



Revista de Epidemiologia e Controle de Infecção

ISSN: 2238-3360

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Universidade de Santa Cruz do Sul

Brasil

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Revista de Epidemiologia e Controle de Infecção, vol.
10, núm. 4, 2020, Outubro-Diciembre, pp. 370-374

Universidade de Santa Cruz do Sul
Santa Cruz do Sul, Brasil

DOI: <https://doi.org/10.17058/reci.v10i4.14694>

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<https://doi.org/10.17058/reci.v10i4.14694>

Received: 14/01/2020

Accepted: 15/07/2020

Available online: 04/10/2020

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ABSTRACT

Background and objectives: despite advances in health care, accidents involving venomous animals are still a major public health problem in Brazil. Between 2015 and 2016, the Southeast region had the highest number of notifications, and Minas Gerais was the state with more occurrences. The objective of this study was to describe the epidemiological characteristics of accidents by venomous animal notified between 2008 and 2017 in the municipality of Patrocínio, Minas Gerais. **Methods:** this is a retrospective descriptive study conducted by analyzing the information from reporting forms of the Notifiable Diseases Information System for victims of accidents with venomous animals occurred during the years 2008 to 2017 in Patrocínio. **Results:** in total, 1084 cases were recorded, mostly caused by scorpions (47.23%), followed by snakes (17.07%), spiders (15.31%) and bees (11.07%). There was a predominance of male victims (63.10%), aged between 20-39 years (32.56%). Most accidents were classified as mild (89.11%) and the cure occurred in 98.80% of cases; one evolved to death. **Conclusion:** although accidents with venomous animals do not have high mortality rates in the municipality studied, the incidence of this health problem has increased in recent years. In addition, this updated epidemiological information may contribute to public policy actions and inform the local population about imminent risks.

Descriptors: Araneism. Scorpionism. Snake bites. Ophidism. Scorpion stings.

RESUMO

Justificativa e objetivos: apesar dos avanços na área assistencial, os acidentes por animais peçonhentos ainda são um importante problema de saúde pública no Brasil. Entre os anos de 2015 e 2016, a região Sudeste apresentou

o maior número de notificações, e Minas Gerais foi o estado com mais ocorrências. O objetivo deste estudo foi descrever as características epidemiológicas dos acidentes por animais peçonhentos notificados entre 2008 e 2017 no município de Patrocínio, Minas Gerais. **Métodos:** estudo descritivo retrospectivo realizado por meio da análise das informações das fichas de notificação do Sistema de Informação de Agravos de Notificação (SINAN) de vítimas de acidentes por animais peçonhentos ocorridos durante os anos de 2008 a 2017 em Patrocínio. **Resultados:** foram registrados 1.084 casos, a maioria ocasionada por escorpiões (47,23%), seguida por serpentes (17,07%), aranhas (15,31%) e abelhas (11,07%). Sobre as vítimas, constatou-se o predomínio de homens (63,10%) na faixa etária entre 20 a 39 anos (32,56%). A maior parte dos acidentes foi classificada como leve (89,11%) e a cura ocorreu em 98,80% dos casos; um evoluiu para óbito. **Conclusão:** embora os acidentes por animais peçonhentos não apresentem altas taxas de letalidade no município estudado, a incidência desse agravo de saúde tem aumentado nos últimos anos. Além disso, informações epidemiológicas atualizadas podem contribuir com ações de políticas públicas e informar a população local sobre os riscos iminentes.

Descritores: Araneísmo. Escorpionismo. Mordeduras de serpentes. Ofidismo. Picadas de escorpião.

RESUMEN

Justificación y objetivos: a pesar de los avances en salud, los accidentes de animales venenosos siguen siendo un importante problema de salud pública en Brasil. Entre 2015 y 2016, la región sudeste tuvo el mayor número de notificaciones y Minas Gerais fue el estado con más casos. El objetivo de este estudio fue describir las características epidemiológicas de los accidentes por animales venenosos notificados entre 2008 y 2017 en el municipio de Patrocínio, Minas Gerais. **Métodos:** estudio descriptivo retrospectivo llevado a cabo mediante el análisis de la información de los formularios de notificación del Sistema de Información de Enfermedades Notificables de víctimas de accidentes con animales venenosos que ocurrieron durante los años 2008 a 2017 en Patrocínio. **Resultados:** se registraron 1084 casos, en su mayoría causados por escorpiones (47.23%), seguidos de serpientes (17.07%), arañas (15.31%) y abejas (11.07%). Predominaron las víctimas del sexo masculino (63,10%), con edades entre 20 y 39 años (32,56%). La mayoría de los accidentes se clasificaron como leves (89,11%) y la curación se produjo en el 98,80% de los casos; uno evolucionó hasta la muerte. **Conclusiones:** aunque los accidentes con animales venenosos no tienen altas tasas de mortalidad en el municipio estudiado, la incidencia de este problema de salud ha aumentado en los últimos años. Además, esta información epidemiológica actualizada puede contribuir a las acciones de política pública e informar a la población local sobre los riesgos inminentes.

Descriptores: Araneísmo. Escorpionismo. Picaduras de serpiente. Ofidismo. Picaduras de escorpión.

INTRODUCTION

Although accidents involving venomous animals still are a neglected public health problem, they have high morbidity and low lethality. The main contributing factors to the increase in this health problem are Brazil's vast biodiversity, the growing urban mobility and changes in life habits that are causing people to have greater contact with nature.¹

Regarding the presence of a device for inoculating poison, animals are classified into two groups: poisonous and venomous. Poisonous animals do not have a device for inoculating poison, while venomous animals have venom-producing glands interconnected through structures such as prey, goads, chelicerae, stingers, among others, where the venom passes actively and is released. In Brazil, the main venomous animals that cause accidents are scorpions, spiders, and snakes.^{1,2}

Accidents with scorpions are the most prevalent. Although scorpions have a low lethality in adults, vulnerable populations such as children and the elderly have a higher risk of death. Worldwide, more than one million cases of scorpion poisoning are reported annually, and

in Brazil, 57,933 accidents were recorded in 2011. Despite the wide variety of scorpion species, only a few are of medical importance in the country, (eg, *Tityus serrulatus*, *T. bahiensis*, *T. stigmurus*, and *T. obscurus*), and the yellow scorpion, *T. serrulatus*, is the most lethal.^{3,4}

The spider is another type of arachnid of great medical importance that inoculates its poison through chelicerae and paralyzes and kills its prey. Although four genera can cause accidents in humans, in Brazil, only three are associated with accidents, namely the *Phoneutria* (spider-spider), *Loxosceles* (brown spider), and *Latrodectus* (black widow). The genus *Loxosceles* has the highest rate of accidents and lethality. In 2015, 25,786.4 spider accidents were reported in Brazil.^{3,4}

Snakes also cause many poisonings, even though not all snakes are venomous. There are non-venomous snakes that also cause accidents. Venomous snakes present forward-positioned fangs, where the poison is inoculated. The main genera of venomous snakes in Brazil are *Bothrops* (jararaca, jararacuçu, urutu, etc.), *Crotalus* (rattlesnake), *Micrurus* (coral), and *Lachesis* (surucucu-pico-de-jaca). Most snake accidents occur by the genus *Bothrops*, represented in the Southeast region,

mainly by the species *Bothrops jararaca*, popularly known as jararaca. According to the World Health Organization, 2,500,000 snakebites occur worldwide each year.^{2,3,5}

The actual number of accidents by venomous animals is not yet known, because of underreporting and the lack of epidemiological surveillance systems in some places. However, between 2008 and 2017, 266,489 cases were recorded in Minas Gerais. Note that the Southeast was the Brazilian region with the highest number of accidents caused by poisonous animals between 2015 and 2016, and Minas Gerais was the state with more occurrences.^{6,7}

The dissemination of epidemiological data related to accidents by venomous animals is essential for the development of public policies and control strategies by health services, and to clarify to the population about the imminent risks in their region. In this context, the objective of this study was to describe the epidemiological characteristics of cases of accidents by venomous animals notified between years 2008 and 2017 in Patrocínio, Minas Gerais.

METHODS

Patrocínio is a Brazilian municipality located in the region called Alto Paranaíba, state of Minas Gerais. According to data from the Brazilian Institute of Geography and Statistics (IBGE), the estimated population for 2019 is 90,757 inhabitants. The region has tropical climate with two well-defined seasons, dry and rainy. During the dry season, mild temperatures prevail (17°C), and in the rainy season, higher temperatures (22°C) prevail. The economy is based on agriculture and livestock, with coffee and dairy cattle as the most relevant activities.^{8,9}

This is a retrospective, descriptive, cross-sectional study on accidents caused by venomous animals notified in the municipality of Patrocínio (MG) between years 2008 and 2017. Secondary data obtained from the Notifiable Diseases Information System (Portuguese acronym: SINAN) were used. Although this was a study of human beings, approval by the research ethics committee was not needed, as secondary data are available on the internet.

A form with 11 variables was created for data collection, and they were separated into three areas: 1) related to the victim: sex, race, age, and education; 2) related to the accident: type of accident, month of the accident, the time elapsed between the bite and medical care; and, 3) related to clinical manifestations: classification and evolution of the case.

Data were grouped in spreadsheets prepared in the Microsoft Excel program for analysis of results, the frequency and percentage of variables were determined, and results were presented in tables to facilitate understanding.

RESULTS

In a ten-year period (2008-2017), 1,084 cases of accidents by venomous animals were reported in Patrocínio (MG); 2017 was the year with the highest number of cases (147), while 2008 had the lowest number of cases (51).

Regarding victim-related variables, most accidents occurred with male individuals (63.10%), white race was the most affected (60.42%), as well as the age group of 20-39 years (36.90%). Although the education variable was analyzed, most data in this item remained unanswered (94.46%) (Table 1).

Table 1. Epidemiological data on victims of accidents caused by venomous animals in the municipality of Patrocínio, Minas Gerais, Brazil, 2008-2017.

Variables	n	%
Sex		
Male	684	63.1
Female	400	36.9
Age range (in years)		
<10	91	8.39
10-19	152	14.02
20-39	400	36.9
40-59	314	28.97
>60	127	11.72
Race		
White	655	60.42
Mixed race	254	23.43
Black	126	11.62
Yellow	13	1.21
No answer	36	3.32
Schooling		
None	60	5.54
No answer	1024	94.46

The most reported type of accident was caused by scorpions (47.23%), followed by snakes (17.07%), spiders (15.31%) and bees (11.07%). When observing the ten-year period of the study, accidents with venomous animals occurred predominantly in February (11.99%) and less frequently in September (4.34%). When the last three years (2015-2017) were evaluated, the period with the highest number of occurrences covered the months between October and December. The time between the bite and medical care was also one of the variables analyzed, and most occurred within one hour (56.83%), but there were still cases in which medical care was provided after 24 hours (2.86%) (Table 2).

Regarding the outcome of the accident, most obtained a mild final classification (89.11%), and only 2.77% were considered serious. Almost all cases resulted in the cure of patients (98.80%), although one death was recorded in 2012 (Table 3).

Table 2. Epidemiological data on variables related to accidents caused by venomous animals, in the municipality of Patrocínio, Minas Gerais, Brazil, 2008-2017.

Variables	n	%
Type of accident		
Scorpion	512	47.23
Snake	185	17.07
Spider	166	15.31
Bee	120	11.07
Others	81	7.47
No answer	20	1.85
Accident month		
January-March	329	30.35
April-June	287	26.47
July-September	165	15.23
October-December	303	27.95
Sting time/care		
0-3 h	896	82.66
3-12 h	118	10.88
>12 h	56	5.17
No answer	14	1.29

Table 3. Epidemiological data on the clinical manifestations of accidents by venomous animals in the municipality of Patrocínio, Minas Gerais, Brazil, 2008-2017.

Variables	n	%
Final classification		
Mild	966	89.11
Moderate	83	7.66
Serious	30	2.77
No reply	5	0.46
Case evolution		
Cure	1071	98.8
Death	1	0.09
No answer	12	1.11

DISCUSSION

From the results obtained, the annual average of approximately 108 cases notified in the studied municipality was observed. There was a significant increase in incidence over the years; 2008 was the year with the lowest number of occurrences and 2017 with the highest. Two distinct variables may have contributed to the growth of notifications in Patrocínio: a possible underreporting in the first years of the study because of flaws in the Notifiable Diseases Information System, or an actual increase in the number of cases. An increase in occurrences may be a consequence of the increase in urban growth, deforestation, and agricultural extension. However, improvements in the notification system associated with greater adherence by service stations also contributed to the higher number of cases, expressing the real situation of the municipality.^{1,6}

As for seasonality, there was a huge variation during the period evaluated. When considering the ten years of the study, the months with the highest and lowest occurrence were February and September, respectively. Note that in the last three years (2015-2017),

the highest number of accidents was recorded between October and December, and a decline occurred between July and September. In the Southeast region, in late spring and early summer, there was an increase in the number of accidents caused by venomous animals, given the increase in temperature and rainfall, and consequently in agricultural activities in this period. Authors have concluded that the higher incidence of accidents by venomous animals is directly related to the increase in air temperature.^{1,10}

In all years analyzed, the male sex was more affected by snakebites. Similar results were observed in macro-regions of the north and south of Minas Gerais. The higher incidence in men may be a result of their higher likelihood of having contact with venomous animals in their work activities, which are generally related to agriculture, construction and livestock. In agreement with the literature, the age group with the highest number of reported cases was 20-39 years, which illustrates the importance of accidents by venomous animals as an occupational health problem, since this age group includes an economically active population.¹¹⁻¹⁴

In the municipality of Patrocínio, in line with the national scenario, most accidents by venomous animals were caused by scorpions. Similar results were found in the state of Minas Gerais. However, results of a study in southern Minas Gerais differed, since spiders, snakes, and bees were the venomous animals associated with a greater number of accident cases. Although most accidents involving venomous animals in Patrocínio were caused by scorpions, there was also a large number of cases related to snakes, spiders, and bees. It was not possible to assess which scorpion species was more associated with accidents by venomous animals in Patrocínio given the scarcity of data related to this variable in the Notifiable Diseases Information System.^{12,15,16}

The time between the bite by a venomous animal and the outpatient care is a very important factor. Some poisons are absorbed faster than others, so early care is related to a good evolution of the case. The service time is closely linked to the resources available at the location of the bite or the environment where medical care occurs. In the municipality of Patrocínio, the time between the bite and the service occurred within one hour in most cases, or three hours at most, which corresponds to the predicted ideal time. Similar results were observed in a study in the state of Minas Gerais.^{16,17}

In this study, in 98.8% of cases patients were cured, which is probably associated with the time between the bite and the service. In the ten years analyzed, only one death caused by accidents with venomous animals was recorded in 2012. Additionally, most cases notified in the municipality were classified as mild (89.11%). These results are in line with those found in epidemiological data on accidents by venomous animals in Minas Gerais. However, in Uberlândia, a city located in the Triângulo Mineiro, in the same period of this study, 32 cases of scorpion were classified as serious, the majority in children. In the state of Amazonas, 65.6% of accidents caused by snake

bites were classified as serious.^{14,16,18}

The main limitations of this study were the lack of information about some important variables such as level of education, species causing accidents, species associated with death, among others. However, the information registered in the Notifiable Diseases Information System is a valuable source of epidemiological data for the definition of public policies for the municipality.

From the results found, it is possible to affirm that between January 2008 and December 2017, in the municipality of Patrocínio, the most affected population by accidents with venomous animals were young male adults, who have a great chance of cure if attended in a timely manner. In addition, the scorpion was the main cause of these accidents.

Despite an increase in the reporting of cases, there is still underreported information. However, these epidemiological data available on the internet are very important, so city managers can make predictions on serum doses in health care, develop prevention strategies for the population at risk, and adopt control measures.

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AUTHORS' CONTRIBUTIONS

Guilherme Henrique Borges contributed to the conception, design of the article and data analysis;

Isadora Caixeta da Silveira Ferreira contributed to the conception, design of the article, data analysis and writing of the article.

All authors approved the final version to be published and are responsible for all aspects of the work, including ensuring its accuracy and integrity.