

Ophidian envenomation in Morocco: Analysis of specific hospitalization records (2012-2015)

Faiçal El Hattimy¹, Chafiq Fouad², Hermann-Désiré Lallié³, Abdelrhani Mokhtari¹, Abdelmajid Soulaymani,¹ and Rachida Soulaymani²

¹Ibn Tofail University, Faculty of Science, Laboratory of Biology and Health, BP 242 Kenitra, Morocco.

²Centre Anti Poison et de Pharmacovigilance du Maroc, Rabat, Maroc

³Péléforo GON COULIBALY University, Training and Research Unit of Biological Sciences, Department of Biochemistry and Genetics, BP 1328 Korhogo, Côte d'Ivoire.

Abstract. Snakebites are a real public health problem in Morocco, from the point of view of incidence and mortality. In order to contribute to the reduction of the resulting morbidity and mortality, the present work aims to describe the epidemiological profile of cases of Snakebites and to follow the spatio-temporal trends of the health indicators studied (incidence, fatality and mortality). The methodology adopted consists of a retrospective analysis of the cases collected from the Anti Poison and Pharmacovigilance Center of Morocco from specific hospitalization records. Between 2012 and 2015, the MPCC gathered 224 cases. The mean age was 26.9 ± 18.9 years with a sex ratio (M / F) of 1.4. Most of the bites occurred during hot seasons (84%) and in rural areas (95%). The time to hospitalization exceeded 24 hours in 7% of cases. Clinically, compartment syndrome was observed in 17 patients, renal failure in 13 patients and shock in 13 patients. The distribution according to clinical gradation was almost uniform. From a therapeutic standpoint, in addition to the antivenom, two types of treatment were the most recommended: symptomatic treatment based on the administration of analgesics (n = 168) and on the administration of an antitetanus serum (n = 99), and treatment involving transfusion (n = 58). Analysis of all of these files enabled us to detect parameters having a direct impact on morbidity and mortality following a bite and ophidian envenomation, on which the competent authorities should focus in order to thwart this scourge and its complications.

Keywords: Snakebites; Epidemiological profile; Morbi-mortality; Morocco

1. INTRODUCTION

Snake bite envenomation remains a serious health risk and threat throughout the world, including Morocco, recording an annual incidence of about 0.5 bites per 100,000 inhabitants a fatality rate of 4% [1].

Among 3000 snake species reported worldwide, around 30% are venomous snakes [2]. In Morocco, the ophidian fauna of the country consists of twenty-eight species, eight of which are poisonous represented by two families, Elapidae (with one species) and Viperidae (with seven species) [3].

To deal with that, snake bites has been integrated into the national envenomation control strategy since May 20, 2013[4]. The aim of this study was to describe the epidemiological characteristics of snake bites after the national envenomation strategy, Morocco over a four years period from 2012 through 2015

2. PATIENTS ET METHODS

2.1. Structure

The Anti Poison and Pharmacovigilance Center of Morocco (MPCC) is the public utility institution

mandated by the Ministry of Health, responsible for the management of poisoning at the individual and collective level in Morocco. It ensures a vigilance and health alert function, to reduce mortality, morbidity and health expenses related to poisoning and envenomation

2.2. Patients

Cases collected at the Poison Control and Pharmacovigilance Center of Morocco (MAPPC), Through 2012 to 2015

2.3. Methods

This study is a descriptive retrospective analysis of all reported cases collected at the Poison Control and Pharmacovigilance Center of Morocco (MAPPC), Through 2012 to 2015 from hospitalization records specific to snakebites. Frequencies were calculated to describe the characteristics that were studied.

3. RESULTS

Since 2012, 224 cases have been collected at the Poison Control and Pharmacovigilance Center of

Morocco. Table 1 follows provides us with an epidemiological profile of all these patients.

Table 1: Epidemiological characteristics of snakebites

Characteristics	Total	%
Sex		
Female	92	41
Male	132	59
Age		
Child (less than or equal to 15)	76	35
Adult (greater than 15)	141	65
Location		
Rural	188	95
Urban	10	5
Seat of bite		
upper limb	92	54
lower limb	78	46
Contraindicated gesture		
Applying the tourniquet	56	62
suck on the wound	13	14
Incision	15	17
traditional therapies	6	7
Season		
Autumn	25	11
Winter	11	5
Spring	75	34
Summer	112	50
Deadline		
≥24 hours	8	7
<24 hours	113	93

The majority of cases were men (59%), the average age of these patients was 26.9 ± 18.9 years. They live mostly in rural location (95%), half of recorded bites occurs in summer, mostly with a hospital stay of less than 24 hours (93%),

The site of the bites was determined in 170 cases. The upper limb was the most affected (92 cases; 54%), especially in the right hand (38 cases). The other cases were bitten on the lower limb, namely the left foot.

Prior to admission, 76 victims used traditional practices more than once, in 10.5% of cases, and most patients used tourniquets (56 cases), incisions (15 cases) or sucking (13 cases).

The initial grade was mostly grade 0 (29 % of cases) and, grade 1 (30% of cases), the white bite represented 14% of cases. Patients' condition was worsened (upgraded to a higher grade) 25 times, from grade 1 to grade 3 in 6 patients and from grade 2 to grade 3 in 5 patients, while the condition improved in 10 patients.

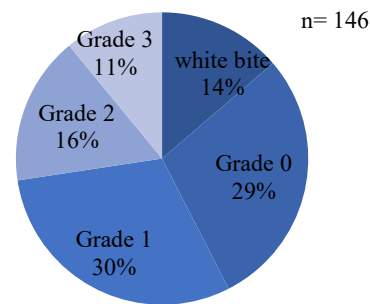


Figure 1: Distribution of the gradation of snakebites

In this study, 186 victims were symptomatic cases, or 83% of the total cases studied. Most of the victims (121 cases) presented with pain. Among these victims, 125 patients presented with edema (local, regional or extensive). The table 2 shows the frequency of symptoms

Table 2: Distribution of patients according to clinical signs

Symptoms			%
Cutaneous	Pain	Moderate	67 9,3
		Important	54 7,5
	Edemas	Local	42 5,8
		Régional	54 7,5
		Extensive	29 4,0
Digestive	Bruises	43 6,0	
	phlyctenules	40 5,5	
	necrosis	19 2,6	
	Cyanosis	6 0,8	
	Paresthesia	2 0,3	
Digestive	Vomiting	15 2,1	
	Nausea	7 1,0	
	Abdominal pain	1 0,1	
Cardiac	Arterial hypotension	16 2,2	

Two types of treatment were used after a snakebite, symptomatic treatment based on the administration of analgesics (n = 168), on the administration of an antitetanus serum in 99 patients, and on antibiotic prophylaxis (n = 107). The second type of treatment was linked to the complications observed in the patients, it was mainly based on transfusion in 58 patients (fresh frozen plasma, red blood cells, platelet pellets), the management of cardiovascular distress (n = 22), and a fasciotomy discharge in 17 patients. antivenom was administered to 56 patients, with a mean administration time of $19.7h \pm 20.7h$. The average number of ampoules administered was 2 ± 0.9 ampoules per person.

Patient outcomes were mostly favorable in 141 cases, sequelae were noted in 15 patients, and 10 people died.

4. DISCUSSION

In many regions of the world, snake bites are an important public health problem, as has been shown in many studies, bites occur especially in rural areas, and most victims were adults [5]. According to the results, most incidents occurred during the spring and summer months, when snakes are more active [6, 7]. The warm period of the year coincides with the harvesting period: people are more active in the fields and therefore are more frequently exposed to snakes, which explains the high frequency of bites and envenomations outside the home. [8, 9]

The specific hospital records included new parameters specific to the bite; the site of the bite, contraindicated gesture, detailed symptomatology (biological assessment and complications), clinical gradation and recommended treatment.

According to the results of the statistical analysis, the snake bites were localized in the lower limbs and upper limbs of the victims, while in intertropical Africa the site of the bite is most often in the foot or leg [10, 11].

For customary and economic reasons, several victims had committed at least one prohibited act (suctions, tourniquet, incision) following a snake bite. These behaviors delay medical treatment and jeopardize the functional prognosis of the bitten limb as well as the patient's vital prognosis [12, 13]. The tourniquet was the most performed. This gesture is however to be avoided; it promotes limb ischemia and retention of the poison in the tissue [14].

There is no cobraic syndrome in our study, consisting mainly of paralysis of the respiratory muscles and striated muscles, has been described. This is predictable given its threatened Mediterranean population [15].

The distribution of bites according to clinical gradation was almost uniform, while another study showed that the incidence of grades 2 and 3 was significant [15].

Antivenom immunotherapy remains the only septic treatment for severe ophidic envenomation [15]. In our study, this treatment was recommended for certain cases

For the clinical course, fourteen cases had retained sequelae. According to the literature, envenomations are associated with mainly locomotor sequelae, and are responsible for around 400,000 amputations each year [17]. Death was reported in ten patients (4.5%), six of them had presented a state of shock, which, according to

Berdai and his collaborators, can be refractory to the vasopressor drugs or hemorrhagic (hematemesis, hematuria, bleeding at the level bite site) [17].

5. CONCLUSION

Analysis of all of these files enabled us to detect parameters having a direct impact on morbidity and mortality following a bite and ophidian envenomation, on which the competent authorities should focus in order to thwart this scourge and its complications.

References

- [1] F. El Hattimy, F. Chafiq, H. Hami, A. Mokhtari, A. Soulaymani, R. Soulaymani Bencheikh, *Geographical distribution of health indicators related to snake bites and envenomation in Morocco between 1999 and 2013*. *Epidemiol Health* 2018;40:e2018024.
- [2] M. K. Al-Sadoon, Mohammed F. Albeshr, B. Ahamad Paray, A. Al-Mfarij. *Envenomation and the bite rate by venomous snakes in the kingdom of Saudi Arabia over the period (2015–2018)*. *Saudi Journal of Biological Sciences* Volume 28, Issue 1, January 2021, Pages 582-586
- [3] M. FEKHAOUI, *Amphibiens et Reptiles du Maroc : étude nationale sur la biodiversité*. Observatoire National de l'Environnement, Ministère de l'Environnement, 1998, 114.
- [4] F. Chafiq, H. Chaoui, N. Rhalem, I. Semlali, R. El Oufir, R. Aghandous. *National strategy of snake envenomations management*. *Toxicol Maroc* 2015;24:3-7.
- [5] F. Chafiq, F. El Hattimy, N. Rhalem, JP. Chippaux, A. Soulaymani, A. Mokhtari, *Snakebites notified to the poison control center of Morocco between 2009 and 2013*. *J Venom Anim Toxins Incl Trop Dis* 2016;22:8.
- [6] G. Ozay, M. Bosnak M, A. Ece, M. Davutoglu, B. Dikici, F. Gurkan, *Clinical characteristics of children with snakebite poisoning and management of complications in the pediatric intensive care unit*. *Pediatr Int* 2005;47:669-675.
- [7] P. Petite J. *Viper bites: treat or ignore? Review of a series of 99 patients bitten by Vipera aspis in an alpine Swiss area*. *Swiss Med Wkly* 2005;135:618-625.
- [8] N. Sharma, S. Chauhan, S. Faruqi, P. Bhat, S. Varma, *Snake envenomation in a north Indian hospital*. *Emerg Med J* 2005;22:118-120.
- [9] R. Dehghani, B. Fathi, MP. Shahi, M. Jazayeri *Ten years of snakebites in Iran*. *Toxicol* 2014;90:291-298.

- [10]JP. CHIPPAUX, *Les morsures de serpents en Afrique intertropicale*. Cahiers Santé 1992 ; 2 : 221-34.
- [11]B. DRAMÉ, N. DIANI, M. TOGO, M. MAÏGA, D. DIALLO, A. TRAORÉ. *Les accidents d'envenimation par morsure de serpent dans le service des urgences chirurgicales de l'hôpital Gabriel-Touré, Bamako, Mali (1998-1999)*. Bull Soc Pathol Exot, 2005, 98, 4, 287-289.
- [12]N.R. KOFFI, E.K. KOUAME, Y.P. YAPO *Morsure de vipère des organes génitaux chez un enfant*. Arch Pediatr 2015;22: 865-7.
- [13]JP. BELLEFLEUR, P. LE DANTEC, *Prise en charge hospitalière des morsures de serpent en Afrique*. Bull Soc Pathol Exot 2005; 98:273-6.
- [14]F. ESSI AIT, M.A. BENHIMA, I. ABKARI, Y. NAJEB, M. LATIFI, M. KHALLOUKI, M.A. SAMKAOUI, *L'amputation des doigts par morsure de serpent : à propos de trois cas* Chir Main, 32 (2013), pp. 92-95
- [15]N. COX, J. CHANSON, S. STUART, *Statut de conservation et répartition géographique des reptiles et amphibiens du bassin méditerranéen*, Programme des espèces de l'UICN 2007.
- [16] G. MION, S. LARRÉCHÉ, M. GOYFFON *Aspects cliniques et thérapeutiques des envenimations graves. Ganges: Urgences Pratiques* Publications, 2010. p. 116-123.
- [17]JP. CHIPPAUX, *Snake-bites: appraisal of the global situation*. Bull World Health Organ 1998 ; 75 : 515-24
- [18]MA. BERDAI, S. LABIB, M. HARANDOU, *L'envenimation ophidienne pédiatrique au centre hospitalier universitaire de Fès (Maroc)* 2013. *Medicine et Santé Tropicales* ; 23 : 427-432