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Assessment of Rabies Knowledge Gaps and Management of Dog Bite Wound among Dog Handlers in Gombe State, Northeastern Nigeria

^{1*}Mohammed, S., ²Kia, G. S. N., ³Ezema, K. U. and ⁴Ashafa, M.

¹Department of Veterinary Public Health and Preventive Medicine, Faculty of Veterinary Medicine, University of Maiduguri, Borno State Nigeria

²Department of Veterinary Public Health and Preventive Medicine, Faculty of Veterinary Medicine, Ahmadu Bello University, Zaria, Nigeria

³Veterinary Teaching Hospital, University of Maiduguri, Maiduguri, Nigeria

⁴Ministry of Agriculture and Livestock Development, Yobe State, Nigeria

* Author for Correspondence: halyme99@gmail.com

ABSTRACT

Rabies is a zoonotic disease with virtually 100% case fatality rate but preventable with early administration of post exposure prophylaxes rabies vaccine to the bite victim. The objectives of this study were to assess the awareness on rabies, modes of transmission, preventive measures, and their rate of exposure to dog bites among dog handlers. The work was carried out in five Local government areas of Gombe State. Ninety-one structured questionnaire was administered by face-to-face interviews in the commonly spoken local dialect (Hausa) to dog handlers. The questionnaire covered information on demographic characteristics, awareness toward rabies and their rate of exposure to dog bites. Only 28 (30.8%) of the respondents were informed that rabies could be fatal; 56 (61.5%) respondents were aware that dog handlers faced risks of rabies infection. Of the participants, eighty-seven (95.6%) recognized that dog bites are responsible for the transmission of rabies; nonetheless, 42 (46.2%) had experienced cuts, and 38 (41.8%) had been splashed with nerves/blood during the processing of raw dog meat. Only 13 respondents (14.3%) were aware of the appropriate management for dog bite wounds in the most severe circumstances. Sixty responders (67.8%) were bitten by dogs, although none received post-exposure vaccination. Approximately 89.3% of the respondents favored the non-conventional way for treating dog bite wounds. Therefore, knowledge on the possible risk of exposure, dog bite wound treatment, post exposure rabies vaccination and preventive measures of rabies need to be improved. An adequate awareness of rabies is very crucial in controlling

Keywords: Assessment; Dog handlers; Dog bite wound; Knowledge Gaps; Gombe; Rabies.

INTRODUCTION

Rabies is an acute progressive viral encephalitis caused by the rabies virus, which is transmitted through domestic dog attacks (Hampson *et al.*, 2015). Once clinical signs develop, rabies is almost always fatal. Globally over 59,000 human rabies cases are reported annually, mostly in developing countries of Africa (40.4%) and Asia (59.6%) (WHO, 2018). This is mostly attributed to rabid dog bites (Hampson *et al.*, 2015; Adesola *et al.*, 2023). In this respect, awareness of dog bite victims or people at risk and their social attitude toward management and prevention of rabies is very crucial. Rabies was first reported in Nigeria in 1912; since then, rabies has taken human lives. A recent review of rabies in Nigeria between 1978 and 2020 identified dog handlers, children and males as high-risk groups for rabies virus Infection in Nigeria (Mshelbwala *et al.*, 2021). In addition to widely reported human rabies outbreaks due to rabid dog bites. Though, there was no sufficient reliable data on human injuries/wounds and deaths attributed to dog bites in Nigeria. Even though 3%-28% canine rabies in Nigeria was documented (Mshelbwala *et al.*, 2021). Previous studies conducted by Mohammed *et al.* (2019) in Billiri and Suleiman *et al.*

(2020) in Billiri and Kaltungo, Gombe State, Nigeria reported 6% and 7.6% prevalence of canine rabies respectively in dogs for human consumption. Unvaccinated dog handlers in Plateau and Niger States in Nigeria had antibodies to the rabies virus, suggesting previous exposure and potential subclinical infection (Konzing *et al.*, 2015). Dog handlers used bare hands to clamp dogs' mouth without using protective equipment and have sustained bites in the process. Previous studies by Ganasva *et al.* (2015) revealed that there are cultural practices of dog bite wound management among high-risk individuals which may interfere with the appropriate dog bite wound management recommended by WHO (2018). However, administration of post exposure prophylaxes and canine vaccination is the most effective and economically sound measure of rabies prevention (Shim *et al.*, 2009; Anothaisintawee *et al.*, 2019; Salahuddin *et al.*, 2021; Bras *et al.*, 2022). A main hindrance to rabies prevention in accordance with the global objective of 2030 in developing countries such as Nigeria is the little level of administrative commitment towards control of rabies, paucity of data or underestimation of the impact of rabies

on the public health or high-risk individuals which are exacerbated by socio-cultural influences particularly at the rural areas where population of stray dogs is merely high, (Mshelbwala *et al.*, 2023). The number of human mortalities attributed to canine rabies grossly underestimates the real incidences of the disease. The negative practices subjected the dog handlers to the risk of rabies infection because of cultural obstacles towards the prevention and control of the disease. No study has evaluated the level of knowledge of dog handlers and their perception towards dog bite wound managements in Gombe State, Nigerian. A good understanding of the knowledge gaps is critical for public health decision making. Therefore, it is crucial to evaluate their knowledge regarding rabies. Our study aimed to assess rabies knowledge gaps among dog handlers in Gombe State.

MATERIALS AND METHODS

Study Area

Gombe State occupies a total land area of 20,265km² representing about 2.2% of Nigerian's total landmass and is located between latitudes 9°30'N and 12°30'E and longitudes 8°45'E and 11°45'E (Abass, 2014). Borno and Yobe States border the State to the east and north, respectively, Adamawa and Taraba to the south and Bauchi State to the west. The State has a population density of 2,353,879, ranking 31st of the 36 states (Abass, 2014). The survey was carried out in five of the eleven Local Governments which comprises of Akko, Billiri, Kaltungo, Shongom and Yamaltu/Deba LGAs of Gombe State (Figure 1).

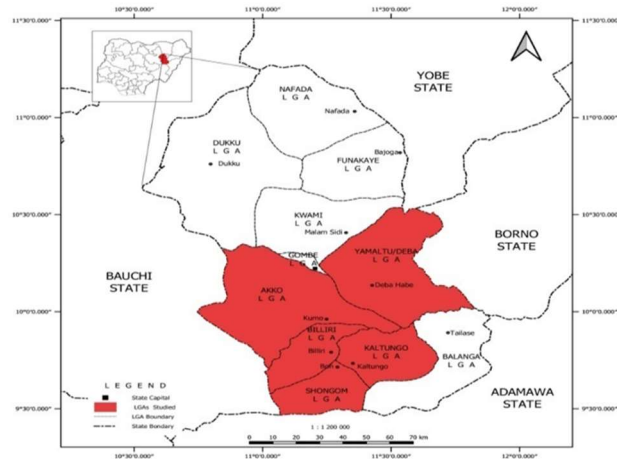


Figure-1: Map of Gombe State showing the study area.

Study design

Community based cross-sectional study was conducted in the study area.

Study population

Dog handlers in the study area that were 18 years and above and were willing to participate in the survey comprised the study population.

Ethical consideration

The approval for this study was obtained from the research and ethical committee of Ahmadu Bello University, Zaria,

Department of Veterinary Public Health and Preventive Medicine. The institution has sent a letter to the Ministry of Animal Husbandry and Nomadic Affairs Gombe State and permission obtained from the Director Veterinary Service through Director Veterinary Public Health and Epidemiology.

Sample size determination and questionnaire design

In this population survey, an Epi-Info V.7.0 (CDC, Atlanta, USA) was used to develop the questionnaire and a sample size of 91 was calculated. The developed questionnaire was pre-tested and administered to the respondents by face-to-face interview in hausa language to ensure accuracy. The questionnaire assessed the respondents' knowledge towards rabies.

The closed-ended questionnaire was divided into two sections A and B. Section A covered the demographic information of the respondents such as location, age, sex, occupation, level of education, ethnic group, duration in dog handling business, history of previous exposure to dog bites and sites of bite. Section B dealt with the respondents' general knowledge of rabies such as mode of transmission, hosts, clinical signs/symptoms of rabies in animals and humans, treatments/management of dog bite victims, cure of rabid patient who developed symptoms and others.

Data analysis

Data on exposure to dog bites amongst the high-risk group were presented in tables and graphs. A Chi-square test (χ^2) was used to test the statistical association between the categorical variables and exposure to dog bites. P value ≤ 0.05 was considered significant. The levels of knowledge of the respondents were assessed and presented in percentages (%). Odd ratio (OR) was used to determine the likelihood of exposure to dog bites which is the major route of rabies transmission.

RESULTS AND DISCUSSION

Public awareness is an important tool in disease prevention and control. However, rabies was known in the study area and even called with local names, 'Karandina' (in Tangale), 'Mbaglanshuna' (in Pero) literally meaning "mad dog" (Mohammed *et al.*, 2019). Most (54.9%) of the respondents attended secondary school, young (78.0%) and majority (89.0%) were from 'Tangale' ethnic group. This is because dog consumption and butchering have cultural acceptance and preference among Tangale' ethnic group (Table 1). The study revealed that a majority (85.8%) of respondents were uninformed about the recommended first aid for dog bite wounds, which include promptly washing the site with warm running water and soap for a minimum of 15 minutes to eliminate saliva and pollutants (Kaur *et al.*, 2025). This might be a hinge toward rabies prevention and control. This study showed that 26.4% of the respondents were unaware that there is no cure for rabies once symptoms have manifested in a patient; and 69.2% were unaware that rabies is a fatal disease. Most (97.8%) of the respondents were unaware of the dumb form of canine rabies, but 96.7% knows that sudden aggression by an initially friendly dog may be due to rabies (Table 2). Fifteen (16.5%) of the respondents were unaware that dog movement increases the chances of

rabies spread and make control difficult. This might be a reason for the underestimation of the risk posed by dog bites and thus, neglecting the disease. Thirty-nine respondents (42.9%) believed that rabies does not affect some domestic animals. Majority (65.9%) of the respondents were bitten by dogs, and 46.6% were bitten on their hands, but no evidence of post exposure prophylaxis. This might have occurred during handling of the dogs. This shows the impact of lack of knowledge of rabies prevention and control in the study area. Majority (91.2%) of respondents preferred traditional medicine when bitten by a dog (Figure 2).

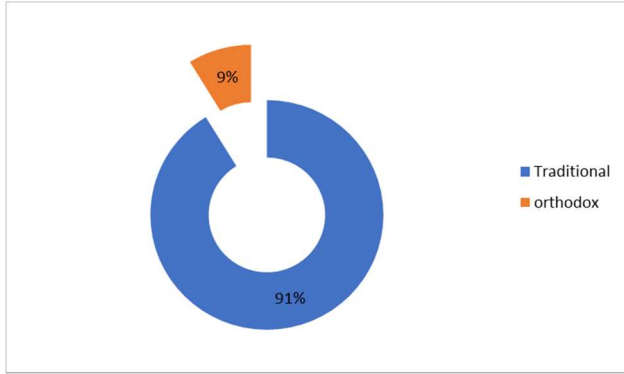


Figure 2: Management of dog bite wounds employed by the dog handlers in the study area.

They believed in the use of traditional herbs for management of dog bite wounds. This may be due to low

level of awareness, inaccessible or hugely expensive cost of life-saving post exposure prophylaxis (PEP) equivalent to 2 months wages for an average African (WHO, 2018), or might be attributed to confidence from myth that has been established centuries back from their lineage, though the practice has no scientific support. This believe resulted in underestimation of exposure to dog bites in the rural areas of African countries such as Nigeria. This finding could be compared to 72.8% in a survey in Abia State, Nigeria by Mshelbwala *et al.* (2014), and also agrees with the findings in other countries where people patronized traditional medicine instead of established modern PEP (Sudarshan *et al.*, 2007; Rumana *et al.*, 2013; Singh *et al.*, 2020). Dog bite rate among male (65.9%) is slightly lower compared to the female (66.6%) counterpart (Table 3). The reason for the higher prevalence female is due their fewer (3.3%) number participating in the study. It was established that, respondents with 10-14 years of involvement in dog handling had the highest (75.0%) dog bites rate. This may be due to their active involvement during the restrain process of dogs. Respondents with non-formal education recorded higher (80.0%) rate of dog bites compared to those that attended primary (58.3%) and secondary (66.0%) schools (Table 4). Therefore, there is need for creation of awareness among dog handlers in the study area on the importance of dog bite wound treatment and prompt receiving of PEP for anyone who is exposed to dog bite from a dog with no history of rabies vaccination.

Table 1: Demographic Characteristics of dog handlers in some parts of Gombe State, Nigeria.

Characteristics	Total number of Respondents (n=91)	Specific rate (%)
Age (years)		
<20	2	2.2
20-30	31	34.1
31-40	38	41.7
>40	20	22.0
Gender		
Female	3	3.3
Male	88	96.7
Occupation		
Farmer	28	30.8
Student	2	2.2
Business	59	64.8
Civil servant	2	2.2
Educational Level		
Drop out	15	16.5
Primary	24	26.4
Secondary	50	54.9
Tertiary	2	2.2
Local Government Area		
Akko	7	7.7
Billiri	56	61.5
Kaltungo	13	14.3
Shongom	11	12.1
Yamaltu-Deba	4	4.4
Ethnic Group		
Ngas	3	3.3
Pero	5	5.5
Tangale	81	89.0
Wurkum	2	2.2

Table 2: Responses of dog handlers to knowledge of rabies in some parts of Gombe State, Nigeria.

Knowledge item (n=91)	Responses	Specific rate (%)
Rabies infects all domestic animals		
Yes	39	42.9
No	52	57.1
Rabies affects all humans		
Yes	61	67.0
No	30	33.0
Sudden aggression by an initially friendly dog may be due to rabies		
Yes	88	96.7
No	3	3.3
Dogs are common source of rabies in Nigeria		
Yes	87	95.6
No	4	4.4
Handlers of dog were at risk of rabies		
Yes	56	61.5
No	35	38.5
Rabies cannot kill		
Yes	63	69.2
No	28	30.8
The symptoms of rabies in human include excitement and agitation		
Yes	71	78.0
No	20	22.0
A suspected rabid dog may be dump and docile		
Yes	2	2.2
No	89	97.8

Table 3: Responses of dog handlers to knowledge of rabies in some parts of Gombe state, Nigeria.

Knowledge item (n=91)	Responses	Specific rate (%)
Is there any cure/treatment for a person who developed rabies symptoms		
Yes	67	73.6
No	24	26.4
Transportation of dogs from market to a sale point increases the risk of rabies spread		
Yes	76	83.5
No	15	16.5
Can vaccination prevent rabies in dogs		
Yes	85	93.4
No	6	6.6
Blood/nerve tissue splash on a face/open wound during the course of slaughter may serve as an exposure		
Yes	38	41.8
No	53	58.2
Rabies can be transmitted from dog to human		
Dog bite	82	90.1
By Housefly	3	3.3
By mosquitoes	3	3.3
Via food	3	3.3
First aid after dog bite		
Do nothing	43	47.3
Tie cloth around the wound	35	38.5
Wash with soap and water	13	14.3

Table 4: Multivariate logistic regression analysis of demographic variables and exposure to dog bite of respondents in some parts of Gombe State.

Variables	Never bitten (%)	Previously bitten (%)	OR	95%CI	p-value
Age (years)					
<20	0	2 (100)	-		
20-30	12 (38.7)	19 (61.2)	Ref		0.646
31-40	11(28.9)	27 (71.1)	0.64	0.23-1.76	
>40	8 (40.0)	12 (60.0)	1.05	0.33-3.33	

Gender					
Male	30 (34.1)	58 (65.9)	Ref		
Female	1 (33.3)	2 (66.7)	0.967	0.084-11.1	
Occupation					
Farmer	8 (28.6)	20 (71.4)	Ref		0.683
Business	21 (37.3)	33 (62.7)	1.59	0.59-4.3	
Student	1 (50.0)	1 (50.0)	2.54	0.14-45.0	
Civil servant	0 (0.0)	2 (100)	0.714	0.56-0.90	
Educational Level					
Non formal	3 (20.0)	12 (80.0)	Ref		
Primary	10 (41.7)	14 (58.3)	2.86	0.636-12.8	0.484
Secondary	17 (34.0)	33 (66.0)	2.06	0.51-8.31	
Tertiary	1 (50.0)	1 (50.0)	4.00	0.19-5.3	
Duration in the business (years)					
1-4	7 (31.8)	15 (68.2)	Ref		0.097
5-9	11 (57.9)	8 (42.1)	2.95	0.82-10.6	
10-14	5 (25.0)	15 (75.0)	0.71	0.18-2.76	
≥15	8 (26.7)	22 (73.3)	0.78	0.23-2.61	

Conflict of Interest

The authors have no conflict of interest to declare.

Author Contribution

SM, and GSNK designed the study, MA and SM collected the data, and wrote the first draft of the manuscript. SM and EK oversaw the entire research and reviewed the manuscript. SM and MA contributed to data collation, cleaning, and managed the data analyses for the study. Finally, SM also conducted the literature searches. All authors read and approved the final draft manuscript.

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