Seroprevalence of brucellosis in cattle and humans in the Akwapim-South district of Ghana: public health implications

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Abstract

A total of 183 cattle comprising 54 bulls, 53 milking cows, 76 heifers and 44 calves in the Akwapim-South district of Ghana were tested for antibodies against Brucella abortus using the Rose Bengal plate test. The results indicated that cattle in the Akwapim-South district were infected with Brucella with a mean seroprevalence of 6.6%. There was no difference in the seroprevalence either between females 11/129 (8.5%) and males 1/54 (1.9%), or among the three different breeds of cattle (Sanga, West African short horn (WASH) and white Fulani) in the study area. However, there was a significant increase in seropositivity with respect to age. A significant association between antibodies against Brucella and a history of abortions and retained placenta in cows indicated that brucellosis might be responsible for significant economic losses to farmers in the area. However, no evidence of human brucellosis was detected by antibody screening in selected risk groups. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

Brucellosis in cattle is endemic in Africa. In Ghana, studies have shown that the infection is prevalent in cattle within the northern and coastal Savanna zones (Turkson and Boadu, 1992; Oppong, 1966). The consumption of unpasteurized milk in some rural communities and a general lack of precautions taken by farmers may contribute to zoonotic transmission in humans. Recently, in Ghana, there has been an increase in the demand for fresh cows’ milk and yoghurt, especially in the cities, and number of local processors of milk have emerged to meet this demand. In this preliminary study, we have attempted to determine the prevalence of antibodies against Brucella abortus both in cattle and in high risk human groups including herdsmen, butchers, veterinarians and meat inspectors.
2. Materials and methods

2.1. Study site

The study was conducted in the Akwapim-South district, in the eastern region of Ghana, within the forest belt and with a land area of 403 km². It has mainly a semi-deciduous forest type of vegetation with annual rainfall between 1200 and 2000 mm and is drained by the river Densu (Dickson and Benneh, 1970).

2.2. Human and cattle samples

A total of 183 blood samples were collected from cattle in randomly selected kraals. In addition, blood samples were obtained from 44 people in high-risk groups (six veterinarians, six butchers, 21 herdsmen and 12 environmental health inspectors). A control group of 30 patients randomly selected from the outpatient department of the District Hospital and who had no history of working with cattle directly or drinking unpasteurized fresh milk were also included.

2.3. Serological detection of Brucella antibodies

Serum samples from both cattle and humans were tested using the standard Rose Bengal plate test (RBPT) (Chernysheva et al., 1980), employing stained *B. abortus* antigen and known positive and negative control sera (IFFA Merieux Institute, France). The data were analyzed according to the variables, e.g. age, sex and breed.

2.4. Data analysis

The mean prevalence for groups were compared using Student’s *t*-test and *P* values of 0.05 or less were considered statistically significant.

3. Results

3.1. Prevalence of antibodies against Brucella abortus in cattle in the Akwapim-South district

Cattle (183) comprising 54 bulls, 53 milking cows, and 76 heifers were sampled. The animals came from 15 Kraals in 11 towns and villages in the district. The seropositivity ranged from 0 (Djankrom, Ahudjo, Amanfrom, Obodan Pukrom) to the highest of 17.2% in Adoagyiri (Table 1).

Three breeds of cattle were included in the study: the Sanga (143/183), the West African short horn (WASH) (31/183) and the white Fulani (9/183). No significant breed difference in seropositivity was seen (11.1% for white Fulani, 7.0% for Sanga and 3.2% for WASH). Similarly, the difference between the prevalence of antibodies in bulls, 1/54 (1.9%) and cows, 11/129 (8.5%) was not statistically significant.

With respect to age, cattle were classified into three age groups: less than 2, 2–5 and over 5 years old. There was an increase in seropositivity with increasing age of the cattle, ranging from 2.5% in animals less than 2 years old, to 7.4% in cattle of 2–5 years old and up to 17.4% in cattle over 5 years old. The differences between the age-groups were statistically significant ($\chi^2 = 6.591; P = 0.037$).

3.2. Association between presence of antibodies and history of abortion and retained placenta

Since brucellosis is an important cause of abortion and foetal death in cattle, an attempt was made to correlate a previous history of abortion or retained placenta with seropositivity. Three out
of eight cows with a history of abortion had antibodies while six out of the 84 cows with no history of abortion were found to be positive for Brucella antibodies. However, although the association between having a history of retained placenta or abortion and seropositivity was statistically significant ($\chi^2 = 7.664$ and $P = 0.006$) the sample groups were small and more studies were required to confirm this data.

3.3. Human samples

None of the human sample from either the control groups or the ‘at risk groups’ tested positive for the presence of antibodies against B. abortus.

4. Discussion

Our study indicated that the mean prevalence of antibody against B. abortus in cattle sampled in the Akwapim-South district of Ghana was 6.6%. This was the first such seroprevalence report from the middle forest belt of Ghana and showed that prevalence was lower than that previously reported for other regions of Ghana (Oppong, 1966; Turkson and Boadu, 1992; VSD Report, 1997). However, considering the highly contagious nature of the disease, the presence of the infection represents a significant health threat to cattle in the district.

Our study confirmed previous reports that older animals were more likely to be seropositive for Brucella antibodies (Turkson and Boadu, 1992). Importantly, the seropositivity in cattle over 5 years of age which were destined for slaughter indicated a potential risk for abattoir workers, meat inspectors, butchers and those involved in food preparation.

There has been a recent increases in the use of fresh milk and milk products in Ghana, especially in neighboring cities like Accra. Since unpasteurized milk serves as an important source of Brucella infection, there is a potential risk of infection through the use of untreated or partially treated milk from the district. Indeed, the consumption of unpasteurized or unboiled milk was identified as a common practice among the herdsman in the study area. Veterinarians who handle infected cattle, aborted fetuses and placentas without adequate protection also put themselves at risk of the infection (Wise, 1980; Onyemelukwe, 1989).

In view of the above, it is perhaps surprising that in this study, none of the human samples, including those from individuals that were considered most at risk of infection, tested positive for Brucella antibodies. This could reflect a genuinely low prevalence but did not completely rule out the possibility of human infection since only a small group was sampled. Further tests with a larger sample group were therefore required.

The association of seropositivity with abortions and stillbirths in cattle indicates there may be a significant economic impact of the disease in the district. It is therefore important that farmers seek veterinary advice on the health status of animals within the district, particularly those used for breeding purposes. There is also a need to improve the diagnostic capacity of both veterinary and district hospital laboratories. This will help confirm cases of brucellosis in cattle as well as aid in the detection of any zoonotic transmission to the human population.

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