BOVINE TUBERCULOSIS SURVEY IN ABATTOIRS AND POSSIBLE HEALTH RISK PRACTISES AMONG CATTLE OWNERS IN OSOGBO, SOUTH -WESTERN NIGERIA.

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Article received: 22nd April, 2015; Article accepted: 19th June, 2015.

ABSTRACT

Bovine tuberculosis caused by Mycobacterium bovis and associated risk factors which cause significant economic losses and public health hazard in sub-Saharan Africa, have been insufficiently studied in our abattoir settings and herd rearing settlement. Twenty abattoirs from all the urban and villages of Osogbo, Nigeria were surveyed before and at slaughter of cattle. Detailed body condition scoring and post mortem meat inspection were used to detect lesion of tuberculosis in cattle with the aims of determining the magnitude and distribution of bovine tuberculosis in Osogbo metropolis. Potential risk factors for transmission of bovine tuberculosis were assessed with the aid of a well- structured questionnaire and interview schedule to two hundred volunteer cattle owners. A total of 1000 cattle, 712(71.2%) male, and 288 (28.8%) female were inspected; of these, 9.6 % (96/1000) had the lesions of tuberculosis. Major breed were white Fulani (680, 68%) and Sokoto Gudali (320, 32%). Characteristic tuberculosis lesions were found in 44(50%) of the lungs; 28.8(30%) of major lymph nodes around the trunk; 9.6(10%) of the liver; and 4.4(5%) of the spleen and kidneys. Out of two hundred volunteer cattle owners who were interviewed, about 80% of the respondents had not heard about bovine tuberculosis, with illness related to tuberculosis recorded in 30% of the respondents. Major health risk factors included the drinking of raw milk, close contact with animals, sharing of household utensils with animals and sleeping on straws. This study demonstrates detection of tuberculosis lesion in meat passed for human consumption and reported poor knowledge of respondents on preventive measures and predominant practices that enhanced the spread of bovine tuberculosis.

Keywords: Abattoirs,bovine tuberculosis, cattle, lungs, kidney, Osogbo,

INTRODUCTION

Bovine tuberculosis (BTB) is a disease characterized by formation of granulomatous nodules called tubercles whose locations depend largely on the route of infection. Tuberculosis due to *Mycobacterium bovis* is one of the seven most neglected endemic zoonoses in the world, particularly in developing countries (WHO, 2014). In sub-Saharan Africa, BTB causes significant economic losses and public health hazard (Ejeh *et al*., 2014). Bovine tuberculosis is an endemic disease of cattle in Nigeria, and its presence has been reported from different regions of the country based on confirmed cases of cattle slaughtered in abattoirs and in fresh and sour milk in several parts Nigeria (Cadmus *et al*., 2010; Jenkins *et al*., 2011). The global prevalence of human tuberculosis caused by *M. bovis* has been estimated to be 3.1% of all tuberculosis cases, accounting for 2.1% and 9.4% of pulmonary and extra pulmonary tuberculosis cases respectively (Cosivi *et al*., 1998).

In most countries in Africa, bovine TB is prevalent, but effective disease control, including regular milk pasteurization and slaughterhouse meat inspection, is largely absent (Cosivi *et al*., 1998; Ayele *et al*., 2004). Difficulties in the isolation of *M. bovis* does not allow for the accurate determination of the occurrence of BTB in Nigeria. Currently, BTB in humans is becoming increasingly important in developing countries like Nigeria due to poverty, malnutrition, human immunodeficiency virus, and inadequate health care (Michel *et al*., 2010). The epidemiology and public health significance of bovine TB in Nigeria also remain largely unknown however; few laboratories in the country are capable of differentiating *M. bovis* from *M. tuberculosis* and other members of the *M. tuberculosis* Complex (MTC) (Cadmus *et al*., 2004.

The need to eradicate bovine tuberculosis in Nigeria cannot be overemphasized as beef remains a major source of animal protein and part of the basic diets of Nigerians. This study therefore intends to document the prevalence of bovine tuberculosis in cattle slaughtered using detailed body condition scoring and post mortem meat inspection to detect lesion of

tuberculosis in cattle with the aims of determining the magnitude and distribution of bovine tuberculosis in Osogbo metropolis. In addition a questionnaire was administered to volunteer household cattle rearers in order to access the risk factors responsible for the continued endemicity of bovine tuberculosis in the region of study.

MATERIALS AND METHODS

Study Location:

The study location used for this study is Osobgo. Osogbo metropolis is the capital state of Osun state, one of the states in South Western Nigeria. In 2009, Osogbo had an estimated population of well over 448,000 inhabitants based on Nigeria 1991 census figures of 210,000 inhabitants with a 3% yearly increase. There is no central abattoir in this city. Cattle are slaughtered at small designated places by the road side, riverside and sheds and near major markets located in various parts of the city.

Sample Collection and Analysis: A total of 1000 cattle, 712(71.2%) male, 288(28.8%) female from twenty major abattoirs in all the urban areas and rural villages of Osogbo were surveyed before and at the slaughter point of cattle. Detailed ante and post mortem meat inspection were used to detect lesion of tuberculosis in cattle with the aims of determining the magnitude and distribution of bovine tuberculosis in Osogbo metropolis. Suspected samples from various organs were taken and fixed in 10% buffered formalin and the areas of lesion showing granulomatous macroscopically were taken for histopathological processing, and stained with H & E stain.

Questionnaires were used to carry out a survey on randomly selected cattle owners by self and through interpreters to two- hundred farmers in order determine socio economic characteristics, animal husbandry and practises that enhance transmission of BTB and risk factors that predispose individuals to BTB. In this study, ten cattle herds in ten temporary settlements of the nomadic Fulani community at five Local Government areas of Osogbo were visited to study the potential risk factors for transmission of bovine tuberculosis

Data collection

The individual animal identification number, breed, sex, and age of the animal were recorded. Body condition scoring was made using a method developed for Zebu cattle (Nicholson and Butterworth, 1986). The range and frequency of anatomical sites where tuberculosis lesion were detected were also recorded for affected cattle.

Data retrieval, collating, and analysis

One abattoir was visited per day; meat in section was done with the assistance of qualified veterinarians, who conducted post-mortem examinations of slaughtered cattle. The various abattoirs were visited after obtaining permission from the relevant authorities, and the needed data were collated on amonthly basis. These included the number of cattle examined before slaughter and those with tuberculous lesions after post-mortem prevalence was calculated as the number of cattle with suspect TBlesions divided by the number of cattle examined at post-mortem within the specified period.

The data collected from the study area was entered into MS Excel spread sheets and was analyzed by using Intercooled Stata 7. Chi-square test and test of agreement (Kappa-value) methods were used for the analysis of the data. In all the analysis, P-value was held at <0.05 for significance.

Selection of animals for slaughter

Most of the animals brought for slaughter were bought from cattle markets located close to the abattoirs. Selection on the herd basis was not possible because most of these bovids originated from nomads who were the predominant cattle owners in this region.

Post-mortem inspection

Meat inspection was carried out at the designated abattoir by well-trained veterinarians with the investigator. A total of 1000 cattle were inspected for bovine carcasses for detection of tuberculosis-like lesions**.** Samples of caseated, suppurative granulomatous lymph nodes and granuloma from parenchymatous organs were collected in polyethylene bags and promptly transported to the laboratory in ice. Some parts of suspected lesion from lungs and other organs were fixed in 10% formalin and the sections were prepared by the paraffin embedding technique according to Banchroft*et al.* (1996).

RESULTS

A total of 1000 cattle, 712(71.2%) male, 288(28.8%) female; were inspected (Table 1), of these, 9.6% (96/1000) had the lesions of tuberculosis.Cattle slaughtered were between the age range from 2-5years and major breed were white Fulani 680(68%) and Sokoto Gudali 320(32%)(Table 1).Post-mortem examination result showed that the most common changes seen in the most affected organare lung cavities that showed grey/white caseousnecrotic materials as well as caseous foci which are features of caseous necrosis. Characteristic lesions of tuberculosis were found mostly in the lungs and lymph modes (Table 2). Figure 1 shows the tuberculous lungs while Figure 2 shows the histological slide of the tuberculous tissue. Results

(Table 1) further showed a significant statistical relationship between the prevalence of BTB and the sex (p=0.001) and rearing method of the cattle (p=0.0114), with none existing between BTB prevalence and the breed of the cattle (p=0.0943). Table 3 describes the age distribution of the cattle, with the highest frequency found amongst cattle that are about 3years old.

Of 200 respondents, 160(80%) had not heard about bovine tuberculosis. Illness related to tuberculosis in the community was recorded in 30% of the respondents. Drinking of raw milk was used to treat symptoms of cough of causes not known by them. The educational background of all respondents showed that all 100% did not have formal education. Drinking of raw milk, very close contact with animals such as, sharing household utensils with animals and sleeping on straw other practises that enhance the spread of BTB was practised by 196(98%) of the respondents.

DISCUSSION

In this study, 9.6% prevalence observed is similar to 10.5%reported by Cadmus *et al*. (2004) in Ibadan, a major Nigerian city in close proximity to Oshogbo. Other regions of Nigeria have shown varied prevalence rates from 2.9% as reported by Ejeh *et al*. (2014) in South-South region of Nigeria, 3.1-5.16% reported by Aliyu *et al*. (2009) in North - Eastern part of Nigeria. The high prevalence of BTB in this region may not be unconnected to the failure of the constituted authorities and other stakeholders to reintroduce and monitor the test and

TABLE 1: Distribution of Tuberculosis lesions in organs inspected

Organs	Frequency
Lungs	38
Lymph nodes (Trunk)	28
Liver	10
Spleen	8
Git (Messenteric)	12
Total	**96**

Figure 1: Scattered granulomatous lesions of the lung grossly appears as irregularly sized rounded nodules that are firm and tan

Table 2: Prevalence of Bovine Tuberculosis with respect to sex, breed, and rearing method of cattle.

			Total	**P value**
	Male	**Female**		
Positive for BTB	44	52	**96**	<0.001
Negative for BTB	668	236	**904**	
Total	**712**	**288**	**1000**	
	White Fulani	**SokotoGudali**		
Positive for BTB	58	38	**96**	0.0943
Negative for BTB	622	282	**904**	
Total	**680**	**320**	**1000**	
	Fenced	**Unfenced**		
Positive for BTB	16	80	**96**	0.0114
Negative for BTB	260	644	**904**	
Total	**276**	**724**	**1000**	

P value less than 0.05 is statistically significant.

Table 3: Age distribution and frequency of the examined cattle.

	2years	**3years**	**4years**	**5years**	Total	**P value <0.001**
Positive BTB	0	44	20	32	**96**	
Negative for BTB	96	504	224	80	**904**	
Total	**96**	**548**	**244**	**112**	**1000**	

P value less than 0.05 is statistically significant

slaughter policy in Nigeria a reason also adduced by Danbirni *et al*. (2013).

The distribution of tuberculosis lesions as shown in Table 1 indicated the possibility that the animals could have been infected through inhalation. The lesions present in the organs were generally encapsulated foci in isolated lymph nodes to extensive caseous nodules in the dorsal areas of the lung, spleen, liver, heart, and some regional lymph nodes this was exactly as described by Cadmus *et al*. (2004). Presence of such lesions was also reported by Opara *et al*. (2012) as well as Radostits *et al*. (1994).

The highest prevalence of BTB observed among cattle of about 3 years old could be largely due to the fact that the highest frequency was among this group of cattle. With a p-value less than 0.001 there was a statistical relationship between the age of the cattle and presence of BTB. Although older cattle are likely to be more prone to BTB due to longer years of exposure and probably lower immunity, the relationship between ages of cattle and the development of BTB has generated different results from different researches; while some (Corbett *et al*., 2003; Okeke *et al*., 2014) indicated that no relationship existed, some others (Humblet *et al*., 2009) indicated otherwise.

The prevalence of BTB by sex of slaughtered animal showed that more cows are infected with TB than bulls. There was a statistical significance ($p<0.001$) between the prevalence of BTB and the sex of the cattle. The high prevalence of BTB amongst cows could be largely adduced to reduced immunity expressed by cows due to stress of pregnancy and lactation over the years. This is consistent with studies on BTB (Cadmus *etal*., 2004; Ejeh *et al*., 2014; Opara *et al*., 2015). The high incidence of BTB infection has majorpublic health implications, since *Mycobacterium bovis* is transmissible through the consumption of dairy products (Opara *et al*., 2015),

and has been isolated at different times from unpasteurized cow milk (Cadmus &Adesokan, 2007). The results from this study showed that there was no statistical significance (p=0.0943) between the breed of cattle and development of BTB lesions. This agrees with the works of Okpara *et al*. (2015), Okolie *et al*. (2006) as well as Cadmus *et al*. (2004) which argued that breed was not likely to have played a role in the development of BTB in their study, but disagrees with Cadmus and Adesokan (2007), which showed that taurines (N'dama) were at higher risk of BTB infection.

This study further showed that the rearing method utilized for the cattle contributed to the prevalence of BTB. With p=0.0114, cattle reared in areas unfenced were at a higher risk of developing BTB. This could be attributed to the mixing of the herds with other livestock other than cattle, a situation which was often noticed in the cause of this study. This observation is in agreement with reports made by Tschopp *et al.* (2009) which stated in their study that having livestock other than cattle in the herd increased the risk of positive tuberculin reaction in cattle.

With the literacy level of pastoral nomads said to be at 0.28% (Chima *et al*., 2014), a large percentage of the respondents interviewed in this study had no knowledge of what bovine tuberculosis was. This could be due to the high illiteracy level amongst the cattle nomads, with all the respondents acknowledging that they had no formal education. This equally contributed to their lifestyle as well as increase in practices which enhanced the spread of BTB.

CONCLUSION

Bovine tuberculosis has significant presence in Osogbo. The reported poor knowledge of respondents on preventive measures and predominant practices that enhanced the spread of bovine tuberculosis provides justification for dissemination of information on this disease and control measures in this area and Nigeria at large.

Acknowledgement

We are grateful to Veterinary Officers in Osogbo, who assisted in conducting meat inspection and provided information needed for this work.

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