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Original Article

Prevalence of Snake Bite Envenomation among Pregnant Women According to their Occupation in Northern Benin from 2010 to 2021

Prévalence des Envenimations par Morsure de Serpent chez les Gestantes selon leur Profession au Nord Bénin de 2010 à 2021

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ABSTRACT

Introduction. Snakebite envenomation is the set of clinical and biological manifestations due to the inoculation of venom by a snake in humans following a bite. The objective of this work was to study snakebite envenomation in pregnant women in northern Benin. **Method.** This was a descriptive cross-sectional study with retrospective data collection from January 1 2010 to December 31, 2021. We included all pregnant women treated for snakebite envenomation. Our study variables were type of snakebite envenomation, socio-demographic characteristics, occupational characteristics, variables related to clinical, diagnostic and management data. **Results.** A total of 106,398 files of pregnant women were analyzed, including 92 for snakebite, i.e. a prevalence of 0.09%. The average age of the victims was 25 years ± 5.72 years with extremes of 16 and 40 years. Among the 92 cases, 87 (94.6%) lived in rural areas, 47 (51.1%) were uneducated, and 36 (39.1%) were professional farmers, 22 (23.9%) were housewives, 5 (5.4%) were artisans and 1 (1.1%) was a civil servant. Concerning the site, 65 (70.7%) were bitten on the pelvic limbs and 11 (11.9%) on the thoracic limbs. Clinically, 72 (78.3%) had edema and 55 (59.8%) had coagulation disorders. Concerning treatment, 89 (96.7%) benefited from antivenom serum, 23 (25.0%) from lung maturation and 20 (21.7%) had blood transfusions. There was 1 (1.1%) maternal death and 14 (15.2%) neonatal deaths. **Conclusion.** Envenomation by snakebite in pregnant women is uncommon but is associated poor maternofetal prognosis. There is a need for sensitization in the community and during prenatal consultations.

RÉSUMÉ

Introduction. L'envenimation par morsure de serpent est l'ensemble des manifestations cliniques et biologiques dues à l'inoculation de venin par un serpent chez l'homme suite à une morsure. L'objectif de ce travail était d'étudier l'envenimation par morsure de serpent chez les gestantes au nord du Bénin. **Méthode.** Il s'agit d'une étude transversale descriptive avec recueil rétrospectif des données du 1er janvier 2010 au 31 décembre 2021. Nous avons inclus les gestantes prises en charge pour envenimation par morsure de serpent. Le recrutement était exhaustif. Les variables d'étude étaient le type d'envenimation par morsure de serpent, les caractéristiques sociodémographiques, professionnelles, les variables liées aux données cliniques, diagnostiques et de la prise en charge. **Résultats.** Au total 106398 dossiers de femmes gestantes ont été recensés parmi lesquels 92 pour morsure de serpent soit une prévalence de 0,09 %. L'âge moyen des victimes était de 25 ans ± 5,72 ans avec des extrêmes de 16 et 40 ans. Parmi les 92 cas, 87 (94,6 %) vivaient en milieu rural, 47 (51,1 %) étaient non instruites, et 36 (39,1 %) étaient cultivatrices de profession, 22 (23,9 %) étaient ménagères, 5 (5,4 %) étaient artisanes et 1 (1,1 %) était fonctionnaire. Concernant le siège, 65 (70,7 %) avaient été mordues aux membres pelviens et 11 (11,9 %) aux membres thoraciques. Sur le plan clinique, 72 (78,3 %) présentaient des œdèmes, 55 (59,8 %) avaient des troubles de la coagulation. Sur le plan thérapeutique, 89 (96,7 %) avaient bénéficié de sérums antivenimeux, 23 (25,0 %) d'une maturation pulmonaire et 20 (21,7 %) de transfusions sanguines. Il y a eu 1 (1,1 %) décès maternel et 14 (15,2 %) décès néonatals. **Conclusion.** L'envenimation par morsure de serpent chez les gestantes est peu fréquente mais d'emblée grave du fait du mauvais pronostic maternel et fœtal. D'où la nécessité des sensibilisations dans la communauté et lors des consultations prénatales.

HIGHLIGHTS

What is already known on this topic

The challenge of snakebites envenomation in tropical countries is increasingly worrying.

What question this study addressed

Describe the characteristics of snakebite envenomation in pregnant women in northern Benin.

What this study adds to our knowledge

Snakebite envenomation in pregnant women is uncommon but is associated with poor maternofetal prognosis

How this is relevant to practice, policy or further research.

Particular emphasis should be placed on the gynecology-obstetrics and resuscitation services for the training of personnel and the provision of these structures with the necessary inputs.

INTRODUCTION

"Snakebite envenomation" means the disease _ resulting from alterations pathological and pathophysiological action induced _ deleterious venom injected into the body following a snake bite [1] .

The problem of bites from snakes and other venomous animals in tropical countries is considered increasingly worrying. A WHO coordination meeting was therefore organized in Zurich (Switzerland) in September 1979. The participants studied the epidemiology of snakebites, the species of snakes of medical importance, the clinical problems and characteristics, the characterization of venoms and various questions relating to antivenoms [2] . A first estimate of the incidence and mortality from snakebite in the world was made in 1954 and concluded at 500,000 envenomations and 40,000 deaths annually in the world (Soviet bloc and China excluded). In tropical countries, envenomings are a frequent but neglected public health problem due to an underestimation of their incidence because they concern poor populations [3] . Envenomation is one of the oldest health problems facing humans in rural Africa [4] . More than 500,000 snakebite envenomations occur each year in sub-Saharan Africa, resulting in nearly 30,000 deaths and as many disabilities affecting the daily lives of the victims.

In Benin, snake bites cause no less than 300 deaths annually [5] . The population at risk is approximately 4 million inhabitants, mainly distributed in the center and north of the country [6] . On average, 4,500 envenomations are recorded each year by public health facilities with more than 650 deaths [4] . In the south of the country, morbidity is between 20 and 450 envenomations per 100,000 inhabitants with a lethality of 3% to 10%. In the north, the incidence is between 210 and 650 cases per 100,000 inhabitants, with a morbidity of up to 300 envenomations per 100,000 inhabitants and a lethality of nearly 5%. In this region of Benin, agro-pastoral activities occupy a prominent place in the economic activities of the population, and it happens to see the active participation of women, including pregnant women. It is thus that we meet with snakebites with envenomation in pregnant women. In order to take stock of the state of knowledge of EMS on this vulnerable layer of the population, this study was initiated in the North of Benin more precisely in the three largest hospitals in the region.

PATIENTS AND METHODS

Study framework

The study was carried out in the gynecology-obstetrics and anesthesia-resuscitation departments of the three largest reference hospitals in the departments of Atacora, Donga and Borgou, namely the Center Departmental University Hospital of Borgou and Alibori (CHUD-B/A), Tanguiéta Zone Hospital (HZ Tanguiéta) and Bassila Zone Hospital (HZ Bassila).

Type and period of study

This was a descriptive cross-sectional study with retrospective data collection from January 1, 2010 to December 31, 2021.

Study population

The target population consisted of all pregnant women admitted to the three hospitals during the study period.

Inclusion criteria

We included in the study all pregnant women seen and diagnosed with snakebite envenomation at any of the hospitals during the study period.

Non-inclusion criteria

We discarded from this study, pregnant women whose files were incomplete, or not usable or whose files were not found.

Sampling

It was an exhaustive census. All records of pregnant women admitted and cared for envenomation by snakebite, and fulfilling the inclusion criteria were identified.

Variables

The study variables were envenomation by snakebite, sociodemographic and professional characteristics (age, place of origin, level of education, marital status, ethnicity, religion, profession), anamnestic data (circumstances of the bite, reason for admission, reason for referral, place of referral, condition of referral, delay in management, time of year, time of bite, site of bite, therapeutic circuit, treatment before referral, medical history, medical history surgical history, gyneco-obstetric history), clinical data (pallor, consciousness, blood pressure, temperature, heart rate, local hooks, local edema, dyspnoea, coagulability test, fundal height, fetal heart sounds, uterine contraction, rupture membranes), paraclinical data (obstetric ultrasound, hemoglobin level), data related to management (vascular replacement, blood transfusion, antivenom serum, anti-tetanus serum), data related to the prognosis (favourable, complications, sequelae , death).

Data collection technique and tool

Data collection was done using a data collection sheet. The technique used for this study was counting. Data were collected from medical records and transfer sheets of

patients admitted and cared for for envenomation by snakebite in the intensive care and obstetrics gynecology departments of the three hospitals where the study was carried out.

Data processing and analysis

Data encoded using Epi Data 3.1 software was exported to Epi Info version 3.5.1. to perform statistical analyses. The normally distributed continuous quantitative variables were presented in the form of means with their standard deviation and medians with their 25th and 75th percentiles depending on whether they are asymmetrical. Qualitative variables were expressed as a proportion. The level of precision of the confidence interval used is 5%.

Ethical aspects

Permissions from departmental health authorities and municipal authorities were obtained prior to data collection. The free and informed consent of the respondents was obtained. The information collected was treated with confidentiality and the survey forms filled in anonymously.

RESULTS

General characteristics of the study population

A total of 92 pregnant women had been identified. The average age was 25 ± 5.72 years with extremes of 16 and 40 years. The age group [21-35] years was the most represented 58 (63.0%). Among the 92 cases, 87 (94.6%) lived in rural areas, 47 (51.1%) were uneducated, 68 (73.9%) were of Christian religion, 36 (39.1%) were cultivators of profession, 22 (23.9%) were housewives, 5 (5.4%) were artisans and 1 (1.1%) were civil servants. **Table I** presents the general characteristics of the study population.

Prevalence of snakebite envenomation

Bassila area hospital for a prevalence of 11 (0.05%), 40,879 (38.4%) at the area hospital Tanguiéta for a prevalence of 78 (0.19%) and 41,243 (38.8%) at the CHUD-BA of Parakou for a prevalence of 3 (0.007%). The overall prevalence of snakebite envenomation among respondents was 92 (0.09%). The majority of patients were received at the Tanguiéta 78 area hospital (84.8%). Figure 1 shows the distribution by hospital of cases of snakebite envenomation in pregnant women in northern Benin in 2022.

Table I: General characteristics of the study population. (N=92)

		Cases of envenomation (N=92)
Features	**not**	**%**
Age		
<21	28	30.4
[21-35]	58	63.1
>35	06	6.5
Total	**92**	**100**
Sociolinguistic group		
Bariba	03	3.3
Dendi	09	9.8
Ottawa	64	69.6
fon	01	1.1
Fulani	02	2.2
Yoruba	01	1.0
Others	12	13.0
Total	**92**	**100**
Educational level		
Uneducated	47	51.1
Primary	08	8.7
Secondary	02	2.2
University	00	0.00
Not specified (Files not filled in)	35	38.0
Total	**92**	**100**
Religion		
Christian	68	73.9
Muslim	21	22.8
Endogenous	01	1.1
Others	02	2.2
Total	**92**	**100**
Marital status		
Bachelor	12	13.0
Bride	66	71.7
Others (Divorced, Widowed, Unspecified)	14	15.3
Total	**92**	**100**
Occupation		
Farmer	36	39.1
Household	22	23.9
Craftswoman	05	5.4
Learner	03	3.3
Official	01	1.1
Trader	00	0.00
Unspecified	25	27.2
Total	**92**	**100**

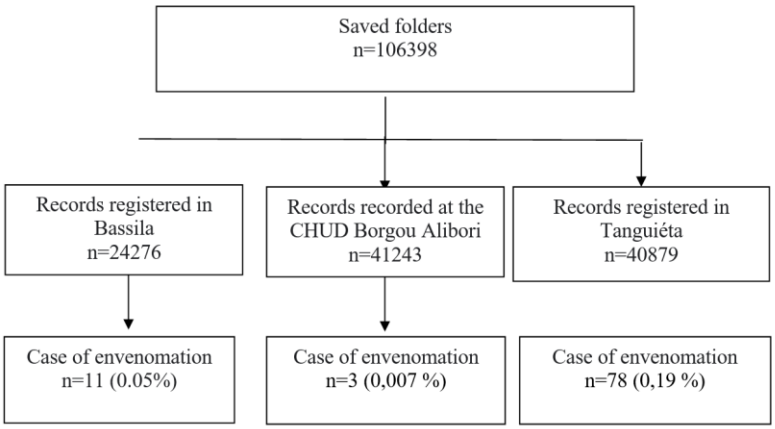

Figure 1: Distribution by hospital of cases of snakebite envenomation in pregnant women in North Benin in 2022. (N = 92)

Department of origin of the patients

Among the 92 cases of snakebite envenomation, 67 (72.8%) resided in the department of Atacora and 12 (13.1%) in Donga. The majority 87 (94.6%) came from rural areas. Table **II** shows the distribution of pregnant women according to the department of residence and place of origin.

Table II: Distribution of pregnant women by department of residence and place of origin in 2022. (N=92)

	Cases of envenomation (n=92)	
	N	%
Residence department		
Atacora	67	72.8
Donga	12	13.1
Borgu	05	5.4
Others	08	8.7
Total	92	100
Place of origin		
Rural	87	94.6
Urban	05	5.4
Total	92	100

Anamnestic data

Of the 92 cases admitted, 39 (42.4%) were referred by peripheral health centers and 53 (57.6%) were admitted directly to the referral hospital. Regarding the reasons for admission, 48 (52.2%) were admitted for reason of snakebite, 22 (23.9%) for edema localized to the limbs, 13 (14.1%) for local bleeding or through the holes.

Pregnant pauci gestures (2 nd to 3 rd pregnancy) are the most numerous and represented about one third 34 (36.9%), followed by primigravida 17 (18.5%), multigestes 14 (15.3%) and grand multiparas 15 (16.3%). Among the 92 cases of bites, 37 (40.2%) had occurred in the context of agricultural activities, 2 (2.2%) in pastoral activities, 48 (52.2%) unspecified; 18 (19.6%) took place between 00:00 and 12:00, 16 (17.4%) between 18:00 and 00:00; and 65 (70.7%) had been bitten on the pelvic limb. Table **III** presents snakebite envenomation in pregnant women according to circumstances, time and location in northern Benin in 2022.

Table III: Envenomation by snakebite in pregnant women according to the circumstances, time and site of the bite in North Benin in 2022. (N=92)

	Number (n=92)	%
Circumstance of the bite		
Agricultural activities	37	40.2
Pastoral activities	02	2.2
Others (house, path, baobab)	05	5.4
Unspecified	48	52.2
Total	**92**	**100**
Bite time		
Morning] 00H-12H]	18	19.6
Afternoon] 12 p.m.-6 p.m.]	05	5.4
Evening] 6 p.m.-12 a.m.]	16	17.4
Unspecified	53	57.6
Total	**92**	**100**
Body part bitten		
Pelvic limbs	65	70.7
Thoracic limbs	11	11.9
Others (Head, Face, Neck, Abdomen, Thorax)	16	17.4
Total	**92**	**100**

Clinical features

At the time of the bite, 35 (38.0%) of the pregnant women had a gestational age between 15 and 28 WA, 20 (21.7%) had a term less than 15 WA and 27 (29.4%) a term greater than 28 SA. The majority of bites 85 (92.4%) had occurred during the rainy season between March and September, including 22 (23.91%) in June and 14 (15.22%) in September.

Of the 92 cases of snakebite with envenomation, 03 (3.3%) had poor general condition, 08 (8.7%) had low blood pressure, 03 (3.3%) had fever, and 04 (4.4%) had impaired consciousness. At the local level 72 (78.3%) had edema at the bite sites, 06 (6.5%) had plaques, 05 (5.4%) had necroses and 45 (48.9%) had cutaneous scarifications at the site of the bite. Obstetrically 14 (15.2%) were in uterine contraction and 02 (2.2%) had premature rupture of the membranes. Table **IV** presents the clinical characteristics of snakebite envenomation in pregnant women in northern Benin in 2022.

Table IV: Clinical characteristics of snakebite envenomation in pregnant women in North Benin in 2022. (N=92)

	Number (n=92)	Percentage
Condition		
Preserved	87	94.6
Altered	03	3.3
Unspecified	02	2.2
Total	**92**	**100**
Low blood pressure		
Yes	08	8.7
No	84	91.3
Total	**92**	**100**
Fever		
Yes	03	3.3
No	89	96.7
Total	**92**	**100**
Conscience		
Good	88	95.6
Altered	04	4.4
Total	**92**	**100**

Paraclinical assessments

Of the 92 cases, 41 (44.6%) had incoagulable blood type coagulation disorders. Obstetric ultrasound was performed in 82 (89.1%) pregnant women and objectified in 09 (11.0%) fetal death in utero, 02 (2.4%) polyhydramnios. Table **V** shows the paraclinical assessment of snakebite envenomation in pregnant women in North Benin in 2022.

Management of pregnant victims of snakebite envenomation in northern Benin in 2022

Before admission, 53 (57.6%) had used traditional treatment. On admission, 89 (96.7%) had received anti-venom serum, 88 (95.6%) anti-tetanus serum; 20 (21.7%) had received a blood transfusion, 23 (25.0%) had benefited from lung maturation, 91 (98.9%) had benefited from systematic preventive antibiotic therapy.

Maternal and fetal prognosis

The evolution under treatment was favorable in the majority of cases 85 (92.4%). Complications were reported in 07 (7.6%) of cases including 1 (1.1%) maternal death and 14 (15.22%) fetal deaths in utero. Lethality was 1.1%.

Table V: Paraclinical assessment of snakebite envenomation in pregnant women in North Benin in 2022. (N=92)

Variables	Effective	Percentage
Ultrasound	(n =92)	
Achieved	82	89.1
Not done	03	3.3
Not specified	07	7.6
Total	92	100
Fetal vitality	(n =82)	
Yes	71	86.6
No	09	11.0
Unspecified	02	2.5
Total	82	100
Fetal weight (g)		
< 2500	06	7.3
] 2500-4000]	00	0.00
> 4000	00	0.00
Unspecified	76	92.7
Total	82	100
Polyhydramnios		
Yes	02	2.5
No	22	26.8
Unspecified	58	70.7
Total	82	100
Coagulability test on admission (in minutes)		
≤20	37	40.2
] 20-30]	14	15.2
Incoagulable blood	41	44.6
Total	92	100

DISCUSSION

characteristics of the study population

The average age of the respondents was 25 years ± 5.72 years with extremes of 16 and 40 years. The age group [21-35] years was the most represented 58 (63.0%). Nient ao et *al.* [7] in Mali found an average age of 34 ± 12 years, Békoin Abhe et *al* . [8] in Ivory Coast in 2018 an age AVERAGE of 24.1 ± 12.6 years, Coulibaly et *al.* [9] in Burkina Faso in 2015 an average age of 25.34 years and a predominance of the 15-29 age group at 37.3 %. Chippaux et *al* . [6] found in 2002 in Benin 60% of bites in subjects aged between 21 and 50 years. This strong representation of young adults in most studies could be explained by the fact that young people are the main players in field work and are the most exposed.

Uneducated pregnant women represented 51.1% of the victims. This could be explained by the low level of schooling of women in Benin and particularly in the north of the country.

The majority of respondents resided in the savannah areas of the department of Atacora 72.8% and in the department of Donga 13.1%. Massougbodji et *al.* [11] had found 486 cases of snakebite requiring emergency hospitalization, of which 413 (85%) were identified in the same area, the departments of Atacora and Borgou . The upsurge in cases of snakebite envenomation in Atacora could be explained by the fact that this department is mainly made up of rural, mountainous areas with a tropical semi-arid climate and rugged terrain favorable to the development of reptiles [12] , [13] .

Profession and origin

In this study, the majority 87 (94.6%) came from rural areas and 39.1% were farmers, 23.9% were housewives and only 5.4% craftswomen. For origin, 94.6% of respondents lived in rural areas. Several authors have found similar results. These are Coulibaly et *al.* [9] who found in 2015 in Burkina Faso 82.5% of farmers and breeders, Drabo et *al.* [10] , still in Burkina, found an even higher rate of 85.7% among farmers and breeders. Zarambaud et *al.* in the Central African Republic (CAR) [14] found the highest proportion of their study among farmers, 26% in the forest zone and 51% in the savannah zone. Then hunters represented 11% in the forest zone and 15% in the savannah zone. The savanna zone is more affected than the forest zone. In almost all studies the growers are the most affected. Similarly, the rural and savannah areas are the most affected. This difference could be explained by the fact that the savannah is both accessible to humans and animals, it is the meeting point for humans and wild animals, especially reptiles.

Prevalence of snakebite envenomation

In this study the prevalence is 0.09%. Nientao et *al.* [7] in Mali in 2019 found a high prevalence 3.14 % of admissions . Bekoin Abhe et *al* . [8] in Côte d'Ivoire in 2018 had found a prevalence annual significantly higher 9.2 %.

The incidence of snakebites seems relatively constant from March to November, apart from two pronounced peaks at the beginning of the rainy season (June) and at the end of the rainy season (September). These periods which seem to correspond to human activities (particularly agricultural) and ophidian (mating and egg-laying). This is the same finding in Fayomi et *al.* [4] for whom bite cases increase gradually each year from March to June, during this period which corresponds to the rainy season. Similarly Chippeaux [6] , in Benin in 2002 concluded that the number of snakebites increased markedly between the months of March and August. In the present study snakebites occurred in the context of agricultural activities (40.22%) of the cases. Zarambaud et *al.* in the Central African Republic (CAR) [14] found similar rates where bites occurred much more during agricultural activities in the savanna zone than in the forest zone (51% vs 26%, $p < 0.0001$). Several authors have also found higher rates; they are Coulibaly et *al.* [9] of which 66.6% of bites were related to activities in the bush (field work, cutting and collecting wood, hunting) , Drabo et *al.* [10] of which 65 bites (93%) took place in the field or in the bush during weeding work and during walks . The bite seems linked to activities related to the bush which is the natural environment of reptiles.

Clinical and paraclinical characteristics

In the present study, the seat of the bites was the pelvic limbs or lower limbs in 70.65% of cases. Two authors had found similar rates. These are Coulibaly et *al.* [9] with 69%, Drab et *al.* [10] 70%. Only Zarambaud et al in CAR [14] and Ouermi et *al.* [15] in Burkina in 2014 found a lower rate with respectively 60% and 51.4% . On the other hand, two other authors found higher bite rates in the pelvic limbs. These are Nientao et *al* . [7] in Mali in 2019 with 78.9% of cases, and Békoin Abhe et *al* . [8] in Ivory Coast in 2018 with 84 %. This high rate in almost all studies could be explained by the fact that the lower limbs are the parts of the body closest to the ground where reptiles move.

At the time of the bite, 38.04% of pregnant women had a gestational age between 15 and 28 weeks. This observation could be explained by the fact that in the 2nd trimester the pregnant woman no longer feels the sympathetic signs of pregnancy and she still feels able to carry out ordinary activities, including rural ones.

In this series, we noted the presence of scarifications in 51.72% of the cases having benefited from the cutaneous-pharnerial examination. This could mean that more than half of the pregnant victims of snakebite envenomation had recourse to traditional treatment before recourse to a hospital consultation. This rate is close to that of Drabo et *al.* [10] for whom 3/4 of patients used traditional treatment before any hospitalization (scarification, use of black stone, application of other traditional powders). Zarambaud et *al.* [14] in CAR noted 50% of traditional treatment involving the absorption of decoctions in the two health districts where the study was carried out. It is almost the same proportion in Nientao et *al* . [7] in Mali with 47.36% of patients who used traditional treatment before the first consultation. Bekoin Abhe et *al* . [8] in Côte d'Ivoire in 2018 found higher rates for traditional treatment (61.2 %) and for scarification at the bite level (10.6%).

Regarding local signs, edema was noted in 78.26% of cases. Zarambaud et *al* . [14] concluded that edema was the dominant symptom, particularly in the forest (54% vs. 42%; p=0.02) than in the savannah. But Coulibaly et *al.* [9] had objectified a higher rate of local edema, 89.7% of cases. This high rate of edema in most studies would be explained by the fact that it is the first sign that occurs after a snakebite.

Administration of antivenom

On admission, 89 (96.7%) had received antivenoms. This is almost the same rate as Nientao et *al.* [7] in Mali in 2019 with 97.4% antivenom serotherapy. Ouermi et *al.* [15] had found a lower rate of 77%. But it's Békoin Abhe et *al* . [8] in Côte d'Ivoire in 2018 who found a significantly lower rate of 13.3 %.

Maternal and fetal prognosis

In this study, of the 92 cases of envenoming recorded, there was 1 maternal death, i.e. 1.09%. This result is similar to that of Fayomi et *al.* [4] who found over 3 years, 142 deaths among the 9414 reported snakebite cases, i.e. 1.5% or 15 deaths per 1000 cases . On the other hand, this result is weak compared to the study by Langley et al. [16] 4% from 1966 to 2009, for 213 poisonous snakebites reported in pregnant women. This difference could be explained by the fact that the study by Langley et *al* . [16] took into account a longer period of 43 years. Zarambaud et *al.* [14] in CAR in 2022 found higher lethality 5% in the forest zone and 1% in the savannah zone. Nientao et al [7] in Mali have found a morbidity and one high mortality 10.52 % and 7.8 % .

Regarding fetal deaths, there were 14 (15.22%) in the present study. This rate is similar to that of Langley et *al.* [16] in which fetal mortality was 20%. This would be explained by the fact that the fetus is entirely dependent on its mother and any disappointment in the latter is fatal to it. Several mechanisms would be responsible for fetal death, namely: fetal anoxia associated with a state of shock in the mother, the direct effect of the venom on the fetus, hemorrhages in the placenta and the uterine wall causing placental abruption, contractions premature uterines caused by venom, fever and the release of cytokines after tissue damage.

The main limitation of this study was that few patients had benefited from adequate paraclinical assessments registered in the medical observation. This would be due to the inadequacy of the technical platform on the one hand, and the victims' lack of financial means due to the high cost of treatment on the other hand. This study would have been more relevant if certain routine examinations (examination on dry blood tube, rhesus grouping; NFS/platelets, fibrinogen; serum creatinine, TP; TCA and glycemia) which are true diagnostic and prognostic indicators at course of snakebite envenoming (EMS) had been systematic and free in all pregnant women.

The first biological examination to be carried out would be the coagulation test on a dry tube at the patient's bedside, which makes it possible to confirm envenomation and serves as an element of therapeutic decision-making. It has a therapeutic and prognostic purpose, that is to say the establishment of serotherapy or not and biological monitoring.

CONCLUSION

Snakebite envenomation in pregnant women is uncommon but immediately serious due to poor maternal and fetal prognosis. It is a public health problem in northern Benin due to the high number of neonatal deaths and occasionally the number of maternal deaths related to envenomation. In the absence of anti-poison centers in most African countries south of the Sahara in general and in Benin in particular, prevention must focus on raising awareness among populations in general and pregnant women in particular. Particular emphasis should be placed on the gynecology-obstetrics and resuscitation services for the training of personnel and the provision of these structures with the necessary inputs, including multi-purpose antivenom serums for the care of victims.

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Conflicts of interest

All authors certify that the information and contents of this manuscript are true and obtained in compliance with ethical and legal rules. This manuscript has not been published, in whole or in part, in another medical or scientific journal, in French or in another language, and it is not the subject of another submission. There are no financial or other conflicts of interest that may have influenced the article. All co-authors appoint the

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