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Research Article

Prevalence of Bovine Tuberculosis at the Gwagwalada Abattoir, Federal Capital Territory (FCT), Nigeria: A One-Year Retrospective Study

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Abstract

Bovine Tuberculosis (BTB) caused by *Mycobacterium bovis* remains a significant zoonotic disease with implications for public health, food safety, and livestock productivity. This retrospective study aimed at determining the prevalence of BTB in cattle slaughtered at the Gwagwalada Abattoir in the Federal Capital Territory (FCT), Nigeria based on records of gross pathological lesions of BTB in cattle slaughtered from April 2024 to April 2025. The veterinary record books in the abattoir showed that a total number of 4,492 cattle were slaughtered in the one-year period under review, out of which 17 cases (0.38 %) were confirmed as BTB based on gross pathologic lesions of caseous and/ or granulomatous lesions typical of the disease. Prevalence based on organ distribution showed that the lungs was the most frequently affected organ, accounting for 14 of the 17 cases (82.4 %); while the liver was involved in 3 cases (17.6 %). The monthly distribution showed the highest number of cases were reported in April 2024 which had 3 cases with a 1.26 % prevalence. This study accentuates the endemicity of BTB in cattle slaughtered for human consumption at the Gwagwalada abattoir, which therefore underscores the need for increased routine surveillance, testing of animals before slaughter, implementation of adequate government control programs with improved meat inspection techniques and public awareness campaigns to mitigate zoonotic transmission risks.

Keywords: Bovine Tuberculosis; Cattle; Abattoir; Retrospective study; Gwagwalada; Nigeria

Introduction

Bovine Tuberculosis (BTB) is a chronic infectious disease of cattle caused by *Mycobacterium bovis*. It is a major zoonotic disease, and cattle are the main reservoir for infection in humans. The disease is widespread to the human population primarily through the consumption of raw or improperly pasteurized milk. It is well known that meat and meat products from infected animals are also sources of infections in man [1]. The disease also affects domestic, wild, laboratory and aquatic animals and is globally associated with huge economic losses and adverse public health implications [2-4]. The disease has a critical public health burden and causes severe economic losses including impairment of animal health, production losses, high costs of eradication programs and trade restrictions [5]. In developing countries such as Nigeria, the disease poses a significant challenge and setbacks to livestock productivity, public health, and the economy in general.

Bovine Tuberculosis has significant zoonotic and economic implications as a result of the disease burden globally. Over 50 million cattle are estimated to be infected with *M. bovis* and *M.tuberculosis*. BTB is a worldwide endemic disease resulting in production loss costing the tune of about 3 billion USD [2]. Annual losses in Nigeria ranging between 13-24 billion Naira are due to condemnation of TB affected meat or carcasses [6,7]. The African region carries the heaviest burden of tuberculosis cases followed by the South-East Asian region [8]. BTB is endemic in Nigeria with the prevalence estimated at 2.94% according to a study conducted between 2020 and 2022 by Danladi, et al [9]. There are many limitations associated with the animal disease reporting system in Nigeria as seen in cases of disease reporting of BTB [10]. Reports from most states of the federation are inconsistent, not giving a true picture of BTB in their region.

In humans, BTB causes pulmonary and extrapulmonary tuberculosis leading to a weakened immune system [11]. A 10% tuberculosis prevalence was recorded in a cross- section of sputum sampled from Nigerian livestock traders, with *M. bovis* strains detected in two of the seven tuberculosis cases from these occupational exposure individuals [12]. Since the disease is mostly detected at slaughter during meat inspection and occasionally during sporadic screening for the disease, people who attend to, and are in close contact with cattle such as herdsmen, butchers, and veterinarians, as well as the general public that consume fresh milk or infected meat are exposed to BTB [13]. In cattle, BTB is characterized by chronic granulomatous lesions with formation of tubercles or nodules in various organs most commonly the lungs and associated lymph nodes. Lesions can also be spread to other organs such as liver, spleen, gastrointestinal tract (GIT), kidneys, uterus and body [14]. BTB is re-emerging in most developing countries including Nigeria, due to inadequate facilities and weak or non-existent surveillance, control measures and established control programs.

Despite ongoing national efforts to control zoonotic diseases, including BTB, abattoir-based surveillance remains underutilized in many parts of Nigeria. Limited data exists on the prevalence of BTB in cattle slaughtered within Abuja and its environs, and there is insufficient documentation to support risk assessment and control measures. This lack of data hinders effective disease control and public health interventions, contributing to the potential risk of zoonotic transmission. Understanding the prevalence and distribution of BTB in slaughtered cattle is essential for improving meat inspection protocols, guiding policy for disease control, and protecting public health. This study provides baseline epidemiological data critical for livestock health management and zoonotic risk reduction in the Gwagwalada region. Abattoir surveillance is relatively cheap and large number of diagnostic specimens from slaughtered animals are available compared to live animals in the field [15]. It encourages a better detection of infection by skilled manpower than livestock owners [15]. Early detection through abattoir surveillance can help inform national and local control strategies. This study was therefore carried out to determine the prevalence of BTB in the Gwagwalada abattoir with the view of analyzing the disease epidemiology in the study area.

Methodology

Study Area

The study was conducted in the Gwagwalada abattoir located in Gwagwalada Area Council, one of the 6 area councils in the FCT Abuja, between the months of April 2024-April 2025. The Gwagwalada Area Council falls within latitude 8°56' 29" North and longitude 7°5' 31" and 7° 39' East and has a land area of 1043 km^2 [16]. Gwagwalada town has a hot, humid and tropical climate. Its major elements have regimes that are intermediate from those of the Southern and Northern regions of the country [17]. The average annual temperature in this region is between 30 and 37 °C, with March being the hottest month. The average annual rainfall in this region is about 1,650 mm [18].

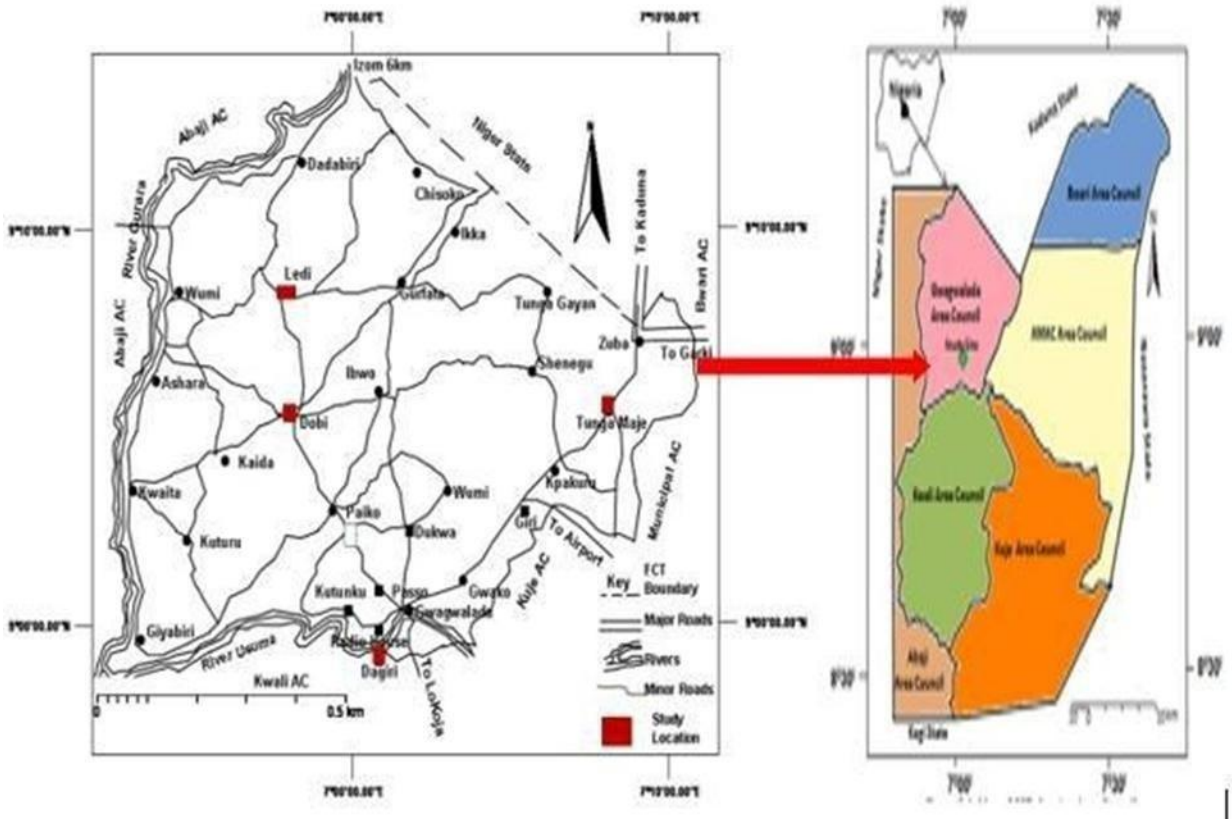

Figure 1: Map of the Federal Capital Territory, Nigeria showing Gwagwalada Area Council where the study was carried out. Source [19].

Study Design

This study was designed to be a one-year retrospective study. Veterinary records at the Gwagwalada abattoir were examined and collated starting from April 2024 to April 2025. Bovine tuberculosis cases were confirmed by Veterinary Doctors of the abattoir post slaughter during routine meat inspection as described by Corner and Grist [21]. Visual post-mortem inspection was carried out to identify tuberculous lesions based on characteristic granulomas, caseation, and calcification in organs focusing on lymph nodes, lungs and liver amongst others. Cattle found with typical tuberculous lesions were recorded. No laboratory confirmation was performed. Prevalence was calculated as the number of cattle with visible BTB lesions divided by the total number inspected. Monthly case distribution was tabulated.

Results

The study revealed that out of the 4,492 cattle slaughtered, 17 cattle had gross lesions consistent with BTB, giving an overall prevalence of 0.38 %. Table 1 shows the monthly distribution of the prevalence of BTB in the Gwagwalada abattoir within the study period. The results show the highest prevalence of 1.26 % for the month of April, 2024 while the lowest prevalence in 2024 was 0.30 % in June. In 2025, the highest prevalence was reported only in January with a prevalence rate of 0.27 %. However, the months of February, March and April of 2025 had no recorded cases of BTB. Figure 1 depicts the relationship between the number of cattle slaughtered for each month and the number of recorded cases. The chart clearly shows the highest number (3) of the cases was recorded in April 2024. This was followed by 2 cases each for the months of May, July, September, October and November in 2024. The months of June, August and December of 2024 and January of 2025 had the least cases. There were no cases recorded for the months of February, March and April of 2025. Table 2 shows the distribution of the prevalences of BTB in Gwagwalada abattoir based on the organs that were affected. The lungs recorded the highest number of 14 cases (82.35 %) while the liver was the least affected with 3 cases (17.65 %). Other organs examined such as the lymph nodes, tissues, kidneys and gastrointestinal tract (GIT) had no lesions of BTB.

Month	Year	Number of Cattle Sampled	Number of BTB Cases Identified	Prevalence (%)
April	2024	239	3	1.26
May	2024	398	2	0.50
June	2024	328	1	0.30
July	2024	497	2	0.40
August	2024	294	1	0.34
September	2024	341	2	0.59
October	2024	371	2	0.54
November	2024	476	2	0.42
December	2024	245	1	0.41
January	2025	367	1	0.27
February	2025	330	0	0.00
March	2025	339	0	0.00
April	2025	267	0	0.00
Total		4492	17	0.38

Table 1: Monthly distribution of cases of Bovine Tuberculosis in Gwagwalada Abattoir from April 2024-April 2025.

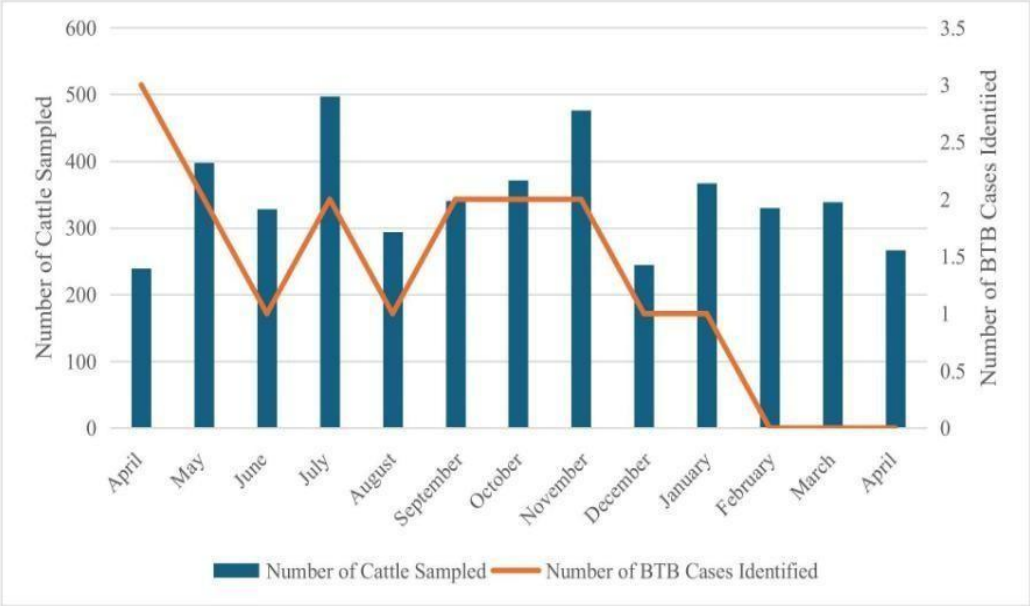

Figure 1: Dissipation of reported cases of Bovine Tuberculosis in Gwagwalada abattoir from April 2024-April 2025.

Organ Affected	Number of Cases	Prevalence (%)
Lungs	14	82.35
Liver	3	17.65
Others	0	0
TOTAL	**17**	**100**

Table 2: Distribution of prevalence of Bovine Tuberculosis in Gwagwalada Abattoir from April 2024-April 2025 based on affected organs.

Discussion

The result of this retrospective study revealed 0.38 % prevalence of BTB in slaughtered cattle in Gwagwalada abattoir. This finding partially agrees with a retrospective study carried out by Danladi, et al., across all the states in Nigeria between 2020-2022 which revealed that across the FCT, the BTB prevalence ranged from 0.36 to 2.19% [9]. However, this prevalence rate is low when compared to a retrospective study carried out across abattoirs in the FCT from 2015 to 2019 where Adamu, et al., reported a higher prevalence of 0.92% in the Gwagwalada abattoir for slaughtered cattle that had tuberculous lesions [22]. The reason

behind the differences in prevalence rates might be due to climate change and seasonal variations within the years. Also, emerging strains of *Mycobacterium bovis* might adapt to these environmental factors thereby leading to higher preponderance of these microorganisms in different geographical locations. The relatively lower prevalence observed in our study may imply adequate meat inspection procedures by veterinarians and proper identification of suspected lesions by meat inspectors. The change in patterns of selecting cattle by the butchers has also a major role in reducing cases of tuberculous lesions in our abattoir. Also, the present economic challenges in the country entails that the butchers may be very watchful in the selection of animals brought for slaughter. This aims at evading carcass condemnation by meat inspectors or veterinarians.

In Nigeria, most of the studies that were based on gross pathological examination at the abattoir have reported varying prevalences in different parts of the country. Okeke, et al., reported an 11% prevalence of BTB lesions in cattle slaughtered at Jos abattoir Plateau State, a peak prevalence of 12.73% was reported in Yola, Adamawa by Ejeh, et al., a 4.47% prevalence in Oyo by Jenkins, et al., and a 0.54% prevalence in Ogbomoso, Oyo State by Ameen, et al. [2,23-25]. In other African countries like Cameroon and Rwanda, a 0.18 to 0.82% and a 0.9% (148/16753) prevalence rates were reported by Awah Ndukum, et al., and Habarugira, et al., respectively [26,27]. Our study only covered Gwagwalada abattoir which indicates that a larger epidemiological survey of BTB is required in the FCT and other parts of Nigeria where this study has not been conducted. Detailed information is required to understand the disease pattern, transmission and spread of BTB in Nigeria.

The predominance of tuberculous lesions in the lungs of the slaughtered cattle recorded in our studies was 82.35%. Reports have shown that the pulmonary parenchyma serves as a very noble predilection site for the proliferation of *Mycobacterium bovis* [28,29]. There is however limited evidence of studies reporting BTB lesions found exclusively in the lungs without involvement of lymph nodes in cattle. However, one retrospective study from Bauchi State, Nigeria, specifically noted that during a 10-year abattoir survey, tuberculous lesions were observed in the lungs (11.87%), liver, and heart, but none were observed in the lymph nodes or intestines [30]. This suggests that, at least in this population and time frame, BTB lesions can be found in the lungs alone during abattoir inspection.

The distribution of prevalence of tuberculous lesions also implicated tuberculous lesions in the liver of the cattle to be 17.65% The presence of lesions in the liver agrees with similar studies that have documented tuberculosis lesions in the liver of cattle, often as part of generalized or extrapulmonary tuberculosis. Jajere, et al., reported a prevalence of 5.93% of all BTB lesions were found in the liver in a retrospective study carried out in the Bauchi Municipal abattoir, which is lower than the prevalence reported in our study [30]. In Ibadan, Nigeria, Adelakun, et al., reported a higher prevalence of 26.1% for condemned livers with suspected BTB lesions [31]. This indicates that though the primary route of BTB infection is through the respiratory route, its spread to other parts of the body is possible as described by Radostits, et al. This also highlights the liver as a significant site for BTB pathology in advanced or disseminated cases [32-36]. Our result may also indicate the possibility of systemic spread or misidentification without laboratory confirmation. The lack of a clear trend across the months studied implies that environmental or climatic factors may not be major contributors to case fluctuations in this context. This agrees with Dauda, et al., who reported that BTB cases along with other diseases detected in the Kubwa abattoir in the F.C.T (Contagious Bovine Pleuropneumonia, Dermatophilosis, Abscess, and Moneziasis) did not show significant variations across the months [37]. This also agrees with reports from Ameen, et al., Raufu and Ameh and Awah Ndukum et al. [7,25,26]. Cattle sourced from various regions with differing climates and management practices may contribute to the dilution of any specific trend or pattern.

The variation in monthly case numbers could also be due to changes in cattle supply sources. This is especially evident in the last 3 months of this study where no TB cases were reported. This could also be due to the inability of visual inspection techniques only to detect early infections or infections presented sub clinically. Certain months may have higher inflows from regions with more prevalent TB infections. Furthermore, increased slaughter activities around festive or market periods can elevate the chance of detecting cases, though this pattern was not strongly evident in the data.

Limitations

It is important to note that this study relied solely on gross pathological inspection, which may under-detect early or less advanced cases of tuberculosis. The absence of laboratory confirmation may also result in misclassification or underestimation of true prevalence.

Conclusion

This study documents 0.38 % prevalence of BTB in slaughtered cattle in Gwagwalada abattoir. The month of April 2024 had the highest prevalence of 1.26 % while the lowest prevalence was recorded in January 2025. Based on the distribution of the tuberculous lesions in affected organs, the lungs were more affected with 82.35 % prevalence while the liver was least affected with 17.65 % prevalence. Other organs such as the kidneys, lymph nodes, GIT had no tuberculous lesions recorded in this study. This study underscores the need for enhanced surveillance measures, including laboratory confirmation and traceback systems using higher molecular technology to better understand the epidemiology of BTB in the region. Retrospective studies of this nature should be conducted in other parts of the FCT and Nigeria at large to reveal the true status of BTB in the country.

Conflict of Interest

The authors have declared no conflict of interest.

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