

SCORPION STING EPIDEMIOLOGY IN MONTES MUNICIPALITY OF THE STATE OF SUCRE, VENEZUELA: GEOGRAPHIC DISTRIBUTION (1)

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SUMMARY

Scorpion stings were surveyed in the Montes Municipality of the State of Sucre, Venezuela, aiming to extend the information on these poisonous accidents by characterizing their geographic distribution. From 1980 to 1990, 184 cases of scorpion stings were recorded with an incidence rate of 38.6 cases per 10,000 inhabitants. The locality of San Fernando presented the highest incidence (68.3‰) of poisonous accidents. The highest percentages of severe cases were recorded in the towns of Arenas (27%), San Lorenzo (21%), and Cocollar (19%), which are located at the foot of the Turimiquire Mountains. This region is a dispersion area of scorpions of the *Tityus* genus. Our results show that this region of the State of Sucre is endemic for scorpion stings which are an important public health problem.

KEYWORDS: Epidemiology; Scorpionism; *Tityus* sp.; Venezuela.

INTRODUCTION

Scorpions belong to an animal group important from the medical and zoogeographic points of view^{14, 18, 19}. Most of the scorpions dangerous to man are species of the Buthidae family. The *Tityus* genus is exclusive of the American continent and represents, among others, the Buthidae family in Venezuela^{13, 15, 18, 19}.

Scorpion stings are related to the population density of these arthropods since they generally concur with the geographic regions where communities are abundant and the morbid-mortality rate is relevant^{21, 22}. Scorpion accidents have been considered a public health problem in several countries due to the mortality and morbidity rates associated with them^{11, 15, 23}. Alterations of the car-

diovascular and pulmonary functions are the most frequent clinical manifestations and cause of death of envenomed patients^{1, 2, 3, 5, 16}.

In Venezuela, scorpionism gathers importance within the regions where the species of the *Tityus* genus predominate^{4, 14, 20, 24, 26}. Particularly, this accident has been cataloged as serious in the endemic zones of the State of Monagas¹². During the triennial 1989-1991, the proven incidence rate of stings for this state was 2.82‰ (398 cases) and its Acosta Municipality was established and recently ratified as a hyper-endemic zone for scorpionism, with an incidence of 18.30‰^{24, 26, 27, 28}. It has been shown that within this municipality, this poi-

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sonous accident behaves as a dynamic and variable phenomenon with a tendency to increase²⁴.

Presently, little is known about the true magnitude and transcendence of scorpion stings in Venezuela since few epidemiological data on the subject have been recorded. In this paper, we present new information concerning this type of accident through the characterization of the geographic distribution of cases of scorpionism in the Montes Municipality of the State of Sucre.

METHODOLOGY

1. Materials and Methods

This is a retrospective study carried out in the Montes Municipality of the State of Sucre, in North-Eastern Venezuela (Figure 1) from January 1980 to December 1990. All the cases of this area that were attended and recorded in the daily morbidity records of the Emergency Service of the Luis Daniel Beauperthuy Hospital, in the town of Cumanacoa, were included in the study.

The incidence rate per 10,000 inhabitants was expressed as the number of cases recorded in relation to the estimated population for 1985 (median year). The clinical classification of VELASCO-CASTREJON et al. 1976²⁵ was adopted to estimate the incidence rate of severe scorpionism.

Percentages of severe cases envenoming for each population of the municipality were obtained by dividing the incidence rate of severe cases of poisoning by the incidence of scorpionism of each locality. These results are shown in Figure 2.

2. Data Processing

The statistical analysis of variables was done by applying parametric methods: proportions of large samples were demonstrated by employing the Inference Test regarding the difference of proportions with independent sampling. The application of this method to the epidemiological data allowed to determine the existence or not of statistically significant differences among the values, considering the significance at 95% reliability ($p < 0.05$).

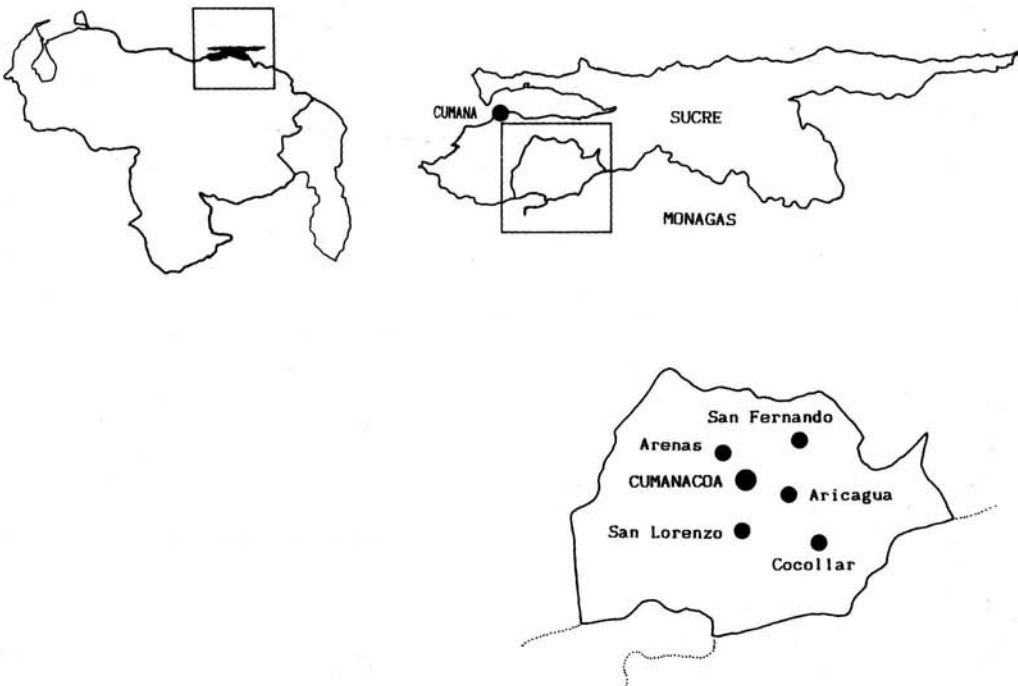


Fig. 1 – Relative geographic location of the State of Sucre in the Northeastern Region of Venezuela, showing the location of the Montes Municipality and its main localities.

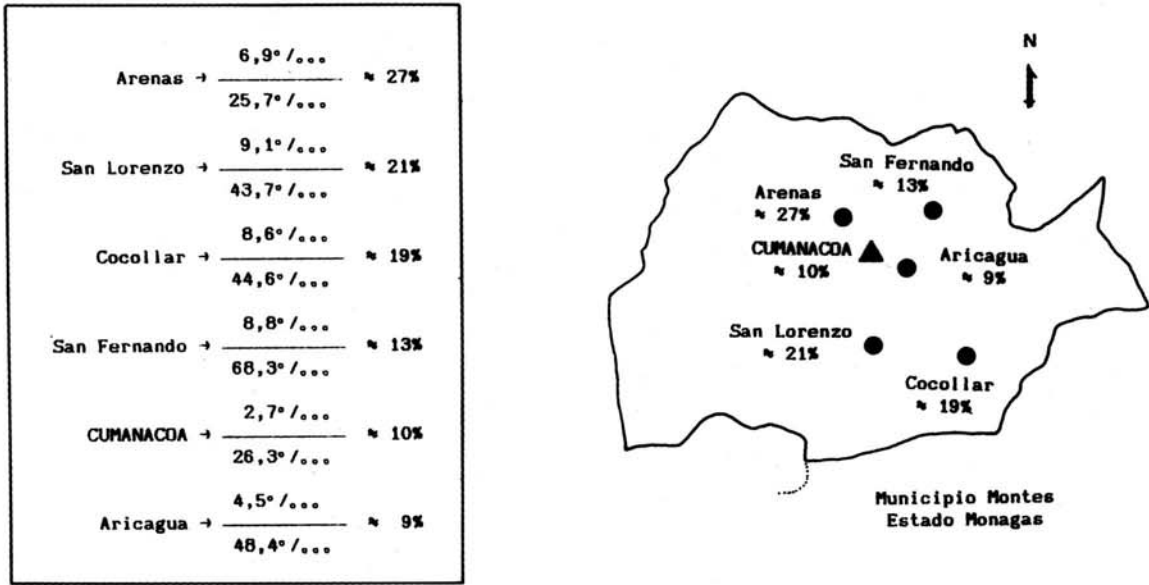


Fig. 2 – Percentages and geographic location of critical scorpion stings in each locality of the Montes Municipality

RESULTS

A total of 184 cases of scorpion poisoning is presented in Table 1, distributed between the localities of Cumanacoa (48 cases), San Fernando (39 cases), Aricagua (32 cases), Cocollar (26 cases), San Lorenzo (24 cases) and Arenas (15 cases). The general incidence for the Montes Municipality was $38.6\%_{000}$. San Fernando was the locality that presented the highest rate ($68.3\%_{000}$) while Arenas presented the lowest ($25.7\%_{000}$). The town of San Fernando presented a significantly higher incidence rate than the others, even when compared to the recorded rate for the entire municipality ($p < 0.05$; Table 2).

Of the 184 accidents, 37 were classified as severe cases (Table 1). Cumanacoa, Cocollar, San Fernando, and San Lorenzo presented 5 severe cases of envenoming each, followed by Arenas with 4, and Aricagua with 3. The incidence rate of severe cases at the entire municipality was $7.8\%_{000}$. San Lorenzo, San Fernando, and Cocollar showed the highest rates with values of 9.1, 8.8, and $8.6\%_{000}$ respectively. However, the comparison of the incidence rate of severe scorpionism (Table 3) between most of the localities evaluated did not show statistically significant differences ($p > 0.05$). The only exception was San Lorenzo which presented a significantly higher rate than that of Cumanacoa ($p < 0.05$).

Figure 2 shows the municipalities' percentages of severe scorpionism. The incidence rates of severe scorpionism were: $6.9\%_{000}$ in the town of Arenas (27% of the cases); $9.1\%_{000}$ in San Lorenzo (21% of the cases);

$8.6\%_{000}$ in Cocollar (19% of the cases). The lowest rates of severe cases were recorded in the central region of the Montes Municipality in the towns of Aricagua (9% of the cases) and Cumanacoa (10% of the cases).

DISCUSSION

Although hardly researched, scorpionism attracts attention in the State of Sucre⁴. The few epidemiological studies on scorpionism carried out in Venezuela show how little is known about the real transcendence and magnitude of this poisonous accidents in our country.

The scorpions of the Buthidae family are responsible for most of the fatal accidents^{6,7,8,9,15,26}. In several regions of America severe scorpion envenomings have been correlated with species belonging to this taxonomic classification. The *Centruroides infamatus* species has been involved in Guanajuato, Mexico¹¹. Most cases in Brazil, are related to the species *Tityus serrulatus* and *Tityus bahiensis*^{6,7,17,23}. In Venezuela, specifically in the State of Miranda and the Federal District, *Tityus discrepans* is the cause of most envenomings^{14,20}. A new species of the *Tityus* genus²¹ has been implicated with the cases detected in the north-central area of the State of Monagas^{26,27,28}. A study carried out in the endemic zones of this state recorded a mortality rate of 3.6% in a three-year period¹². The Acosta Municipality was later established as a hyper-endemic zone for scorpion stings, with an incidence rate of $18\%_{000}$, acquiring epidemic proportions^{24,26,27,28}. The geographic proximity of the State of Monagas to the

TABLE 1
Incidence rates of scorpion accidents and of cases of severe envenoming in some geographic localities of Montes Municipality, Venezuela

Localities	Population (1985)	Scorpion Accidents		Severe Cases of Envenoming	
		No. of Cases	Incidence Rate	No. of Cases	Incidence Rate
Arenas	5,838	15	25.7 ^o / ₁₀₀₀	4	6.9 ^o / ₁₀₀₀
Aricagua	6,607	32	48.4	3	4.5
Cocollar	5,827	26	44.6	5	8.6
Cumanacoa	18,246	48	26.3	5	2.7
San Fernando	5,707	39	68.3	5	8.8
San Lorenzo	5,494	24	43.7	5	9.1
Montes Municipality	47,719	184	38.6^o/₁₀₀₀	37	7.8^o/₁₀₀₀

TABLE 2
Comparison of incidence rates of cases of scorpionism between localities of Montes Municipality

Localities	Localities						Montes Munic.
	Are	Ari	Coc	Cum	SnFer	SnLor	
Arenas		*3.13	*2.86	0.09	*5.38	*2.57	1.88
Aricagua			0.50	*3.10	*2.51	0.61	1.28
Cocollar				*2.54	*2.96	0.12	0.80
Cumanacoa					*5.41	*2.96	0.12
San Fernando						*3.14	*3.75
San Lorenzo							0.68
Montes Munic.							

* p < 0.05; Are = Arenas; Ari = Aricagua; Coc = Cocollar; SnFer = San Fernando; SnLor = San Lorenzo

TABLE 3
Comparison of incidence rates of severe cases of scorpionism between localities of Montes Municipality

Localities	Localities						Montes Munic.
	Are	Ari	Coc	Cum	SnFer	SnLor	
Arenas		0.75	0.44	1.33	0.49	0.57	0.23
Aricagua			1.16	0.65	1.23	1.31	0.94
Cocollar				1.86	0.05	0.04	0.21
Cumanacoa					1.93	*2.02	1.61
San Fernando						0.07	0.26
San Lorenzo							0.34
Montes Munic.							

* p < 0.05; Are = Arenas; Ari = Aricagua; Coc = Cocollar; SnFer = San Fernando; SnLor = San Lorenzo

Montes Municipality of the State of Sucre could suggest that the cases of scorpionism, especially those that are severe, in this municipality are conditioned to the presence of species of this genus.

We captured species belonging to the *Tityus* genus in the Montes Municipality of the State of Sucre (DE SOUSA et al., unpublished data), which borders the State of Monagas.

Scorpionism morbidity is relevant in the Montes Municipality. According to the incidence rates, there are few scorpion poisonings in the central region. These poisonings tend to increase toward the periphery, where San Fernando is epidemiologically the most important locality of the municipality. San Lorenzo is the most significant region regarding to severe cases of scorpionism. The municipality's percentages of critical scorpionism (Figure 2) show that most severe accidents originate mainly in the northeast, and in the southwest at the mountain foot of the Turimiquire Sub-region. This type of incidence distribution concurs with the areas of dispersion of species of the *Tityus* genus^{21,22}.

Some authors sustain that poisonings are related to the geographic and ecological conditions of the poisonous animal's habitat¹⁰. In this respect, the physical-geographic region of Turimiquire, to which the Montes Municipality belongs, is the ecological environment of toxic scorpion species. It would be interesting to evaluate the zoogeographic distribution of scorpions in the localities of this region. A morphometrical study, the use of truss networks, and multivariate analysis techniques employed in 1992 by MANZANILLA-PUPPO¹⁹, accredited for characterizing the *Rhopalurus* genus in Venezuela, could be applied. Using this methodology, thorough knowledge of the scorpions of this region would contribute to a better understanding of the distribution of scorpion stings in the Montes Municipality.

Our study demonstrated that the Montes Municipality of the State of Sucre is an endemic zone for this poisonous accident in Eastern Venezuela. Therefore, scorpion stings achieve transcendence in this municipality as a public health problem that requires more detailed research, that includes the identification of the species involved in scorpion envenomings.

RESUMO

Epidemiologia do Escorpionismo no Município Montes, Estado Sucre, Venezuela: distribuição geográfica.

Os autores estudam o escorpionismo no Município Montes, Estado Sucre, Venezuela. Durante o período 1980 a 1990, foi registrado um total de 184 acidentes causados por escorpiões, com índice de incidência de 38,6 casos por 10.000 habitantes. A localidade de São Fernando apresentou a maior probabilidade para o acidente com incidência de 68,3‰. A maioria dos casos graves foi observada nas populações de Arenas (27%), São Lorenzo (21%) e Cocollar (19%), localizadas no pé da montanha da sub-região geográfica do maciço montanhoso do Turimiquire, áreas de dispersão

definidas para espécies do gênero *Tityus*. Os resultados obtidos evidenciam que esta região do Estado Sucre é endêmica para o acidente peçonhento causado por escorpiões que assumem importância como problema de saúde pública.

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