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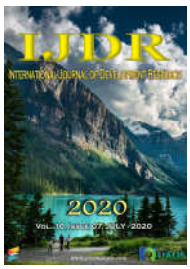

RESEARCH ARTICLE OPEN ACCESS

CLINICAL-EPIDEMIOLOGICAL PROFILE OF SNAKEBITE NOTIFICATIONS IN THE CITIES OF THE 1st REGIONAL HEALTH MANAGEMENT OF THE STATE OF PERNAMBUCO, IN THE PERIOD 2009-2019

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ABSTRACT

Introduction*:** Ophidian accidents represent a serious public health problem for tropical countries. **Objective:** To describe the clinical-epidemiological profile of snakebite accidents that occurred in the cities of the 1st Regional Health Management, in the State of Pernambuco, Brazil, between 2009 and 2019. ***Method*:** This is a retrospective, descriptive, quantitative, documentary study. ***Results and Discussion: The number of cases reported in the cities studied was 2,516 representing 28.25% of the entire state. The prevalence of this event was 7.7/100,000 inhabitants in 2019. The most affected age groups were 20-39 years and 40-59 years, which together accounted for 53.69% of cases. Regarding the gender of the victims, 1,703 were male, corresponding to 68%, while 811 were female, about 32% of the total. Regarding the genus of venomous snakes, the genus Crotalus sp. was observed as the main responsible for the accidents, about 15.9% of the occurrences, followed by the Bothrops sp. (11.2%), Micrurus sp. (4.5%) and lastly, Lachesis sp. (0.6%). ***Conclusion*:** It is necessary to qualify information about accidents involving snakes in order to understand the epidemiology of these accidents and to promote better care for these occurrences.

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INTRODUÇÃO

In tropical countries, accidents involving snakes represent a serious public health problem. In Brazil there are many regions where such accidents occur. It is estimated that about 2.5 to 2.7 million accidents occur, with 250,000 victims evolving to sequelae and 125,000 deaths per year. In 1986, the Ministry of Health instituted the notification of snakebite accidents, making it mandatory. In order to provide a better understanding of the epidemiological situation since this disease, the Diseases Information and Notification System (SINAN) was implemented through the Ministry of Health in 1993, aiming at monitoring compulsory notification diseases and others grievances of public health interest, among them, accidents with venomous animals (Fiszon; Bochner, 2008). In Brazil there are approximately 405 species of snakes, which are distributed in 10 families, the snakes of the family Viperidae, genus Bothrops sp. (Jararacas), Crotalus sp. (Rattlesnakes) and Lachesis sp. (Surucucu-Pico-de-Jaca); and the family Elapidae, the genus Leptomicrurus sp. and Micrurus sp. (True corals) are considered venomous and have importance in the incidence of cases of snakebites (Costa; Bérnils; 2018; Bernarde, 2018). In this way, the groups of snakes potentially causing accidents can be divided into four categories:

i. Botropic Accident, involving jararacas, caiçacas, urutus, jararacuçus snakes;
ii. Laquetic, they occur with the snakes surucucu-bico-de-jaca, surucutinga or surucucu;
iii. Crotalic, snakes involved are rattlesnakes; and
iv. Elapidic, are caused by snakes known as true corals (Bernarde, 2015; Bernarde, 2014).

Some of these accidents are potentially fatal in the absence of immediate and adequate therapy. There are still species of non-venomous snakes considered relevant to public health due to their ability to cause systemic poisoning, these are those of the genus Phalotris sp., Philodryas sp., Xenodon sp. and Tachimenis sp. (Salomão *et al.,* 2003; Warrel, 2004). Due to the insipience of studies on snakebite accidents in the State of Pernambuco, and due to their relevance to public health, it is extremely important to report snakebite accidents, as these can provide a database that will be used for the development of research aimed at improving public health management, by implementing actions to promote effective diagnosis and care in cases of accidents involving snakes. In this context, the present study aims to present the clinical-epidemiological profile of snakebite accidents that occurred in the cities that constitute the 1st Regional Health Management in the State of Pernambuco in the period between the years 2009 to 2019.

METHODOLOGY

This is a retrospective, descriptive, quantitative, documentary study. The universe of research was the Information System for Notifiable Diseases (SINAN), made available via the Web by the Informatics Department of the Unified Health System - DATASUS (http://www.datasus.gov.br), referring to the number of accidents involving snakes, according to the municipalities that make up the 1st Regional Health Management (1st GERES) of the State of Pernambuco, Brazil, in the period from 2009 to 2019. Data collection took place in June and July 2020 through the use of the Health Information program (TABNET). The tabulation of the records of the Notifiable Diseases Information System (SINAN), for the research included the following variables: age, sex, race and pregnancy women, year, animal causing the accident, type of snake, length of service, final classification, evolution, lethality rate. Population data for calculating the prevalence and lethality of cases of snakebites, according to the municipalities of 1st GERES, were obtained from the DATASUS portal. For the data, the calculations of the absolute values, frequencies and percentages were performed and the results were organized in tables and graphs using Microsoft Excel® Programs.

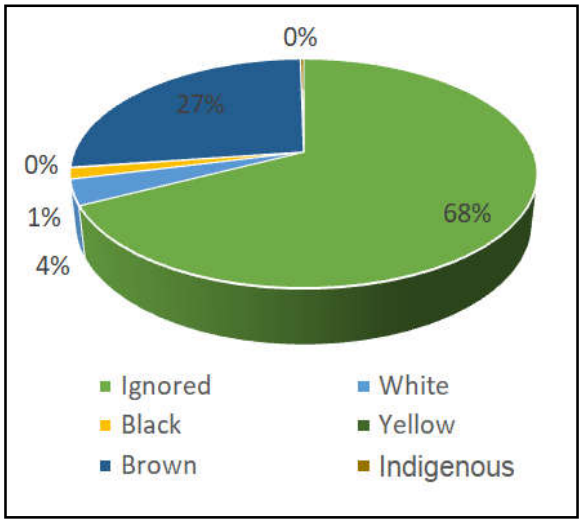
RESULTS AND DISCUSSION

Responsible for resolving cases of medium and high complexity, the 1st Regional Health Management of Pernambuco (1stGERES), is composed of a total 19 cities, these are, Abreu e Lima, Araçoiaba, Cabo de Santo Agostinho, Camaragibe, Chã Grande, Chã de Alegria, Glória de Goitá, Fernando de Noronha, Igarassu, Ipojuca, Itamaracá, Itapissuma, Jaboatão dos Guararapes, Moreno, Olinda, Paulista, Pigeons, Recife, São Lourenço da Mata and Vitória de Santo Antão, in addition to the island of Fernando de Noronha, serving a total population of 4,116,153 inhabitants (Figure 1) (Pernambuco, 2020). From 2009 to 2019, 8,874 cases of snake accidents were confirmed in the state of Pernambuco, registered with SINAN, making it the 4th state with the highest number of notifications in the northeast region and 14th in Brazil during the period studied. Out of a total of 187 cities, all registered at least 1 case of snakebite. The number of cases reported in the studied cities was 2,516, representing 28.25% of the number reported in the entire state. As for the place of residence of victims of accidents involving snakes, it was not possible to verify, because this information is not available in the system. However, a previous study that evaluated the occurrence of accidents with snakes across the state, found that 80% of them occurred in the countryside (Aquino, 1999). The literature points out that many of these victims are rural workers, and that due to the lack of use of protective equipment, such as long boots, leggings, gloves and other clothing, they are more susceptible to accidents in these areas (Lima, 2009a; Lima, 2009b; Rojas, 2007; Bochner, 2003). It is estimated that the use of protective equipment can reduce the number of snakebite accidents by 50.0% to 75.0% (Lemos, 2009). In relation to the months of the year in which the highest number of accidents was observed, April and May were 245 and 248 respectively. Menezes (2010) explains that the number of accidents involving snakes tends to increase at this time of the year due to being related to the end of the winter period and the beginning of the harvest. According to the author, the grains attract rodents, which are the natural prey of snakes, thus forcing them to leave their dens in search of food.

Source: Jconline, 2020

Figure 1. Cities that make up the 1st Regional Health Management

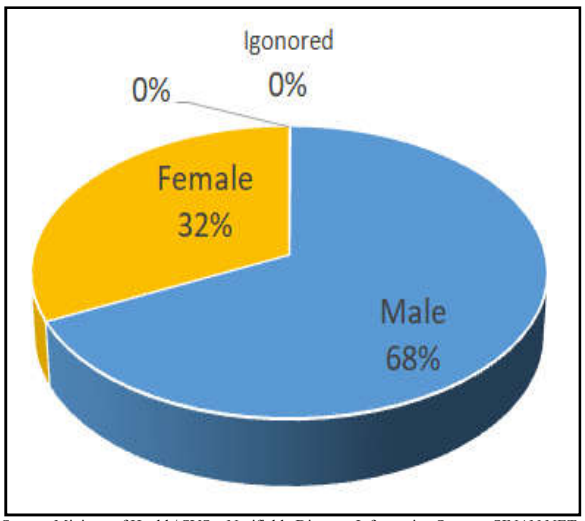
The annual distribution of accidents gradually increased until reaching its peak in 2016 with 500 reported cases, that is, 19.87% of cases during the period studied, after that period the numbers of accidents returned to a downward profile, the incidence coefficient varied from the year 2009, which was 2.3/100,000 inhabitants, reaching 12.14/100,000 inhabitants in 2016, after that year it declined again reaching 5.7/100,000 inhabitants in 2019.The increase in the number of cases in 2016 may be related to the pluviometric and climatic profile observed that year, since other studies have already shown that there is a relationship between these variables and the activity of venomous animals (Castro, 2006; Lima, 2009a; Correia, 2016). The year 2016 was marked by heavy rains, floods and flooding in many cities in Pernambuco, due to this environmental situation, animals looking for shelters may appear in places where there is a greater circulation of people, this fact may have contributed to the increase in the number of accidents recorded this year. (Nascimento, 2016).



Source: Ministry of Health/ SVS – Notifiable Diseases Information System- SINAN NET, 2020.

Graph 1. Classification of notifications by race

The most affected age groups were 20-39 years and 40-59 years, which together accounted for 53.69% of cases in the period from 2009 to 2019. About 1,994 (79, 25%) had their level of education marked as "Ignored" in the notification. Approximately 20.1% of the victims were illiterate or had low education, while in about 0.19% of the cases, the victims had completed higher education. This data corroborates the findings of Moura *et al* (2010), who states that people with less education have a greater tendency to consider all species of snakes as dangerous, and thus, exhibit more hostile behavior with these animals, resulting in possible accidents.According to Souza (1996), the defective filling of the notification forms contributes to the generation of insufficient and little measurable data, thus favoring the lack of knowledge about the disease. Regarding the self-declaration of race, 1,702 notifications were left "white" or "ignored", that is, approximately 68%, 90 were considered white, representing 4% of the total, 39 black, about 1%, yellow and indigenous, 2 and 7 respectively, remaining at 0%, and finally, 676 browns, representing 27% of the total of notifications (Graph 1).In several other studies, the population most affected by snakebite accidents were those who declared themselves to be brown, according to data from the 2006 National Household Sample Survey (PNAD), approximately 42.6% of the population of the Brazilian population considers themselves brown, a factor that can explain this high rate of notifications in this population (IBGE, 2006; Belmino, 2015; Lise, *et al*., 2019).



Source: Ministry of Health/ SVS – Notifiable Diseases Information System- SINAN NET, 2020

Graph 2. Classification of notifications by genre

Regarding the gender of the victims, 1,703 were male, which corresponds to 68%, while 811 were female, about 32% of the total, yet 2 were left blank/ignored (Graph 2). The incidence coefficient was 2.99/100,000 inhabitants for males, while for females it was 2.0/100,000 inhabitants in 2009. In 2016, the period in which there was a greater number of reports of accidents involving snakes, the incidence coefficient was 17.56/100,000 inhabitants for the male population and 7.07/100,000 inhabitants for the female population. Finally, with the decline in the curve of new cases in subsequent years, the incidence coefficient was 8.77/100,000 inhabitants in the male population and 4.39/100,000 inhabitants in the female population.These data corroborate the findings of the literature in which it has been reported that male individuals represent the main victims in accidents involving snakes, which may point to the relevance of snakebite as an occupational health problem, especially in agricultural activities (Bochner, 2003). During the period analyzed, there were only 10 reports of snake accidents with confirmed pregnant victims, about 0.39% of the total cases. Two of them were in the 1st trimester of pregnancy, three in the 2nd trimester of pregnancy and five in the 3rd trimester of pregnancy. The other notifications were: "ignored" or "white" was equal to 318 notifications (12.63%), "non-pregnant" was equal to 210 notifications (8.34%), marked as "not applicable" were 1,978 (78.61%). None of the cases of snakebites involving pregnant women resulted in a death notification. Regarding the genus of venomous snakes, the genus Crotalus sp. was observed as the main responsible for accidents during the analyzed period, about 15.9% of the occurrences, followed by the genusBothrops sp. (11.2%), Micrurus sp. (4.5%) and lastly, Lachesis sp. (0.6%). About 33.61% were notified as "ignored" gender of the event and another 33.8%as "non-venomous". The frequency of notifications by year occurred is shown in Table 1. What happened differently from previous studies that revealed that in Brazil, most snakebites are attributed to snakes of the genus Bothrops sp. (90%), followed by the genusCrotalus sp. (7.7%), Lachesis sp. (1.4%) and Micrurus sp. (0.5%) (Pinho, 2001).Jararacas (Bothrops genus) live in rural and peripheral areas of cities, have affinity with humid environments such as forests and cultivated areas, as well as places that accumulate debris or garbage and promote the proliferation of rodents. They have a habit of hunting at night. If they feel threatened they can show aggressive behavior, (FUNASA, 2001). In the cities of 1stGERES Pernambucana, during the period studied, the lethality rate of this condition was 0.35%. Staying among the expected for this type of occurrence in the country, where the Botropic accident has a lethality of 0.3% (Bernarde*et al.,* 2018).Rattlesnakes (genus Crotalus) do not usually attack, and when they feel threatened, through the characteristic noise of the creptacle, similar to the sound of a rattle located on the tip of its tail, they denounce its presence (FUNASA, 2001). In Brazil, its lethality rate is 1.8%, in the cities of 1stGERES, its lethality rate was 2.2%.Part of the high lethality of crotalic venom in relation to botropic venom, occurs due to the properties of both substances, crotalic venom has myotoxic, neurotoxic, nephrotoxic and hepatotoxic activity, while botropic venom has local proteolytic, hemorrhagic and nephrotoxic activity (Castro, 2006).The Laquetic accident (genus Lachesis) is responsible, in Brazil, presents a lethality three times greater than the botropic accident (0.9%), however half of the lethality of the accident with snakes of the genus Crotalus sp. (Bernarde*et al.,* 2018;Silva; Bernarde; Abreu, 2015). During the period from 2009 to 2019, thee were no deaths due to this condition.The Elapidic accident (genus Micrurus sp. and Leptomicrurus sp.) account for less than 1% of snake accidents in the country. (Bernarde *et al.,* 2018; Silva; Bernarde; Abreu, 2015). There were no reports of deaths related to this cause, during the period analyzed by the study.Although accidents with snakes have been a condition of compulsory notification since 1986, for some authors the data recorded do not fully reveal the current situation in the country, taking into account the difficulty of access and underreporting in more remote locations (Lopes *et al.,* 2017).Most of the victims (56.5%), obtained medical care within the first 3 hours after the accident, however about 22.5% were seen between 3 and 6 hours. Most of the cases seen were classified as mild (66.2%), followed by moderate (17.2%), and severe (6.3%), as shown in Table 2. Of the total number of cases (n = 2,516), only 0.5% (n = 13) evolved to

Table 1. Notifications by snake genres/year. Recife-PE, 2020

Genre	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Ignored	43	47	65	93	55	94	95	168	84	56	60	861
Bothrops	6	10	10	12	21	23	55	94	21	13	17	282
Crotalus	15	17	29	17	29	37	32	64	41	48	71	397
Micrurus	2	3	5	16	14	11	15	16	12	9	8	111
Lachesis	-	2	-	2	-	1	1	1	4	1	1	13
Not venemous	32	14	25	42	83	78	130	156	77	97	116	850
Total	98	93	134	182	202	244	328	499	239	224	273	2516

Image caption: Mechan. (Mechanism); Ign. (Ignorado).
Source: Ministry of Health /SVS - Notifiable Diseases Information System- Sinan Net, 2020.

death as a result of the condition for which it was notified, predominantly evolving to a cure (88.6%).

Table 2. Notifications of snake accidents according to variables; Time bit and service; accident classification and evolution of cases/ year. Recife-PE, 2020

VARIABLES	NUMBER OF CASES	%
TIME BIT AND SERVICE (n = 2,516; 100%)		
0 to 1 hour	753	29,9
1 to3 hour	671	26,6
3 to6 hour	406	16,1
6 to 12 hour	163	6,4
12 to24 hour	117	4,6
24 hours and +	121	4,8
Ignored/White	285	11,3
ACCIDENT CLASSIFICATION (n =2,516; 100%)		
Light	1.667	66,2
Moderate	435	17,2
Serious	159	6,3
Ignored/White	225	8,9
EVOLUTION OF CASES (N = 2,516; 100%)		
Cure	2.231	88,6
Death duetoinjury	13	0,5
Death fromanother cause	2	0,07
Ignored/White	270	10,7

Image caption: Mechan. (Mechanism); Ign. (Ignorado).
Source: Ministry of Health /SVS - Notifiable Diseases Information System- Sinan Net, 2020.

These data are similar to other studies carried out in other regions of the country (Correia, 2016). In order to avoid complications and have a better prognosis, the time elapsed between the accident and the first appointment is essential. The sooner the victim receives care, the greater the chances of not developing sequelae. Comparing with national data, it was found that the proportion of cases treated between 0 and 1 hour was 29.9%, in line with the percentage observed in Brazil, during the same period of time, around 29.9%, the Northeast region presented a percentage of 24.74%, this value may have been lower due to the amount of blank/ignored notifications in the region, about 9.25% (BRASIL, 2020).This study presented an important limiting factor regarding the high proportion of ignored or blank variables, especially for those that refer to the micro-region of the accident, the victim's profession and the anatomical location of the bite. As previously mentioned, underreporting represents a limiting factor for the adequate interpretation of data. When compared to the South and Southeast regions, the Northeast still presents high rates of underreporting. However, it is expected that over the years there will be a decrease in these rates and an improvement in the quality of notifications of health problems in the macro-region and throughout the country.

FINAL CONSIDERATIONS

It is concluded that victims of snakebites in the municipalities of 1stGERES Pernambuco do not differ in many aspects, from the others in other regions of the State and even the country, however, it was found that there was a change in the snake genus that has caused more accidents, requiring more studies that can evaluate the variables capable of analyzing this phenomenon. Another determining factor, however, which is not recent is the incompleteness of the notification forms, which do not allow a complete look at the analyzed scenario. The qualification of information about accidents involving snakes will contribute to the knowledge of the epidemiology of these accidents and to the promotion of a better attendance to these occurrences, in addition to contributing to the creation of prevention measures appropriate to the local reality, thus, it becomes essential invest in notification and surveillance services for these events.

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