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Full Length Research Article

Serological Survey of Brucellosis in Livestock Animals and Workers in Ibadan, Nigeria

Cadmus S.I.B.*, Ijagbone I.F.*, Oputa H.E.*, Adesokan H.K.*, Stack J.A.**

* *Department of Veterinary Public Health & Preventive Medicine, University of Ibadan, Ibadan, Nigeria.*

** *Department of Statory & Exotic Disease, Veterinary Laboratories Agency, New Haw, Addlestone, Surrey Kt15 3nb, United Kingdom.*

ABSTRACT

A serological survey of brucellosis in livestock animals and workers was conducted in Ibadan, Southwestern Nigeria between May and August 2004. A total of 1,210 cattle, 54 sheep, 496 goats, 200 pigs and 21 humans (i.e. butchers and herdsmen) were screened using the Rose Bengal test (RBT).From the results, prevalence in trade cattle was 5.82% while 0.86% was recorded in goats. None of the sheep and pigs was positive to the test. Out of the 11 samples taken from butchers, seven were positive and none of the ten herdsmen were sero-positive. This gives an infection rate of 63.3% in the butchers; and a combined infection rate of 31.82% in humans. This shows that brucellosis is still a major zoonosis in Nigeria; other public health implications are discussed.

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**Address for Correspondence (e-mail) : : sibcadmus@yahoo.com (Cadmus S.I.B.)*
Tel.: 234 80237 510 93; fax: 234 02 8103043

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INTRODUCTION

Brucellosis is a disease of domestic, livestock and wild animals with serious zoonotic implications in man; causing huge economic losses to the livestock industry. Cattle, goats, pigs, sheep, horses and dogs play an important role in the transmission of this disease to man. It is defined as a contagious systemic bacterial disease primarily of ruminants, characterized by inflammation of the genital organs and fetal membranes, abortion, sterility and formation of localized lesions in the lymphatic system and joints (WHO, 1971, CDC, 2005). Brucellosis is a chronic disease of animals caused by Gram negative and facultative non-motile intracellular bacteria of the genus *Brucella*. It occurs worldwide though determined efforts have reduced the incidence to very low levels in many countries. Some countries are now designated 'Officially *Brucella* Free', such as Great Britain, after a long and expensive eradication campaign. As a result of compulsory pasteurization of milk products and strict control of the disease in dairy cattle, the incidence of brucellosis has steadily declined in most industrialized countries during the last 50 years unlike in Nigeria where people still consume unpasteurized milk and milk products.

Detailed studies confirming the problem of brucellosis in Nigeria's livestock have been documented by several authors (Esuruoso, 1974, Falade, 1974, Falade, et al., 1974, Falade et al., 1975, Okon, 1980, Chukwu, 1987, Brisibe et al., 1993, Ajogi, 1997, Ajogi et al., 1998, Ogundipe et al., 1994, Ishola et al., 2001); with evidence of the spread of the disease in all parts of the country which is usually accompanied by severe economic losses. Serological prevalence rate of between 0.20% and 79.70% have been reported in various parts of the country to date. The infection has been reported in various animal species in Nigeria (Esuruoso and Hill, 1971,Esuruoso, 1974, Falade, 1974, Falade and Shonekan 1981, Falade et al., 1975, Okoh et al., 1978, Adamu and Ajogi, 1995). These demonstrate how brucellosis has been identified as an endemic and problematic disease in Nigeria. However, the infection is not static; it is evident from previous studies that prevalence varies at different times and locations. This is especially apparent where there is no control policy, like Nigeria. There is a pattern of low and high prevalence in specific areas of the country and prevalence variability also arises between herds in the same area (Nuru and Dennis, 1975). Although prevalence in brucellosis has been shown to be low in most dairy and private farms, it is actually on the increase among nomadic and semi-nomadic herds which contribute about 95% of all annual food population in Nigeria (Rikin, 1988).

Evidence of *Brucella* infection either through serological or cultural examinations has been demonstrated in domestic livestock and humans in Nigeria (Ocholi et al., 1993). Most of the disease reports originated from Government herds where screening tests were easily carried out, while some originated from settled Fulani herds and private farms (Ocholi et al., 1993). The general situation is that the disease is more prevalent in Government-owned farms than in the nomadic herds (Esuruoso, 1974). Epizootiological investigations also revealed that results obtained varied depending on the region, area or animal group sampled (Ocholi et al., 1993). The distribution of the disease among humans is not well known but serological evidence has shown that the disease exists. Evidence of the presence of the disease in humans in Nigeria has also been published (Collard, 1962, Alausa, 1977, Alausa and Osoba, 1977, Falade, 1974 and Falade, 2002). It is a zoonosis and the disease in man is highly debilitating, though not considered to be fatal (Falade, 1974). Collard (1962) documented the first case of human brucellosis in Nigeria where *Brucella* antibodies were demonstrated in the sera of healthy persons in various parts of the country.

The intention of this study was to investigate the disease in livestock and animal workers in Nigeria, to access the current infection rates and the zoonotic presence in humans.

MATERIALS AND METHODS

Location and period of the study

The study was conducted in Ibadan, Southwestern Nigeria, in Bodija Municipal Abattoir (the biggest abattoir in Ibadan), Akinyele Cattle Market/Control Post (a major cattle market in Southwestern Nigeria) and some resident cattle farms.

In all, 21 humans (consisting of butchers, abattoir workers and herdsmen), 1,210 cattle, 54 sheep, 496 goats and 200 pigs were screened over a period of four months (May to August, 2004).

Human samples

Human samples were collected from volunteers after due consultations with the respective leaders of the different groups. Collection of blood was done by qualified medical personnel. For this, sterile syringes and needles were used to collect blood aseptically from the cephalic veins of volunteers into properly labeled sterile bottles and kept in a box container before being transported to the laboratory.

The blood samples were centrifuged at 1,500g for 10 minutes and the pure sera decanted and stored in the freezer at -20°C until required for testing.

Animal samples

Two methods were employed in the collection of blood from the animals. The first involved collection of blood from farm animals and the second from abattoir animals.

Farm animals: Blood samples were collected aseptically from properly restrained animals using sterile syringes and Vacutainer tubes. The labeled tubes were then placed in slanted positions in the containers to avoid haemolysis of blood cell and to assist in serum separation.

Abattoir animals: Labeled sterile vacutainers were used to collect blood from animals at the time of slaughter. The blood samples were kept in slanted positions in the containers prior to being transported to the laboratory as in the farm samples.

Samples from both farm and abattoir were then processed for sera collection as for the human samples.

Rose Bengal test (RBT)

A drop of the test serum was taken using a clean Pasteur pipette and placed onto test plate beside an equal drop of RBPT antigen [supplied by Veterinary Laboratory Agency (VLA), Surrey, United Kingdom] added using another clean Pasteur pipette. This then was mixed well using a sterile applicator stick. The mixture was then rocked manually for 4 minutes before examination. The presence of distinct pink granules (agglutination) was recorded as positive result while samples that appeared clear without agglutination granules were recorded as negative. This procedure was described by Alton et al; (1975) and has been a recognized diagnostic test for decades.

RESULTS

Human samples

Seven out of the 11 samples obtained from the butchers were positive; indicating an infection rate of 63.63%, none of the cattle rearers was positive, giving a total rate of 31.82% for humans

Table I:
Distribution of farm animals with respect to species, sex and brucellosis status.

Farm	Species	n		Sex	RBPT Result	RBPT Result
			M	M	Male	Female
1	Cattle	13	13	-	-ve	-ve
2	Cattle	9	-	9	-ve	-ve
3	Cattle	9	5	4	-ve	-ve
4	Cattle	6	4	2	-ve	-ve
5	Cattle	23	21	2	-ve	-ve
6	Cattle	7	7	-	-ve	-ve
7	Cattle	26	16	10	-ve	-ve
8	Goats	21	5	16	-ve	-ve
8	Sheep	14	1	13	-ve	-ve
9	Goats	9	2	7	-ve	-ve
9	Sheep	6	-	6	-ve	-ve

M = male, F = female, n = number of animal present

Farm animals

A total of nine farms were visited during the study period (Table 1) comprising 93 cattle that consisted of 66 males and 27 females. Various breeds were tested including White Fulani, Red Bororo, Sokoto Gudali and mixed breed. Most of the animals observed were apparently healthy. All the farm animals tested negative for brucellosis by the RBPT indicating an infection rate of 0.00%.

Abattoir Samples

The cattle were transported from the northern parts of the country and neighbouring African countries of Chad, Niger and Mali. They comprised

Zebu breeds (i.e. White Fulani, Red Bororo, Sokoto Gudali and Mixed breed). A total of 1,117 cattle were screened, majority (95%) of which were adult; comprising 154 males and 963 females (Table II). In all, 65 were sero-positive (six males and 59 females) for brucellosis giving a positive rate of 5.82%.

From the other animals (466 goats, 34 sheep and 200 pigs), only 4 goats (all females) were positive for brucellosis giving an infection rate of 0.86% in goats. All pigs were negative to the RBT.

Table 2:
Distribution of Abattoir Animals with respect to Sex and Brucellosis Status

Species	No of Animal Sampled	Sex		RBT Result	RBT Result
		Male	Female	Male	Female
Cattle	1117	154	963	6	59
Goats	466	241	225	-	4
Sheep	34	9	25	-	-
Pigs	200	94	106	-	-

Table 3:
Infection rate among the different breeds of cattle

Breed	Total Sample Collected	No +ve	Male +ve	Female +ve	% +ve in total sample
White Fulani	631	38	3	35	3.4
Red Bororo	279	19	1	18	1.7
Sokoto Gudali	38	1	0	1	0.09
Kuri	16	0	0	0	0
Mixed	147	6	1	5	0.54
Keteku	6	1	1	0	0.09
Total	1117	65	6	59	5.82

DISCUSSION

The prevalence of brucellosis in screened cattle was 5.82% which is comparable to unpublished works carried out in 1994 and 2001 where 8.20% and 5.45% were reported respectively and that of Ishola and Ogundipe, (2001) where they reported 6.28% within the same area. It shows that the prevalence of the disease has remained similar over a period of 12 years and that the disease is endemic in this area. None of the farm animals was positive for the disease; whereas in the trade cattle a prevalence of 5.82% was recorded. This could suggest better management among the farm animals; with the trade cattle (i.e. abattoir animals) being indiscriminately transported from one area to the other thereby exposing them to other diseases, not only brucellosis. During these periods, it is common practice for cattle (livestock animals generally) from different farms and owners to be brought to the central market to be sold (this market setting extends from areas from neighboring African countries like Niger, Chad, Burkina Faso and Cameroon down to local ones in the northern parts of Nigeria). Irrespective of their health status animals are brought together and sold to major cattle merchants travelling to the Southwestern parts of Nigeria. The long duration of these animals staying closely together under stress of transportation without adequate food and water encouraged further spread of the disease to the healthy ones.

Although it was observed that the female White Fulani cattle made up the majority of the total positive animals (59.32%), they were also the majority screened; sex therefore may not play a key role in the results obtained. The positive rate in goats (0.86%) and yet freedom from serological response in sheep and pigs is in agreement with the previous unpublished studies carried out in Ibadan in 1994, among similar species of animals.

An interesting outcome of this study was the positive results obtained among the humans that were tested. This highlights the occupational hazard posed to humans handling these animals (Falade, 2002). Most of the butchers during the screening complained of frequent treatments for malaria without much improvement, while some complained of joint pains and general body weakness. These findings are all similar to reports made by CDC (2005) and Muchaal (2005). From these information, it may be suggested that these symptoms might have been as a result of brucellosis which mimics malaria syndrome (Muchaal, 2005).

The fundamental reasons for the high infection rate recorded among the butchers may not be unconnected with the poor state of meat inspection services and the unhealthy practices by butchers in

this abattoir. Generally, the butchers in this abattoir do not wear any protective clothing, leaving them exposed to infected material such as blood, urine, vaginal discharges, aborted fetuses and especially placentas from infected animals. These butchers are constantly exposed on a daily basis from aerosols and because of cuts on their bodies (especially hands and feet), they are at great risk of exposure to the disease through breaks in the skin. As a result of little or no access to detailed medical care, those who develop symptoms like fever, joint ache and weakness, always associate them with malaria which is an endemic disease in this area.

In conclusion, this study has confirmed the endemicity of brucellosis especially bovine brucellosis among slaughtered cattle at the abattoir; hence making it a source of occupational hazard to workers who are directly involved in cattle meat processing. The high infection rate of brucellosis observed in the butchers calls for urgent government intervention towards public health enlightenment of this group of workers coupled with free treatment for those found positive. Attempts should also be made by government and other private bodies to encourage routine screening of all livestock animals especially those who are potential reservoirs and those at risk of exposure.

Finally, public health enlightenment should be focused on the zoonotic aspect of this disease as it relates to consumption of unpasteurised milk and other food items obtained from diseased animals.

Essentially education regarding the cause of human infection is necessary for farmers, abattoir workers and owners must be made aware of the dangers of drinking unpasteurised milk. This is not only for prevention of brucellosis but for other zoonotic organisms also.

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