THE ROLE OF DOG TRADING AND SLAUGHTER FOR MEAT IN RABIES EPIDEMIOLOGY WITH SPECIAL REFERENCE TO NIGERIA- A REVIEW

Ehimiyein Ajoke¹,* , Audu Solomon¹ and Ehimiyein Ikhide²

¹Ahmadu Bello University, Zaria, Kaduna State, Nigeria
²Gimaf Veterinary Consult, Kaduna State, Nigeria

Received – March 10, 2014; Revision – March 30, 2014, Accepted – April 18, 2014
Available Online - April 30, 2014

ABSTRACT

The aim of this review was to define the risk factors associated with dog trading and slaughtering for food in the transmission of rabies to human health in Nigeria. The review also examined the factors that increase the risk of transmission of the rabies virus and epidemiology in humans and preventative measures that may be taken. Emphasis was also laid on the potential role that the butchers play in rabies transmission and their susceptibility to rabies through contact with infectious meat samples and materials. Dog meat is gradually becoming a delicacy in many parts of Nigeria. It is eaten for various reasons including medicinal values, source of protein and ritual rites. Stray and apparently healthy dogs are transported together to the slaughter-houses for processing. Rabies virus have been confirmed in apparently, healthy dogs to be slaughtered showing that butchers are at risk, especially in Nigeria, where the butchers neither wear protective gears nor vaccinated against rabies. It is recommended that regular and mass vaccination of butchers and dogs should be carried out to ensure effective control and eradication of rabies. In conclusion, dog trading, slaughtering and consumption might play a major role in the epidemiology of rabies from dogs to humans in Nigeria.

* Corresponding author
E-mail: ajokeeo@gmail.com (Ehimiyein Ajoke)

Peer review under responsibility of Journal of Experimental Biology and Agricultural Sciences.
1 Introduction

Rabies is a fatal viral zoonotic disease that affects all warm-blooded animals (Zulu et al., 2009). It is caused by viruses of Family Rhabdoviridae, belonging to Genus Lyssavirus (Madhusudana et al., 2010), order Mononegavirales (Nel, 2005) which has seven genotypes 1 to 7 (Bourhy et al., 1999). Classical rabies virus (RABV, genotype 1) is mainly found in dogs worldwide (Wu et al., 2009), Lagos bat virus (LBV; Genotype 2) (Picard-Meyer et al., 2007), the Mokola virus (MOK; Genotype 3), the Duvenhage (Genotype 4) (Markotter et al., 2006; Adedeji et al., 2010), the European bat lyssaviruses 1 and 2 (EBLV 1 and 2) (genotypes 5 and 6), and the Australian bat lyssavirus (ABLV; Genotype 7), (Badrane et al., 2001; Fauquet et al., 2004; Paweska et al., 2006). Four additional new rabies-related lyssaviruses, have been isolated from bats in Eurasia: Irktu, Aravan, Khujand and West Caucasian Bat Viruses (Botvinkin et al., 2003; Kuzmin et al., 2003; Liu et al., 2013 as well as Bokeloh bat lyssavirus (Freuling et al., 2011) and the Ikoma lyssavirus (Marston et al., 2012).

Meat is the fleshy, edible part of the skeletal muscle of animals and it has been a major source of protein all over the world, including Nigeria (Holzman, 2003; Oladoye et al., 2011). Dog meat has been consumed since ancient times, presently, dogs and cats are mainly consumed by countries like Cambodia, China, Mexico, Rome, South Korea, Thailand, Vietnam (Schwabe, 1979; Rupert, 2002; Clifton, 2003; Anthony, 2009), India, Indonesia (Anon, 2004; Mao, 2010; Shepard, 2012) as well as in Africa including Cameroon, Ghana and Nigeria (Simmons, 1994; Garba et al., 2013). The practice of eating dogs and cats is abhorred in some countries, including United States of America and United Kingdom, where the animals are mostly kept as pets (Podbersek, 2009). In Nigeria, dogs are kept for several reasons, including hunting, guarding, source of income, as pets, and as a source of meat (Aiyedun & Olugasa 2012). Dogs are eaten in many States in Nigeria, including Akwa-ibom, Cross River, Ondo, Plateau, Taraba, Gombe, Bauchi, Nasarawa, Kaduna, Niger, Kebbi and Ondo (Frederick,1994; Murray, 2007; Ogun et al., 2010). Dog trading is a common practice in Nigeria and has become a source of livelihood for some people. Stray and free-roaming dogs are usually captured by dog charmers and are transported from the northern parts of Nigeria to the southern states. Dog swapping is being done in the northern parts of Nigeria; these dogs are not sold but exchanged by owners for mobile phones, iron, radio sets and cutlasses (Audu et al., 2011). The dogs are then sold by the middle men to the traders, and they are eventually transported in large overcrowded trucks where they are kept in tight cages to southern Nigeria (Ekemem et al., 2013; Hambolu et al., 2013). Dog slaughter-houses are increasingly becoming a major source of rabies transmission from dogs to humans and among dogs (Wertheim et al., 2009). Although dogs have been known as a reservoir for rabies all over the world, including Nigeria (Aiyedun & Olugasa, 2012), the relationship between dog slaughters and eating in the transmission of rabies virus and epidemiology has not been elucidated.

In Nigeria, dogs are either clubbed or strangled to death before the blood is properly drained out by cutting the jugular vein. It is a general belief that the more gruesome the death of a dog, the sweeter the meat (Elisha & Solomon, 2008). Dog meat is a delicacy in many countries, including Nigeria and it has about 44.4 mg/100 g of cholesterol (Ann, 2000). It is nutritious because it contains the many essential nutrients including carbohydrates, fat, protein, vitamins A, B1, B2, B3, C, calcium, iron, phosphorus, potassium and sodium. Dog meat is eaten for different reasons, including rituals (Eric & Oliver, 1982); as a delicacy (Mao, 2010); source of food in times of war (Douglas, 2009); as well as for its medicinal values (Murray, 2007; Willy, 2007). Garba et al. (2013) observed that 64% of the respondents consume dog meat because it is a delicacy, 18.4% for its medicinal values, 8.8% inherited the practice from their parents and 1.6% as a cheap source of protein. The aim of this review is to determine the risk factors associated with dog trading and dog slaughter for food in the transmission of rabies to human health in Nigeria.

2.1 Transportation for slaughter

Migration of dogs from state to state within Nigeria to different slaughter-houses is normally done with trucks that are not specifically designed for dog transportation, involving the use of vehicles often having bulging iron metals that inflict injuries on the animals. The vehicles are usually not disinfected before and after use, and the health status of the animal is normally not determined before their transportation (Ekanem et al., 2011). This factor favours the transmission of the rabies virus; not only during transportation of dogs for slaughter, but thereafter. It is worthy of note that in most developing countries, especially in Nigeria, dogs are transported together with goods and humans in the same cabin of the vehicle. This further increases the spread of the virus from dogs to humans. Also, the dogs are usually starved for days and thus making them exhausted and irritable. This leads to in-fighting among the dogs, thereby inflicting bite wounds on themselves which might further aid the spread of rabies especially in a situation where dogs with unknown medical history are all packed together in tight cages.

2.2 Factors favoring the epidemiology of rabies in dog slaughter-houses

Rabies virus is transmitted by different host species and widespread among domestic dogs (Ngoepe et al., 2009). Domestic dogs have been reservoir of rabies and a source of rabies infection to humans and other animals (John, 2005; Joo et al., 2011) in many parts of the world, especially in Africa and Asia, 85-95% of human rabies cases being caused by dog bites (Tang et al., 2005; Fitzpatrick et al., 2012). Ten million people are bitten by animals and considered for Post-Exposure-Prophylaxis annually worldwide, out of which 55,000 die
annually of rabies (Freuling et al., 2012). Dog bite is usually associated with both physical and emotional trauma to the victims (Dwyer et al., 2007). Rabies causes 100% fatality in humans (Mazigo et al., 2010), and it is also 100% preventable (Tekki et al., 2013).

Presence of rabies virus in the brains of apparently healthy dogs for slaughtering in many dog markets have been reported in Nigeria by various authors (Ajayi et al., 2006; Baba, 2006; Aliyu et al., 2010; Ehimiyein et al., 2010; Garba et al., 2010; Ekanem et al., 2013; Mshelbwala et al., 2013; Hambolu et al., 2013). Serological detection of Mokola and Lagos Bat viruses has been reported in Nigeria (Nottidge et al., 2007; Dzikwi et al., 2010a; Dzikwi et al., 2010b). In Vietnam, 5 human rabies victims with no history of previous bites from dog or cat was reported, which might have been contracted through butchering, processing and consumption of dogs and cats (Anh et al., 2011). With this Anh et al. (2011) also confirmed the presence of rabies virus in sick animals from slaughter-houses in Vietnam, therefore making dog slaughter-house an important factor to be considered in rabies epidemiology. Factors that are considered important in the epidemiology of rabies in dog slaughter-houses include the dog trade, slaughter processes and the consumption of dog meat. Dog trading is a major practice all over the world especially in Nigeria where dogs are brought in from neighboring country including Cameroon (Ogunkoya, 2008). David et al. (2008) observed that rabies isolates from dogs in Plateau State, Nigeria was antigenically related to isolates from Cameroon, Chad, Benin Republic and Northern Africa. Also, rabies virus isolates from Burkino-Faso (De Benedictis et al., 2010) and Vietnam (Anh et al., 2011) were also related to trans-boundary spread from Mauritania and China respectively. This further emphasises the role of dog trading and slaughtering in the epidemiology of rabies. In most slaughter-houses, dogs from different places without any medical history are assembled in a tight cage, thus the spread of rabies is possible among the dogs. On arrival at their destinations, it poses a risk on both the dog and human population. The middle men catching the dogs are also at risk because they can be bitten or scratched, while apprehending the dogs; thus exposing them to rabies (Mshelbwala et al., 2013). Dog slaughter-houses in Nigeria are not government-owned, but for example, individual houses, which are converted for slaughtering dog. Most of the dog markets are located in discrete areas, which are close to residential areas (Ekanem et al., 2013). The unhygienic conditions of the slaughter-houses are alarming and this has been shown to aid the transmission of rabies and other infectious diseases (Dacheux et al., 2012). During dog slaughter, the animal parts are freely disseminated in the environment because of poor hygienic practices; which favours the spread of the rabies virus, not only in the environment where the dogs are slaughtered for meat, but also in distant places where the meat and by-products of dogs may be conveyed to. According to Aiyedun & Olugasa (2012), there is apparently a link between environmental hygiene and dynamics of rabies in most neglected rural communities in Nigeria; thus, increasing the chances of exposure in dogs and man to rabies. This is particularly true in densely populated areas. There is need to effectively control rabies in dogs through a common linkage between general hygiene and the environment.

Proper ante-mortem and post-mortem inspections of these dogs are usually not carried out, thus the rabies status of the dogs are unknown. Clinical diagnosis of rabies in dogs meant for slaughter is difficult, yet brains of apparently healthy dogs brought to be slaughtered have tested positive to rabies (Aliyu et al., 2010). The presence of these rabies carriers predisposes the butchers to rabies (Mshelbwala et al., 2013; Hambolu et al., 2013).

Plate 1 Slaughtering/Handling of a dog that tested positive to rabies using bare hands (Source: S. W. Audu, 2011).
Rabies can be transmitted through contact (mucous membranes and open wounds) with infected saliva (Aghahowa & Ogbevoen, 2010). Sick and emaciated dogs as well as healthy dogs are usually brought to the market for butchering and this type of infected meat reached to different local food sellers where they are served with meals. Butchers usually use bare hands during the slaughtering process of the dogs (Plate 1). With this Butchers are usually prone to bites and scratches from dogs to be slaughtered, thus making them at risk of contracting rabies. Mshelbwala et al. (2013) reported that 94.7% of the butchers in Abia State, Nigeria are usually exposed to dog bite during the slaughtering, of which 72.7% sought traditional medical intervention while only 27.8% reported to the hospital. Ekanem et al. (2013) also found that most of the bite victims visit to quacks who know little or nothing about rabies Post-Exposure-Propylaxis treatment. The level of awareness of the butchers about rabies is also very low and usually there are no previous vaccinations against the disease (Mshelbwala et al., 2013).

Previous work done in Cross River and Abia States of Nigeria well reported that deaths of dog butchers and close relatives especially children as a result of rabies (Ekanem et al., 2013; Mshelbwala et al., 2013). It has also been reported in Vietnam that two butchers died of rabies after slaughtering rabid animals. The first butcher died two months after he removed the teeth of the suspected dog, crushed by a vehicle, singed its hide, then opened up the skull to remove the brain by wearing hand gloves (Wertheim et al., 2009). The second butcher died after butchering a cat that has been sick for three days, and he also singed the cat’s hide and then removed the brain without wearing protective gloves. In these two cases, the former wore hand gloves but no other protective gears including eye goggles and aprons was taken, while the latter did not wear any gear. In both cases, all the people who ate out of the meat (dog and cat), did not contract rabies, except the two butchers (Wertheim et al., 2009). Currently, in many of these countries, the extent to which the slaughter of dogs contributes to the spread of the rabies virus to the environment, to other live dogs and humans is unknown. An in-depth study on the relationship between dog slaughtering and transmission of rabies may further shed light to present understanding on the role of dog meat in rabies epidemiology. Although the consumption of dog meat does not actually lead to the contraction of the disease by the individuals who eat the meat (Garba et al., 2013), but the process of handling, catching, loading, transportation, holding, keeping in the cages post-transportation and actual process of slaughtering of the animals in many deplorable slaughter-houses in Nigeria, enhance the transmission of rabies virus within the other dogs and humans. Therefore, butchers are at risk during the slaughtering process of suspected rabid animals, especially if the process is carried out without any protective gears (Wertheim et al., 2009). The problem is compounded by the fact that proper modern method of slaughtering dogs is not being used. Incisions are made with ordinary knives or instruments that are inappropriate and contaminated, like knives and cutlasses, which may be in bad working condition and unsterilized (Garba et al., 2013). Such approaches are particularly critical and favourable to the spread of the virus, particularly during the harmattan season prevailing in Nigeria, when the spread of the virus may be facilitated through aerosol route. Most of the butchers working in the abattoirs are unkempt individuals, with little or no basic education and lacking fundamental knowledge of the public health importance of rabies (Garba et al., 2013). Public enlightenment is minimal or practically absents in remote rural communities and these factors further compound the measures to prevent the spread of the disease.

3 Recommendations

Awareness campaigns through mass media outlets and workshops (Dzikwi et al., 2011) should be carried out on the public health importance of rabies in relation to dog trading, slaughtering, butchering and consumption of dog meat. Transported dogs should have adequate vaccination history against rabies which must be well documented. The Nigeria government should ensure that the Veterinary control posts at the borders of the country and in each state are active. Thorough ante-mortem examination of the transported dogs must be carried out and stray dogs without history should be destroyed. Proper protective gears, including eye goggles, aprons and hand gloves should be worn by butchers during slaughtering of dogs. Butchers should ensure that all dog bites and scratches must be reported to the hospital for prompt medical interventions. Pre and Post exposure vaccination of the human population at risk should be carried out, including that of the butchers and their relatives, dog traders and the middlemen. This can be limited by the cost and unavailability of anti-rabies vaccine (Adeyemi et al., 2005), but three-doses of rabies vaccine administered intradermally has been found to be economical, safe and has a long lasting immunity (Gautret & Parola, 2012; Soentjens et al., 2013; Carrara et al., 2013). Mass vaccination of dogs is still the best approach for the control and eradication of rabies in Nigeria. The government should subsidize the cost of rabies vaccines to make it affordable for dog owners (Awoyomi et al., 2007) and ensure continuous production of rabies vaccines using rabies virus strains resident in Nigeria.

4 Concluding Remarks

In conclusion, dog trading, slaughtering, and consumption may play a very important role in the epidemiology of human rabies in Nigeria and most developing countries. Mass vaccination of dogs remains the most effective method of control and eradication of rabies in Nigeria.

References


Frederick JS (1994) Eat not this flesh: Food avoidances from prehistory to the present. In University of Winsconsin Press Pp 229.


Zulu GC, Sabela CT, Nel LH (2009) Molecular epidemiology of rabies focus on domestic dogs (Canis familiaris) and black-backed jackals (Canis mesomelas) from northern South Africa. Virus Research, 140: 71-78.