible and using the rattle as an alarm mechanism to ward off other animals (CARDOSO *et al.*, 2009).

This study found that accidents involving snakes of the genus *Micrurus* spp. were rare, which is in line with the available literature. Studies show that the anatomical characteristics of the dentition, combined with the less

aggressive behavior and fossorial habits of these snakes, make encounters less frequent and accidents less likely (MELQUÍADES; NUNES, 2018).

The second most frequent type of accident was araneism, mainly affecting dogs. The agents causing the largest number of accidents belong to the *Phoneutria* spp. genus, contrary to the data available for accidents involving venomous spiders in humans (SANTANA; BARROS; SUCHARA, 2015). Armor-piercing spiders behave more aggressively and occupy places that are more easily accessible to animals, a fact that can contribute to an increase in the number of accidents (CARDOSO *et al.*, 2009; SAKATE; 2011). It is important to note that many cases of spider accidents are ignored. Often it is not possible to identify the agent, so the number of accidents caused by medically important spiders may be underestimated due to lack of identification. It is therefore important to recognize the clinical signs and consider the possibility as a differential diagnosis.

Accidents caused by bees are relatively common and can be potentially lethal (SCHIMDT, HASSEN, 1996). In all the cases described by Figuera; Souza; Barros (2007), the veterinarians interpreted the clinical manifestations as hypersensitivity reactions, indicating a lack of knowledge about the pathogenesis of bee poisoning. Veterinarians urgently need to be

able to differentiate between allergic and toxic reactions in order to make the best therapeutic decisions and establish a prognosis.

The majority of scorpionism cases occurred with individuals of the *Bothriurus bona-riensis* species, which does not pose an imminent risk to the animals' lives. This may be due to the wide geographical distribution of the animal, which is present throughout Rio Grande do Sul.

CONCLUSION

The number of cases involving unknown agents represents a significant proportion of the records kept by CIT-RS, showing that underreporting may be even higher. This indicates that it is extremely important to have greater knowledge in identifying this type of accident, as well as seeking appropriate information and guidance for better management, treatment and outcome of cases.

The CIT-RS represents an extremely important point of support, both in helping to identify the causative agents and in guiding emergency procedures, not only in cases of accidents with venomous animals, but with all types of toxicological accident. The definitive diagnosis of cases of accidents involving venomous animals can be a challenge, but specific knowledge of clinical syndromes can provide important guidance on therapeutic approaches and protocols.

REFERENCES

- BLANCO, B. S.; MELO, M. M. **Animais peçonhentos: cadernos técnicos de veterinária e zootecnia**. 1. ed. Belo Horizonte: FEPMVZ Editora, 2014. 46 p.
- CARDOSO, J. L. C. *et al.* **Animais peçonhentos no Brasil: biologia, clínicas e terapêutica dos acidentes**. 2. ed. São Paulo: SARVIER, 2009. 539p.
- CARDOSO, J. L. C.; FRANCA, F. O. S.; WEN, F. H. **Animais peçonhentos no Brasil: biologia, clínica e terapêutica dos acidentes**. São Paulo: Sarvier, 2003.
- CENTRO DE INFORMAÇÕES TOXICOLÓGICAS, CIT-RS. Secretaria da Saúde. Centro Estadual de Vigilância em Saúde. Disponível em: http://www.cit.rs.gov.br/index.php?option=com_content&view=category&layout=blog&id=4&Itemid=56. Acesso em: 16 jul. 2024.

- CHAGAS, F. B.; D'AGOSTINI, F. M.; BETRAME, V. Aspectos epidemiológicos dos acidentes por aranhas no Estado do Rio Grande do Sul, Brasil. **Evidência, Joaçaba**, v. 10, n. 1-2, p. 121-130, 2010.
- FIGHERA, R. A.; SOUZA, T. M.; BARROS, C. S. L. Acidente provocado por picada de abelhas como causa de morte de cães. **Ciência Rural**, Santa Maria, v. 37, n. 2, p. 590-593, mar./abr. 2007.
- LAUREANO, J. Aspectos epidemiológicos e clínicos dos acidentes com aranhas e serpentes peçonhentas em cães e gatos atendidos pelo CIT-RS (2016-2021). Monografia (Especialização em Medicina Veterinária) - Universidade Federal do Rio Grande do Sul, Porto Alegre, 2021.
- MELQUIÁDES, M. M. D.; NUNES, C. P. Acidente ofídico com coral verdadeira no estado do Rio de Janeiro: um relato de caso. **Revista da Faculdade de Medicina de Teresópolis**, Rio de Janeiro, v. 2, p. 12, 2018.
- NASCIMENTO, D. S. Filogenia molecular de serpentes neotropicais do grupo *Bothrops atrox* (Linnaeus, 1758) (Viperidae: Crotalinae). Dissertação (Mestrado em Biologia Animal) – Universidade de Brasília, Instituto de Ciências Biológicas, Brasília, 2014.
- NOGUEIRA, C. C. *et al.* Atlas of brazilian snakes: verified point-locality maps to mitigate the Wallacean shortfall in a megadiverse snake fauna. **South American Journal of Herpetology**, v. 14, esp. 1, p. 1-274, 2019.
- OLIVEIRA, F. N. *et al.* Accidents caused by *Bothrops* and *Bothropoides* in the State of Paraíba: epidemiological and clinical aspects. **Revista da Sociedade Brasileira de Medicina Tropical**, v. 43, n. 6, p. 662-667, 2010.
- OLIVEIRA, H. F. A.; COSTA, C. F.; SASSI, R. Relatos de acidentes por animais peçonhentos e medicina popular em agricultores de Cuité, região do Curimataú, Paraíba, Brasil. **Revista Brasileira de Epidemiologia**, v. 16, n. 3, p. 633-643, 2013.
- PAZ, G. G. *et al.* Efeitos tóxicos causados por envenenamento escorpiônico no Brasil. **UNILUS Ensino e Pesquisa**, v. 17, n. 46, p. 92-99, 2020.
- SAKATE, M. Intoxicação por animais peçonhentos: aranhas e escorpiões. In: NOGUEIRA, R. M. B.; ANDRADE, S. F. **Manual de Toxicologia Veterinária**. São Paulo: Roca, 2011. p. 274-284.
- SANTANA, V. T. P.; BARROS, J. O.; SUCHARA, E. A. Aspectos clínicos e epidemiológicos relacionados a acidentes com animais peçonhentos. *Revista de Ciências Médicas e Biológicas*, v. 14, n. 2. p. 153-159, 2015.
- SCHIMIDT, J. O.; HASSEN, L. V. B. **When africanized bees attack: what your clients should know. Veterinary Medicine**, v. 10, p. 923-928, 1996.
- TOKARNIA, C. H.; PEIXOTO, P. V. A importância dos acidentes ofídicos como causa de mortes em bovinos no Brasil. **Pesq. Vet. Bras.**, v. 26, n. 2, p. 55-68, 2006.
- VETTER, R. S. *et al.* Mass envenomations by honey bees and wasps. **Western Journal of Medicine**, v. 170, n. 4, p. 223-227, 1999.