

Case Report



A Case of Fatal Rabies in a Donkey in Dawakin Tofa, Kano State, Nigeria

SALISU ALI ALHASSAN¹, BASHIRU GARBA^{2*}, BALA BELLO¹, SULEIMAN MUSA¹, MUKHTAR KABIR ALI¹, YAHAYA TANKO³, YUSHAU UMAR⁴, BASHIR SAIDU⁵

¹Department of Veterinary Services, Ministry of Agriculture and Natural Resources, Kano, Kano State, Nigeria;

²Department of Veterinary Public Health & Preventive Medicine, Faculty of Veterinary Medicine, Usmanu Danfodiyo University Sokoto. Sultan Abubakar Road, City Campus Complex. 840212, Sokoto, State Nigeria; ³Epidemiology Unit, Federal Ministry of Agriculture & Rural Development, Kano, Kano State, Nigeria; ⁴Sovet International Company Limited, Kano, Kano State, Nigeria; ⁵Department of Veterinary Physiology & Biochemistry, Faculty of Veterinary Medicine, Usmanu Danfodiyo University Sokoto. Sultan Abubakar Road, City Campus Complex. 840212, Sokoto State, Nigeria.

Abstract | This article presents a rare case of rabies in an 11-year-old male Auraki breed donkey (*Equus asinus*) from Dawakin Tofa Town, Kano State, Nigeria. The donkey was said to have been bitten by a stray rabid dog. Twelve days after the bite, the animal started exhibiting signs of colic, restlessness, grunting sound, recumbency, biting its legs and rubbing around udder against objects. The donkey died 22 days following the bites by the rabies affected stray dog; despite the intervention. The head of the donkey was severed and sent to the National Reference Laboratory. The diagnosis was confirmed by the detection of virus particles in the donkey's brain by the fluorescent antibody technique. For the other two donkeys attacked by the rabid donkey, no evidence of disease was observed upon examination. Rabies is a highly fatal viral infection affecting most mammalian species, including humans. This case further emphasises the importance of pre and post-exposure immunisation of dogs and the need for dog owners to vaccinate their dogs routinely against rabies so as to limit the risk of transmission to humans and other susceptible animals.

Keywords | Emerging zoonoses, Rabies, Dog bite, Donkey, Fluorescence antibody test, Nigeria

Editor | Asghar Ali Kamboh, Sindh Agriculture University, Tandojam, Pakistan.

Received | January 09, 2020; **Accepted** | March 01, 2020; **Published** | March 31, 2020

***Correspondence** | Bashiru Garba, Department of Veterinary Public Health & Preventive Medicine, Faculty of Veterinary Medicine, Usmanu Danfodiyo University Sokoto. Sultan Abubakar Road, City Campus Complex. 840212, Sokoto, State Nigeria; **Email:** garba.bashiru@udusok.edu.ng

Citation | Alhassan SA, Garba B, Bello B, Musa S, Ali MK, Tanko Y, Umar Y, Saidu B (2020). A case of fatal rabies in a donkey in Dawakin Tofa, Kano State, Nigeria. *J. Anim. Health Prod.* 8(1): 40-44.

DOI | <http://dx.doi.org/10.14737/journal.jahp/2020/8.1.40.44>

ISSN | 2308-2801

Copyright © 2020 Alhassan *et al.* This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Rabies is a highly fatal zoonotic disease associated with the central nervous system (WHO, 2018). The disease is considered a neglected viral infection with significant public health and veterinary importance (WHO, 2018). Like many emerging tropical diseases rabies has a worldwide distribution (Figure 1); however, the vast majority of human fatalities are reported in Africa and Asia (Hampson *et al.*, 2015; WHO, 2018). Infected dogs cause the vast majority of rabies cases, and the rural poor communities suffer the most from the disease,

with 50% of cases occurring in children (WHO, 2018). Infection is caused by the rabies virus, of the Lyssavirus genus, belonging to the *Rhabdoviridae* family (Seetahal *et al.*, 2017). For the most part, domestic dogs are the most important reservoir of infection to both humans and other susceptible mammalian species. Nonetheless, in other parts of the world, the virus mostly circulates among wild animals such as bats, raccoons, and other wild carnivores (Velasco-Villa *et al.*, 2008).

Rabies is traditionally transmitted when virus-laden saliva from a rabid animal gets in contact with a wound, damaged

skin from scratches, or by direct contact of mucosal surfaces to the saliva of an infected animal (Ngugi et al., 2018). It is important to note that the virus cannot infiltrate an intact skin, hence the reason why most cases result from animal bites (Gautret et al., 2015; Ngugi et al., 2018). Upon gaining access into the body, the virus migrates to the brain, where it replicates, and exerts its detrimental effect (Ngugi et al., 2018). The clinical manifestations in both humans and animals vary depending on the form of infection that ensued (the furious or dumb rabies). However, furious rabies is the most common form of human rabies, accounting for approximately 80% of cases (WHO, 2018).

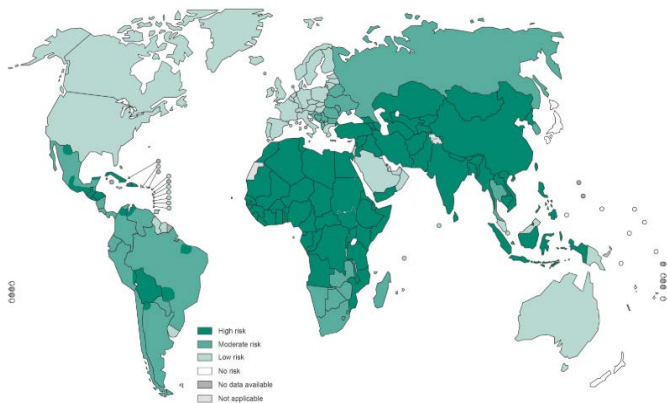


Figure 1: Global distribution of high-risk locations for human rabies (WHO, 2018).

Although rabies in horses and donkeys infrequently occur worldwide, the disease still represents a significant cause of mortality in many parts of the world (Green, 1993). Similarly, the transmission of rabies from an infected donkey or horse to humans and other susceptible mammalian species appears to be rare (Green, 1993). Nonetheless, the risk of exposure to a rabid animal is undoubtedly significant, especially in African and Asian countries where the disease is poorly controlled (Gautret et al., 2015). As soon as clinical signs of rabies begin to manifest, the donkey invariably dies within a few days (Carrieri et al., 2006; Quiambao et al., 2009). Clinical manifestations usually include; agitation, depression and occasionally colic. Donkeys with rabies pose a considerable risk to their handlers because the virus-laden saliva from an infected animal can potentially transmit the disease to a person. Unfortunately, no treatment exists for the disease. Despite the broad understanding of the pathophysiology and epidemiology of rabies, the disease is still considered a zoonosis with the highest case fatality (Seetahal et al., 2017).

STATUS OF RABIES IN NIGERIA

Since the first case report of rabies about eight decades ago, rabies has remained a persistent endemic problem in Nigeria with over 10,000 human cases being reported annually (NCDC, 2017). Rabies constitutes a serious

public health problem in Nigeria because the rabies viral antigens have been routinely detected in brain tissues of healthy dogs as well as other domestic animal species, including primates, equine species as well as cats, and cows (Oduye and Aghomo, 1985). In Nigeria, the dog is the most popular source of infection (Ojo et al., 2016; Audu et al., 2019). However, raccoons, skunks, bats and foxes serve as the major sylvatic reservoirs in the United States and Canada (Green, 1993). Nonetheless, spillover infection from sylvatic reservoirs to domestic livestock and horses, especially during enzootic outbreaks is also common (Hikufe et al., 2019). Surveillance data from the Nigerian Center for Disease Control (NCDC) indicates that the disease is endemic in almost all the six geopolitical zones of the country, though, states that patronise dog meats as a delicacy is at a higher risk of infection (NCDC, 2017). Therefore, in order to successfully curb the menace of this deadly disease and improve the productivity of livestock, serious efforts and measures need to be put in place to control stray dog population and enforce the routine practice of vaccination by pet dog owners.

RISK FACTORS

In Nigeria, it is estimated that 55 000 people die annually as a result of rabies, with rabid dogs accounting for about 94% of confirmed human infection (WHO, 2019). The importance of dogs in the transmission of infectious diseases among the human population cannot be overemphasised (Bashiru and Bahaman, 2018; Garba et al., 2018b). Although dogs are the most important source of infection, other domestic animals, including horses and donkeys, could pose a significant risk to their owners. In recent years, there has been an increase in the incidence of rabies infections in horses and other livestock (Gizachew et al., 2012; Gill et al., 2019). Traditionally, donkeys contract rabies through the bite of an infected (rabid) animal. More so, bites typically occur on the face, muzzle, or lower limbs. In most cases, exposures are not noticed, and most bite wounds are not found (Quiambao et al., 2009). Further, the practice of keeping horses in barns or tied to a leash may increase their risk of infection when a rabid animal wandered to their vicinity (Ojo et al., 2016).

On the other hand, factors that may predispose to risk of acquiring human rabies include; travelling to or living in countries where rabies is endemic with feeble control measures, especially in African and Southeast Asian countries. Others are activities that result in direct contact with reservoir like wild or domestic animals that may be harbouring the rabies virus or working in laboratories with the rabies virus (Gautret et al., 2015; Ngugi et al., 2018). Occasionally, rabies cases in animals seem to also assume seasonality with a higher number of cases being recorded during the wet season, while at the same time, socio-demographic, anthropogenic and environmental factors

also play significant roles (Dhand and Ward, 2012).

CASE PRESENTATION

On the 22nd of July 2019, an 11-year-old donkey was reported to have been bitten by an allegedly rabid dog (bitch) around the orbital region on its head. The donkey was reared along with two others and is mainly used for labour. The case was reported in Dawaki Town, Dawakin Tofa Local Government, Kano State, Nigeria. Following the attack, the owner did not report to the District Veterinary Clinic but instead used traditional herbs to treat the wound site. Twelve days later (the 3rd of August 2019), the owner noticed that the donkey starts coughing and exhibiting some abnormal behaviour with increased aggression (Figure 2) and occasionally attacking the two other donkeys kept together in the same stable. As a result, the owner notified a Veterinary Assistant who came and administered medication for the cough (Tylosin inj. 10 ml IM; Dexamethasone Inj. 10 ml IM; Albendazole Suspension, 40 ml PO-Stat).



Figure 2: Showing the rabid donkey biting and mutilating its limb.

With the deterioration of the health of the donkey despite the initial intervention, the owner invited another Veterinary Officer to review the case, and the following clinical manifestations were observed; foamy salivation, jerking, teeth grinding, laboured breathing, sternal recumbency and bleeding at the left fore-limb; as a result of self-mutilation. While further information was being gathered and discussion on the next line of action, the donkey died on the 15th of August 2019.

Upon further clarification that the dog that bit the donkey was suspected to be rabid and was killed and disposed by its owner, the head of the dead donkey was severed, packaged and sent to the rabies Reference Laboratory,

at the National Veterinary Research Institute (NVRI, Vom) Plateau State, Nigeria for confirmatory diagnosis. On 9 August, 2019, the result was received, and it confirmed that the donkey had rabies based on fluorescent antibody test (FAT), as recommended by both World Health Organization (WHO) and World Organization for Animal Health (OIE). Similarly, inquiries revealed that there was no human exposure from both the rabid dog and the infected donkey. However, the donkey was reported to have bitten the other two donkeys that were kept together, thus necessitating quarantine of the donkeys and observation for further two weeks. Upon receiving the report by the Zonal Veterinary Officer, the other two donkeys were acquired, euthanised and their heads sent for confirmation. On 16 October, 2019, the result indicated that the donkeys were negative to the rabies virus antigen.

DISCUSSION

Rabies is a highly fatal viral disease of humans and all other susceptible mammals. Majority of the cases follow rabid animal bites with dogs being the most popular culprit. Although, the infection does not cause a high number of death like Bubonic plague, Rinderpest and Anthrax, the high case fatality rate and the poor manner in which rabies manifests itself in infected humans and animals is a serious cause for concern to both veterinary health workers (Bishop et al., 2010). The actual status of rabies in Nigeria remains unclear following serological surveillance due to the circulating antibodies from the protection rendered to thousands of humans receiving pre-exposure and post-exposure treatment annually. This is in addition to the highly undiagnosed animal rabies cases. According to the Nigerian Center for Disease Control, rabies is an endemic disease occurring in both humans and animals throughout Nigeria, and has been reported to be responsible for the death of over 50, 000 people annually (WHO, 2019). Unfortunately, people continue to succumb to the disease as a result of the inability to afford the post-exposure treatment following dog bites (Audu et al., 2019).

This donkey rabies highlights several important issues that needed to be given serious consideration for successful control and prevention. Firstly, it is essential to clarify that we never had access to the suspect dog that bit the donkey in the first place. So, the conclusion that it is rabid was based on the clinical history of several unprovoked attacks, synonymous with rabid dogs, which prompted the owner to kill it. Upon completion of the incubation period, which may range from 12 to 180 days, the virus migrates from peripheral nerves at the bite site to the central nervous system. The speed at which it gets to the brain depends on the proximity of the bite sites to the head. At this stage,

the disease progresses rapidly, and the animal begins to manifest classic behavioural signs of rabies which include; viciousness or paralytic signs (Oduye and Aghomo, 1985). Furthermore, there is increased tendency for the infected dog to bite and attack at the slightest provocation, regardless of whether it is the owner or not. Unfortunately, in this case, the dog owner neither reported the abnormal behaviour he noticed from his dog nor took any action until the said attack. Ironically, about two months earlier, the Kano State Government had sponsored a free anti-rabies vaccination for all dog owners in the State, including Dawaki Town where the outbreak occurred. Even though rabies is a highly fatal infection, it is preventable with the timely and proper administration of rabies post-exposure prophylaxis (Green, 1993). Public enlightenment and efficient methods to increase awareness on the measure necessary for the prevention of rabies are critical components of successful control programmes (Hasanov et al., 2018). This is especially important considering the significant impact the disease has on health and socio-economic wellbeing of people. As earlier emphasised, public education is an integral part of rabies prevention. Public education on the prevention and control measures for rabies should highlight the need to avoid contact exposure to all potentially rabies-infected wildlife and susceptible domesticated animals (Ngugi et al., 2018). Secondly, rather than euthanising the dog and test for a possible notification, the dog was killed and buried. This could serve as a potential risk to the individuals who conducted the killing and burial. Additionally, there are high chances of other dogs and carnivores getting access to the dead carcasses, feasting on it thereby potentiating the transmission cycle.

It is commendable and worthy to appreciate the decisive intervention of the Veterinary Service Division for their promptness at the quarantine and subsequent interventions including the payment of incentive and acquiring the exposed donkeys to limit the dangers of further transmission. However, it is imperative also to highlight the need to educate veterinary assistants serving in villages on the best course of action in the event of suspected rabies case. Animal health professionals are equally crucial players in the control of rabies in animals through the execution of a well-planned and sustainable strategy toward control. In this regard, veterinary professionals can assist in educating animal owners on the dangers of rabies and the appropriate response following dog bites.

Any case of a dog bite, whether provoked or unprovoked should be treated as an emergency. Similarly, the practice of the often ineffective traditional medical intervention for the treatment of rabies cases should be discouraged and people better educated on the implication of such practice

with its potentially fatal outcomes as earlier reported by Audu et al. (2019). The implementation of public awareness measures such as education at sporting and outdoor events, visual arts, mass media, and vaccination campaigns can go a long way in achieving the desired goal of rabies prevention (Mshelbwala and Weese, 2017).

Finally, the provision of adequate anti-rabies vaccine and coverage will go a long way in curtailing exposure. The annual campaign should be preceded by holistic and wide-ranging publicity using TV, radios and other social media platforms to enlighten the public on the need to vaccinate their dogs. In the same vein, awareness by human medical professionals, as well as the provision of effective pre-exposure prophylaxis, should be recommended.

AUTHORS CONTRIBUTION

SAA, BB, and SM handled the case including follow up and subsequent decapitation of the dead donkey. MKA and YT handled the bureaucratic process as well as the filling of the relevant case report forms and documentations. BG, YU, and BS conducted the literature search, and developed the manuscript draft. All the authors were involved in the revision and criticism of the manuscript before the final draft was produced.

CONFLICT OF INTERESTS

The Authors have declared no conflict of interest.

REFERENCES

- Audu SW, Mshelbwala PP, Jahun BM, Bouaddi K, Weese JS (2019). Two fatal cases of rabies in humans who did not receive rabies postexposure prophylaxis in Nigeria. *Clin. Case Rep.* 7(4): 749–752. <https://doi.org/10.1002/ccr3.1972>
- Bashiru G, Bahaman AR (2018). Advances & challenges in leptospiral vaccine development. *Indian J. Med. Res.* 147(1): 15.
- Bishop GC, Durrheim DN, Kloeck PE, Godlonton JD, Bingham J (2000). Speare rabies advisory group. *Guide Med. Vet. allied Prof. Rabies.* [http://www.nicd.ac.za/assets/files/B5_rabies_revised_2010\(2\).pdf](http://www.nicd.ac.za/assets/files/B5_rabies_revised_2010(2).pdf).
- Carrieri ML, Peixoto ZMP, Paciencia MLB, Kotait I, Germano PML (2006). Laboratory diagnosis of equine rabies and its implications for human postexposure prophylaxis. *J. Virol. Methods.* 138(1–2): 1–9. <https://doi.org/10.1016/j.jviromet.2006.07.005>
- Dhand NK, Ward MP (2012) Anthropogenic and environmental risk factors for rabies occurrence in Bhutan. *Prevent. Vet. Med.* 107: 21–26.
- Garba B, Bahaman AR, Zakaria Z, Bejo SK, Mutalib AR, Bande F, Suleiman N (2018). Antigenic potential of a recombinant polyvalent DNA vaccine against pathogenic leptospiral infection. *Microb. Pathogen.* 124: 136–144.
- Gautret P, Harvey K, Pandey P, Lim PL, Leder K, Piyaphanee

- W, Parola P (2015). Animal-associated exposure to rabies virus among travelers, 1997–2012. *Emerg. Infect. Dis. Centers Dis. Contr. Prev. (CDC)*. 21(4): 569–577. <https://doi.org/10.3201/eid2104.141479>
- Gill GS, Singh BB, Dhand NK, Aulakh RS, Sandhu BS, Ward MP, Brookes VJ (2019). Estimation of the incidence of animal rabies in Punjab, India. Edited by U.G. Munderloh, *PLoS One*. 14(9): e0222198. <https://doi.org/10.1371/journal.pone.0222198>
 - Gizachew A, Endebu B, Pal M, Abdo J, Deressa F (2012). Spontaneously occurring fatal rabies in a donkey. *Int. J. Livest. Res. Pashupati Found. India*, 2(3): 109–111.
 - Green SL (1993). Equine Rabies. *Vet. Clin. North Am. Equine Pract. W.B. Saunders*, 9(2): 337–347. [https://doi.org/10.1016/S0749-0739\(17\)30400-5](https://doi.org/10.1016/S0749-0739(17)30400-5)
 - Hampson K, Coudeville L, Lembo T, Sambo M, Kieffer A, Attlan M, Barrat J, Blanton JD, Briggs DJ, Cleaveland S, Costa P (2015). Estimating the global burden of endemic canine rabies. *PLoS Negl. Trop. Dis.* Edited by M.S. Carvalho, 9(4): e0003709. <https://doi.org/10.1371/journal.pntd.0003709>
 - Hasanov E, Zeynalova S, Geleishvili M, Maes E, Tongren E, Marshall E, Horton DL (2018). Assessing the impact of public education on a preventable zoonotic disease: Rabies. *Epidemiol. Infect.* Cambridge Univ. Press. 146(2): 227–235. <https://doi.org/10.1017/S0950268817002850>
 - Hikufe EH, Freuling CM, Athingo R, Shilongo A, Ndevaetela EE, Helao M, Kabajani J (2019). Ecology and epidemiology of rabies in humans, domestic animals and wildlife in Namibia, 2011–2017. *PLoS Negl. Trop. Dis.* Edited by D.G. Streicker, 13(4): e0007355. <https://doi.org/10.1371/journal.pntd.0007355>
 - Mshelbwala PP, Weese JS (2017). Rabies in the developing world: Challenges and Prospects. *Cliniciansbrief.com* Available at: https://www.researchgate.net/publication/319494121_Rabies_in_the_Developing_World_Challenges_Prospects (Accessed: the 7th of November 2019).
 - Ngugi JN, Maza AK, Omolo OJ, Obonyo M (2018). Epidemiology and surveillance of human animal-bite injuries and rabies post-exposure prophylaxis, in selected counties in Kenya, 2011–2016. *BMC Publ. Health. BioMed. Central Ltd.*, 18(1): 996. <https://doi.org/10.1186/s12889-018-5888-5>
 - Nigerian Centre for Disease Control and Prevention (2017). Rabies: <https://ncdc.gov.ng/diseases/info/R>. accessed 28/8/2019
 - Oduye OO, Aghomo HO (1985). Epidemiology of Rabies in Nigeria. In *Rabies Trop.* Springer Berlin Heidelberg, pp. 491–496. https://doi.org/10.1007/978-3-642-70060-6_64
 - Ojo DT, Nwadike VU, Onyedibe KI, Kalu IE, Ojide K (2016). Rabies in Nigeria: A review of literature. *Afr. J. Clin. Expt. Microbiol.* 17(2): 159–163. <http://dx.doi.org/10.4314/ajcem.v17i2.12>
 - Quiambao BP, Dy-Tioco HZ, Dizon RM, Crisostomo ME, Teuwen DE. (2009). Rabies post-exposure prophylaxis with purified equine rabies immunoglobulin: One-year follow-up of patients with laboratory-confirmed category III rabies exposure in the Philippines. *Vaccine*. 27(51): 7162–7166. <https://doi.org/10.1016/j.vaccine.2009.09.036>
 - Seetahal J, Vokaty A, Carrington CV, Adesiyun AA, Mahabir R, Hinds AQ, Rupprecht CE (2017). The History of Rabies in Trinidad: Epidemiology and Control Measures. *Trop. Med. Infect. Dis.* MDPI AG. 2(3): 27. <https://doi.org/10.3390/tropicalmed2030027>
 - Tenzin D, Ward NK (2012). Anthropogenic and environmental risk factors for rabies occurrence in Bhutan, Preventive Veterinary Medicine. Available at: <http://www.sciencedirect.com/science/article/pii/S0167587712001420> (Accessed: the 7th of November 2019).
 - Velasco-Villa A, Reeder SA, Orciari LA, Yager PA, Franka R, Blanton JD, Zuckero L, Hunt P, Oertli EH, Robinson LE, Rupprecht CE (2008). Enzootic rabies elimination from dogs and reemergence in wild terrestrial carnivores, United States. *Emerg. Infect. Dis.* 14(12): 1849–1854. <https://doi.org/10.3201/eid1412.080876>
 - WHO, (2018). Epidemiology and burden of disease *WHO*. World Health Organization.
 - WHO, Regional Office for Africa (2019). Nigeria joins the world in raising awareness on Rabies. Available at: <https://www.afro.who.int/news/nigeria-joins-world-raising-awareness-rabies> (Accessed: the 7th of November 2019).