Research Article

Evidence of Brucella Antibodies in Milk of Cows in the North Senatorial District of Kaduna State, Nigeria

Hajarah Uwale Buhari[1*], Shehu Naallah Alhaji Saidu[2], Garba Mohammed[3], Mashood Abiola Raji[4]

[1]Samaru College of Agriculture, Division of Agricultural Colleges; [2]Department of Veterinary Medicine; [3]Veterinary Teaching Hospital; [4]Department of Veterinary Microbiology, Ahmadu Bello University, Zaria, Nigeria.

Abstract | In view of the socio-economic and cultural roles played by cow milk in Nigeria, a study was carried out to determine the status of bovine brucellosis in the North Senatorial District of Kaduna State, Nigeria. Six Local Government Areas (LGAs) from the North Senatorial District of Kaduna State were selected for the study. A total of 202 milk samples from apparently healthy lactating cows were collected and subjected to the Milk Ring Test (MRT) between the Months of July, 2013 and January, 2014. From the 202 samples subjected to the MRT, 77 (38.1%) were positive while 125 (61.9%) tested negative. The highest prevalence was obtained from Kubau LGA (54.8%) while the least prevalence of 20.0% each was obtained from Ikara and Makarfi LGAs respectively. There was, however, no statistical significant difference in the prevalence rates between LGAs. The high prevalence of Brucella antibodies in the milk of sampled cattle indicates the great public health risk posed to humans in the study area to infection with Brucella spp. Stake holders in the livestock sector should be educated on the public health implication of the disease in other animal species and humans.

Keywords | Brucella, Brucellosis, Milk Ring Test, Antibodies, Cows

Editor | Muhammad Abubakar, National Veterinary Laboratories, Islamabad, Pakistan.
Received | March 03, 2015; **Revised** | April 10, 2015; **Accepted** | April 12, 2015; **Published** | May 07, 2015
***Correspondence** | Hajarah Uwale Buhari, Ahmadu Bello University, Zaria, Nigeria; **Email:** buharihajarah@gmail.com
Citation | Buhari HU, Saidu SNA, Mohammed G, Raji MA (2015). Evidence of brucella antibodies in milk of cows in the north senatorial District of Kaduna State, Nigeria. Res. J. Vet. Pract. 3(2): 33-35.
DOI | http://dx.doi.org/10.14737/journal.rjvp/2015/3.2.33.35
ISSN | 2308-2798

INTRODUCTION

Brucellosis is one of the world's major zoonotic diseases. Almost all domestic animal species are susceptible to brucellosis except cats which are relatively resistant to the infection (Gul and Khan, 2007). Human brucellosis is a serious, debilitating and sometimes chronic disease capable of affecting a variety of organs (CFSPH, 2009). Brucella spp. infections in humans occur through consumption of unpasteurized dairy products in addition to occupational exposure to infected animals.

Estimates of losses in meat and milk production due to brucellosis in the United States of America (USA) and Nigeria were $800 million and in excess of $224 million annually respectively (Esuruoso, 1974 and Richey and Harrell, 2008).

One major factor contributing to the spread of the disease is the free movement of animals practiced by the nomadic Fulani herdsmen, who own about 95% of all food animal populations in Nigeria (Ocholi et al., 2004). The traditional way of food preparation and consumption, especially unpasteurized milk and milk-derived products, coupled with the close association between animals and humans may be linked to the high prevalence rate of brucellosis in developing countries (Nicoletti, 1984).

Cattle are the most prominent of all domesticated animals in Nigeria (Tewe, 1997) with Kaduna State having an estimated cattle population of 1,144,000. The people of Kaduna State are predominantly farmers producing food crops and rearing of livestock (KDSG, 2008). This study was aimed at determining the prevalence rate of Brucella antibodies in milk of cattle in the North Senatorial District of Kaduna State, Nigeria with the hope of generating information for brucellosis control and subsequent eradication.

MATERIALS AND METHODS

Study Area

This study was carried out in the North Senatorial District of Kaduna State, Nigeria which comprises of eight Local Government Areas (LGAs). Kaduna State is located in the Northwest geopolitical zone of Nigeria and lies between latitudes 6° and 11° North and longitude 7° and 44° east. It is 1995ft above sea level with distinct wet and dry seasons within the Guinea Savannah and part of the Sahel Savannah zones of Nigeria. The State occupies about 48, 473.25km^2 comprising 23 Local Government Areas (LGAs). It has a human population of over 6,066,562 people and a cattle population of 1,144,000 (KDSG, 2008).

Six out of the eight LGAs in the North Senatorial District of Kaduna State were randomly selected without replacement. They also had the highest concentration of cattle in the study area. These LGAs included Ikara, Kubau, Kudan, Lere, Makarfi and Sabon-Gari LGAs. Three districts were selected from each of the LGAs using simple random sampling without replacement. The herd location, breed and age of the animals sampled were recorded. At least, 21 lactating cows were sampled per herd per district.

Study Animals

Cattle from pastoralist herds were used for the study. Herds were selected randomly based on farmers' willingness. A total of 202 lactating cows were sampled.

Sample Collection

Lactating cows selected were properly restrained with the help of an assistant. The teats of the udder were cleaned and disinfected using a clean gauze bandage to which some drops of 70% alcohol were added. The initial fore-milk streams were discarded after which about 5 ml of milk was collected into sterile plain sample bottles which were labelled according to location and breed of sampled cows. The collected milk samples were then transported over ice to the Veterinary Public Health Bacterial Zoonosis laboratory of the Faculty of Veterinary Medicine, Ahmadu Bello University Zaria, and stored in the refrigerator at 4°C for 12 hours after which they were analysed.

Laboratory Investigation

The Milk Ring Test (MRT) was performed according to the procedures described by FAO (2010). The MRT antigen was sourced from the Onderstepoort Veterinary Institute, Republic of South Africa. Both milk samples and antigen were removed from the refrigerator and allowed to stand for one hour at room temperature prior to the commencement of the investigation. About 0.03ml of antigen was placed into each of sterile test tubes after which 1ml of milk was added to each of the test tubes. The antigen-milk mixtures were covered and incubated at 37°C for one hour after which the results were read by visual examination. A positive reaction was identified by formation of a dark blue ring above a white milk column, or the appearance of a blue layer at the interface of milk and cream. The test was considered to be negative when the colour of the underlying milk remained homogeneously dispersed in the milk column (FAO, 2010).

Data Analysis

Data obtained were analysed using Chi square (χ^2) (Snedecor and Cochran, 1980) using SPSS version 20.0. Values of $P<0.05$ were considered significant.

RESULTS

The results obtained from this study showed that 77 out of the 202 milk samples tested were positive for Brucella antibodies indicating a sero-prevalence of 38.1% (Table 1).

Of the 77 positive samples for Brucella antibodies, the highest prevalence of 17 (54.8%) was obtained from Kubau LGA. This was followed by Kudan LGA with 22 (52.4%), Lere LGA with, 20 (41.7%), Sabon-Gari LGA with 6 (28.6%) and the least from Ikara and Makarfi LGAs with sero-prevalence of 6 (20.0%) each (Table 1).

Table 1: Sero-prevalence of Brucella antibodies in cattle milk in six LGAs of the North Senatorial District of Kaduna State, Nigeria

Local Government Area	No. of samples Tested	No. Samples Positive	No. Samples Negative
Ikara	30	6 (20.0%)	24 (80.0%)
Kubau	42	22 (52.4%)	20 (47.6%)
Kudan	31	17 (54.8%)	14 (45.2%)
Lere	48	20 (41.7%)	28 (58.3%)
Makarfi	30	6 (20.0%)	24 (80.0%)
Sabon-Gari	21	6 (28.6%)	15 (71.4%)
Total	202	77 (38.1%)	125 (61.9%)

DISCUSSION

The results of the current study have indicated an overall prevalence rate of 38.1% by the MRT. This has serious public health significance since pastoralists are known to use milk as their main source of food and that pastoralists' children have the habit of consuming milk directly from the udders of milking cows. The increase in the demand for milk and its products could lead to an increase in the spread of milk-borne diseases including brucellosis which could lead to a very serious health hazard in humans (FAO/WHO, 1986; Olsen and Tatum, 2010).

Thus in situations where such cows are infected with bru-

cellosis, the chances of them coming down with brucellosis are great. It has been reported that Brucella spp can survive in sour milk and therefore, there is the risk for public infections in such situations (Cadmus et al., 2006; Ofukwu et al., 2007; Lopes et al., 2010).

It has been documented that the MRT is a screening test for Brucella antibodies in milk and should not be used solely for the diagnosis of brucellosis because it can be influenced by conditions such as mastitis, presence of colostrum, and condition of milk at the end of lactation (OIE, 2000). This, however, does not overrule the fact that the MRT is reasonably sensitive even though non-specific reactions are common with this test, especially in brucellosis- free areas.

The detection of Brucella antibodies in sampled cows in this study is significant and is an indication of a previous exposure of the cows to the organisms since vaccination against brucellosis is not readily accessible to the pastoralists in the study area as most of them have no knowledge of the existence of a vaccine against the disease. There is therefore, the need to carry out more detailed study with a view to determining the Brucella species circulating among the cattle as well as in other animal species before any control and eradication programmes should be under taken in the area.

CONCLUSION

Brucella antibodies are present in the milk of cows in the North Senatorial District of Kaduna State, Nigeria and this poses a great public health risk to humans in the study area. More studies are needed to ascertain the prevalence of the disease using other specialized serological tests in the study area and in Nigeria at large.

REFERENCES

- Cadmus SIB, Ijagbone IF, Oputa HE, Adesokan HK, Stack JA (2006). Serological survey of Brucellosis in livestock animals and workers in Ibadan, Nigeria. African J. Biomed. Res. 9: 163 – 168.
- CFSPH (2007). Center for Food Security and Public Health. Brucellosis. http://www.cfsph.iastate.edu/Factsheets/pdfs/brucellosis.pdf Accessed 30/04/2014.
- Esoruosu GO (1974). Bovine brucellosis in Nigeria. Vet. Rec. 95: 54-58. http://dx.doi.org/10.1136/vr.95.3.54
- FAO/WHO (1986). Report, joint FAO/WHO expert committee on brucellosis. Technical report series, World Health Organisation, Geneva, pp. 740.
- FAO (2010). Milk Ring Test. Retrieved from http://www.fao.org/ag/againfo/programmes/en/empres/gemp/avis/B103-brucellosis/modl/1320-milk-ring-test.html
- Gul ST, Khan A (2007). Epidemiology and epizootiology of brucellosis: A review. Pak. Vet. J. 27(3): 145-151.
- Kaduna State Government (KDSG) (2008). Kaduna State Achievements. In: Data on estimated annual animal population and fish production investment opportunities in Kaduna State. Pp. 16-18.
- Lopes LB, Nicolino R, Haddad JPA (2010). Brucellosis - Risk factors and prevalence: A review. Open Vet. Sci. J. 4: 72-84. http://dx.doi.org/10.2174/1874318801004010072
- Nicoletti P (1984). Control of brucellosis in tropical and subtropical regions. Prev. Vet. Med. 2: 193-196. http://dx.doi.org/10.1016/0167-5877(84)90062-X
- Ocholi RA, Kwaga JKP, Ajogi I, Bale JOO (2004). Phenotypic characterisation of Brucella strains isolated from livestock in Nigeria. Vet. Microbiol. 103: 47-53. http://dx.doi.org/10.1016/j.vetmic.2004.06.012
- Ofukwu AR, Yohanna CA, Abuh HA (2007). Brucellosis infections among hospital patients in Makurdi, North-Central Nigeria. J. Med. Pharmaceut. Sci. 5: 56-570.
- OIE Manual of standards for Diagnostic Tests and Vaccines (2000). Bovine brucellosis. OIE, Paris, pp. 328-345.
- Olsen S, F Tatum (2010). Bovine brucellosis. Vet. Clin. North. Am. Food Anim. Pract. 26: 15-27. http://dx.doi.org/10.1016/j.cvfa.2009.10.006
- Richey EJ, Harrell CD (2008). Herd Management; IFAS Extension. University of Florida. Pp. 74.
- Snedecor GW, Cochran WG (1980). Statistical Methods. 7th Ed. The Iowa State University Press, Ames, IA.
- Tewe OO (1997). Sustainability and development: Paradigm from Nigeria's Livestock industry. Inaugural lecture, University of Ibadan. Polygraphic Ventures Publisher, Ibadan, Nigeria.