

## Snakes Responsible for Bites in North-Eastern Nigeria – A Hospital Based Survey

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**Abstract:** Snakebite cases by certain snake species are on the increase in Northern Nigerian and becoming an important occupational and public health hazard. This study was carried out between the years of 2005 to 2009 to determine the snakes responsible for envenomation in North-Eastern Nigeria. 10,017 snake bite cases were documented and handled in five (5) snake bite treatment centers: Zamko (Plateau State), Kaltungo (Gombe State), Bambur (Taraba State), Lafiya-lamarde and Savannah (Adamawa State) and Bauchi (Bauchi State). 4,113 snakes responsible for the snake-bite cases were killed and brought to the treatment centers by the victims. After taxonomic identification, the snakes were to comprise of 3,989 snakes of 7 species belonging to the Viperidae (*Echis ocellatus*, *Bitis arietans* and *Causus maculatus*), Elapidae (*Naja nigricollis*, *Naja katiensis* and *Naja haje*) and Actrastaspidae (*Actrastaspis microlepidota*) families respectively and 124 snakes belonging to non-venomous mimic species *Telescopus variegatus* (mimic of *Echis ocellatus*) and Colubrid snakes. *Echis ocellatus* accounted for 95% of the bite cases (3907), *Naja nigricollis* 0.71% (29), *Causus maculatus* 0.66% (27), *Actrastaspis microlepidota* 0.44% (18), *Bitis arietans* 0.1% (4) while, *Naja haje* and *Naja katiensis* 0.05% (2 each). From this study based on hospital records, the prevalence of reported snakebite cases has increased from 15.60% to 25.65% in five (5) years with *Echis ocellatus* still posing a major challenge to combating snakebite cases in North-Eastern Nigeria.

**Keywords:** *Echis ocellatus*, Envenomation, Snakebites, Viperidae, Elapidae,

### I. Introduction

Snake bite is an important occupational and public health problem in Nigeria (Theakston & Warrell, 2000; Laloo et al, 1995). Although no proper record has been documented on snakebites in Nigeria, however, it has been estimated that mortality rate range from 2 to 16 per 100,000 per year in Nigeria, Kenya, Senegal and west Bengal (Theakston et al, 2003). The kaltungo snakebite treatment centre recorded an average of 6 snakebites per day (EchiTab, 2008). At certain periods of the year about 74% of hospital beds in this region are occupied by snakebite victims (Revault, 1991). The major species responsible for bites in North-Eastern Nigeria is the saw scaled or carpet viper i.e. *Echis ocellatus* (Habib et al, 2008; Abubakar et. al. 2010). Others include *Naja nigricollis*, *Bitis arietans* and to a lesser extent *Causus maculatus*, *Naja katiensis*, *Naja haje*, *Atractaspis microlepidota*, *Telescopus variegatus* and several species of rat snakes, sand snakes and Lycopodium semicinctum (Abubakar, 2010; EchiTab, 2009).



Fig.1 *Echis ocellatus*



fig.2 *Naja haje*



Fig.3 Naja katiensis



fig.4 Bitis arietans



Fig.5 Naja nigricollis

**Courtesy EchiTab study group, Kaltungo.**

Antivenoms available for treatment of snakebites in this region include EchiTAB G which is monospecific for *Echis ocellatus* and EchiTab G<sup>plus</sup> (Costarican) which is polyspecific against *Echis ocellatus*, *Naja nigricollis* and *Bitis arietans* (EchiTab, 2010), although a few pharmaceutical stores stock other brand of antivenoms of doubtful efficacy.

Pains and local swelling are a common finding with most of the victims of snakebites in this region, although *Echis ocellatus* envenomation may manifest features such as spontaneous bleeding from the gums, haematuria, haematemesis, melena, haematochezia, haemoptosis, angioedema, bullae and coagulopathy. Dry gangrene is commonly seen in *Echis ocellatus* and *Bitis arietans* envenomations. *Naja* species envenomations are accompanied by wet gangrene, ptosis, blepharospasm and blisters (EchiTab, 2009). Some of the patients killed the snakes responsible for bites and present them at the hospitals for positive identification. In cases where snakes are not killed and brought to hospitals, diagnosis is dependent on clinical manifestation of the victim which to a little extent could be defective, except for *Echis ocellatus* in which case the Twenty Minutes Whole Blood Clotting Test (20WBCT) is employed to reach a confirmatory diagnosis. Hence the aims of this survey are to record the species most prevalent in the study area so as to narrow down diagnosis in cases of snake bite in which the snakes are not presented for identification and diagnosis and hence discourage patients and their relatives from killing snakes for the sole purpose of presenting them for identification and clinical diagnosis in this region.





Wet gangrene. *Naja nigricollis* bite



Dry gangrene. *Echis ocellatus* bite



Haemoptosis. *Echis ocellatus* bite



Dry gangrene. *Bitis arietans* bite

## II. Method

Although snakebites have been treated in some hospitals across the country, there are two major antivenom treatment centres in Nigeria, located in Kaltungo, Gombe State and Zamko in Plateau State.

Snakebite victims from North-Eastern Nigeria visit the Kaltungo treatment centre and a few others are treated at Zamko, Bambur, Lafiya-Lamarde, Savannah and Bauchi. We visited hospitals in these areas and explained the methodologies to the Doctors and Health workers. The dead snakes presented to the hospitals were preserved in 10% formalin in saline. In a situation where the snakes are not killed, we only considered patients that manifest not less than three of the known clinical symptoms for the alleged species of snake. While the 20WBCT was used as the only criterion for *Echis ocellatus* envenomations. The study covered a period of 1<sup>st</sup> January, 2005 to 31<sup>st</sup> December, 2009 (i.e. 5 years). Each hospital was visited fortnightly. Data were analyzed at the physiology laboratory in faculty of Veterinary medicine, Ahmadu Bello University, Zaria. The parameters measured were body length, tail length, mid-circumference and sex (using hemispheres as indicators).

## III. Results

Of the 10017 snakebite victims that were presented in this period, only 4113 snakes were presented to the hospital. These include 3989 specimen of 7 species of venomous snakes and 124 specimen of non-venomous species. *Echis ocellatus* is the major cause of bites accounting for about 95% of total snakebite (3907). *Naja nigricollis* ranked second with a total of 29 bites (0.71%). *Causus maculatus* came third with a total of 27 bites (0.66%). *Atractaspis microlepidota* came 4<sup>th</sup> with 18 bites (0.44%). *Bitis arietans* ranked 5<sup>th</sup> with 4 bites (0.1%) while *Naja haje* and *Naja katiensis* came 6<sup>th</sup> with 2 bites each (0.05%).

## IV. Discussion

The study was done for 5 years and each snakebite victim that came to the hospital from that area were included in the studies. North Eastern Nigeria is believed to harbour the highest population of snakes than all other parts of the country put together (Habib et al., 2010). *Echis ocellatus* was found throughout the study area (fig.1). Earlier works show that the snake is found around the Benue river basin and some scattered pockets in Nigeria (Abubakar et al., 2010, Warrell and Arnett, 1976). Despite the prevalence of *Echis ocellatus* in this area, most of the people still mistake *Telescopus* and *Causus* spp for *Echis ocellatus* often leading to misdiagnosis and subsequent misuse of antivenom. *Echis ocellatus* is the most prevalent snake responsible for bites in North-Eastern Nigeria (95%).

Table 1. Month Distribution of admitted snakebite patients in north eastern Nigeria from 2005-2009 (EchiTab, 2010).

	2005	2006	2007	2008	2009
January	64	72	94	67	105
February	63	71	95	66	104
March	104	116	157	193	172
April	155	172	212	175	254
May	154	171	206	199	247
June	113	128	159	241	189
July	154	171	208	242	249
August	173	189	176	259	288
September	158	173	174	194	262
October	207	230	241	275	345
November	154	172	190	154	252
December	64	70	97	106	102
Total	1563	1711	2003	2171	2569

Table 2. Snakes responsible for bites in north eastern Nigeria based on carcasses of species killed and brought to hospital

Species	English name	Family	No. Of specimen
<i>Echis ocellatus</i>	Saw-scaled, carpet viper	Viperidae	3907
<i>Naja nigricollis</i>	Black spitting cobra	Elapidae	29
<i>Bitis arietans</i>	Puff adder	Viperidae	4
<i>Causus maculatus</i>	Night adder	Viperidae	27
<i>Atractaspis microlepidota</i>	Burrowing asp	attractaspidae	18
<i>Naja haje</i>	Egyptian cobra	Elapidae	2
<i>Naja katiensis</i>	Malian cobra	Elapidae	2
<i>Lycophidion semicinctum</i>		columbridae	1

*Naja nigricollis* was the second most medically important snake in the study area. It is believed to be the most urbanized since most patients bitten were resident in urban settings when the bites occurred. *Causus maculatus* ranked third and was found in most areas where *Echis ocellatus* is found. This snake co-habit with *Echis ocellatus*. *Atractaspis microlepidota* was also found throughout the area of study. *Bitis arietans* which literature favoured as the most distributed snake in Africa (Anon, 2008) was only found in farms in rural areas. No specimen or live snake was found in human habitat throughout the period of the study. *Naja katiensis* and *Naja haje* were not reported in any of the human habitats except in uncultivated bushes; hence all the victims were hunters. Other snakes found were *Lycophidion semicinctum*, *Elapsoidae semiannulata*, *Ramphiophis oxyrrhynchus*, *Psamophis sibilans* and *Telesscopus variegatus*. Until now, the commercial polyvalent antivenoms are produced from the venoms of *Naja nigricollis*, *Bitis arietans* and *Echis ocellatus*. From hospital records all the victims bitten by *Naja haje* died and only one survived after *Naja katiensis* bite. Antigenic variations have been reported in venoms of snake of the same genus (Koh et al., 2006). Hence there is a need for antivenom producers to also consider the venoms of other venomous snakes present in this area in order to alleviate the suffering of people living in North-Eastern Nigeria, who suffer the highest casualty rate of snake envenomation in Nigeria.

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