Journal of Advanced Veterinary and Animal Research
ISSN 2311-7710 (Electronic)
http://doi.org/10.5455/javar.2017.d212
A periodical of the Network for the Veterinarians of Bangladesh (BDvetNET)

June 2017
Vol 4 No 2, Pages 222-226.

Short Communication

Seroepidemiological survey of bovine brucellosis in selected Fulani Herds in Kwara State, Nigeria

Julius Olaniyi Aiyedun[1], Oladapo Oyedeji Oludairo[1,#], Isaac Dayo Olorunshola[2], Nathan Ahmadu Furo[3], Francis Rotimi Olowoleni[4], Mohammed Adam[5] and Shodeinde Vincent Olu Shoyinka[5]

• **Received:** Dec 4, 2016 • **Revised:** May 2, 2017 • **Accepted:** May 10, 2017 • **Published Online:** May 27, 2017

AFFILIATIONS

[1]*Department of Veterinary Public Health and Preventive Medicine, Faculty of Veterinary Medicine, University of Ilorin, Nigeria.*

[2]*Department of Veterinary Microbiology, Faculty of Veterinary Medicine, University of Ilorin, Nigeria.*

[3]*Department of Veterinary Medicine, Faculty of Veterinary Medicine, University of Ilorin, Nigeria.*

[4]*Veterinary Teaching Hospital (VTH), Faculty of Veterinary Medicine, University of Ilorin, Nigeria.*

[5]*Department of Veterinary Pathology, Faculty of Veterinary Medicine, University of Ilorin, Nigeria.*

CORRESPONDENCE:

[#] Oladapo Oyedeji Oludairo, *Department of Veterinary Public Health and Preventive Medicine, Faculty of Veterinary Medicine, University of Ilorin, Nigeria.*
E-mail: olaaiyedun@yahoo.com; oludairo@hotmail.com

ABSTRACT

Objective: Brucellosis is a bacterial zoonotic disease caused by members of the genus *Brucella*. It causes economic loss and ill health among animals and humans. This study was conducted to determine the prevalence of brucellosis in cattle particularly in White Fulani breed of cattle in Kwara State, Nigeria.
Materials and methods: A total of 120 blood samples were collected randomly from the cattle in Kwara State of Nigeria. Sera were separated from the blood samples. The serum was used for the identification of antibodies against *Brucella* present in it. Three screening tests namely Bovine Brucella Antibody Test (BBAT; ImmunoComb[R]), Rose Bengal Plate Test (RBPT) and Serum Agglutination Test (SAT) were used for the identification purpose.
Results: Based on BBAT, 13.3% (n=16/120) cattle were positive for brucellosis. Similary, 14.2% (n=17/120) and 3.3% (n=4/120 cattle were found to be positive for RBPT and SAT, respectively. The affected cattle were mainly of White Fulani breed with few cross-bred.
Conclusion: Results of this study indicates that brucella antibody is circulating in cattle examined in the study area. This calls for urgent public health intervention and routine screening of other domestic animals as well.

KEYWORDS

Bovine brucellosis; Fulani herd; Seroepidemiology; Zoonosis

How to cite: Aiyedun JO, Oludairo OO, Olorunshola ID, Furo NA, Olowoleni FR, Adam M, Shoyinka SVO (2017). Seroepidemiological survey of bovine brucellosis in selected Fulani Herds in Kwara State, Nigeria. Journal of Advanced Veterinary and Animal Research, 4(2): 222-226.

INTRODUCTION

Brucellosis is a zoonotic disease that seriously affects animal health, public health and international trade. The disease poses a formidable threat to profitable livestock production through decreased milk production, weight loss, loss of young ones, infertility and lameness (Ross et al, 1994; Muriuki et al., 1997; Godfoid et al., 2005). The disease can be transmitted to human causing "Undulant Fever". Brucellosis in animals and humans has since been identified as an important problem in many countries like Nigeria (Falade et al., 1995), Sudan (Elhassan et al., 2015; Ebrahim et al., 2016), Iran (Gharekhani et al., 2016), Kwuait (El-Gohary et al., 2016) and India (Mohamand et al., 2014).

Bovine brucellosis is usually caused by *Brucella abortus*, less frequently by *B. melitensis* and occasionally by *B. suis* (El-Gohary et al., 2016). Brucellosis was first diagnosed in human in 1887 (Ocholi et al., 2004). The infection is common in countries that do not have effective public health and domestic animal health program such as in most countries of Asia, Africa, The Caribbean, Mexico, South and Central America, Middle East and The Mediterrean. It is a rare disease in the USA, Israel, UK, Australia and South Africa because of successful implementation of effective animal disease control programs (Ocholi et al., 2004).

Brucellae are Gram-negative coccobacilli or short rods with straight or slightly convex in shape, and rounded ends. The genus *Brucella* comprises of six classical species namely *B. abortus B. melitensis, B. suis, B. ovis, B.canis,* and *B. neotomae*. Seven biovars are recognized for *B. abortus*, three for *B. melitensis* and five for *B. suis*. *B. abortus, B. melitensis, B. suis*, and *B. neotomae* generally occur in smooth form, while *B. ovis* and *B. canis* are invariable rough species (Nielsen et al., 2004). The other four non-classical documented *Brucella* isolates are *B. ceti, B. pinnipedialis* (Sohn et al., 2003; Foster et al., 2007), *B. microti* (Scholz et al., 2008) and *B. inopinata* (De et al., 2008; Scholz et al., 2009).

Brucellosis is commonly transmitted to susceptible animal by direct or indirect contacts (Esuruoso, 1974). Aborted fetus, placental membrane, vaginal discharge or other fluid present after an infected animal has aborted or calved may be contaminated with *Brucella* organism. Another source of infection is through an infected bull during normal service or artificial insemination, excretion through the colostrum and uterine discharges. Also, wild animals infected with brucellosis can transmit the disease to domestic livestock population (Davis et al., 1990; Schelling et al., 2003).

The incubation period of brucellosis could be 2 weeks to 1 year or longer. The most obvious signs in pregnant animal are abortion or birth of weak calves, reduction in milk production, delayed conception; not all infected cows abort but those that do usually abort between the fifth and seventh month of pregnancy. Other signs include lower fertility with poor conception rates, retained placenta and arthritis. In brucellosis, the affected animal remains as carrier for life (Bale et al., 2010).

Knowledge on prevalence of brucellosis is of paramount importance as far as public health is concerned (Bale et al., 2010). This study gathered current information to contribute in understanding the epidemiology of brucellosis. Also, findings from this study will be used to recommend some forms of community intervention to minimize the health problem associated with brucellosis in both humans and animals. Based on the results of this study, the prevalence of brucellosis in Kwara State could be clarified and would primarily help to create awareness to livestock officers, livestock keepers and to the community people.

This study was conducted with the general objective of establishing the status of bovine brucellosis in Kwara State, North-Central Zone, Nigeria. Provide inputs for evidence-based disease control in the country as it relates to brucellosis. This study investigated the prevalence of brucellosis in cattle and determined the current status of bovine brucellosis in Kwara State. This study will improve the understanding of the epidemiology of bovine and human brucellosis in Kwara State, Nigeria.

MATERIALS AND METHODS

Ethical statement: The experiments were conducted as per the guidelines of American Veterinary Medical Association providing minimal discomfort to the animals during blood collection.

Study area: The study was conducted in Kwara State, North-Central Zone, Nigeria, an area lying between latitude 8°25'N to 8°32'N and longitude 4°30'E to 4°41'E. The area is closer to the confluence of the rivers Niger and Benue, the two rivers that demarcate the Northern and Southern regions of Nigeria (Olorunfemi and Odita, 1998). Ilorin the state capital has a small industrial activity base and the inhabitants are predominantly civil servants or small business operators. The city is 50.2 Km in area and is situated approximately 420 Km from Federal Capital Territory. It is strategically located as the gateway between the Southern and Northern areas of the country which makes it easily accessible to all parts of the country by air, road and rail transportation (Aiyedun, 2011).

Table1: Distribution of sampled cattle with respect to sex and breed of cattle in the study area.

Parameters		Number (%)
Sex	Male	22 (18.3)
	Female	98 (81.7)
Total		120 (100)
Breed	White Fulani cattle	113 (94.2)
	Cross-breed	7 (5.8)
Total		120 (100)

Sampling method and specimen collection: Necessary consent from the owner was obtained before collecting data from the selected Fulani herds. 10% of the herd size was randomly screened in each farm for this study. Approximately 10 mL of blood was collected aseptically from the jugular vein of properly restrained animal using sterile needle and vacutainer tubes. On each farm, blood was collected randomly from cattle aging equal or >1 year old. The samples were left at room temperature overnight to allow clotting for serum separation. Serum was collected from the vacutainer tubes using a disposable plastic Pasteur pipette, dispensed to an Eppendorf tube and stored in a cool-box in the field. Eppendorf tubes were then stored in the freezer at -20°C.

Bovine brucella antibody test (BBAT): The commercially available Bovine Brucella Antibody Test Kit (Catalog number: 50BBA103) was obtained from Biogal Laboratories UK. The test was performed as per the procedures/protocols indicated by the manufacturer.

Rose Bengal plate test (RBPT): The test was performed by placing one drop (0.03 mL) of antigen on each square of hand rule enamel strip. One drop (0.03 mL) of the serum sample was placed alongside the antigen. The antigen and serum were thoroughly mixed using sterile tooth pick. The enamel strip was placed on the rocking machine for 4 min. The test was examined for agglutination. A known positive and negative sera were included in the test. The result was either negative (no agglutination) or positive (agglutination). Positive reaction was also considered as either weak or strong based on the degree of agglutination (Mousa et al., 1988; Godfoid et al., 2010).

Serum agglutination test (SAT): 0.5 mL of phenol saline was dispended each into five test tubes and 0.3 mL of serum sample was added and mixed gently without making any froth. 0.5 mL was transferred from the first tube to the next test tube and carried on to the last test tube, finally 0.5 mL was discarded from the last tube. It was incubated at 37°C for 20 h. The standard positive and negative tests were set up along with the test sera, and finally the degree of agglutination in each tube was read (Kozukeev et al., 2003).

RESULTS AND DISCUSSION

Based on BBAT, 13.3% (n=16/120) cattle (5 males and 11 females) were positive for brucellosis. Similary, 14.2% (n=17/120) and 3.3% (n=4/120 cattle were found to be positive for RBPT and SAT, respectively (**Table 2**). The cattle were mainly of White Fulani breed with few cross-bred.

Table 2: The distribution of *B. abortus* antibody in cattle in the study areas using BBAT(Immunocomb), RBPT and SAT.

Test	Interpretation	Result (%)
BBAT	Positive	16 (13.3)
	Negative	104 (86.7)
RBPT	Positive	17 (14.2)
	Negative	103 (85.8)
SAT	Positive	4 (3.3)
	Negative	116 (96.7)

North-Central zone (*i.e.*, Kwara State) of Nigeria is the hub for movement of cattle. Cattle moved through this zone downward during dry season to southern part of the country and upward to the northern states during rainy season. Due to this movement, the North-Central geo-political zone is peculiar for harbouring some zoonotic diseases. In some previous studies in Nigeria, serological prevalence of brucellosis varied between 0.20% and 79.70% (Bale et al., 2010). This variation might be due to difference in time and location.

The prevalence of brucellosis in screened cattle in Kwara State was 13.3% (n=16/120); this finding was higher as compared to previous reports in the neighbouring areas such as Ibadan, Oyo State that had 5.82% (Cadmus et al., 2006) and Ogun State with 6.28% (Talabi et al., 2013), but lower than 25% reported in Sokoto, Nigeria by Junaidu et al. (2008). These findings showed that the prevalence of the disease increased over the years. The movement of animals between herds may act as an important factor for brucellosis in many regions of the world (Abbas and Agab, 2002; Al-Majali et al., 2009). The mixing of cattle either through sharing or grazing at water point is an important factor for transmission of brucellosis (Muma et al., 2007; Al-Majali et al., 2009).

The prevalence could not reflect the past or present exposure to *Brucella* organisms because vaccination against brucellosis using *B. abortus* S19 was not previously

practiced. However, positive tests for *Brucella* antibodies does not necessarily mean that the animals have current or active infection at the time of sampling. It may be a result of past infection resulting in a "*self-limiting disease*". This showed that cattle indiscriminately roamed from one area to the other in search of pasture on a daily basis predisposes them to diseases including brucellosis. Also, stress and inadequate water encourages the animal to come down with diseases. The fundamental reason for the high prevalence recorded in this study may be connected with nomadic nature of the pastoral Fulanis, poor farm management and biosecurity practices in the North-Central geopolitical zone. Although female White Fulani cattle showed as positive animals mostly, sex may not have any role in the results obtained because majority of tested animals were of this type.

CONCLUSION

This study confirms that brucellosis particularly bovine brucellosis is prevailing among Fulani herds in Kwara State, Nigeria. Being a zoonotic infection, brucellosis may make an occupational hazard to the cattle farmers and other related personnel. Appropriate actions should be taken by the government and other private bodies considering routine screening, awareness and education.

ACKNOWLEDGEMENT

Prof. SVO Shoyinka graciously financed the work. Mr M Bolaji of the Clinical Pathology Laboratory, Department of Veterinary Pathology, University of Ilorin helped in the analyses of the samples. Contribution of Dr. (Mrs) Adesiji in this research is accordingly acknowledged.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

AUTHORS' CONTRIBUTION

Sampling and field works were carried out by JOA, OOO, IDO, NAF and FRO, while the write up and logistics were provided by MA and SVOS. All the authors read and approved the final version of the manuscript.

REFERENCES

1. Abbas B, Agab H (2002). A review of camel brucellosis. Preventive Veterinary Medicine, 55: 47-56. https://doi.org/10.1016/S0167-5877(02)00055-7
2. Aiyedun JO (2011). Epizootiology of canine rabies in Ilorin, Nigeria. PhD Thesis, Department of Veterinary Public Health and Preventive Medicine, University of Ibadan, Nigeria; pp 247.
3. Al-Majali AM, Talafha AQ, Ababneh MM (2009). Seroprevalence and risk factors for bovine brucellosis in Jordan. Journal of Veterinary Science, 10: 61-65. https://doi.org/10.4142/jvs.2009.10.1.61
4. Bale JO, Nuru S, Addo PB (2010). Serological study of sheep and goat brucellosis in Northern Nigeria. Bulletin of Animal Health and Production in Africa, 30: 73-79.
5. Cadmus SIB, Ijagbone IF, Oputa HE, Adesokan HK, Stack JA (2006). Serological survey of Brucellosis in livestock Animal and Workers in Ibadan, Nigeria. African Journal of Biomedical Research, 9: 163-168. http://dx.doi.org/10.4314/ajbr.v9i3.48900
6. Davis DS, Templeton JW, Ficht TA, Williams JD, Kopec JD, Adams LG (1990). *Brucella abortus* in captive bison. Serology, bacteriology, pathogenesis and transmission to cattle. Journal of Wildlife Disease, 26: 360-371. https://doi.org/10.7589/0090-3558-26.3.360
7. De BK, Stauffer L, Koylass MS, Sharp S, Gee JE, Helsel LO, Steigerwalt AG, Vega R, Clark TA, Daneshvar MI, Wilkins PP (2008). Novel *brucella* strain (BOI) associated with a prosthetic breast implant infection. Journal of Clinical Microbiology, 46: 43-49. https://doi.org/10.1128/JCM.01494-07
8. Ebrahim WOM, Elfadil AAM, Elgadal AA (2016). Seroprevalence and risk factors of anti-brucella antibodies in cattle in Khartoum State, the Sudan. Journal of Advanced Veterinary and Animal Research, 3(2): 134-144. https://doi.org/10.5455/javar.2016.c141
9. El-Gohary A, Abdelkhalek A, Mohamed A, Al-Sherida Y (2016). Seroprevalence of brucellosis and typing of Brucella melitensis biovar 2 in lactating cows in Kuwait. Journal of Advanced Veterinary and Animal Research, 3(3): 229-235. https://doi.org/10.5455/javar.2016.c159
10. Elhassan AM, Fadol MA, Elfahal AMA, El Hussein ARM (2015). A cross sectional study on reproductive health disorders in dairy cattle in Sudan. Journal of Advanced Veterinary and Animal Research, 2(2): 101-106. https://dx.doi.org/10.5455/javar.2015.b57
11. Esuruoso GO (1974). Bovine brucellosis in Nigeria. Veterinary Record, 95: 54-58. https://doi.org/10.1136/vr.95.3.54
12. Falade S, Nwufoh JK, Nmezi LY (1995). Brucellosis in investigation in selected herds in Oyo state, Nigeria. Bulletin of Animal Health and Production in Africa, 29: 197-201.
13. Foster G, Sterman BS, Godfroid J, Jacques L, Cloeckaerf A (2007). *Brucella ceti* sp. nov. and *Brucella*

pinnipedialis sp. nov. for *Brucella* strains with cetaceans and seals as their preferred hosts. International Journal of Systematic and Evolutionary Microbiology, 57: 2688-2693. https://doi.org/10.1099/ijs.0.65269-0
14. Gharekhani J, Rasouli M, Abbasi-Doulatshahi E, Bahrami M, Hemati Z, Rezaei A, Shahreiari A (2016). Sero-epidemiological survey of brucellosis in small ruminants in Hamedan province, Iran. Journal of Advanced Veterinary and Animal Research, 3(4): 399-405. https://doi.org/10.5455/javar.2016.c179
15. Godfoid J, Nielsen K, Saegerman C (2010). Diagnosis of brucellosis in livestock and wildlife. Croatian Medical Journal, 51: 296-305. https://doi.org/10.3325/cmj.2010.51.296
16. Godfoid JA, Cloeckaert JP, Liautard S, Kohler, D, Fretin K, Walrans B, Letesson JJ (2005). From the discovery of the malta fevers agent to the discovery of marine mammals reservoir. Veterinary Research, 36: 313-326. https://doi.org/10.1051/vetres:2005003
17. Junaidu AU, Oboegbulem S, Salihu MD (2008). Seroprevalence of Brucellosis in Prison Farm in Sokoto, Nigeria. Asian Journal of Epidemiology, 1: 24-28. https://doi.org/10.3923/aje.2008.24.28
18. Kozukeev TB, Ajeilat S, Maes E, Favorov M (2003). Risk factors in brucellosis. Morbidity and Mortality, 55: 31-34.
19. Mohamand N, Gunaseelan L, Sukumar B, Porteen K (2014). Milk Ring Test for spot identification of Brucella abortus infection in single cow herds. Journal of Advanced Veterinary and Animal Research, 1(2): 70-72. https://dx.doi.org/10.5455/javar.2014.a8
20. Mousa AM, Elhag KM, Khogali M, Marafie AA (1988). The nature of human brucellosis in Kuwait: Study of 379 cases. Review Infectious Disease, 10: 211-217. https://doi.org/10.1093/clinids/10.1.211
21. Muma JB, Samui KL, Oloya J, Munyeme M, Skjerve E (2007). Risk factors for brucellosis in indigenous cattle reared in livestock-wildlife interface areas of Zambia. Preventive Veterinary Medicine, 80: 306-317. https://doi.org/10.1016/j.prevetmed.2007.03.003
22. Muriuki SMK, McDermott J, Arimi SM, Mugambi JTM, Wamola IA (1997). Criteria for better detection of brucellosis in the Narok District of Kenya. East African Medical Journal, 74: 317-320.
23. Nielsen K, Smith P, Widdison J, Gall D, Kelly L, Kelly W, Nicoletti P (2004). Serological relationship between cattle exposed to *Brucella abortus*, *Yersinia enterocolitica* O:9 and *Escherichia coli* O157:H7. Veterinary Microbiology, 100: 25-30. https://doi.org/10.1016/j.vetmic.2003.12.010
24. Ocholi RA, Kwaga JKP, Ajogi I, Bale JO (2004). Phenotypic characterization of *Brucella* strain isolated from livestock in Nigeria. Veterinary Microbiology, 103: 47-53. https://doi.org/10.1016/j.vetmic.2004.06.012
25. Olorunfemi JF, Odita CO (1998). Land use and solid waste generation in Ilorin, Kwara State Nigeria. The Environmentalist, 18: 67-75. https://doi.org/10.1023/A:1006614206361
26. Ross HM, Foster G, Reid RJ, Jahans KL, Macmillan AP (1994). Brucella species infection in sea-mammals. Veterinary Record, 134: 359-365. https://doi.org/10.1136/vr.134.14.359-b
27. Schelling E, Diguimbaye C, Daoud S, Nicolet J, Boerlin P, Tanner M, Zinsstag J (2003). Brucellosis and Q-fever seroprevalences of nomadic pastoralists and their livestock in Chad. Preventive Veterinary Medicine, 61: 279-293. https://doi.org/10.1016/j.prevetmed.2003.08.004
28. Scholz HC, Hubakki Z, Sedlacek L, Vergnaud G, Jomaso H, Al Dahoukk S, Melzeu F, Kampter P, Neubauer H, Cloeckaert A, Maquart M, Zygmunl MS, Hubeu B, Busse HJ, Ndckler K (2008). *Brucella microti* specie now; isolated from the common vole (*Microlu sarvalis)*. International Journal of Systematic and Evolutionary Microbiology, 58: 375-382. https://doi.org/10.1099/ijs.0.65356-0
29. Scholz HC, Nockler K, Gollner C, Bahn P, Vergnaud G, Tomaso H, Al Dohouk S, Pfeffev M, Huber B, Busse O, De BK (2009). *Brucella Inopinata* species Nov. Isolated from a breast implant infection. International Journal of Systematic Evolution of Microbiology, 60: 49-57.
30. Sohn AH, Probert WS, Glasser CA (2003). Human neurobrucellosis with intracerebral granuloma caused by a Marine mammal *brucella* specie. Emerging Infectious Diseases, 9: 485-488. https://doi.org/10.3201/eid0904.020576
31. Talabi AO, Oyekunle MA, Agbaje IK, Oyewusi IK, Otesile EB, Bankole OA (2013). Serological survey of brucellosis in food animals in Ogun State, Nigeria. Bulletin of Animal Health and Production in Africa, 60: 181-185.

****