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Prevalence of Bovine Tuberculosis (BTB) in Imo State, Southeastern Nigeria

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Abstract

This 8-month study was conducted to determine the prevalence of bovine tuberculosis (BTB) in the three major zonal abattoirs of Imo State, southeastern Nigeria. During this period, 7,164 cattle were slaughtered and examined, of which 247 (3.4%) were infected with bovine tuberculosis. Of the infected, 170 (3.5%) cases were recorded in Owerri Zone, 20 (2.5%) in Orlu, and 57 (3.7%) in Okigwe. Female cattle showed higher BTB prevalence (4.5%), with males 3.3%. There were no observable differences in TB infection among the different cattle breeds. BTB infection was recorded among White Fulani, at 3.3%. Infections in Sokoto Gudali, N'dama and Bunaji were 3.7, 3.6, and 3.3%, respectively. Over 50% of the slaughtered cattle were Sokoto Gudali.

The lungs of 59.1% of the infected animals examined had TB lesions. Lesions were also found in 21.5, 11.3, and 8.1% of the livers, intestines and lymph nodes, respectively, of the infected cattle. Considering the appreciably high prevalence of tuberculosis in this study, there is a need for the government to employ competent and qualified personnel to conduct meat inspections in the various abattoirs in the State, and for citizens to be educated about the public-health significance of BTB.

Keywords: bovine tuberculosis, Imo State, Nigeria

Introduction

Tuberculosis is a chronic infectious disease of animals, birds, and humans, caused by members of the genus *Mycobacterium*. In most species it can lead, with the proliferation of tubercles, to caseation and calcification in the parenchyma of affected organs [1].

The disease is of zoonotic importance, and has become a resurgent problem in Nigeria [2]. In developing countries like Nigeria, bovine tuberculosis (BTB) is an endemic problem [1,3-7] with no well-defined national eradication or animal tuberculosis control program [8].

It is imperative that simple and inexpensive measures be put in place to diagnose the disease in our local abattoirs and on our slaughter slabs. One of the most efficient and practical ways of doing this is through organized meat inspection, as shown in the United Kingdom [9], which has faced problems of bovine tuberculosis similar to

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those experienced by countries in Africa. This entails both accurate and detailed ante- and post-mortem inspection by veterinary meat inspection officers of animals brought for slaughter [10].

Signs like emaciation and weakness are just two of the cardinal alert symptoms during ante-mortem inspection, though these two alone do not confirm bovine tuberculosis. Meat inspection officers are trained to check for miliary tubercles in the head, spleen, kidney, mammary glands, fore- and hind-limbs, lungs, liver, heart, and associated lymph nodes [9,10].

In Nigeria, an annual loss of 5 million United States dollars in meat products has been reported [11]. The Nigerian government and numerous foreign agencies have instituted interventions to reduce its impact. These measures are increasingly being hampered by several other factors, including rising poverty, poor housing, poor diet, inconsistent government policy on tuberculosis control, and expensive and not readily available antimycobacterial drugs [12].

About 36% of the Nigerian meat supply comes from beef alone, as reported by Aniebo, Wekhe & Okoli [13], and about 40% of the cattle population in southeastern Nigeria is slaughtered in Imo State [14]. As a result of the zoonotic implications of tuberculosis from slaughtered cattle [3,5-7], there is a real need to determine its current prevalence and the potential public-health hazards of beef consumption.

This paper reports a six-month prevalence study of tuberculosis among cattle slaughtered at the three major zonal abattoirs of Imo State, Nigeria.

Materials and methods

Data collection

This study was conducted across the three main zonal abattoirs of Imo State–Owerri (Afor Ogbe Modern Abattoir), Orlu (Nkwo-Idemili Abattoir), and Okigwe (Main Garki Abattoir)–over a period of 8 months. During this time, daily visits were made to the abattoirs from 6:30 am to 8:00 am for ante- and post-mortem examinations of cattle slaughtered for meat. The animals were examined systematically, starting from the face to the left or right side, to the rear or anus, right or left, and back to the face, checking if the prescapular lymph nodes were swollen or enlarged by being remarkably visible. Also, the prefemoral lymph nodes were checked for enlargement during ante-mortem inspection. Later, the thoracic and abdominal cavities of the slaughtered animal were opened for visual examination and palpation of the different organs and lymph nodes; they then underwent incision for evidence of miliary nodules and granulomatous tubercles to investigate potentially tuberculous lesions.

The data generated were recorded by sex, age, breed, and weight of cattle slaughtered, and analyzed using simple averages and percentage.

Results

During the study period, a total of 7,164 cattle (Table 1) were slaughtered at the three zonal abattoirs: 247 (3.4%) were infected with tuberculosis. Of the total animals slaughtered, 4,816 (67.2%) were from the Owerri zonal abattoir, where 170 (3.5%) were infected with tuberculosis; 791 cattle (11.0%) were slaughtered at the Orlu zonal abattoir, where 20 (2.5%) had tuberculous lesions; and at the Okigwe zonal abattoir, 1,557 (21.7%) cattle were slaughtered, where 57 (3.7%) had TB lesions.

Table 2 shows the overall prevalence of bovine tuberculosis at the three zonal abattoirs of Imo State, by sex of animal slaughtered. Of the 7,164 cattle examined, 5,966 (83.3%) were male and 951 (13.7%) female; of which 202 (3.4%) male and 45 (4.7%) female were found to be infected with bovine tuberculosis. At the Owerri zonal abattoir, a total of 4,233 males were slaughtered, of which 138 (3.4%) were infected, while 32 (5.8%) of 583 females carried the disease; in the Orlu zonal abattoir, 620 males were slaughtered with 14 (2.3%) found to be infected, while of the 152 cows slaughtered, 5 (3.3%) had BTB; 1,251 (21.0%) bulls were slaughtered at the Okigwe zonal abattoir and 50 (4.0%) were infected, while the number of cows slaughtered was 249, of which 7 (2.8%) had BTB.

Table 1 Prevalence of bovine tuberculosis in the three zonal abattoirs of Imo State.

Zonal abattoir	No. of animals examined	% examined	No. infected	% infected
Owerri	4,816	67.2	170	3.5
Orlu	791	11.0	20	2.5
Okigwe	1,557	21.7	57	3.7
Total	7,164	–	247	3.4

Table 2 Prevalence of BTB in cattle according to the sex of slaughtered animal.

Zonal abattoir	No. (%) of animals examined		No. (%) of animals infected	
	Male	Female	Male	Female
Owerri	4,233 (68.6)	583 (58.5)	138 (3.4)	32 (5.8)
Orlu	620 (10.4)	152 (15.9)	14 (2.3)	5 (3.3)
Okigwe	1,251 (21.0)	249 (26.2)	50 (4.0)	7 (2.8)
Total	5,966 (83.3)	951 (13.7)	202 (3.4)	45 (4.7)

The prevalence of bovine tuberculosis in cattle according to the breed of animals slaughtered in the three zonal abattoirs of Imo State is shown in Table 3. Of 7,164 cattle examined, 3,596 (50.2%) were Sokoto Gudali. Of these, 134 (3.7%) were infected with tuberculosis, while of 1,829 (25.5%) White Fulani examined, 61 (3.3%) were infected. The number of N'dama examined was 944 (13.2%) and 3.6% of them were infected, while the infection rate amongst 548 Bunaji was 3.3%.

Table 4 shows the prevalence of bovine tuberculosis lesions in the organs of cattle slaughtered in the three zonal abattoirs of Imo State (see also Fig 1-3).

Of the 247 cattle infected with tuberculosis in the three abattoirs, lesions were observed in the lungs of 146 animals (59.1%), in 53 (21.5%) livers, 28 (11.3%) intestines, and 20 (8.1%) lymph nodes.

In the Owerri zonal abattoir, of the 170 infected animals, lesions were found in the lungs of 101 (59.4%), and in 10 (5.9%), lesions were evident in the lymph nodes. In the Orlu zonal abattoir, where 20 slaughtered cattle were infected, TB lesions were found in the lungs of 7 (35%) and in the intestines of 3 (15%) animals. The lungs of 38 (66.7%) infected cattle slaughtered in Okigwe zonal abattoir had TB lesions, while infection was discovered in the intestines of 2 (3.5%).

Discussion

The overall prevalence rate of bovine tuberculosis, recorded at 3.4% in this study, is far lower than that recorded by Cadmus *et al* [7], who reported a prevalence of 10.5% in Ibadan, southwestern Nigeria. Although this study was carried out in the southeast, the slaughtered cattle are sourced from areas in the north. The lower prevalence rate here suggests improved accuracy over a number of years in the diagnosis of animal disease at ante- and post-mortem inspection. Similar nodular lesions of the higher bacteria, such as *Nocardia* and *Corynebacterium*, can be mistaken for TB lesions [15], as most slaughter slabs and abattoirs still do not have diagnostic facilities to

Table 3 Prevalence of BTB in cattle by breed of animal slaughtered.

Zonal abattoir	No. of animals examined	No. of animals infected	Breed of Animal Examined							
			Sokoto Gudali		*White Fulani*		*N'dama*		*Bunaji*	
			No. examined	No. infected	No. examined	No. infected	No. examined	No. infected	No. examined	No. infected
Owerri	4,816	170	2,337 (48.5%)	100 (4.3%)	1,182 (3.5%)	41 (24.1%)	660 (13.7%)	21 (3.2%)	467 (9.7%)	8 (1.7%)
Orlu	791	20	314 (39.7%)	9 (2.9%)	231 (29.2%)	6 (2.6%)	174 (22.0)	3 (1.7%)	52 (6.6%)	2 (3.8%)
Okigwe	1,557	57	945 (60.7%)	25 (2.6%)	416 (26.7%)	14 (3.4%)	110 (7.1%)	10 (9.1%)	29 (1.9%)	8 (27.6%)
Total	7,164	247	3,596 (50.2%)	134 (3.7%)	1,829 (25.5%)	61 (3.3%)	944 (13.2%)	34 (3.6%)	548 (7.6%)	18 (3.3%)

Table 4 Prevalence of tuberculosis lesions in the organs of slaughtered cattle in the three zonal abattoirs of Imo State.

Zonal Abattoir	No. of animals examined	No. (%) of animals infected	Lungs infected (%)	Liver infected (%)	Intestine infected (%)	Lymph nodes infected (%)
Owerri	4,816	170 (3.5%)	101 (59.4%)	36 (21.2%)	23 (13.5%)	10 (5.9%)
Orlu	791	20 (2.5%)	7 (35%)	5 (25%)	3 (15%)	5 (25%)
Okigwe	1,557	57 (3.7%)	38 (66.7%)	12 (21.1%)	2 (3.5%)	5 (8.8%)
Total	7,164	247 (3.4%)	146 (59.1%)	53 (21.5%)	28 (11.3%)	20 (8.1%)

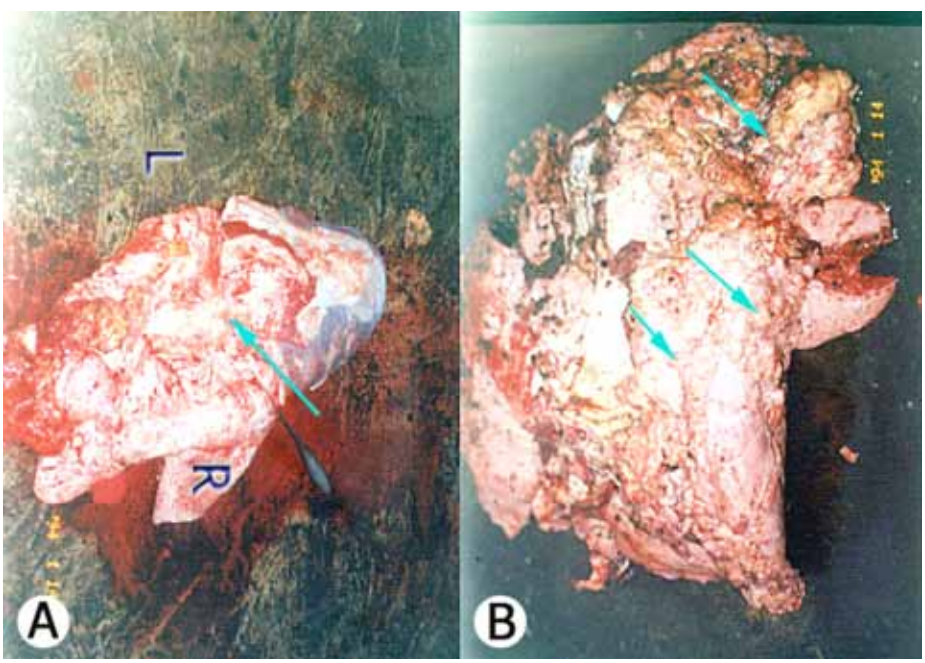

Fig 1 An incised lymph node with TB lesion (A), and lung with widespread TB nodules (arrows) (B).

confirm tuberculosis and other similar diseases.

The overall prevalence of bovine tuberculosis by sex of slaughtered animal, although not statistically tested, suggests that more cows are infected with TB than bulls. This observation agrees with Cadmus *et al* [7], who reported a higher TB prevalence among cows. This may be due to the reduced immunity expressed generally by female animals due to the stress of pregnancy and lactation [16,17]. The finding that female cattle have a high incidence of BTB infection has major public health implications, since *Mycobacterium bovis* is transmissible through the consumption of dairy products, and considering that it has been

Fig 2 Butchers and meat hawkers on the slaughter slab.

isolated from unpasteurized cow's milk (nono) in Nigeria [2,18].

Four major breeds of cattle – White Fulani, Sokoto Gudali, N'dama and Bunaji – were examined. However, Sokoto Gudali was the most prevalent. They were more common because of their larger size, and are therefore assumed to produce more meat than the other breeds slaughtered. Tuberculosis infection among the different breeds of cattle examined, although not statistically tested, was similar. The results of this study tend to disagree with the work of Cadmus and Adesokan [18], which showed that taurines (N'dama) were at higher risk of BTB infection. Similarly, a study in Ethiopia [19] showed that *Bos taurus taurus* cattle were more susceptible to bovine tuberculosis than *Bos taurus indicus*. Our result agrees with the report by Okoli *et al* [20], and suggests that different cattle breeds found in Imo State have equal ability to serve as sources of TB infection. Disparities elsewhere in Nigeria [18] require further investigation.

Tuberculous lesions were recorded most frequently in the lungs, followed by the liver,

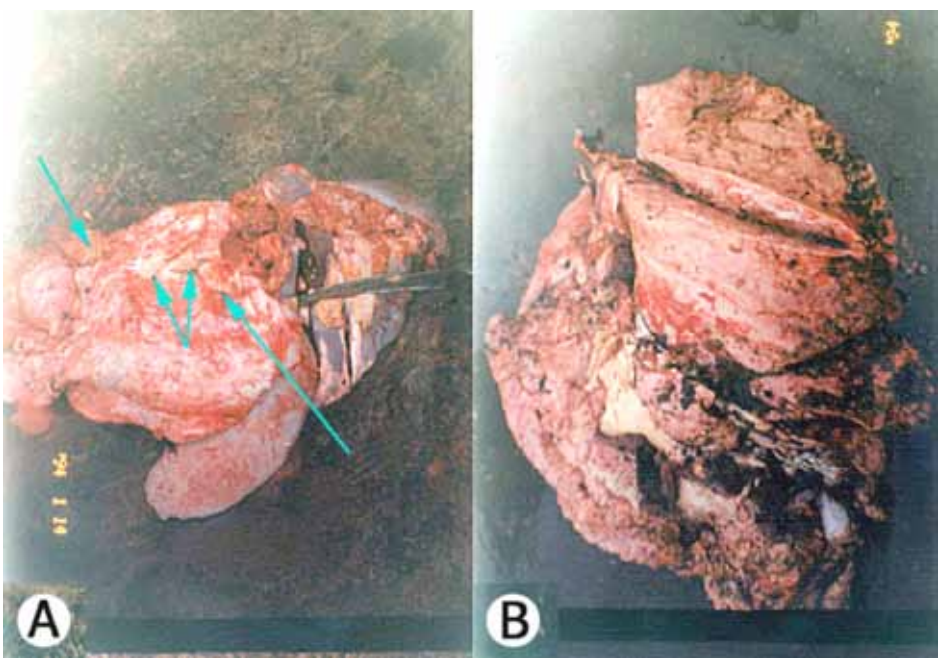

Fig 3 Large TB nodules on the liver (arrows) (A), and widespread TB lesions on the lung (B).

intestines, and lymph nodes. This agrees with Opara [17], but not with Cadmus and Adesokan [18], who found a higher occurrence of lesions in the liver. This, however, may be attributed to a number of factors, such as period of study and the fewer number of animals they used. The occurrence of lesions in the different major organs suggests the ease with which the infection can be transmitted. Cattle were found to shed *M. bovis* in respiratory secretions, feces, and milk, and sometimes in urine, vaginal secretions, and semen [16]. Large numbers of the organism may be shed in the latter stages of infection. In most cases, *M. bovis* is transmitted between cattle via aerosol during close contact.

M. bovis can infect humans, primarily via the ingestion of unpasteurized milk and other milk products, but also via aerosol and broken skin. Raw or undercooked meat has also been reported as being a source of infection [21]. Person-to-person transmission is rare in immuno-competent individuals, but *M. bovis* has occasionally been transmitted within small clusters of people, particularly alcoholics or HIV-infected individuals [8,22]. Rarely have humans been known to infect cattle via aerosol or urine [23].

Conclusion

The prevalence of bovine tuberculosis still seems high, considering the number of cattle slaughtered daily in various abattoirs. This calls for a more concerted effort by the Nigerian government to employ qualified, competent personnel to implement meat inspection measures, and also equip them with functional facilities to enable them to carry out effective diagnoses whilst inspecting meat. This will be of great help in reducing the number of incidences of bovine tuberculosis found in our abattoirs. Meat hawkers should be prevented from using these abattoirs, because of their tendency to pick condemned meat and sell it to the public.

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