

## Epidemiology of Snakebites in Togo

Tabana Essohanam Mouzou\*, Pilakimwé Egbohoun, Pikabalo Tchetike and Kadjika Tomta

Anesthesia-Reanimation, University of Lomé, Togo

\*Corresponding Author: Tabana Essohanam Mouzou, Anesthesia-Reanimation, University of Lomé, Togo.

Received: February 27, 2019; Published: March 28, 2019

### Abstract

**Introduction:** Ophidian envenomation is a neglected public health problem in Sub-Saharan Africa. Very little data on ophidian envenomations from Togo exists. The objective of this study was to describe and update the epidemiological data of Ophidian envenomations in Togo.

**Methods:** It was a multicenter, prospective and perspective and descriptive study over 12 months, from October 1, 2015 to September 30, 2016. It concerned hospitals in all the 6 health regions of Togo. All patients admitted for snake bites in these centers were included.

**Results:** 51 centers participated to the study. There were 987 cases of snake bites with a hospital incidence of 98.3/100,000. Upland regions (24.9%); Savannas (24.5%) and Central (24.4%) were the most affected. The average age of the patients bitten was  $30.3 \pm 15$  years. The male sex was the most affected: 65.9%, sex-ratio: 1.9. Farmers were the most profession affected (63.1%). Vipers were responsible for the bite in 63.8% cases. There were 101 deaths, with 10.2% as fatality rate and 10.1/100,000 as hospital mortality rate.

**Conclusion:** The incidence of Ophidian envenomation in Togo remains quite high with a high lethality.

**Keywords:** Envenomation; Epidemiology; Togo

### Introduction

The bites of snakes constitute in especially Sub-Saharan Africa, neglected public health problems which affect approximately 1 million people bitten, leading to 100 000 to 500 000 envenomation a year and 10 000 to 30 000 deaths [1,2]. The epidemiologic data of the envenomation ophidians in Togo are rare and those existing relate to the period of 1988 to 1997 and mention an annual hospital incidence of  $130 \pm 25$  envenomation/100000 in habitants, with approximately 150 deaths a year [3].

### Objective of the Study

The objective of this study was thus to describe and update the epidemiologic data of the envenomations ophidians received in the hospital structures to Togo.

### Materials and Methods

It was about an exploratory study and descriptive over 12 months, from October 1<sup>st</sup>, 2015 to September 30<sup>th</sup>, 2016. It was multicentric and gathered emergency departments of the 6 medical areas of Togo. It concerned all the patients received for bite of snake in the afore mentioned centers. A card of investigation was used for the collection of the data by a medical staff and ancillary medical of the centers concerned. The interrogation of the patients and/or accompanying, supplemented data of the medical records allowed the data-

gathering. The data collected were: the type of health professional training, the medical area, the age, the sex, the profession, the zone of residence of the victim, circumstances of the bite, the climatic season, the type of snake, complaints with the admission, the severity of the envenomation, specific treatment by immunotherapy, recorded deaths. The identification of the type of snake, was made on the basis of examination of the killed snake or the examination of the hooks to the site of the bite, or of the clinical type of syndrome presented by the patient. The severity of the envenomation was evaluated according to a scale of gradation from 0 to 3 according to Larréché S., *et al.*: Rank 0: no envenomation, moderated pain, traces of hooks, not of oedema. Grade 1: envenomation minor; marked pain, oedema not exceeding the elbow or the knee, turbid minor of the bilateral haemostasis, ptosis (for the cobraic syndrome). Grade 2: moderated envenomation, tachycardia, hypotension, oedema exceeding the elbow or the knee, necrose minor, moderated, turbid bleeding of swallowing (for the cobraic syndrome), Grade3: severe envenomation, oedema reaching or exceeding the root of the member, necrosis wide, serious haemorrhages (epistaxis, hemoptysy, haemorrhages digestive), a secondary state of shock with anuria, an acute respiratory distress (for the cobraic syndrome), coma, convulsions, a coagulopathy of consumption [4].

The data were treated with the software Epi info version 3.5.1 of August 2008. The qualitative variables were expressed of number (percentage) and the quantitative variables on average  $\pm$  standard deviation. The comparison of the qualitative variables was made with the test of  $\chi^2$ . A value of  $p \leq 0.05\%$  was consider as significant.

### Ethical consideration

The ethics committee of the Ministry of Health and Public Hygiene of Togo approved this study. Parturient anonymity was preserved during data collection and processing

## Results and Discussion

### Results

Fifty-one hospitals took part under investigation. They were 3 University hospitals (FALLEN), 6 Regional hospitals (CHR), 25 Hospitals Prefectoral (CHP), 5 Medico-social Centers (MSC), 6 Units of Peripheral Care and 6 Denominational Establishments Private of care. One listed 987 cases of envenomations by bites of snakes on a full number of consultations of 1 003 948, which represented a hospital incidence of: 98.3/100 000 in habitants. The distribution of the cases of bites of snakes according to the various medical areas (Table 1) shows strong incidences in the areas of the Plates (24,9%); Savannas (24.5%), and power station (24.4%) and weaker incidences in the areas of Kara (12.1%), Maritime (7.5%) and Lomé-commune (6,6%). The bites of snakes were done in 62% of the cases in rainy season and 38% of the cases in dry season. The median age of the bitten subjects was of  $30.3 \pm 15$  years with extremes of 4 and 86 years. The age brackets understood 16 and 40 years (60.9%) were touched, followed by that of the 41 - 60 years (19,7%). The male sex was most affected: 651 (65.9%), sex-ratio: 1,9. The most touched profession was that of the farmers: 623 (63.1%), followed by the group of the apprentices, pupils, students: 266 (27%). In 89.3%, the bite occurred in rural environment. *Viperidae* were responsible for the bite for 630 cases (63.8%), of *Elapidae* for 127 cases (12.9%) and for 230 cases (23.3%) the type of snake was not identified. The average time of admission in the medical structures was of  $14.9 \pm 8.8$  hours.

Sanitary regions of Togo	Estimated population (census 2012)	Number of investigated structures	Number of bites	Number of deaths (%)
Lomé Commune		11	65	5 (7,7)
Maritime	1 122 295	6	74	6 (8,8)
Plateaux	1 375 176	15	246	29 (11,8)
Centrale	617 810	6	241	26 (10,8)
Kara	769 940	8	119	11 (9,2)
Savane	828 224	5	242	24 (9,9)

**Table 1:** Envenoments by health regions in Togo.

The complaints with the admission were dominated by lador (91.8%), the oedema (51.4%), the bleedings (81.4%). The bite sat at the pelvic members in 83.2% of the cases and 14.4% with the thoracic members. One noted neurological signs dominated by a deterioration of the conscience (28.6%), agitations (18.6%), convulsions (7.9%). A respiratory attack was noted in 4.1% of the cases, a hypotension in 17% per important bleeding. Classification according to the gravity of the envenomations was the following one: rank 0 (no envenomation): 33 (3.3%), grade 1 (minor envenomation): 200 (20.3%), rank 2 (moderate envenomation): 395 (40%) and rank 3 (severe envenomation): 359 (36.4%). The immunization by an antivenin (customer service) general-purpose was made for 918 (93%) patient. These patients received on average 2 amounts of customer service General-purpose standard FAV Afrique® (Sanofi Pasteur) or Panafrican Inoserp® (Inosan Biopharma). 101 death was recorded (rate of lethality to 10.2%). Mortality rate hospital by bite of snake was of 10.1/100 000 consultants. These deaths were more frequent in the male sex than female (12.9% vs 5% respectively,  $p < 0.000$ ). The deaths more frequently occurred in the age brackets from 61 to 80 years (29%), and those > 81 years (28.6%) that in the slices of 15 - 40 years and 41 - 60 years: 16.4% and 14.3% respectively,  $p < 0.000$ . The deaths more frequent with were *Viperidae* than *Elapidae*: 12.5% vs 6.3% respectively,  $p = 0.002$ . The rate of death grew proportionally with the time of admission, it was respectively of 0%, 3.1%, 6.5%, and 25.9% for the times of less 6: 00, 6 - 12h, 12 - 24h and > 24:00,  $p < 0.000$ . Table 2 gives the characteristics of the patients deceased.

	N (%)	n (%)	P
<b>Sex</b>			0,000
Feminine	337 (34,1)	17 (5)	
Masculine	650 (65,9)	84 (12,9)	
<b>Age slices</b>			0,000
0 - 15 years	153 (15,5)	4 (2,6)	
15 - 40 years	601 (60,9)	86 (14,3)	
41 - 60 years	195 (19,8)	32 (16,4)	
61 - 81 years	31 (3,1)	9 (29,0)	
> 81 years	7 (0,7)	2 (28,6)	
<b>Health regions</b>			0,9
Lomé commune	65 (6,6)	5 (7,7)	
Maritime	74 (7,5)	6 (8,1)	
Plateaux	246 (24,9)	29 (11,8)	
Centrale	241 (24,4)	26 (10,8)	
Kara	119 (12,1)	11 (9,2)	
Savanes	242 (24,5)	24 (9,9)	
<b>Bite site</b>			0,002
Thoracic limb	123 (12,5)	26 (21,1)	
Pelvic limb	799 (81)	68 (8,5)	
Other	65 (6,5)	7 (10,8)	
<b>Type of snake</b>			0,026
<i>Viperidae</i>	630 (63,8)	79 (12,5)	
<i>Elapidae</i>	127 (12,9)	8 (6,3)	
Unidentified	230 (23,3)	14 (6,1)	
<b>Delay before admission</b>			0,000
< 6h	276 (27,9)	0 (0)	
6h - 12h	129 (13,1)	4 (3,1)	
12h - 24h	277 (28,1)	18 (6,5)	
> 24h	305 (30,9)	79 (25,9)	
<b>Prior treatment</b>			0,000
Automedication	207 (21)	22 (10,6)	
Traditional therapy	378 (38,3)	75 (19,8)	
Directly USP	402 (40,7)	1 (0,2)	

**Table 2:** Characteristics of registered envenomations and deaths.

## Discussions

Limits of this study resident in made that the investigation related to only the medical structures where as to Togo as in most country in Sub-Saharan Africa a strong proportion of patients makes recourse to traditional medicine [2]. However, the fact that the study related to 51 health professional trainings through the 6 medical areas of Togo makes it possible to have an overall picture of the envenomations ophidians received in the hospital structures of Togo. The annual incidence of 98/100 000 found in this study is in fall compared with that former of 130/100000 of the decade 1988-1997 to Togo. In deed Gogovor in this study in Togo over the years noted a significant decrease of the incidence rate of the bites of snake and evoked as reason a reduction in the exposure or a closing down of modern medicine [3]. This rate remains higher than the averages of the urban African incidences hospital (5,2/100 000) and rural (56.4/100 000) [2].

Of our study, this reveals that 3 medical areas have a strong incidence of bites of snakes to knowing the Area of the Plates, the Area of Savannas, and the Central Area. These 3 areas count for less than half of the Togolese population but concentrate close to the 3/4 of the whole of the bites of snakes listed. The explanation would be that these three regions have a large rural agricultural population, hence a high risk of snakebite, compared to the Lomé Commune, Maritime and Kara regions, which concentrate them, more urban populations at lower risk. The fact that in this study, 89.3% of the envenomations occur in rural environment comes to consolidate this explanation. The strong rural incidences of the envenomations ophidians are often described in Sub-Saharan Africa, in Morocco or in Asia [2,5-7]. The median age of the patients in our study was of  $30,3 \pm 15$  years and 76.4% of the patients had less than 41 years. The male sex was touched the most (65.9%, ratio 1.9). The profile frequently found in Togo, as elsewhere in Africa of the subject bitten by a snake is that of a young man, alive in rural environment and carrying on farmings [2, 5,8,9]. To Togo the farmings are seasonal and proceed primarily in rainy season, also explaining the strong incidence (62%) of the bites in this season in our study. In our study 63.8% of the bites were the fact of *Viperidae*. In its work, Chippaux counted for the West Africa a strong presence of *Viperidae*, in particular of the species *Echis* sp, like person in charge of the majority of the envenomations in Sub-Saharan Africa [10]. The preferential seat of the bite to the pelvic members (81%) is in agreement with most former studies [2,5]. The average time of admission in our study of  $14,9 \pm 8,8$  H; this particularly long time, constituted a significant factor of death: 25.9% after 24 ours versus 0% in for deadlines < 6:00 ( $p = .0, 000$ ). This long time was explained by the difficult access to the health systems (83% of the bites taking place in rural areas, generally far away from the medical structures), the lack of financial means, and the preliminary recourse to traditional medicine. The incidence of the dry bites, without envenomation in our study was of 3.3%. This rate varies in the African studies of Chippaux from 4% to 83% and Chafiq in Morocco found 16.4% [2,5]. The moderate and severe envenomations accounted for 40% and 36.5%. Chippaux Cameroon respectively found 41% and 40% with the ranks 2 and 3 [11] and Chafiq in Morocco 25.4% and 24.8% with these same ranks [5,11]. The gravity of the envenomation would be function of the toxicity and the quantity of venom injected, factors depend on the species of snake, its size, of the capacity of the poison glands, their state of repletion, and the circumstances of the bite [12]. The indications of an immunotherapy by a customer service suitable remain any proven envenomation i.e. of grade 1 at least of the syndromes viperine, hemorrhagic or neurotoxic [10]. In our study of the 954 (96.7%) cases, presenting a proven envenomation (of grade 1 at least), 918 (96.2%) received an immunotherapy by customer service General-purpose FAV Afrique® (Sanofi Pasteur) or Inoserp® Panafricain (Inosan Biopharma). In the meta-analysis of Chippaux, the rate of immunotherapy in the hospital structures in Sub-Saharan Africa varied from 0% to 100% with an average of 31.7%. The cost, even subsidized customer service General-purpose cost much for certain patients and explained his nonsystematic administration when indicated. Customer services used in Togo: FAV Afrique® (Sanofi Pasteur) and Panafrican Inoserp® (Inosan Biopharma) were recognized effective on most species of snakes met in West Africa [10,13].

Lethality observed was 10.2% with 101 patients deceased and a hospital mortality of 10.1/100,000. In Morocco Chafiq found a mortality of 3.9/100,000 [5]. In Sub-Saharan Africa this rate on average of 1.35/100 000, for the rural hospitals varies much with extremes from 0.08 to 68 per 100 000 according to the structures and the countries [2]. The rate particularly high in ours series poses the problem of a better formation of looking after with an adequate assumption of responsibility of the envenomations, but also that of a sensitizing of the rural populations to a consultation without delay as of the bite. Moreover, the exemption of the costs of the immunotherapy though already strongly subsidized would allow a better access to this specific treatment and a reduction of the rate of death.

## Conclusion

The hospital incidence of the envenomation ophidians in the Togo of 98.1/100,000 remains rather high with a hospital mortality of (10.1/100 000) important.

## For improved first aid and intensive care

avoid placing the tourniquet, cauterizing and incising the bite point, but rather immobilize the bitten limb; remain calm, reassure the victim (agitation accelerates the diffusion of venom); getting to a health center as quickly as possible; considering any envenomation as a medical emergency requiring special supervision; Improve the bush evacuation system from remote areas to hospitals by equipping remote centers with emergency and resuscitation equipment and improving communication lanes (runways and roads); considering any environment as a medical emergency requiring special surveillance and adopt the distribution of the service according to the frequency of the envenomation according to the health regions and review the price downwards.

## Acknowledgements

I thank all my collaborators and all those who contributed to the development of this project.

## Conflict of Interest

None.

## Bibliography

1. Chippaux JP. "Incidence et mortalité par animaux venimeux dans les pays tropicaux". *Médecine Tropicale* 68.4 (2008): 334-339.
2. Chippaux JP. "Estimate of the burden of snakebites in Sub-Saharan Africa: a meta-analytic approach". *Toxicon* 57.4 (2011): 586-599.
3. Gogovor KA. "Données préliminaires sur les morsures de serpents au Togo". *Bulletin de la Société de Pathologie Exotique* 98 (2005): 325-326.
4. Larréché S., et al. "Critères de gravité des morsures de serpent: implications thérapeutiques". In: Baud F, Hantson P, Thabet H. eds. *Intoxications aiguës*. Paris, Springer Verlag (2013): 313-328.
5. Chafiq F., et al. "Snakebites notified to the poison control center of Morocco between 2009 and 2013". *Journal of Venomous Animals and Toxins including Tropical Diseases* 22 (2016): 8.
6. Kipanyula MJ and Kimaro WH. "Snakes and snakebite anvenoming in Northern Tanzania: a neglected tropical health problem". *Journal of Venomous Animals and Toxins including Tropical Diseases* 21 (2015): 32.
7. Devkota UN., et al. "Snakebite in Nepal: a study from Sihara district". *Journal of Nepal Medical Association* 30.134 (2000): 203-209.
8. Kouamé KE., et al. "Envenimations par morsures de serpents dans la région de Bouaké en Côte d'Ivoire". *RAMUR* 18.1 (2013): 31-41.
9. Adéhossi E., et al. "Morsures de serpents à l'hôpital national de Niamey: à propos de 53 cas". *Bulletin de la Société de Pathologie Exotique* 104.5 (2011): 357-360.
10. Chippaux JP. "Prise en charge des morsures de serpent en Afrique Subsaharienne". *Médecine et Santé Tropicales* 25 (2015): 245-248.
11. Chippaux JP, et al. "Epidémiologie des envénimations ophidiennes dans le Nord du Camérout". *Bulletin de la Société de Pathologie Exotique* 95.3 (2002): 184-187.
12. Chippaux JP. "Venins de serpents et envenimations". IRD, coll. Didactique, Paris (2002): 288.
13. Chippaux JP, et al. "Evaluation d'un nouvel antivenin polyvalent contre les envenimations ophidiennes (Inoserp® Panafricain) dans deux contextes épidémiologiques: le nord du Bénin et la Guinée Maritime". *Médecine et Santé Tropicale* 25 (2015): 56-64.

## Volume 5 Issue 4 April 2019

©All rights reserved by Tabana Esohanam Mouzou., et al.