FACULTY OF VETERINARY MEDICINE
USMANU DANFODIYO UNIVERSITY
P.M.B. 2346, SOKOTO. NIGERIA

Sokoto Journal of Veterinary Sciences

ISSN 1595-093X

Yohanna *et al*. /*Sokoto Journal of Veterinary Sciences* (2008). **7**(2): 46-48.

Prevalence of bovine tuberculosis using single comparative intradermal tubeculin test (SCITT) in Fulani herds in Nasarawa state, north central Nigeria

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Abstract

In a study to determine the prevalence of bovine tuberculosis in the cattle population of Nasarawa State, 199 cattle were randomly selected and screened using the Single Comparative Intradermal Tuberculin Test (SCITT).
A 15.08% reactor rate was observed in the cattle screened. While the bulls and calves had 1.00% and 2.51% reactor rate respectively. The cows had as high as 11.56% which is statistically significant ($P \leq 0.05$). The infected cows would continue to be the source of infection to susceptible cattle especially the calves and humans.
Control measures such as public enlightenment, mandatory pasteurization of milk before sale to the public and trace back of infected carcass to the herd with subsequent test and slaughter with full compensation have been suggested.

Key words: Tuberculosis, Cattle, Nassarawa State, PPD-Tuberculin.

Introduction

Tuberculosis, a chronic, infectious, debilitating and wasting zoonosis caused by Mycobacterium species has an alarming global incidence being the biggest killer of humans in the world resulting in 1500 deaths everyday in Africa (WHO, 2005). The most common species of Mycobacterium (M) associated with the disease in humans is M. tuberculosis although an unknown proportion of cases are due to M. bovis (Cadmus et al 2003).

Zoonotic tuberculosis due to M. bovis is present in animals in most developing countries where surveillance and control measures are often inadequate or unavailable. A considerable public health significance of M. bovis infection in humans and animals has been observed, as it has emerged as a major zoonotic problem in many African countries (WHO, 1994). M. bovis is widely distributed; it appears to have a predilection for Africa, where the tuberculosis epidemic is out of control. The worsening poverty in Africa with a coinciding epidemic of HIV which increases tuberculosis transmission and the emergence of drug resistance, the problem is likely to get worse (Enarson, 2005).

In humans, M. bovis is the major cause of extra-pulmonary tuberculosis like the tuberculosis of the gastrointestinal tract, cervical and the mesenteric lymph nodes, peritoneum, and the genito-urinary tract (Bonsu et al, 2001 and Dankner et al, 1993). In countries where bovine milk is not pasteurized before use, bovine tuberculosis has emerged as the single major cause of extra-pulmonary human tuberculosis.

Many methods are available for the diagnosis of tuberculosis in infected animals but the SCITT is the most widely used for diagnosis and eradication of bovine tuberculosis (OIE 2004).

Regrettably, bovine tuberculosis has not been seriously attended to in Nasarawa State. Information regarding its prevalence and incidence in the cattle population is not available. This calls for the need for research to determine its prevalence and proffer recommendations on how to safeguard the human population.

Materials and Methods

Study area

Nasarawa State of Nigeria, located in the North Central Region, lies between latitude 70 and 90 North and longitude 70 and 100 East has a total human population of about 1,207, 876 and cattle population of 225, 470 (Presidential Task Force, 1992). The climate is Tropical and the vegetation is Guinea Savannah which is conducive for farming and raring of livestock. It has seven Grazing Reserves located in seven Local Government Areas of the state, namely Lafia, Doma, Awe, Keana, Karu, Nasarawa and Wamba. The economy is Agriculture-based with farmers engaged in subsistence agriculture and the standard of living being poor. Her human population is at the risk of getting infected with tuberculosis because they consume milk and suspected infected meat.

Materials

199 cattle comprising bulls, cows and calves were randomly selected from two Fulani herds in Nasarawa Eggon LGA and Awe LGA of Nasarawa state.

The Bovine and avian PPD-Tuberculin (purified protein derivative of tubercle bacilli) were obtained from Veterinary laboratories Agency Addlestone, Surrey, KT 15 3NB, United Kingdom.

Methods

Single Comparative Intradermal Tuberculin Test

Two sites, 12 cm apart on the right side of the mid-neck of each animal were shaved and the skin thickness was measured with calipers. Aliquots of 0.1ml of the 2500 iu/ml of bovine PPD and 0.1 ml of 2500 iu/ml avian PPD were injected into the dermis at these sites. After 72 hours, the thickness of the skin at each injection site was measured with the same calipers. The result was interpreted in accordance with the recommendations of World Health Organization (OIE, 2004). An animal was classified as tuberculin positive if the increase in the thickness at the injection site for bovine-PPD was at least 4 mm greater than the increase in the skin thickness at the injection site of avian-PPD. The reaction was considered to be inconclusive if the increase in skin thickness at the injection site for bovine-PPD was from 1 to 4 mm greater than that at the injection site for avian-PPD. The reaction was considered to be negative if the increase in skin thickness at the bovine site of injection was less than or equal to the increase in the skin reaction at the avian site of injection.

The cattle in which positive reaction was seen at the site of bovine tuberculin were confirmed as positive for bovine tuberculosis.

Results

A 15.08 % reactor rate was observed in the cattle screened, while calves and cows had 11.56% and 2.51% reactor's rate respectively the bulls had as low 1.00%.

Table 1:Result of the Single Comparative Intradermal Tuberculin Test conducted in Fulani Herds in Nasarawa state, Nigeria (Number tested and Prevalence (%))

Sex	Calves		Bulls		Cows		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)
No Tested Negative	18	9.05	22	11.06	75	37.69	115	57.79
Inconclusive Reactors	6	3.02	8	4.02	40	20.10	54	27.14

Positive Reactors	5	2.51	2	1.01	23	11.56	30	15.08
Total	29	14.58	32	16.09	138	69.35	199	100.02

Discussion

From the result of the study a reactor rate of 15.08% was observed in the 199 cattle screened giving rise to a prevalence rate of 15.08% of bovine tuberculosis in Nasarawa state. This fell within the range of 5.3 to 26.6% reported by Alhaji (1976). Though this is higher than the 8.3% observed by Cadmus (2003), this may be attributed to the fact that those cattle screened were on resident farm. Whereas the ones screened in this study were Fulani cattle which have frequent association within and between other cattle and other animals during grazing, at water points and as they migrate seasonally. Hence these stood a higher risk of acquiring the infection and disseminating same.

Observed also, was a higher prevalence for cows (11.56%) as against that of calves (2.51%) and bulls (1.00%). This was statistically significant ($P \leq 0.05$) when tested using chi square, for it tallied with what was observed at the Sokoto abattoir (Sonfada and Garba, 2000) that female and older cattle were statistically more infected. It could be due to the fact that the cows are more preferred by the Fulani for breeding and they stay longer in the herd, which explains the higher population of those infected. The milk from these cows can be a source of infection to humans if taken unpastuerized, this point out a very serious public health problem.

Mycobacterium bovis being highly pathogenic, one of its main routes of transmission to man and from man to cattle is by aerosol for its shedding in respiratory secretion is a consistent feature of the tuberculous cattle (Neil O'Brien and Hanna, 1991). Constant exposure to tuberculous cattle as a result of co-habitation observed with the Fulani increases the risk of human infection with the bacteria as observed in Zambia (Grange, 1996). It is therefore very important that efforts should be made to control the disease in the cattle beyond the pasteurization of milk.

Recommendation

The control and elimination of bovine tuberculosis would only be achieved if strict and uniform control measures are adopted for both the animal and human population. Control measures such as public enlightenment, mandatory pasteurization of milk before sale to the public and trace back of infected carcass to the herd with subsequent test and slaughter with full compensation. These, coupled with the control measures already in place in the human population would help greatly in reducing the incidence of the bovine tuberculosis.

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