

Research Article

Hospital Records (2006-2013) of Dogbite Cases and Laboratory Confirmation of Dog Rabies in Niger State, Nigeria

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Abstract: The hospital records of dog bite cases reported to the government hospitals across Niger State between January, 2006 and July, 2013 were investigated. Additionally, records of animal samples submitted to the National Veterinary Research Institute (NVRI), Vom-Nigeria for confirmatory rabies diagnosis during same period were investigated. Data on dog bite victims including year/month of bite, sex of victims, age and sites of bite were retrieved and analyzed using descriptive statistics. Results indicated that a total of 223 cases were recorded with the highest number (40 cases) recorded in 2012 and the least (10 cases) recorded in 2013. Higher proportions of victims (66.8%) were males and 46.2% of victims were children below the age of 15 years. Majority (81.3%) of bite was inflicted on the legs and then to some extent (14.3%) on the hands. A total of 1976 animal samples were submitted to NVRI, Vom for rabies diagnosis during the reporting period with 55.6% being confirmed positive but none was submitted from Niger State. Considering that over 81% of bite sites occurred on the legs, it suggests a possible prolong incubation period of rabies in victims. This may enhance misdiagnosis of rabies due to none or poor follow up of dog bite victims in our society. Similarly, non-submission of animal samples to NVRI, Vom from Niger State for rabies diagnosis suggest non-surveillance of rabies in the state. Enhanced surveillance of animal and human rabies in the state and Nigeria at large is highly recommended.

Keywords: Dog bite, hospital records, Niger state, Nigeria, rabies surveillance

INTRODUCTION

Rabies caused by *lyssavirus* is a zoonotic disease expressing most agonizing dead in both animals and humans. Despite the long knowledge and history of the disease over 2300 years before Christ (Theodorides, 1986), rabies remain a global zoonotic disease that claims over 55,000 human lives annually worldwide (World Health Organization, 2010). Of this number, 30,000 deaths are believed to occur in the developing countries of Asia and 24,500 in Africa (World Health Organization (WHO), 2010). Unfortunately the disease is under-diagnosed and under-reported particularly in the developing countries (World Health Organization, 2010) probably due to poor surveillance of the disease. Transmission of rabies is principally through bites or scratches from an infected animal, however, other mode of transmission through organ transplant in humans have been documented (Jackson, 2002a). Infection by the olfactory route (through aerosol) has been shown experimentally in bat caves (Gibbons, 2002).

Depending on geographic location, animal reservoirs of rabies virus vary globally. For instance, bats are the principal reservoirs of rabies in the United states (Kuzmin *et al.*, 2010), foxes in the United Kingdom and dogs in Africa and most of Asia (Garba, 2011). In Nigeria all published reports and surveys have indicate dog to be the principal reservoir host of rabies (Oboegbulem, 1994; Garba *et al.*, 2008). National Veterinary Research Institute (NVRI), Vom saddled with the responsibility of animal rabies diagnosis, began rabies diagnosis in 1928. Between 1928 and 1990, up to 3770 animal rabies have been confirmed in Vom of which 3555 (94.3%) were from dogs (Oboegbulem, 1994). In a similar report, between 1991 and 2005, up to 2143 animal samples were received in NVRI across Nigeria for rabies confirmatory diagnosis. A total of 1039 (45.5%) were confirmed positive for rabies but 1024 (99.1%) of the total positives were in dogs (Garba *et al.*, 2008). During this same period only one sample was submitted from Niger State of Nigeria for rabies confirmation which proved to be negative

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(Garba *et al.*, 2008). Additionally, no published reports of rabies from Niger State based on literatures reviewed. Based on the above, this study investigated the presence of dog bite cases in human hospitals in Niger State and the number of dog rabies confirmed in NVRI, Vom submitted from Niger State.

MATERIALS AND METHODS

Study area: The study was conducted in Niger State, Nigeria, a state in the north central region of Nigeria. The state is located between Latitudes 8°30' N and 11°30' N and between Longitudes 3°30' and 7°20'E, comprising of three senatorial zones (Bida, Kontagora and Minna) with 26 local government areas. The state has a total human population of 3.8 million with abundant livestock resources having 132,147 dog's population (with 98.5% in the villages and 1.5% in the township) of the state (RIM, 1992). The state falls within Guinea (southern) Savanna Belt of Nigeria, with about 90% of its population living in the rural areas practicing subsistence farming. Niger State is the largest state in the country in terms of land area, which is about 76,000 km² (or nearly 9% of Nigeria's total land area).

Study design: A total of nine General Hospitals and two tertiary health providers were randomly selected out of a total of 18 General Hospitals in the state and were visited across Niger State. Data from the records of dog bite cases between January 2006 and July 2013 in these hospitals were retrieved. Information sought included date of bite, sites of bite, sex and age of

victims. Similarly, the records of rabies confirmatory diagnosis at NVRI, Vom-Nigeria between January 2006 and July, 2013 were retrieved. These data were analyzed using descriptive statistics and information/ results were presented in tables.

RESULTS

Available hospital records of human dog bite cases indicated that a total of 223 cases were recorded in the human hospitals visited in Niger State during the period January, 2006 and July, 2013. The highest number of cases (40 cases) were recorded in the year 2012 and the least (10 cases) in 2013 (Table 1). General Hospital Tungan Magajiya had the highest total cases of 114 followed by General Hospital Minna with 62 cases and the least cases of 2 each were recorded in Bida and Wushishi General Hospitals. No record of dog bite cases were seen in Ibrahim Badamasi Babangida (IBB) Specialist Hospital and Federal Medical Center (FMC) (Table 1).

Furthermore, the monthly distribution of cases suggested that more dog bite victims were received in the hospitals in the months of January and April with 22 and 24 cases each. Followed by 21 cases in the months of October, while the least cases were seen in the months of November and December with 14 and 11 cases each, respectively (Table 2).

Sex distribution amongst victims of dog bite in Niger State indicated that majority of victims (66.8%) were males (Table 3).

Table 1: Annual distribution of dog bite cases in Niger State, Nigeria January, 2006-July, 2013

Year/Hospital	2006	2007	2008	2009	2010	2011	2012	2013	Total
T/Magajiya	15	16	14	16	15	19	17	2	114
Kontagora	0	2	0	1	2	3	5	1	14
Minna	5	11	7	9	9	6	10	5	62
Bida	0	0	0	2	0	0	0	0	2
Wushishi	0	0	0	0	0	0	1	1	2
Suleja	2	3	1	2	1	1	1	0	11
Kagara	0	1	3	1	2	0	5	1	13
Makwa	0	1	1	0	1	1	1	0	5
IBB	NR	NR	NR	NR	NR	NR	NR	NR	NR
FMC	NR	NR	NR	NR	NR	NR	NR	NR	NR
Zungeru	NR	NR	NR	NR	NR	NR	NR	NR	NR
Total	22	34	26	31	30	30	40	10	223

IBB = Ibrahim Badamasi Babangida Specialist; FMC = Federal Medical Center; NR = No Record

Table 2: Monthly distribution of dog bite cases in Niger State, Nigeria January 2006 to July 2013

Month/Hospital	Jan	Feb	Mar	April	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Total
T/Magajiya	12	8	9	10	10	8	11	10	11	11	4	10	114
Kontagora	1	0	0	0	1	0	2	2	4	3	1	0	14
Minna	5	5	7	7	7	6	6	7	2	5	4	1	62
Bida	0	0	1	0	1	0	0	0	0	0	0	0	2
Wushishi	0	0	1	0	0	1	0	0	0	0	0	0	2
Suleja	1	2	1	2	0	1	0	0	0		1	3	11
Kagara	3	1	1	4	1	1	0	0	0	0	2	0	13
Makwa	0	1	0	1	1	1	0	0	0	1	0	0	5
IBB	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
FMC	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Zungeru	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Total	22	17	20	24	21	18	19	19	17	21	14	11	223

IBB = Ibrahim Badamasi Babangida Specialist; FMC = Federal Medical Center; NR = No Record

Table 3: Sex distribution of dog bite cases amongst victims in Niger State, Nigeria January, 2006-July, 2013

Sex/Year	Male (%)	Female (%)	Total (%)
2006	18	4	22
2007	22	12	34
2008	18	9	27
2009	19	16	30
2010	21	9	30
2011	20	10	30
2012	24	16	40
2013	7	3	10
Total	149 (66.8)	74 (33.2)	223 (100)

Table 4: Age distribution of dog bite victims in Niger State, Nigeria January, 2006 -July, 2013

Age/Year	>15 years (%)	<15 years (%)	Total (%)
2006	3	2	22
2007	13	21	34
2008	13	13	29
2009	17	14	31
2010	19	11	30
2011	17	13	30
2012	25	15	40
2013	5	5	10
Total	120 (53.8)	103 (46.2)	223 (100)

Table 5: Site of bites in relation to dog bite victims in Niger State, Nigeria January, 2006-July, 2013

Site of bite/Year	Leg (%)	Hand (%)	Face (%)	Multiple (%)	Total (%)
2006	19	3	0	0	22
2007	30	3	0	1	34
2008	22	3	1	0	26
2009	24	4	1	2	31
2010	25	4	1	0	30
2011	25	3	0	2	30
2012	28	10	2	0	40
2013	3	2	0	0	5
Total	181 (81.2)	32 (14.3)	5 (2.25)	5 (2.25)	223 (100)

Table 6: Animal samples submitted to NVRI, Vom across Nigeria for rabies confirmatory January, 2006-July, 2013

Samples/Year	Samples submitted across Nigeria	Samples positive (%)	Samples submitted from Niger State
2006	200	93 (46.5)	None
2007	133	55 (41.4)	None
2008	242	169 (69.8)	None
2009	427	300 (70.3)	None
2010	302	179 (59.3)	None
2011	344	150 (43.6)	None
2012	226	116 (57.3)	None
2013	102	36 (35.3)	None
Total	1976	1098 (55.6)	None

Age distribution of victims suggests that majority (53.8%) of dog bite victims were adult over the age of fifteen years. About 46.2% were children below the age of fifteen years (Table 4)

It has also been observed that majority (81.2%) of the victims of dog bite were bitten on the legs, followed by hand (14.3%). The least sites of bite were face and multiple area of the body these were seen in 2.25% each of the victims (Table 5).

Considering animal brain samples submitted to NVRI, Vom for rabies diagnosis over the same period of dog bite cases (January 2006-July, 2013) from Niger State. It was observed that a total of 1976 animal samples were received for rabies diagnosis from all

over Nigeria. However, 1098 (55.6%) were confirmed positive for rabies but no sample was received from Niger State during the period (Table 6).

DISCUSSION

The presence of dog bite cases with over 223 different occurrences across Niger State is a strong pointer to the possibilities of rabies in the state. It is pertinent to note that in most cases of dog bite; the scenario that warrants further hospital/medical attention especially in our society may be due to unprovoked bite. There has been a strong inclination that an unprovoked bite from a dog could be due to rabies. In a report 45.5% of dogs samples that inflicted bites on humans or other animals submitted to NVRI, Vom during 1991 and 2005 have been confirmed to harbor rabies antigen (Garba *et al.*, 2008). This suggested that close to 45% of dog bite cases in the present study may be due to rabid dogs. It has been observed that there has been a steady annual increase in dog bite cases during the reporting period with the highest number of 40 cases recorded in 2012. This may be due to either continues awareness and reporting of dog bite cases to the hospitals, or there was true increase of rabies in the dog population hence increase in dog bite in the state. However, a drastic drop in number and lowest cases of 10 was seen in 2013. There is no other reason for this drop than due to the lower number of months (January to July) of data collection in 2013 when the study was concluded excluding the months of August to December, 2013. Considering the hospital distribution of cases, it was observed that over 51% (114) of the total 223 dog bite cases were seen in Tungan Magajiya General Hospital; followed by 27% (62) of the cases seen in Minna General Hospital. The most probable reason could be that Tungan Magajiya has been one of the oldest hospitals set up by the colonial masters providing primary and secondary health care in Nigeria. Additionally, it is an institutional (School of Health Technology) hospital surrounded by villages and rural settlements. Report has indicated that 92% of dog population in Nigeria are in the rural settlements (RIM, 1992), majority of these dogs received none or inadequate anti-rabies vaccination coverage (Oboegbulem, 1994). It is the belief of this paper that the large population and traffic of dogs in the rural settlements (which could inflict bite) coupled with the tract records of the hospital that made Tungan Magajiya hospital recorded the highest number of dog bite cases. On the other hand, Minna is the capital city of Niger State which houses civil servants, educated and enlightened citizens. These attributes may be the reason why Minna General Hospital recorded second highest dog bite cases. Unfortunately, no record of dog bite or rabies was found in IBB and FMC assumed to be tertiary health institutions in the state. There may not be

other reason than these hospitals are more or less referral health centers in the state and cases of dog bite are often taken immediately to General hospitals which are easily accessible to victims. On monthly distribution of dog bite victims, more cases were recorded in the month of April, followed by January and the least number of cases recorded in December during the reporting period. This may not represent true monthly incidence of dog bite cases in the study area as no seasonal index was analyzed. However, seasonal indices of biting dogs recorded in the veterinary clinic of NVRI Vom-Nigeria have indicated higher cases were seen in the months of November, January and March. These periods were assumed to be the festive periods and breeding seasons for dogs (Garba *et al.*, 2005). On sex distribution of dog bite victims, it was observed that about 67% of victims were males. This is due to the lifestyle of the residence of Niger State. More males are engaged in official and day to day street activities than the females, couple with the fact that majority of dogs though owned are free-roaming (unleashed/unchained). This lifestyle could be responsible in exposing more males to dog bite than the females. Over 46% (103) of dog bite victims were children below the age of 15 years. This finding is in contrast with the saying of the World Health Organization (WHO) that children below the age of 15 years are vulnerable to rabies world over (World Health Organization, 2010). However, if the age limit of children was marked from 18 years and below; probably more cases would have been seen in children. Vulnerability of these children below the age of 15 years to dog bite incidences in the present study may not be unconnected to some facts. Majority of these children (unprivileged) go to schools, apprentice's points and other places sent by their parents/guardians on foot (pedestrians). In the process they could get bitten by free-roaming or rabid dogs. Unlike the few privilege children and adults who can afford public or private transport to schools and other places shunting the menace of biting dogs as seen in this study.

Since over 81% of dog bite victims in this study were bitten on the legs and over 14% on the hands as shown. This may be due to the closer proximity of the extremities (legs and hands) to the offending dogs during running and defense by the victim than other parts of the body. Consequence to this bites on the extremities particularly legs, suggest that majority of these dog bite victims could took a longer Incubation Period (IP) to manifest rabies even if the biting dog was rabid. This is based on the fact that the farther the distance of bite (rabies virus inoculation site) to the brain, the longer the IP in the pathogenesis of rabies virus (Jackson, 2002b). Reports have indicated that Rabies virus migrates along peripheral nerves towards the central nervous system at about 50-100 mm per day via the fast axonal transport system (Tsiang, 1993;

Warrell and Warrell, 2004). In this scenario where majority of the bites being on the legs suggesting prolong IP, there could be misdiagnosis of rabies in such victims due to none follow up/fast tracking of dog bite victims. Especially, that most of the victims only received the early day treatment and never showed up for the remaining treatment course even where post exposure anti-rabies vaccination schedule was initiated. Eventually after several months or years if the victim comes down with rabies especially with neurologic involvement the relatives will acclaim the ailment was due to evil spirit and not rabies. This may trigger none diagnosis or misdiagnosis of rabies even where victims are referred to hospitals at the terminal point of the disease.

During the same period (January 2006 and July 2013) when dog bite cases occurred in Niger State, no single sample was submitted from Niger State of Nigeria to NVRI for rabies diagnosis. This finding is similar to the previous report that between 1991 and 2005 about 2143 animal samples were submitted to NVRI across Nigeria for rabies confirmation. But only one sample was submitted from Niger State which was diagnosed negative (Garba *et al.*, 2008). The implication of this finding is that there is poor surveillance of rabies in Niger State of Nigeria and a lot of dog bite victims could die due to undiagnosed rabies.

CONCLUSION

In conclusion, it is evident that dog bite cases and possibly rabies are present in Niger State. It is recommended that surveillance structures should be put in place to diagnose and track the occurrence of rabies in both human and animal population in the state.

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