IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Human Journals
Research Article
August 2019 Vol.:16, Issue:1

Prevalence of Snakebite and Demographic Characteristics of Snakebite Patients at General Hospital Kaltungo, Gombe State, Nigeria: Implication for Patients' Education during Pharmaceutical Care Services

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INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
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OHIEKU John David*[1], MIDALA A.S. Tola[2], DAVID, Emmanuel Agada[2], CALEB Emmanuel[2].

1. Department of Clinical Pharmacy and Pharmacy Administration, Faculty of Pharmacy, University of Maiduguri, PMB 1069, Maiduguri, Borno State, Nigeria

2. Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmaceutical Sciences, Gombe State University, PMB 127 Tudun Wada, Gombe, Gombe State, Nigeria

Submission: 28 July 2019
Accepted: 2 August 2019
Published: 30 August 2019

Keywords: Snake, snakebites, Carpet viper, Kaltungo, Fulanis

ABSTRACT

Background: Snakebite is one of the neglected tropical diseases. Understanding the pattern of snakebites and the influence of demographic characteristics in a given region is desirable for the optimization of Pharmacotherapeutic and Pharmaceutical care principles to snakebite patients. **Objective:** We assessed snakebites patients to identify the effects of demographic characteristics on vulnerability to snakebites. **Methods:** The cross-sectional prospective study was carried out at Kaltungo General Hospital in the Gombe State of Nigeria. A total of 221 patients were studied through convenience sampling. **Results:** The peaked age band occurred in those who are 21-30 years with 86(38.9%) cases and thereafter decreases progressively. About 27(12.2%) cases were observed in those within 10 years old. The patterns of snakebites were carpet viper 187(84.6%), puff adder 29(13.1%) and cobra 5(2.3%). The Fulanis 80(36.2%) ethnic groups are the most vulnerable while the Tangales 61(27.6), Hausas 33(14.9%) and the Wurkuns 32(14.5%) were similarly involved. A total of 190(86.0%) are unemployed, 114(51.6%) are single, and 106(48.0%) had no form of formal education. The activities/or environments leading to snakebite are outdoor 168(76.0%), grazing 37(16.7%), farming 99(44.8%) and fire-wood fetching 25(11.3%), while the site of snakebite is mostly lower limb 153(69.2%). A total of 39(17.6%) patients were previously bitten by a snake in the region. There were significant differences when snakebites from various types of the snake were assessed during rain and dry seasons (P=0.023) and between grazing variations (P<0.001). Snakebites at the lower limb are significantly different (P<0.001) from the upper limb in all the types of snake. Demographic features like gender, occupation, and education indicated significant differences when evaluated with several variables. The odds of snakebite arising from firewood fetching is 0.57 times lower in male than female but that of grazing and farming activities were 1.32 and 1.25 times higher in male than female respectively while that arising from indoor and outdoor activities was 0.91 lower in male than female. **Conclusion:** The epidemiological profile showed snakebite victims in all age strata but those of 11-30 years age band are more frequently affected. There were great significant variations in gender and occupational predisposition of snakebites in the region. Educational status of the individual contributes to bite patterns in some cases while the ethnic groups as a factor have a strong association with the occupation. All snake types showed seasonal variation in their bite patterns. Much is desired in the patient's education and counselling as a component of pharmaceutical care in the region.

INTRODUCTION

Snakebite envenomation is a common occurrence worldwide, which require emergent medical intervention to save the life of the victim or prevent complications that can lead to morbidity and mortality. The annual worldwide snakebite load is estimated to be above two million cases causing more than 100,000 deaths and 400,000 people with permanent sequelae [1]. Snakebite can affect anyone at great exposure risk but the most vulnerable victims are the agricultural workers like farmers, nomads, and rural dwellers. Some snakebite may cause envenomation while others only inflict injuries that may be mild or severe.

Snake bites introduce venoms into the victims, which may contain over twenty toxins that are mostly enzymes, non-enzyme peptide toxins and non-toxic proteins [2]. Most neurotoxic and cardio-toxic venoms are those that originate from a bite by cobra and krait venoms but bite from viper venom is vascular-toxic with severe necrotizing local effects. In some neurotoxins, particularly those introduced by elapids and sea snakes, there is rapid absorption into the blood leading to their systemic activities. Other venoms, however, can also be absorbed slowly from the site of the bite through the lymphatics system but most venom does not cross the blood-brain barrier [3, 4]. The main clinical features of some species of snakebite envenoming may include systemic hemorrhage, incoagulable blood, shock, local swelling, bleeding, and occasionally necrosis.

Although snake venom may affect all the body systems and cardiac as well as hemodynamic abnormalities may result but the strongest predictor of mortality is the central nervous system involvement with intracranial hemorrhage [5, 6]. Dry bites can lead to anxiety and activation of the sympathetic activities leading to other symptoms that may include flushing, breathlessness, palpitations, and dizziness, tightness in the chest, sweating and acroparesthesia. The airway can be obstructed and the paralysis of the intercostal muscles and diaphragm cause respiratory failure [2]. Other neurotoxic symptoms can paralysis as ptosis and can later affect other parts the body like the face, palate, jaws, tongue, vocal cords, neck muscles, and muscles of deglutition but nephrotoxicity can lead to renal failure secondary to ischemia. Cardiotoxicity results to direct myocardial damage manifesting as arrhythmias, bradycardia, tachycardia or hypotension and is a common feature of Viper and elapid venom.

Snakebite can lead to several complications including amputation, blindness resulting from spitting cobra (*Naja nigricollis*) venom, ophthalmia, fetal loss, and wound infection, tetanus

and scarring with potential for malignant transformation, and psychological consequences e.g., excessive anxiety, stress, hysteria and worry[7].

Despite the prevalence of snakebite envenomation and injuries in many regions of the world, not much attention is paid on their research and treatment, and not many health workers are trained in this field while most national public policies are silent over them. It is important to understand the profile of snakebite victims and pattern of snakebite or their demographic characteristics in a region to provide comprehensive preventive and treatment plan that will limit morbidity and mortality.

OBJECTIVES

The objectives of the study were to assess snakebites pattern and incidence as well as to identify the effects of demographic characteristics on vulnerability to snakebites in Kaltungo and its environs.

MATERIALS AND METHODS

The study was conducted at the General Hospital Kaltungo in Kaltungo Local Government Area of Gombe State, Nigeria which lies between longitude 10º and 12º west and latitude 90º and 11º North, covering about 881sq Km. The topography is characterized by small hills and the dry season lasts from November to April, while the rainy season lasts from May to September with the main annual rainfall varying from 850 to 950mm. Most of the inhabitants are farmers cultivating crops such as beans, maize, millet, guinea corn, rice, vegetable, and groundnut. The General Hospital Kaltungo hosts the regional snakebite reference center in Kaltungo. Kaltungo is located within the Sudan savannah vegetation of the Benue River valley known for carpet vipers' envenomation.

The study design is a prospective and cross-sectional study design. However, the retrospective survey was made on patients who have had repeated episode of snakebites in the past and who currently presented with a fresh episode. The duration of the study lasted from January to April 2018. Convenience sampling technique was adopted and all patients who met the inclusion criteria within the study period were enrolled in the study until the sample size was obtained. Ethical Clearance was obtained from the Gombe State Ministry of Health, Department of Research and Statistics. A a total of 221 patients' case folders was studied.

Relevant and Related data was collected from the patients' case folders in a predesigned data collection form over 4 months. A total of 221 patients' folders from the Snakebite Clinic were screened. Information retrieved from the folders are: Age, gender, occupation, marital status, educational level, ethnic group/tribe, types of snake, area of the body affected, environment of bite, season of bite, level of exposure to snake (intentional/unintentional), occupational setting, time between bite to hospital visit/treatment, first aid treatment carried out, medication list, hospital duration, symptoms presented by the patients, complications experienced by the patients, laboratory results, clinical outcome and general outcome. Statistical analysis was aided with the use of SPSS version 23. Chi-square analysis was carried out to find an association between two variables with a significant level set at $P<0.05$.

RESULTS

The mean age and standard deviation of snakebite victims were 22.4 ± 14.5 years. The peaked age band occurred in those who are 21-30 years with 86(38.9%) cases and thereafter decreases progressively. Victims of snake bite occurring in ages below 10 years and above 50 years are 27(12.2%) and 8(3.6%) respectively (Table 1). Among the three types of snake identified in the zone (Table 2), the patterns of snakebites were carpet viper 187 (84.6%), puff adder 29(13.1%) and cobra 5(2.3%)-(Table 2). The Fulanis 80(36.2%) ethnic groups are the most vulnerable groups while the proportions of other ethnic groups affected are the Tangales 61(27.6), the Hausas 33(14.9%) and the Wurkuns 32(14.5%)-Table 2. Among the population studied, 190(86.0%) are unemployed, 114(51.6%) are single, and 106(48.0%) are uneducated (Table 3). The activities/or environments leading to snakebite are indoor 53(24.0%) versus outdoor 168(76.0%), grazing 37(16.7%) versus non-grazing 184(83.2%), farming 99(44.8%) versus non-farming 122(55.2%), raining 106(48.0%) versus dry season 115(52.0%), firewood fetching 25(11.3%) versus non-firewood fetching 196(88.7%), while the site of snakebite is lower limb 153(69.2%), upper limb 63(28.5%) and trunk 4(1.8%)-Table 3. A total of 39 (17.6%) patients were previously bitten by a snake while 182 (82.4%) were not (Table 4). Snakebites through torching or stepping on snake were 59 (26.7%) versus the 162(73.3%) non-torching or stepping on a snake (Table 4). The odds of snakebite arising from firewood fetching is 0.57 times lower in male than female but the odds of snakebites during grazing activities and farming activities for both genders were respectively 1.32 and 1.25 times higher in male than female while that arising from indoor and outdoor activities was 0.91 lower in male than female (Table 4).

These odds ratios notwithstanding, there was little or no gender preference for snake bite when evaluated in respect to other variables, except a significant difference (P=0.040) only in snake bite between male and female during seasonal variations of dry and raining seasons when occupation was evaluated but no other associations were observed between the two genders in snakebites relating to the environment of torch, mode of contact, types of snake and previous experience of snakebite (Table 4).

The educational status of individuals is another demographic risk factor of importance for snakebite in the region. This affects the mode of bite (stepping/torching) (P=0.029), seasonal variation (dry or raining) in snakebites episode (P<0.001) and snakebites during farming and non-farming activities (P=0.027)-Table 5.

The association between occupational exposures and the demographic factor of employed/unemployed was significant when farming and non-farming activities (P=0.042) were evaluated, as well as between previous and non-previous snake bite experience (P=0.025), and that of seasonal variation of bite (P=0.006) in the region. These results, therefore, suggest that being unemployed is a risk factor in snake bite only in those associated with farming and non-farming activities (P=0.042), previous and non-previous snake bite (P=0.025), and season such as dry and raining season (Table 6).

For instance there, was a significant difference (P=0.023) in various types of a snakebite when both seasons (raining and dry seasons) were assessed in relation the educational status of victims (Table 5). Also, significant differences (P<0.001) exist among the various snakes and their bites during grazing (Table 5). Snake bites at the lower limb are significantly different (P<0.001) from the upper limb in all the types of snake studied (Table-7).

Tables of Results

Table No. 1: Age and gender Characteristics of Snakebites victim

Age band of patients (Years)	Gender distribution of patients		Total (%)
	Male (%)	Female (%)	
0-10	15(12.0)	15(15.6)	27(12.2)
11-20	39(31.2)	38(39.6)	77(34.8)
21-30	55(44.0)	31(32.3)	86(38.9)
31-40	6(4.8)	4(4.2)	10(4.5)
41-50	7(5.6)	6(6.3)	13(5.9)
51-60	5(4.0)	1(1.0)	6(2.7)
61-70	1(0.8)	0(0)	1(0.45)
71-80	0(0)	1(1.0)	1(0.45)
>80	0(0)	0(0)	0(0)
TOTAL	125(100)	96(100)	221(100)

Table No. 2: Ethnic Groups Distribution of Snakebite Patients

Ethnic Groups	Types of Snake			TOTAL
	Carpet Viper	Puff Adder	Cobra	
Fulani	63(78.8)	12(15.0)	5(6.3)	80(100)
Hausa	27(81.8)	6(18.2)	0(0)	33(100)
Tangale	53(86.9)	8(13.1)	0(0)	61(100)
Wurkun	31(96.9)	1(3.1)	0(0)	32(100)
Others	13(86.7)	2(13.3)	0(0)	15(100)
TOTAL	187(84.6)	29(13.1)	5(2.3)	221(100)

Table No. 3: Demographic Pattern of Snakebite Victims

Description	Status	Frequency	Percentage
1. Employment Status	Employed	31	14.0
	unemployed	190	86.0
	TOTAL	**221**	**100**
2. Marital Status	Single	114	51.6
	Married	100	45.2
	Divorced	3	1.4
	Widow	2	0.9
	Widower	2	0.9
	TOTAL	**221**	**100**
3. Educational Level	Uneducated	106	48.0
	Primary	26	11.8
	Secondary	44	19.9
	Tertiary	33	14.9
	Adult education	12	5.4
	TOTAL	**221**	**100**
4. Ethnic Group	Fulani	80	36.2
	Hausa	33	14.9
	Tangale	61	27.6
	Wurkun	32	14.5
	Others	15	6.8
	TOTAL	**221**	**100**

Table No. 4: Relationship between Occupation and Gender Characteristics of Snakebite Victims

Description	Gender		Total	Odds Ratio;
	Male	Female		(X^2, P-value)
Firewood fetching	11 (9.6)	14 (14.6)	25 (11.3)	OR:0.57;
No firewood fetching	114 (90.4)	82 (85.4)	196 (88.7)	X^2=1.80; P>0.05
TOTAL	**125 (100)**	**96 (100)**	**221 (100)**	
Torching/stepping	33 (26.4)	26 (27.1)	59 (26.7)	OR=0.97; P>0.05
Not by stepping/torching	92 (73.6)	70 (72.9)	162 (73.3)	
TOTAL	**125 (100)**	**96 (100)**	**221(100)**	
Herdsmen grazing	23(18.4)	14(14.6)	37(16.7)	OR=1.32, P>0.05
Nonherdsmen activities	102(81.6)	82(85.4)	184(83.3)	
TOTAL	**125(100)**	**96(100)**	**221(100)**	
Bitten at the farm	59(47.2)	40(41.7)	99(44.8)	OR=1.25;
Not bitten at the farm	66(52.8)	56(58.3)	122(55.2)	X^2=0.69; P>0.05)
TOTAL	**125(100)**	**96(100)**	**221(100)**	
Raining season	53(42.4)	53(55.2)	106(48.0)	OR=0.59;
Dry season	72(57.6)	43(44.8)	115(52.0)	X^2=4.20; P<0.05)
TOTAL	**125(100)**	**96(100)**	**221(100)**	
Bite at home area	29(23.2)	24(25.0)	53(24.0)	OR=0.91;
Bite at field area	96(76.8)	72(75.0)	168(76.0)	X^2(P>0.05)
TOTAL	**125(100)**	**96(100)**	**221(100)**	
Carpet Viper	102(81.6)	85(88.5)	187(84.6)	
Puff Adder	20(16.0)	9(9.4)	29(13.1)	
Cobra	3(2.4)	2(2.1)	5(2.3)	
TOTAL	**125(100)**	**96(100)**	**221(100)**	
Had Previous snake bite	25(20.0)	14(14.6)	39(17.6)	OR=1.46; P>0.05
No previous snake bite	100(80.0)	82(85.4)	182(82.4)	
TOTAL	**125(100)**	**96(100)**	**221(100)**	
Upper limb	36(28.8)	27(28.1)	63(28.5)	
Lower limb	87(71.2)	67(69.8)	153(69.2)	
Trunk	2(1.6)	2(2.1)	4(1.8)	
TOTAL	**125(100)**	**96(100)**	**221(100)**	

Table No. 5: Relationship between Environment and Educational Status of Snakebite Victims

Activities leading to snakebite	Educational Status			Total	*Odds Ratio (OR); (X^2, P-value)
	Educated	Uneducated	Informal education		
Torching/stepping	35(35.4)	23(20.2)	1(12.5)	59(26.7)	OR=2.16;
Not by stepping/torching	64(64.6)	91(79.8)	7(87.5)	162(73.3)	X^2=7.09, P=0.029
TOTAL	**99(100)**	**114(100)**	**8(100)**	**221(100)**	
Herdsmen/passing bush	14(14.1)	21(18.4)	2(25.0)	37(16.7)	OR=0.73 X^2=1.10,
No herdsmen activities	85(85.9)	93(81.6)	6(75.0)	184(83.3)	P>0.05
TOTAL	**99(100)**	**114(100)**	**8(100)**	**221(100)**	
Bitten at the farm	35(35.4)	61(53.5)	3(37.5)	99(44.8)	OR=0.45;
Not bitten at the farm	64(64.6)	53(46.9)	5(62.5)	122(55.2)	X^2=7.24, P=0.027
TOTAL	**99(100)**	**114(100)**	**8(100)**	**221(100)**	
Raining season	31(31.3)	74(64.9)	1(12.5)	106(48.0)	OR=0.25;
Dry season	68(68.9)	40(35.1)	7(87.5)	115(52.0)	X^2=28.1, P<0.001
TOTAL	**99(100)**	**114(100)**	**8(100)**	**221(100)**	
Indoor	28(28.3)	24(21.1)	1(12.5)	53(24.0)	OR=1.48;
Outdoor	71(71.7)	90(78.9)	7(87.5)	168(76.0)	X^2=2.12 P>0.05
TOTAL	**99(100)**	**114(100)**	**8(100)**	**221(100)**	
Previous snakebite	15(15.2)	20(17.5)	3(37.5)	38(17.2)	OR=0.84;
	84(84.8)	94(82.5)	5(62.5)	183(82.8)	X^2=3.80, P>0.05
TOTAL	**99(100)**	**114(100)**	**8(100)**	**221(100)**	

*****Odds Ratios are calculated between educated and uneducated only ignoring informal education

Table No. 6: Relationship between Environment and Employment Status of Snakebite Victims

Activities leading to snakebite	Employment Status	Yes Bite	No bite	Total	Odds Ratio (OR); (X^2; P-value)
Firewood fetching	Employed	4(12.9)	27(87.1)	31(100)	OR=1.19; P>0.05
	Unemployed	21(11.1)	169(88.9)	190(100)	
	TOTAL	**25(11.3)**	**196(88.7)**	**221**(100)	
Torching/stepping on snake	Employed	9(29.0)	22(71.0)	31(100)	OR=1.14; P>0.05
	Unemployed	50(26.3)	140(73.9)	190(100)	
	TOTAL	**59(26.7)**	**162(73.3)**	**221**(100)	
During farming Activities	Employed	9(29.0)	22(71.0)	31(100)	OR=0.45; P=0.042
	Unemployed	90(47.4)	100(52.6)	190(100)	
	TOTAL	**99(44.8)**	**122(55.2)**	**221**(100)	
During Raining or Dry season	Employed	8(7.5)	98(92.5)	106(100)	OR=0.33; P=0.006
	Unemployed	23(20.0)	92(80.0)	115(100)	
	TOTAL	**31(14.0)**	**190(86.0)**	**221**(100)	
Previous snake bite	Employed	4(10.3)	35(89.7)	39(100)	OR=0.49; (FET:P=0.025)
	Unemployed	27(14.8)	155(85.2)	182(100)	
	TOTAL	**31(14.0)**	**190(86.0)**	**221**(100)	
Walking through Bush	Employed	8(25.8)	23(74.2)	31(100)	OR=1.93; P>0.05
	Unemployed	29(15.3)	161(84.7)	190(100)	
	TOTAL	37(16.7)	184(83.3)	221(100)	

Table No. 7: Relationship between Environment of snakebite and Types of Snake

Description	Variables		Total	p-value
1. Environment of bite	Home	Field		
Carpet viper	50	137	187	P>0.05
Puff adder	3	26	29	
Cobra	0	5	5	
2. Season of Bite	Raining	Dry		
Carpet viper	96	91	187	P<0.05
Puff adder	10	19	29	
Cobra	0	5	5	
3. Bitten during farming	Yes	No		
Carpet viper	88	99	187	P>0.05
Puff adder	10	19	29	
Cobra	1	4	5	
4. Previous bite experience	Yes	No		
Carpet viper	35	152	187	P>0.05
Puff adder	3	26	29	
Cobra	0	5	5	
5. Bitten during grazing	Yes	No		
Carpet viper	24	163	187	P<0.001
Puff adder	10	19	29	
Cobra	3	2	5	
6. Site of limb bitten	upper	lower		
Carpet viper	48	139	187	P<0.001
Puff adder	18	10	29	
Cobra	1	4	5	

DISCUSSION

Snakebite is a frequent incident worldwide and considered by WHO to be one of the neglected tropical diseases. In this study, we looked at this disease in one of the snake bites centers in Nigeria to apply pharmacotherapy and pharmaceutical care principles. The mean age and standard deviation of snakebite victims in the study are 22.4 ± 14.5 years, being 21.9 ± 9.1 years for male and 20.9 ± 12.1 years for the female. The male to female ratio of snakebite victim is 1.3: 1. Higher male to female ratio of 5:1 was reported by Kularatne [8]. These findings are consistent since being male gender may predispose one to snakebite in some regions particularly in a situation where occupational vulnerability is predominantly male and if otherwise, the reverse is the case. The male also involved in more outdoor activities with prolonged hours that may extend into the dark hours of the day-which both predispose to higher risk. The World Health Organization also reported that the

preponderance of snakebite is higher in male than their female counterpart. Similar research on gender preponderance of snake bite by Usman and associates [9] and Nagnath and associates [10] have not shown findings different from this study. Generally, the male vulnerability is related to fieldwork outdoor activities compared with the female who most of the times work indoors particular in cities, although female genders in rural area also work outdoors but to a lesser degree than their male counterpart.

The peak age of snakebite occurred in those who are in their third decades (21-30 years age band) of life for the male and those who are in their second decades (11-20 years age band) of life. The result indicated that people in active age class have a higher risk than geriatrics. This is in agreement with research in Nigeria conducted by Usman *and associates* [9]. It is noteworthy to know that individuals in this age group are actively involved in farming and other outdoor activities such as fetching firewood and grazing. The attitude of walking through dark unlighted places without using protective measures such as boots may account in part for reasons for the prevalence of snakebite in the regions. But generally, a very high proportion (close to three-quarter) of snakebite victims in this study occurred between the ages of 11-30 years, a result that is closely related to the 10-40 age bands reported by Kularatne [8]. In northeastern Brazil, Tavares reported that snake bites were predominant in ages 10-29 years [11]. The result in this present study and other studies are not surprising since, in rural areas, most people of this age bands are greatly involved in agricultural activities as they attempt to contribute to the economy of their families. There is however serious implication as most of these young adults often lost their lives or having one form of disability or the other in the process of experiencing snake bites due to inadequate facilities or the late seeking of medical interventions.

The influence of demographic factors on the preponderance of snakebite is further demonstrated in the employed versus the unemployed victims. A very high proportion (86%) of snakebite victims fall in the unemployed categories. In this region, being unemployed is 6 times at higher risk of snakebite than the employed individuals because the employed individuals, who are often office holders do not engage in agricultural activities as means of livelihood compared to the unemployed group who are solely involved in agricultural activities as the primary source of income. Our results showed a significant difference between employed and unemployed snakebite victims when they are evaluated for the season

of bite (P=0.006), bite occurring in the farm and off-farm areas (P=0.042), and previous snake bite (P=0.025).

Based on the educational level of snakebite victims, snakebite was higher in the uneducated individuals than educated ones and varied considerably with the level of education. Torching/stepping on snakes, bite during farming activities and seasonal changes all showed significant variations (P<0.05) when evaluated for educational status. The result may have shown that poor knowledge of protective and preventive measures or ability to afford them may contribute to this observed pattern and further demonstrated that the demographic characteristics of patients constitute risk factors for snakebite in the region. It is a known fact that low levels of education have the potential to affect the understanding of information on the biology of snakes as well as their risk of incidents. Poor or low levels of education have been reported by other researchers as contributing factors to increase incidents of snake bites [12].

Diagnosis of the species of snake responsible for the bite is important for optimal clinical management. This may be achieved by identifying the dead snake or by inference from the "clinical syndrome" of envenoming. The three major snake types identified in the region are carpet viper, puff adder and cobra. Of these, the carpet viper is the major cases accounting for more than four-fifths of all incidence encountered. The trio of carpet viper (*Echis ocellatus*), black-necked spitting cobra (*Naja nigricollis*) and puff adder (*Bitis arietans*) have similarly been reported as the three major types of most important snakes associated with envenoming in Nigeria[13].

There were significant differences (P=0.023) in various types of a snakebite when both seasons (raining and dry season) was assessed. These results confirmed the findings that there is significant seasonal variation in snakebite incidence that is attributable to climate, especially to rainfall and temperature, which determine annual cycles of agricultural activity [14]. The influence of occupational differences to the incidence of snakebites was similarly shown to be related, particular among victims involved in grazing activities as significant differences (P<0.001) exist among the various snakes and their bites during grazing in this present study, which again confirms the assertion that snake bite is predominantly an occupational disease. According to WHO [14] many people involving in other occupations with similar high risk of having snake bite are farming (rice), plantation workers (rubber, coffee), herding, hunting, fishing and fish farming, catching and handling snakes for food (in

snake restaurants), displaying and performing with snakes (snake charmers), manufacturing leather (especially sea snakes) and also people who move in dark places without using torchlight and protective clothes like safety boots. It is essential to educate these people of dangers and hazard they face in their profession or what to do to prevent bites from snakes.

More than two-thirds of bites occurred at the lower limb area such as foot, ankle, and leg and is consistent with findings from another researcher where high proportions of snake bites injuries occurring at the lower limb were similarly reported [9, 15]. Snake bites at the lower limb are significantly different ($P<0.001$) from the upper limb in all the types of snake considered in this study, which is attributed to the crawling natures of snake where they gain stability on the ground and easy accessibility to the human body.

In terms of gender variation, snake envenomation affects more male than female. Many authors have similarly reported the dominance of snakebite in male over female in many quarters [11, 16]. Furthermore, in this present study, there was a significant difference ($P=0.040$) in snake bite in male and female during seasonal variations such as between dry and raining season when evaluated against occupation which confirmed the finding that climatic changes or variation is one of the major factors in the epidemiology of snake bites. However, no other associations were observed between the two genders in snake bites relating to the environment of a torch, mode of contact, types of snake and previous experience of snake bite. However, occupational hazard between employed and unemployed was significantly different between farming and non-farming activities ($P=0.042$), previous and non-previous snake bite experience ($P=0.025$), and season of bite ($P=0.025$). Employment status is a risk factor in snake bite only in those associated with farming and non-farming activities ($P=0.042$), previous and non-previous snake bite ($P=0.025$), and season such as dry and raining season.

The influence ethnic characteristics among snakebite victims are demonstrated in the higher levels observed with the Fulanis compared to other, ethnic groups. The leading factor for more bites among the Fulanis may be attributed to their lifestyle, or area of settlement, since most often live in bushes and farmland settlements day and night without quality shelter and are involved in rural activities which always involve walking and grazing through the bush which predisposes them to frequent encounter with snake contact.

CONCLUSION

In conclusion, the epidemiological profile of snakebite victims showed that most bites affected victims within the age of 11-30 years, with males and farmers at higher risks and were more predispose to snake bite. It was also observed that uneducated individual are mostly affected, from the ethnic aspect bite was common in Fulani and Hausa with the most bite on the lower limbs. Carpet vipers were responsible for most of the bite.

REFERENCES

1. Kasturiratne A, Wickremasinghe AR, de Silva N, Gunawardena NK, Pathmeswaran A, et al. The global burden of snakebite: a literature analysis and modeling based on regional estimates of envenoming and deaths. PLoS Med. 2018; 5: e218.
2. Mehta SR, Sashindran VSM and Sashindran VK. Clinical Features and Management of Snake Bite. Med. J. Armed Forces India. 2002; 58(3): 247–249.
3. Grenvik AKE, Ayers SM, Holbrook PR, Shoemaker WC (editors). Injuries by venomous and poisonous animals: In: Textbook of Critical Care 4th ed 2000; I: 224-233
4. Reid HA, Theakston RBG. The Management of Snakebite. Bull of WHO. 1983; 61(6):885–895.
5. Karaye KM, Mijinyawa MS, Yakasai AM, Kwaghe V, Joseph GA, Iliyasu G et al. Cardiac and hemodynamic features following snakebite in Nigeria. Int. J. Cardiol. 2012; 156(3):326–328.
6. Habib AG, Abubakar SB: Factors affecting snakebite mortality in northeastern Nigeria. Internat Health. 2011; 3(1):50–55.
7. Habib AG, Abubakar SB, Abubakar IS, Larnyang S, Durfa N, Nasidi A et al. Envenoming after carpet viper (Echisocellatus) bite during pregnancy: timely use of effective antivenom improves maternal and foetal outcomes. Trop. Med. Int. Health. 2008; 13(9):1172–1175.
8. Kularatne SA. Epidemiology and clinical picture of the Russell's viper (Daboiarusselii russelii) bite in Anuradhapura, Sri Lanka: a prospective study of 336 patients. Southeast Asian J. Trop. Med. Public Health. 2003; 34: 855–862.
9. Usman R, Dalhal M, Nguku P, Hamza M, Muhammed, Obani H, Dada A, Yusuf H, Zaifad A, Oladimiye NA, Balla A, Difa J, Nasir S, Mukhtar A, Abdulrazaq. Clinical pattern of bite by carpet viper in Kaltungo snake bite Center Gombe State, Nigeria, August 2015.
10. Nagnath R, Bhaisare S, Bansod Y and Rohan H. Management and Outcome Study of Snake Bite Cases in Central India. Sch. J. App. Med. Sci. 2014; 2(1D):435-441.
11. Tavares AV, Medeiros de Araújo AK, Radan de Vasconcelos MM, Vieira AA, Renner de Souza L. The epidemiology of snakebite in the Rio Grande do Norte State, Northeastern Brazil Rev. Inst. Med. Trop. São Paulo. 2017; 59:e52.
12. Moreno E, Queiroz-Andrade M, Lira-da-Silva RM, Tavares-Neto J. Características clinicoepidemiológicas dos acidentes ofídicos em Rio Branco, Acre. Rev. Soc. Bras. Med. Trop. 2005; 38:15-2.
13. Habib AG, Gebi UI and Onyemelukwe GC: Snake bite in Nigeria. Afr. J. Med. Sci. 2001; 30(3):171-8.
14. WHO. World Health Organisation Guidelines for the management of snake-bites; Edited by DA Warrell; WHO Library Cataloguing-in-Publication data (NLM classification: WD 410); 2010; 1–162.
15. Ochola FO, Okumu MO, Muchemi GM, Mbaria JM, Gikunju JK. Epidemiology of snake bites in selected areas of Kenya. The Pan African Medical Journal. 2018; 29:217.
16. Oliveira HF, Barros R, Pasquino JA, Peixoto LR, Sousa JA, Leite RS. Snakebite cases in the municipalities of the State of Paraíba. Brazil. Rev. Soc. Bras. Med. Trop. 2013; 46:617-24