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Short Communication

Seroprevalence of Brucellosis in Cattle in Abia State

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ABSTRACT

Bovine brucellosis caused by the organism *Brucella abortus* is a chronic infectious disease of public health and economic significance. Studies on prevalence of bovine brucellosis in Abia State are scarce. Therefore, a cross-sectional study was conducted to determine the prevalence of bovine brucellosis in the State. Blood samples were collected from 212 cattle from various parts of the State and sera subjected to Rose Bengal Plate Test (RBPT) to detect antibodies against Brucella. Overall sero-prevalence of 13.7% was reported. The prevalence was higher in female cattle (24.2%) than in males (11%). Red Bororo showed higher seropositivity (26.7%) than other breeds screened. Sero-prevalence was higher in the semi-intensively managed animals (27.8%) than in extensively reared cattle. Similarly, cattle aged 2 to 3 years recorded a higher prevalence (25%) than others. However, there was no statistically significant association between the seroprevalence of brucellosis and age (P=0.82)/ breed (P=0.25), while a significant association was recorded for seroprevalence of brucellosis and sex (P= 0.05)/management system (P=0.07). The detection of brucellosis in cattle poses a very significant public health risk in Abia state, and so it is important to carry out awareness campaigns to enlighten cattle handlers and the general public of its public health significance.

Keywords: Abia, brucellosis, cattle, Rose-Bengal, sero-prevalence

INTRODUCTION

Brucellosis is a zoonotic disease caused by the members of the Genus Brucella. These organisms are gram negative, non-spore forming, facultative intracellular organisms that affect livestock (Kakoma *et al.,* 2003). In cattle, it is caused by *Brucella abortus* (Thakur *et al.,* 2012), which has great affinity for the reproductive organs of animals. This organism has been recognised as one of the causative agents of reproductive failure with clinical signs such as abortions, sterility in bulls, and infertility in cows, resulting therefore in economic losses (Thakur *et al.,* 2012, Poester *et al.,* 2013). Bovine brucellosis is therefore, a zoonosis of great economic and public health importance worldwide and in developing countries. Transmission amongst animals can occur through ingestion of contaminated feed or water, contact with infected uterine discharges, foetal and placental fluids. In man, transmission could be through ingestion of unpasteurized milk and milk products such as cheese, yoghurts and butter (Bakhtullah *et al.,* 2014), contact with placental discharges (Teshager *et al.,* 2014), contaminated equipment (Alshaalan *et al.,* 2014), contact with abbraided skin (Bamaiyi *et al.,* 2010) and therefore, serve as a hazard to abattoir workers, veterinarians and herdsmen (Corbell, 2006, Ducrotoy, 2014).

Livestock production is very essential in the economic development of any nation. Cattle production in Nigeria provides foreign exchange for the nation, employment and income for its citizens (Boukary *et al.,* 2010). Livestock diseases such as brucellosis will remain a threat to the nation's economy if not given adequate attention. Uncontrolled movement of trade/slaughter cattle within the country, illiteracy, poor hygienic practices by farmers, herdsmen and abattoir workers also serve to maintain this disease (Cadmus *et al.,* 2006; Adesokan *et al.,* 2013).

Various works have been done to determine the prevalence rates of brucellosis in various parts of Nigeria. In the South west, prevalence rates ranging from 1.9%-7.8% have been

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recorded (Ogugua *et al.,* 2015). In the North, a prevalence rate of 32.2% was documented in a cattle herd in Sokoto Prison Farm (Junaidu *et al.,* 2010), and 3.5% in Gombe State (Jajere *et al.,* 2016). In the North central particularly in Plateau State, a prevalence of 2.7% - 37.3% was recorded (Bertu *et al.,* 2010; Nanven *et al.,* 2013, Agada *et al.,* 2017). In the south-western Nigeria, prevalence of 4.0% has been recorded (Akinseye *et al.,* 2016). Information concerning the prevalence rate of bovine brucellosis in Abia State or generally in the south east of Nigeria is scarce. Hence, this study was conducted to determine the prevalence of brucellosis in cattle in Abia State using the Rose Bengal Plate Test (RBPT).

MATERIALS AND METHODS

STUDY AREA

This study was performed in Abia State, which is located in the south-eastern zone of Nigeria. The state is located along the railroad that lies between Port-Harcourt to its south and Enugu State to its north. Abia state is located in the Southeastern geopolitical zone of Nigeria. It shares a common boundary with Anambra, Imo, Enugu, Cross River, Akwa Ibom and Rivers states along the expansive savannah zone. The state is situated within latitudes 4.4˚ and 6.1˚ north of the equator and longitudes 7.0˚ and 8.0˚ east. Agriculture is the major occupation of people living in the state.

Fig 1: Map of Abia State

SAMPLING PROCEEDURE

A cross-sectional study was carried out using purposive sampling method based on availability of samples in the area. Samples were sourced from cattle from Ubakala Slaughter house (Umuahia South LGA), Michael Okpara university of Agriculture Farm (Ikwuano LGA, Lokpanta Cattle Market (Umunneochi LGA) and a private farm inBende LGA, all in Abia State. Herds were selected based on cooperation and consent of the herd owners. Animals at the abattoir were selected by simple random sampling method; every third cattle slaughtered on the day of collection was sampled.

A total of 212 samples were chosen comprising 179 females and 33 males. A total of 5 mLs of blood were collected from the jugular veins of the animals into plain tubes devoid of anticoagulant using sterile needles and syringes. The tubes were kept in a slanting position to enhance serum separation. The tubes were labelled and details of the animals (sex, age, breed and management system) noted. The blood samples were transported in an ice packed flask to the Veterinary Microbiology laboratory of the College of Veterinary medicine, MOUAU. Samples were centrifuged at 3000 rpm for 15 minutes and sera were preserved at -20^{o}C until further analysis.

SEROLOGY

Serum samples were tested for Brucella antibodies using the Rose Bengal Plate Test (RBPT) as described by Bale (2008).

ROSE BENGAL PLATE TEST (RBPT)

The *Brucella abortus* antigen used in this work was sourced from (Animal and Plant Health Agency) APHA Scientific, New Haw, Addlestone, Surrey KT15, 3NB, United Kingdom.

About 30 µL of sera were dispensed on a clean, ceramic tile with an equal volume of antigen and mixed thoroughly with a sterile applicator stick and rocked gently for 4 minutes. The mixture was then observed for agglutination. The presence of agglutination after 4 minutes was recorded as positive and the absence of agglutination after 4 minutes recorded as negative.

DATA ANALYSIS

Data generated were analysed using SPSS (Statistical Package for the Social Sciences) version 22.0. Results were considered statistically significant at $P<0.05$. Chi-square test was used to determine the strength of association between seroprevalence of bovine brucellosis and factors such as age, breed, sex and management systems.

RESULTS

Out of the 212 samples screened, 29 (13.7%) were positive for *Brucella abortus* antibodies using the Rose Bengal Plate Test (RBPT). Of the 179 males screened, 21(11%) were seropositive for the Brucella antibody. For the female cattle screened, only 8 out of 33 (24.2%) were positive. Amongst the various breeds sampled, 20 (11.98%) out of 167 White Fulani cattle were seropositive, 15 Red Bororo breeds were sampled with 4 (26.7%) being seropositive, 30 Sokoto Gudali breeds were tested and 5 (16.7%) were positive. (Table I)

Based on age distribution, cattle within the age bracket of 2 to 3 years recorded the highest sero-prevalence of (25%)

while seroprevalence of 13.6% was recorded in cattle above 3 years and none was recorded in cattle below 2 years. (Table I).

The animals used for this study were reared under 2 different management systems. 194 cattle under the extensive system of management were tested and seroprevalence of 24 (12.4%) was recorded while 5 (27.8%) was recorded in animals from the semi-intensive system. (Table I).

There was no statistical difference in the seroprevalence rates between brucellosis and any of the potential risk factors. (P<0.05).

DISCUSSION

Table 1: Sero-prevalence of bovine brucellosis among cattle in Abia State

VARIABLES	NUMBER SAMPLED	RBPT POSITIVE (%)	P VALUES
SEX			
Male	179	21 (11.7)	
Female	33	8 (24.2)	0.05
BREED			
Sokoto Gudali	30	5 (16.7)	
White Fulani	167	20 (12.0)	
Red Bororo	15	4 (26.7)	0.25
MGT SYSTEM			
Extensive	194	24 (12.4)	
Semi Intensive	18	5 (27.8)	0.07
AGE			
< 2 years	3	0 (0)	
2-3 years	4	1 (25.0)	
> 3 years	205	28 (13.6)	0.82
TOTAL	212	29 (13.7)	

This study has established serological evidence of brucellosis in Abia state with an overall seroprevalence of 13.7%. The observed prevalence in this study was higher than that from (Boukary *et al.,* 2010)] where a prevalence of 5.82% among trade cattle was reported and the 7.1% recorded in Kaduna by (Mbuk *et al.,* 2011) but lower than the reported 19.5% by Junaidu et al (2010) in Sokoto and an alarming prevalence of 45.75% reported by Ojo et al. in a goat flock in Abeokuta in western Nigeria.

Even though the percentage of males sampled in this work was greater than the females (because more males are slaughtered in the abattoir and because female cattle tend to be kept by farmers for reproductive purposes and disposed only when they are no longer useful for reproduction due to age or disease), the females showed high seropositivity than the females. This is in agreement with Jajere *et al.,* 2016 and Salisu et. al, 2018. This may be due to the high volume of erythritol in the uterus (Jajere *et al.,* 2016). Pregnancy and lactation has been reported to increase susceptibility to infection (Asegedom *et al.,* 2016; Keppie *et al.,* 1965).

Amongst breeds sampled, higher seroprevalence was seen in Red Bororo (26.7%) than in other breeds. This is in contrast to the findings of Jajere *et al.,* 2016 and congruent with the findings of (Junaidu *et al.,* 2008). There was also no significant association between breed and Brucellosis (P>0.05).

From this study, cattle above 3 years recorded higher prevalence than those below 3 years. This is in agreement with many other studies done that reported the prevalence to be higher in sexually matured animals (Asegedom *et al.,* 2016, Jajere *et al.,* 2016, Salisu *et al.,* 2018). This may be attributed to constant exposure of cattle over time to the disease agent (Radositits *et al.,* 2007). The high prevalence recorded in the cattle managed semi- intensively may be due to exposure during mating or grazing thereby increasing exposure and susceptibility to the infection. This agrees with the reports of (Junaidu *et al.,* 2010; Jajere *et al.,* 2016; Agada *et al.,* 2017). It may also be due to increased exposure to contaminating materials such as placental fluid and aborted materials in the farms or as a result of purchase of parent stock from extensively managed systems.

CONCLUSION

This study shows that brucellosis is present in the area of study. The high prevalence rate recorded in this work raises public health concern. More studies on brucellosis to isolate the prevalent species of the organism and the education of farmhands, herdsmen, butchers and abattoir workers in Abia State on brucellosis are recommended.

CONFLICT OF INTEREST

Authors have no conflict of interest to declare.

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