

The patient's profile of envenomation by venomous animals in the Federal District of Brazil between 2007 and 2015: a cross sectional study and therapeutics review

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ABSTRACT

Introduction: Injuries caused by venomous animals are frequent in all emergency departments. Incident rates have risen sharply over the years in Brasília-DF, varying according to the patient's gender, age group, race, case and its consequences. **Methods:** This cross-sectional descriptive study analyzed 5,663 cases reported to the Ministry of Health – by the Information System on Diseases of Compulsory Declaration – between 2007 and 2015. Were analyzed 2957 for scorpions, 907 for snakes, 815 for bees, 453 for spiders, 419 for other animals (e.g. caterpillars, ants, wasps, beetles, centipedes) and 112 notifications whose victims could not identify the animal, but reported the bite and showed symptoms consistent with a venomous animal's injury. **Results:** The economically active population was the most affected, as well as people of mixed race. Regarding the severity of the cases, 9.8% were considered severe, and 0.14% of the patients died. The mortality rate was 0.33% for snakes, 0.25% for bees, 0.22% for spiders and 0.07% for scorpions. When each animal was analyzed, the data were different both in the profile of the patients and in the genus of the animals involved. Accidents with scorpions accounted for 52.2% and prevailed in the female gender, with snakes accounting for 16% of the cases and prevailing in males, as well as spiders (8%), bees (14.4%) and other animals. **Conclusions:** The genus of snakes and spiders differed from the reports of other states, presenting a unique characteristic for the population of Brasília-DF. This study demonstrates the need for epidemiological assessments of major accidents with venomous animals for better distribution of specific serum and to

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optimize the identification of animals in cases where they were not identified by the victims.

Keywords: Emergencies; Envenomation; Scorpions; Snakes; Spiders.

INTRODUCTION

Brazil is considered as a continental country due to its size and variety of biomes and climates, presenting a diversity of venomous animals of great importance for collective health¹. Several animals are present in one biome and others not. The same happens with their different genera and subspecies².

High rates of injuries caused by venomous animals are common in Brazil^{3,4}, and these incidents are supposedly caused by the destruction of the animals' natural habitat and their subsequent migration to urban centers⁵.

During the last nine years, 1,180,847 confirmed cases of injuries by venomous animals were recorded in Brazil, 44.2% of which were caused by scorpions, 20.9% by snakes, 18.8% by spiders, 6.7% by bees, and 6% by other animals (e.g. caterpillars, ants, wasps, beetles, centipedes). In 2.7% of cases, the animal that caused the lesion could not be identified, although the bite was reported, the patient was examined, and

the symptoms were consistent with a venomous animal's injury⁶.

Injuries with scorpions pose a serious public health problem due to the toxicity of the venom of some species and their considerable presence in urbanized environments^{7,8}, and severe cases predominate in children⁸.

Injuries with snakes are a problem in all nations of the world, especially in tropical and subtropical countries^{4,9}. Yet they are neglected in their control and prevention by international institutes such as the World Health Organization¹. In Brazil, about 400 species are found, and about 55 of these are venomous, with four genera accounting for around 20,000 cases annually in Brazil^{2,10,11,12}: jararacas (genus *Bothrops*) found throughout the country^{3,2} rattlesnakes (genus *Crotalus*) prefer the Southeast and South of the country, but are also widely found in the Cerrado biome²; the corals (genus *Micrurus*) throughout the territory^{2,3} and the surucucus (genus *Lachesis*) mainly in the Amazon region³ and in the Atlantic Forest - from the

Northeast to the north of the state of Rio de Janeiro². These 4 genera of snakes also present several subspecies known and scattered throughout the nation. There are still hundreds of other non-venomous genera in the country. The populations with the highest mortality rates are in intertropical¹, underdeveloped, poor, rural¹² regions that are difficult to access.

Brazil has 5 main genera of spiders, two of which have little medical importance (*Megalomorphae* and *Lycosa* or wolf spiders) because they are less dangerous to humans, and the other three are the most feared (*Phoneutria*/the Brazilian wandering spider/"armadeira", *Loxosceles*/recluse or brown spiders and *Latrodectus*/brown widow).

Bees are the cause of exacerbated allergic reactions in about 0.4% to 10% of the population. The available data consider that attacks in swarms are more fatal than the poison of individual bees, as in isolated cases¹³.

METHODS

This cross-sectional descriptive study analyzed injuries by venomous animals occurred between 2007 and 2015, in the Federal District (population estimated at 3,039,444), which were

confirmed by medical staff and notified to the Ministry of Health of Brazil through communications to the Disease Information System of Compulsory Declaration (SINAN). These data were computerized and made available publicly by the Department of Information Technology of the Public Health System (DATASUS). The data used in this study were collected in a secondary database in 2017 through the governmental website (<http://tabnet.datasus.gov.br>).

The analyzed variables were: venomous animal causing the injury, sex, age and race of the patients, severity and outcome; which were analyzed systematically, revealing the incidence in each population, age group, racial sample and case outcome at each one of these groups and with each poisonous accident.

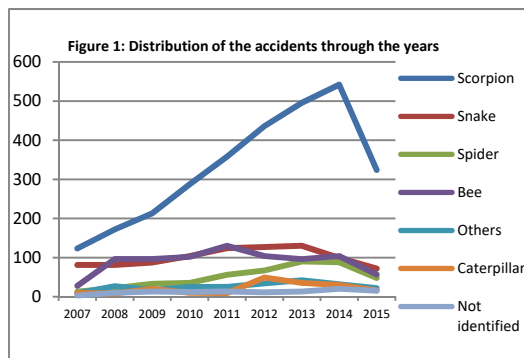
Each variable was isolated year after year and automatically transported to spreadsheet programs, generating automatic analysis of incidence and prevalence of each one, than they were compared, evidencing their correlations.

After this analysis, the data obtained were compared with those known in other Brazilian municipalities,

in works already published in the national and international literature.

RESULTS

Between 2007 and 2015, there were 5,663 cases of injuries by venomous animals reported and confirmed in the Federal District (Figure 1), showing that 1.9 from 1,000 people were victim of an accident in these 9 years analyzed.



They are prevalent in males (56.6%), confirming available data^{2,10,14-16}. The incidence by age was: 1.6% in children under 1 year; 5.3% in patients aged 1 to 4 years; 7.8% between 5 and 9 years; 7.1% between 10 and 14 years; 8.4% between 15 and 19 years; 38.7% between 20 and 39 years; 23.7% between 40 and 59 years; 2.6% between 60 and 64 years; 2.1% between 65 and 69 years; 2.1% between 70 and 79 years; 0.7% among those over 80 years of age. In 0.02% of the cases, the age was not informed¹⁴. The patient's race was not reported in 78.6% of the cases.

In the 1,212 cases where it was reported the incidence was: 64.6% in mixed race patients; 29.1% in white; 4.1% in black; 1.3% in Asian and 0.8% in indigenous. The classification of injuries was considered mild in 78.7% of cases, moderate in 9.8%, severe in 2.6% and not informed in 8.9% of them, in accordance with the recommendations of the State available in each compulsory notification form. From the analyzed sample, 82.8% achieved recovery, 0.14% died from the animal's poison (Table 1), 0.04% died from causes not directly related to the venom - not listed on the form sheet or by the Ministry of Health - and 17.1% did not give their status.

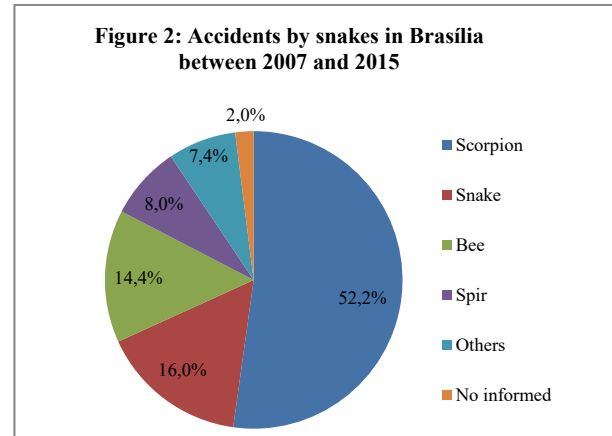
Table 1: Registered deaths resulting from injuries by venomous animals between 2007 and 2015				
Animals	Death by notified act	Death by another cause	Number of Accidents	Mortality rate
Snakes	2	1	907	0.33%
Spiders	-	1	453	0.22%
Scorpions	2	-	2957	0.07%
Bees	2	-	815	0.25%
Others	2	-	419	0.86%
Ignored	-	-	112	0%
Total	8 (0.14%)	2 (0.04%)	5663	0.18%

Injuries with scorpions always were the majority of the cases in the Federal District. They prevailed in the female

sex with 50.8% of the registered cases. Regarding the age groups affected, 1.7% were children under 1 year of age, 3.9% were children between 1 and 4 years of age, 6.1% were children between 5 and 9 years of age, 6.1% of 10 to 14 year old, 8.7% in the 15-19 age group, 40.1% in the 20-39 age group, 25.3% in the 40-59 age group, 2.8% in the 60-64 age group, 2.2% in the 65-69 age group, 2.2% in the 70-79 age group and 0.8% in those over 80 years old. Of the cases with declared race, 67.2% were mixed race, 27.6% were white, 3.3% were black, 1.2% were Asian and 0.7% were indigenous. Regarding severity, 83.8% were mild, 6.2% moderate, 1.1% severe and 8.9% did not inform. Of the patients bitten by a scorpion -of our sample-, 82.8% were cured, 0.07% died from the injuries and 17.2% did not inform. In a study⁶ relating to the Brazilian northeast, the scorpion-caused injury rates were lower than the rate in the Federal District (DF), representing 35.5% of that region's injuries resulting from venomous animals.

Injuries with snakes prevailed in males, responsible for 77.2% of the cases, while females accounted for the other 22.8%. Of these, 61.1% were with

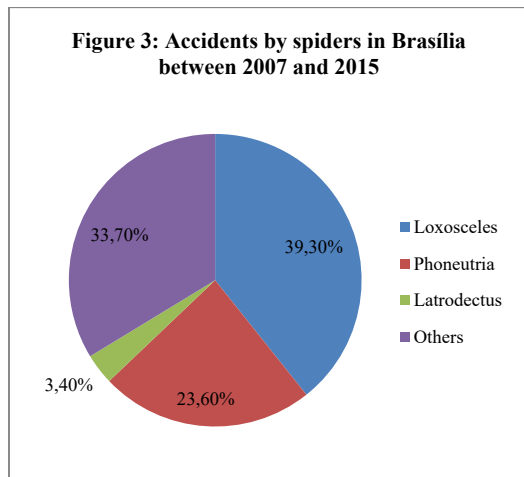
Bothrops, 11% with *Crotalus*, 1.7% with *Micrurus*, 0.4% with *Lachesis*, 5% with non-venomous snakes and 20.8% did not specify the type of snake (Figure 2).



The incidence of injuries by age was 1% in children under 1 year of age, 2.5% in patients aged 1 to 4 years, 5.6% in 5 to 9 years, 8.4% in 10 to 14 years, 6.9% from 15 to 19 years old, 40% from 20 to 39 years old, 28.1% from 40 to 59 years old, 2.2% from 60 to 64 and 65 to 69 years old, 2.3% from 70 to 79 years and 0.7% in those over 80 years of age. The patients' race was not informed in 57.3% of the cases. Of the 907 reported, 26.1% were mixed race, 12.6% were white, 2.6% were black, 0.8% were Asian, and 0.6% were indigenous. Injuries were classified as mild in 48.7% of the cases, moderate in 31.3%, severe in 11.7% and in 8.3% of the cases there was no information. From these samples, 83% of the patients

achieved recovery, 0.2% died from the injuries, 0.1% died from another cause, and in 16.6% of the cases the outcome was not informed.

Spiders were responsible for 8% of injuries in the Federal District, 56.5% in men and 43.5% in women. Of these, 80.4% could not specify the type of spider. Of the injuries with spiders identified, 39.3% were with *Loxosceles*, 23.6% with *Phoneutria*, 3.4% with *Latrodectus* (*L. geometricus*, the only one found in Brasília's fauna¹³) and 33.7% accounted for other species in the Federal District (Figure 3).



The incidence of the total sample by age was 1.8% in children under 1 year of age, 6.8% in patients aged between 1 and 4 years, 7.3% between 5 and 9 years, 5.3% between 10 and 14 years, 6.8% between 15 and 19 years, 34.7% between 20 and 39 years, 26.9% between 40 and 59 years, 3.8% between

60 and 64 years, 2.9% between 65 and 69 years, 3.1% between 70 and 79 years and 0.7% in those over 80 years. Of the sample with specified race, 70% were mixed race, 26.3% white, 2.5% Asian and 1.3% black. No injuries were recorded with indigenous people. The severity classification in spider injuries was omitted in 9.7% of cases, mild in 83%, moderate in 6.4% and severe in 0.9%. Of the 453 spider injuries in the Federal District, 84.3% recovered, 0.2% died due to other causes and no death from the venom was recorded. Besides that, 15.5% of the patients did not have an update on their healing status.

Injuries with bees were reported 815 times, 58.7% were in males and 41.3% were in females. Injuries occurred in children under 1 year of age in 1.8% of cases, 9.1% between 1 and 4 years, 12% between 5 and 9 years, 10.3% between 10 and 14 years, 11.2% between 15 and 19 years, 36.7% between 20 and 39 years, 14.1% between 40 and 59 years, 1.4% between 60 and 64 years, 1.1% between 65 and 69 years, 1.8% between 70 and 79 years and 0.45 in those over 80 years of age. Of the patients who declared their race, 64.2% were mixed race, 34.6% white and 1.2% indigenous. Regarding the

severity of the registered cases, 89.6% were mild, 3.4% moderate, 0.2% severe and 6.7% did not inform. Of these, 87% recovered, 0.2% died and 12.8% had no reported outcome.

Injuries with other venomous animals accounted for 7.4% of the sample, of which 60.4% of the victims were male and 39.6% were female. Injuries occurred in children under 1 year of age in 0.7% of cases, 10.7% between 1 and 4 years, 17.4% between 5 and 9 years, 7.4% between 10 and 14 years, 5% between 15 and 19 years, 33.2% between 20 and 39 years, 19.8% between 40 and 59 years, 2.4% between 60 and 64 years, 1.9% between 65 and 69 years, 1% between 70 and 79 years and 0.5 in those over 80 years of age. Of the patients who had declared their race, 60.9% were mixed race, 31.9% white and 7.2% black. Regarding the severity of the registered cases, 85.7% were mild, 5.5% moderate, 0.2% severe and 8.6% did not declare severity. Of these, 78% were cured, 1% died and 21% had no reported outcome.

DISCUSSION

Scorpions from the *Tityus* genus are the ones responsible for most injuries^{7,16} in the Federal District, and these cases occur mainly in the

economically active population (68.2% of the cases between 20 and 64 years). *Tityus charreyroni* Vellard and *Tityus fasciolatus* Pessôa are the species most found in the region⁷. In DF they were responsible for 52.2% of all injuries caused by venomous animals, prevailing slightly in the female population (50.8% of cases) and the majority age group was between 20 and 39 years old, representing 40.1% of the population. In the available data, these values varied by region, as shown by a study from Paraná¹⁵, where the injuries with scorpions represented 2.85% of the cases. The mixed race population was the most affected in our sample, where 0.1% died. Injuries should be classified to guide medical therapy^{17,18} (Table 2).

In the Federal District, venomous snakes were the second largest cause of accidents with venomous animals in the analyzed period, bringing us important data when compared to those of other regions/municipalities. In a study¹³ from 1990 to 1993 in the whole country, were 90.5% (non-venomous snakes were not computed) and 73.1% (computing them) of injuries were recorded with *Bothrops*; in another study, in the city of Ribeirão Preto (SP)³, the injury rate was

42.9%; in Paraná¹⁵ it was 19.94%; in the state of Acre (AC) it was 38% in the interior¹⁰ and 75.7% in the capital⁹; in Amapá it was 67.5%⁹, in Mato Grosso 99%⁹, 81.8% in Roraima⁹, in the city of Cuité¹⁹ in Paraíba it was 68.1% and in the Amazon, as a whole, *Bothrops* was responsible for 80-90% of injuries¹².

Table 2: Classification of Severity and Therapeutic Conduct in Accidents by Scorpions.		
Clinical condition		Conduct
If asymptomatic		Request complementary tests (CK, blood glucose, amylase and hemogram). Wait at least 12 hours for DH.
Adults or Children with Symptoms	Mild: pain, tachycardia and vomiting.	Premedication (Hydrocortisone 10mg/kg IV + Cimetidine 10mg/kg IV or Ranitidine 3mg/kg IV + Promethazine 0.5mg/kg IM). Analgesia and observation for at least 12 hours for DH.
	Moderate: Mild clinical condition + stronger local pain, light sweating, tachypnea, hypertension and psychomotor agitation.	Analgesia + premedication + 2 to 3 ampoules of SAE IV or SAA IV + supplementary oxygenation. Request Complementary Tests such as CK, CBC, electrocardiogram, electrolytes, AST (TGO), renal function, EAS and chest X-ray.
	Severe: moderate clinical condition + profuse sweating, sialorrhea, cardiac arrhythmia, convulsion, acute pulmonary edema and shock.	Analgesia + premedication + 4 to 6 ampoules of SAE IV + tracheal intubation + mechanical ventilation + check control: noradrenaline and/or volume. Intern at ICU and request complementary exams.
IV: Intravenous; IM: Intramuscular; SAE: Anti-scorpion Venom Serum; DH: discharge from hospital; ICU: Intensive Care Unit; SAA: Antiaracnid Serum		

Our sample of 61.1% was higher than in Ribeirão Preto, than in the interior of Acre, and than in Paraná; it was lower than the national average, Rio Branco-AC, Amapá, Mato Grosso, Roraima and Paraíba. With the *Crotalus* snake, the rate was 6.2% for the country, 9.8% for Ribeirão Preto, 2% for Acre and 2.1% for Paraíba, while in the DF it was found to be 11%, which was higher than all the samples compared. There are numerous reports of bite without poison, where they must be carefully observed to avoid the undue use of

antivenom serum^{20,21}. For the genus *Micrurus* our rate was 1.7%, while Ribeirão Preto was 0.7%, Brazil on average 0.3-0.4%²² and 0% in Acre. Again, our sample proved to be higher than the others, historically low²³. As for *Lachesis*, no cases were found in the Ribeirão Preto sample -because they are not found in the region Southeast -, and the rate of the overall Brazilian sample was 1.1%; in the Acre sample it was 51.3%^{10,9}. In our sample, the rate was 0.4%, thus higher than Ribeirão Preto, and lower than National and Acre. Injuries with non-venomous snakes represented 5% in DF, 46.6% in the Ribeirão Preto sample and 19.3% in the overall Brazilian sample, being smaller than the other samples analyzed.

Regarding the patient, the incidence of our sample was higher in men of economically active age - between 20 and 59 years of age - representing 52.7% of all cases and corroborating the data found in the literature^{1,9,10,15}. The ethnic group most affected was mixed race, representing 61.2% of all declared cases. Overall, 48.7% of the cases were considered mild (Table 3) and 3 deaths were reported, 2 resulting from the injuries and 1 from another non-specified cause.

Table 3: Classification of Severity and Therapeutic Conduct in Accidents by

snake.			
Genus	Classification	Clinical condition	Conduct
Serpent <i>Bothrops</i> (Jararaca) Action: Proteolytic Coagulant Hemorrhagic	Mild	Local pain + edema near the bite + mild bruises (not necessarily all)	Analgesia + 2 to 4 ampoules of SAB or, as a second option, SBAC in the same dosage. Minimum observation of 12h.
	Moderate	Mild clinical condition + easily identifiable ecchymoses and mild hemorrhages at the distance from the bite	Analgesia + 4 to 8 ampoules of SAB or, as a second option, SBAC in the same dosage. Minimum observation of 24h.
	Severe	Moderate clinical condition + intensification of pain and edema, blisters, severe bleeding, hypotension, oliguria/anuria, acute renal failure, shock.	Analgesia + 12 ampoules of SAB or, as a second option, SBAC in the same dosage. Hospitalization in intensive care for at least 24 hours.
Serpent <i>Crotalus</i> (Cascavel) Action: Neurotoxic Myotoxic Coagulant	Mild	Mild or absent myalgia, slightly blurred vision and late onset, palpebral ptosis.	Oral zero diet + premedication + analgesia + 5 ampoules of SAC or SABC. Minimum observation of 12h.
	Moderate	Myalgia present, myasthenic face may be present, dark urine, palpebral ptosis.	Lightweight conduction + 10 SAC or SABC ampoules + Minimum observation of 24h.
	Severe	Generalized intense myasthenia, early and blurred vision, present myasthenic face, present myoglobinuria, may or may not progress to oliguria or anuria.	Lightweight conduction + 20 SAC or SABC ampoules. Hospitalization in intensive care for at least 24 hours.
Serpent <i>Lachesis</i> (Surucucu) Action: Proteolytic Coagulant Neurotoxic	Mild	Pain and local edema.	Symptomatic and observation by 12h. To evaluate the need for SABL.
	Moderate	Presence of pain, edema, mild bleeding and blisters at the site of the bite.	10 ampoules of SABL, minimum stay of 24h.
	Severe	Presence of marked pain, blisters, strong edema, frank hemorrhage, intestinal changes, abdominal cramps, hypotension and shock.	20 ampoules of SABL, hospitalized in intensive care for at least 24 hours.
Serpent <i>Micrurus</i> (Coral) Action: Neurotoxic	Mild	Local pain.	Symptomatic and observation by at least 12h. Evaluate use of SAEL.
	Moderate	Mild clinical condition + neurotoxic symptoms	Symptomatic + 5 ampoules of SAEL
	Severe	Discrete pain and paresthesia with visual turbidity and palpebral ptosis. Presence of intense muscle weakness and paralysis.	Symptomatic + 10 SAEL

SAB: Antibotrope Serum; SBAC: Antibotrope-crotalic Serum; SAC: Anticrotalic Serum; SABL: Antibotrope-lachetic Serum; SAEL: Antielapid Serum.

Bees accounted were 14.4% of the reports of lesions in animals in the Federal District, most of whom were males and between 20 and 39 years of age. The cases were, in the majority, mild, but 0.2% of them were considered critical, leading to the death of two patients. The treatment of human injuries is based on the removal of the sting without their compression, drug control of pain, combat of allergic

reactions, maintenance of the hydroelectrolytic balance, preventive observation of respiratory function and acute renal failure, and general care against anaphylactic shock, the greatest cause of death¹³.

Our sample of accidents with arachnids revealed that in the Federal District, they were responsible for 8% of lesions with venomous lesions, with *Loxosceles* being the main cause of lesions, reaching 39.3% of the sample, followed by *Phoneutria* with 23.6% and *Latrodectus* with 3.4%. In Ribeirão Preto (SP)¹⁶, the statistics revealed, among the spiders identified, 75% of the cases caused by *Phoneutria*, 4.8% by *Loxosceles* and none by *Latrodectus*. In a Maringa (Paraná) sample¹⁴, the rate of spider injuries was 28.2%, which was 20.2% higher than what was found in this study.

In the Federal District (Brazil), spiders were responsible for 8% of the cases of injuries with venomous animals, not very different from a São Paulo¹⁶ state study, where this rate was 5.3%. In Paraná¹⁵, spiders represented 44% of the injuries and *Loxosceles* were also the main cause. Injuries prevailed in males of mixed race and economically active age (61.5% from

20 to 59 years). No cases were reported in the local indigenous population. Of the hospitalized patients, 83% were in a mild state and 0.9% severe, 1 patient died from another associated cause, but not from the spider toxin itself. Each spider has its own clinical and therapeutic status (Table 4).

Table 4: Classification of Severity and Therapeutic Conduct in Accidents by spider.			
Animals	Classification	Clinical condition	Conduct
<i>Phoneutria</i> Spider "armadeira"	Mild	Local pain and restlessness + tachycardia in some cases.	Observation, local anesthesia or analgesia
	Moderate	Mild clinical condition + sweating, vomiting and hypertension.	Hospitalization for at least 48 hours + 2 to 4 ampoules of SAA.
	Severe	Moderate clinical condition + severe vomiting, priapism, profuse sweating, sialorrhea, convulsion, heart failure, coma, shock, bradycardia, pulmonary edema.	Hospitalization for at least 48 hours in an intensive care unit + 5 to 10 ampoules of SAA.
<i>Loxosceles</i> spider Brown spider	Mild	Injury is uncharacteristic and usually painless.	Follow-up for 72h.
	Moderate	Pale lesion, ecchymosis, erythema and local edema, fever, myalgia, headache, exanthema and cutaneous rash < 3cm.	Symptomatic + 5 ampoules of SAA or SALox.
	Severe	Characteristic lesion > 3cm and signs of hemolysis (acute anemia, pallor, jaundice).	Symptomatic + corticoid + SAA ou SALox 10 ampoules.
<i>Latrodectus</i> spider Brown Widow	Mild	Pain in lower limbs and local, paresthesia in limbs, edema and local sweating, tremors and muscular contractures.	Symptomatic + Analgesics + Observation for 72h
	Moderate	Mild clinical condition + abdominal pain, generalized sweating, myalgia, psychomotor agitation, headache, hyperthermia, vertigo and difficulty to ambulation.	Symptomatic + 1 ampoule of SALatr + Observation for 72h.
	Severe	Moderate clinical condition + priapism, nausea and vomiting, tachycardia or bradyarrhythmia, tachypnea or dyspnea, arterial hypertension, urinary retentions and latrodectismica facies.	Symptomatic + 2 ampoules of SALatr + follow-up in intensive care unit.
SAA: Antiaracnid Serum; SALox: Antiloxoscelic Serum; SALatr: Antilatrodectus Serum.			

CONCLUSION

Venomous animals were responsible for 5,663 cases in the Federal District between 2007 and 2015. Scorpions were the animals that most caused injuries, accounting for 52.2% of the cases and emphasizing the

need for basic sanitation and housing improvements in the region. Snakes were the second most reported animals in the research, responsible for 16% of the cases. Although the 4 main genera are not, in theory, found in the Midwest, they were all found in DF causing injuries. *Bothrops* rates were higher than those found in Ribeirão Preto, but lower than the national Brazilian rate. For *Lachesis*, the finding was the opposite, and it was higher than the Ribeirão Preto rate and lower than the Brazilian rate. With the snakes of the *Crotalus* and *Micrurus* genera, the rates in DF were higher than the rates in Ribeirão Preto and Brazil. As for the non-venomous snakes, our sample had the lowest rate, 5%. Bees accounted for 14.4% of all injuries caused by venomous animals in this research. The most found spider was *Loxosceles*, followed by *Phoneutria* and *Latrodectus*. A peculiarity was found in relation to the municipality of Ribeirão Preto (SP), where no case of *Latrodectus* was reported and, in our sample, *Latrodectus geometricus* represented 3.4% of the cases with identified spiders. All forms of injuries prevailed in the economically active population of the country, between 20

and 64 years of age. As for sex, injuries with snakes, spiders and bees prevailed in males, but scorpions prevailed among female victims. Of the deaths registered in the Federal District, 30% were from snake injuries, 20% from scorpions, 20% from bees, 20% from other animals and 10% from spiders. This study demonstrates the need for epidemiological assessments of major accidents with venomous animals for better distribution of specific serum and to optimize the identification of animals in cases where they were not identified by the victims.

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