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Research article

Knowledge and practice of bovine tuberculosis among occupational workers in abattoirs in Abuja

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Abstract

Zoonotic tuberculosis particularly those caused by Mycobaterium bovis is increasingly of importance especially since the emergence of HIV/AIDS, posing a serious public health threat to human population. The aim of the study was to determine the knowledge and practice of Bovine tuberculosis among occupational workers in abattoir in Abuja. A total of 389 questionnaire were administered to butchers and meat sellers in the randomly selected abattoir in four selected area councils. Data were analysed using Chi-square at a $\rho<0.05$ level of significant and descriptive statistics such as percentages. Out of 384 of the respondents, 95.1% were males while 4.9% were females; 96.9% were between that of 18-45; 57% had secondary education; 61.2% had 1 to 10 years working experience. Based on knowledge, 67.4% knew bovine tuberculosis to be zoonotic; 20.1% and 36.2% knew transmission could be from infected milk and meat respectively; 53.9% and 49.0% knew emaciation and respiratory distress as signs in cattle respectively; 72.1% and 54.9% of the respondents knew tuberculosis lesions to be of pulmonary and extrapulmonary regions respectively. Based on practice, 34.9% do nothing when they see abnormal lesions while 24.5% call the veterinarian; 31.0% and 9.9% of respondent use boot and mask as protective clothing respectively; 43.2% wash their hands and knife with water and soap while 10.9% use disinfectant. The findings of this study revealed that butchers and meat sellers have acquired knowledge about the nature of tuberculosis lesions through repeated meat inspection carried out by veterinarians in Abuja abattoirs.

Keywords: *Abuja, Bovine tuberculosis, Knowledge, Occupational workers, Practice*

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INTRODUCTION

Tuberculosis (TB) a chronic bacterial disease of animals and man is characterized by progressive development of specific granulomatous lesions of tubercles in affected tissue (Shitaye et al., 2006). This disease, is wide spread in nature, infectious and a leading cause of death due to a single infectious agent (Mycobacterium) among humans in the world; Mycobacterium tuberculosis is the most common cause of human tuberculosis; however, an unknown proportion of cases are due to Mycobacterium bovis (Damene et al., 2020; Mujeeb-ur-Rahman et al., 2020). Bovine tuberculosis (bTB) is a chronic contagious zoonotic disease of both domestic and wild animals including humans, primarily caused by *M. bovis* (Jemal et al., 2016). The disease is caused by a slowly growing bacillus which is a member of the Mycobacterium tuberculosis complex (MTC) comprising of different species; *M. tuberculosis*, *M. bovis*, *M. africanum*, *M. canettii*, *M. caprae*, *M. microti* and *M. pinnipedii* (Jenkins et al., 2011). Bovine tuberculosis has been widely distributed throughout the world with serious effect on animal production (Jenkins et al., 2011). Cattle are the usual primary host of *M. bovis*; however, it also affects a wide range of domestic, wild animals and humans (De Lisle et al., 2001). The spread of the disease within and between animal species by *M. bovis* is mainly through aerosol and ingestion route (Menzies and Neil, 2000). In humans, infection from animals is by the consumption of unpasteurized contaminated milk, ingestion of raw or undercooked meat, aerogenous route, also transcutaneous through handling of infected carcass (Theon and Barletta, 2006). Tuberculosis is a major public health problem in Nigeria as the country is ranked 5th amongst the 22 high tuberculosis burden countries which collectively bear 80% of the global tuberculosis burden (WHO, 2013). Onyedum and Ukwaja (2017) are of the view that high tuberculosis prevalence has been reported in 170 million of Nigerian population, as the country has been ranked among the 8 countries with highest epidemic of TB globally. The aim of this study was to therefore, ascertain the knowledge and practice of bovine tuberculosis among occupational workers in abattoirs in Abuja.

MATERIALS AND METHODS

Study Area

Abuja is the Federal Capital Territory (FCT) of Nigeria. The territory was formed in 1976 from part of former Nasarawa, Niger and Kogi State. It is the central region of the country located just north of the confluence of river Niger and Benue. It is bordered by the state of Niger to the West and North, Kaduna to the Northeast, Nasarawa to the East and South and Kogi to the Southwest. It lies between latitude 8°25' and 9°25' North of equator and latitude 6°45' and 7°45'East of Greenwich, and cover a total area of 7,315km². The actual city occupies 275,3km², with an estimated population of 2.4 million people according to Nigeria national bureau of statistics (NNBS, 2010).

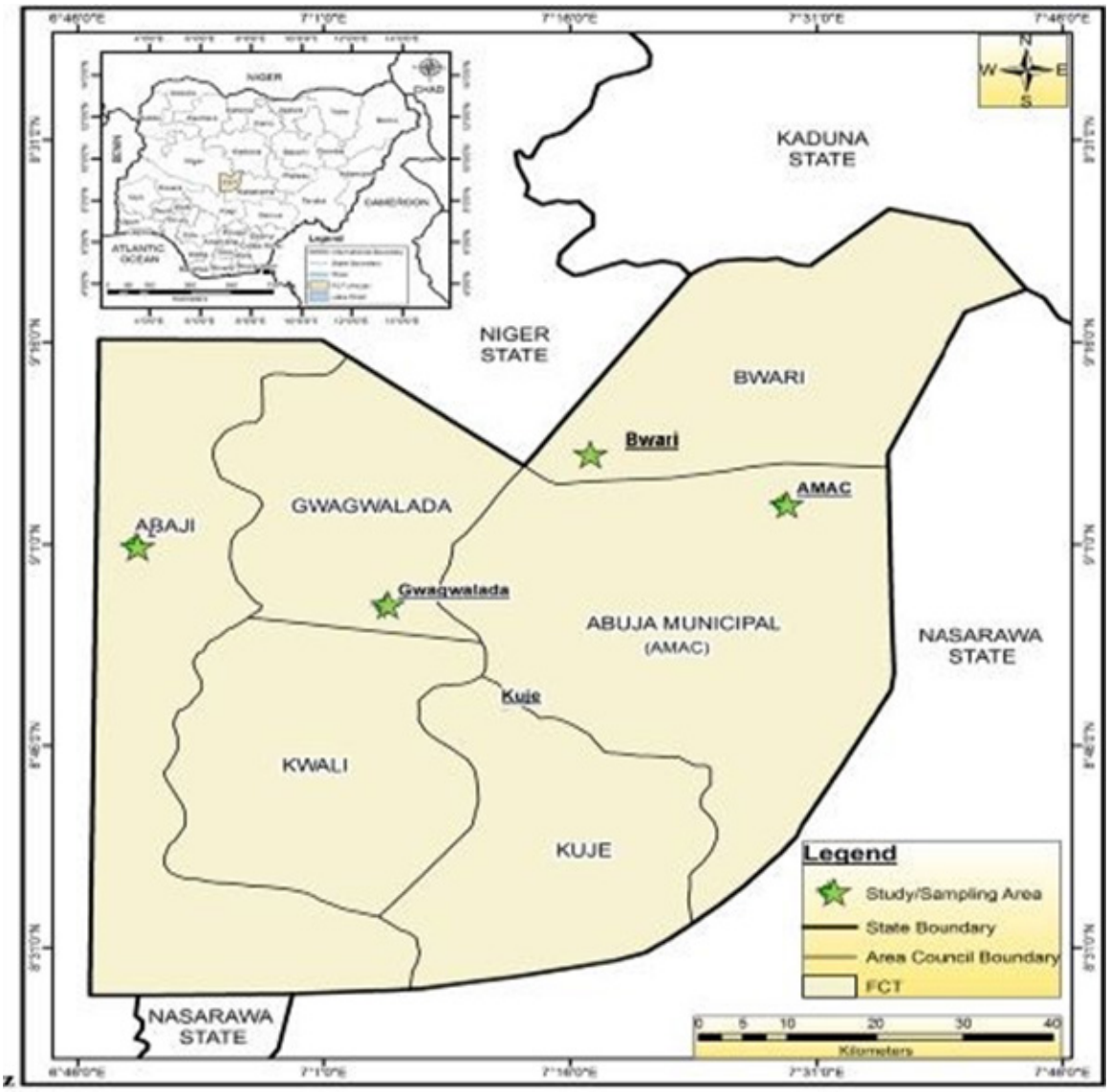

Figure 1 Map of Abuja showing the various area council and study area (Marked Star). Source: Modified from the administrative map of Abuja.

Study Design

The study design was a cross sectional study.

Study population

All butchers and meat sellers present at the abattoirs at the time of the study were included following their consent but other individual at the abattoirs that are not butchers or meat sellers were excluded. The study was carried out in four Abattoirs from four randomly selected area councils of Abuja, Nigeria.

Sample size determination

The sample size was calculated using the formula of Thrusfield (1997):

$n = z^2pq/d^2$

n =sample size

p= expected prevalence

d=desired absolute precision

z=standard normal deviate for 95% confidence level (1.96)

q=1-p

Calculation of sample size for questionnaires using 53.2% prevalence by Kachalla *et al*., (2014) of individuals with knowledge of tuberculosis and absolute precision of 0.05%

$$N = \frac{1.96^2 \times 0.532 \times 1-0.532}{0.05^2}$$

$$= \frac{3.842 \times 0.532 \times 0.477}{0.0025}$$

$$= 383$$

Questionnaire survey

Well structured, closed ended questionnaires comprising of three sections were administered with the demographic information/data of the respondent as contained in section A. Information on knowledge of tuberculosis is contained in section B. Questions on practice of respondent towards tuberculosis provided in section C. The questionnaire was administered through a face-to-face interview to butchers and meat sellers in the four selected area councils. The choice of respondents was based on consent during the interview. The questionnaire survey covered the period of January to February 2017.

Data Analysis

Descriptive statistical tables were constructed, and data was sorted using Microsoft Excel® 2010. The data collected that comprised of the responses for each main area of the questionnaires were classified, frequencies were estimated, and data were used to explain variables. The degree of association between variables was compared by the Chi-square test of significance on the different classes of data.

RESULTS

Demographic information of respondents

Results of the questionnaires administered equally (96 per area council) to asses knowledge and practice of butchers and meat sellers to tuberculosis in the four selected area councils (Abaji, AMAC, Bwari and Gwagwalada) showed that out of 384 of the respondents 365 (95.1%) were males while 19 (4.9%) were females. With respects to age distribution, 253 (65.9%) of the respondents were between 18 to 30 years of age while 12 (3.1%) were above 45 years of age. The survey also showed the level of education of the respondents as 219 (57%) having secondary education while 25 (6.5%) having tertiary education. However, 235 (61.2%) respondents had 1 to 10 years working experience, 16 (4.2%) had 21 to 30 years experience while 2 (0.5%) had more than 30 years experience (Table 1).

Table 1 Demographic Information of Respondents in the Four Selected Abattoirs in Abuja

Variables	Category	Frequency	Percentage (%)
Sex	Male	365	95.1
	Female	19	4.9
	Total	384	100
Age	18-45 years	372	96.9
	Above 45 years	12	3.1
	Total	384	100
Education	Qur'anic	64	16.7
	Primary	76	19.8
	Secondary	219	57.0
	Tertiary	25	6.5
	Total	384	100
Working Experience	1-10 years	235	61.2
	11-20 years	131	34.1
	21-30 years	16	4.2
	Above 30 years	2	0.5
	Total	384	100

Knowledge of butchers and meat sellers about Tuberculosis in the selected Abuja abattoir

In assessing knowledge of the respondents, 259 (67.4%) claim to know that humans can get tuberculosis from animals. However, 77 (20.1%) were aware of the transmission of zoonotic tuberculosis from milk while 139 (36.2%) thought it to be through consumption of infected meat. The survey also showed that 280 (72.9%) of the respondents were aware of cough as symptoms while others 174 (45.3%) thought tuberculosis symptoms is emaciation. In addition, 207 (53.9%) and 188 (49.0%) of the respondent knew the sign to be emaciation and respiratory distress respectively in cattle. There were 277 (72.1%) and 211 (54.9%) respondents who knew tuberculosis lesions as of pulmonary and extrapulmonary regions respectively (Table 2).

Table 2 Knowledge of Zoonotic Tuberculosis amongst butchers and meat sellers

Variable	No of responses	X^2	P- Value
Do you think humans can get TB from animals?	Yes 259 (67.4) No 125 (32.6) total 384 (100)	209.016	0.000
How do you think humans get TB			
Milk and milk product	Yes 77 (20.1) No 133(34.6) Missing 74(45.3) Total 384(100)	14.933	0.000
Consumption of infected meat	Yes 39(36.2) No 93(24.2) Missing 52(39.6) Yes 84(100)	9.121	0.003
A person with TB has the following symptoms Coughing	Yes 280(72.9) No 11(2.9) Missing 93(24.2) Total 384 (100)	248.663	0.000
Emaciation	Yes 174 (45.3) No 82 (21.4) Missing 128 (33.3) Total 384 (100)	33.063	0.000
Cattle with TB have the following signs			
Emaciation	Yes 207 (53.9) No 43 (11.2) Missing 134 (34.9) Total 384 (100)	107.584	0.000
Respiratory distress	Yes 188 (49.0) No 80 (21.6) Missing 116 (30.2) Total 384 (100)	197.515	0.000
Lesions of TB are seen in the following			
Pulmonary organ	Yes 277 (72.1) No 11 (2.9) Missing 96 (25.0) Total 384 (100)	245.681	0.000
Extra pulmonary organ	Yes 211 (54.9) No 51 (13.3) Missing 122 (31.8) Total 384 (100)	97.710	0.000

Keys: X^2= Chi-square

Practice of butchers and meat sellers towards Tuberculosis in the selected Abuja abattoir

The responses of respondent showed that 134 (34.9%) do nothing when they see abnormal lesions in slaughtered cattle while 94 (24.5%) call the veterinarian. However, the responses to the type of protecting clothing's used showed that, 119 (31.0%) of respondent uses boot while 38 (9.9%) claims to use mask. In addition, 116 (43.2%) said they wash their hands and knife with water and soap after work while 42 (10.9%) says they use disinfectant (Table 3). The disinfectants used by the butchers in the abattoir is Dettol or IZAL; these detergents are the most commonly used as disinfectant generally, however, no studies have been carried out to test or ascertain how effective they are in destroying the Mycobaterium species.

Table 3 Practice of butchers and meat Sellers to Zoonotic Tuberculosis in the selected Abuja abattoir

Variable	No of response	X^2	P- Value
What do you do when you see abnormal lesion slaughtered cattle?			
Cut out affected	Yes 134 (34.9) No 100 (26.0) Missing 150 (39.1) Total 384 (100)	1.110	0.292
Call the veterinarian	Yes 94 (24.5) No 105 (27.3) Missing 185 (48.2) Total 384 (100)	0.608	0.436
What type of protective clothing do you use while working at the abattoir?			
Boot	Yes 199 (31.0) No 87 (22.7) Missing 178 (46.4) Total 384 (100)	4.971	0.026
Mask	Yes 38 (9.9) No 56 (14.6) Missing 289 (75.3)	49.663	0.000
What do you do when you finish work at abattoir?			
Wash hand and knife with soap and water	Yes 166 (43.2) No 36 (9.4) Missing 182 (47.4) Total 384 (100)	83.663	0.000
Wash hand and knife with disinfectant	Yes 42 (10.9) No 27 (7.0) Missing 315 (82.0) Total 384 (100)	3.261	0.071

Keys: X^2= Chi-square
P = Probability value

DISCUSSION

Questionnaire survey in the four selected area councils of Abuja to assess butchers and meat sellers Knowledge and practice to TB revealed that most of the respondents were male which was similar to findings by Kachalla et al., (2016) and in consistent with the findings of Ahmad et al., (2017) and Mohammed et al., (2019). The findings of Agada et al., (2019) and Mohammed et al., (2019) were lower than that of this study. On the level of education, the highest was secondary level; Adesokan et al., (2018) reported similar finding while that of Mairo et al., (2016) and Agada et al., (2019) were higher and lower than the finding in this study respectively. Working experience showed that most of the respondent had worked in the abattoir for ten years; these findings are similar to the report by Ogugua et al., (2021).

In assessing knowledge of the disease, a good percentage of the respondents were aware that humans can get TB from animal; this finding are lower than the report by Agada et al., (2019) and Mohammed et al., (2019) but similar to the finding by reported by Amenu et al., (2010), Mairo et al., (2016), Ibrahim et al., (2016), Adesokan et al., (2018) and Ogugua et al., (2021). Among the respondent, 20.1% believed that humans can acquire the disease through the consumption of milk and milk product while 36.2% believed it could be through consumption of infected meat; this finding are similar to that of Ibrahim et al., (2016) and Mohammed et al., (2019).

However, Agada et al., (2019) reported that few of the respondents engaged in poor practices that could expose them to TB. The respondents in this study believed that coughing and emaciation were symptoms of TB in humans; Agada et al., (2019) reported similar findings. In cattle the respondent in this study believed that signs were emaciation and respiratory distress with lesions seen in pulmonary organ and extra pulmonary organ. Damene et al., (2020) reported small circumscribed tubercles with yellow content in the left tracheobronchial lymph node; white-yellowish foci in the medial mediastinal lymph node; yellow necrosis in the liver; grey to white-yellowish tubercle in the uterus; gray-reddish tubercle and Large caseous mass in the lungs. Samuel et al., (2014) reported calcified and necrotic granulomas in the lungs of a bull carcass. Similarly, Woldemariyam et al., (2021) reported nodules, caseation of bronchial lymph node and white spots in the lung.

In assessing practice of butchers and meat sellers, the respondents cut off affected area and call the attention of veterinarians. On the use of protective clothing, some of the respondents use boots and masks respectively while working; this finding is lower than the report by Mohammed et al., (2019) and Ogugua et al., (2021). On the level of personal hygiene, the practice by the respondents in washing their hands and knife with soap and water was poor so also was washing hands and knife with disinfectant but still higher than the safe practices as reported by Mairo et al., (2016).

Mycobacterium species such as *M. bovis*, *M. caprae* and *M. tuberculosis* are responsible for Bovine tuberculosis infection that occasionally affects other species of mammals with cattle the primary host for *M. bovis* (Abubakar et al., 2005). Bovine tuberculosis is a zoonotic disease that spread to humans through the inhalation of aerosols, consumption of unpasteurized milk, raw meat or through breaks in the skin (Ameen et al., 2008). Transmission of *M. bovis* in

cattle is through aerosols during close contact; however, in humans, drinking raw milk is the primary route of infection and is mostly extra pulmonary, particularly in cervical lymphadenitis (Ameni et al., 2007). Though, the disease is widely distributed globally, in countries such as Denmark and Sweden, control programs have eliminated or nearly eliminated this disease from domesticated animals (Ashford et al., 2001; Ameni et al., 2007). In Africa, the disease in still wide spread and the occurrence of bovine tuberculosis due to *M. bovis* in humans is difficult to determine accurately because of technical problems in isolating the microorganism (Assaged et al., 2000; Ayele et al., 2004). Bovine TB is prevalent among the nomadic Fulani tribe in West and Central Africa, who herd their cattle across the borders of the country and use un-boiled milk from their cattle for food (Cadmus et al., 2004).

This disease is of great importance in developing countries like Nigeria due to close association between humans and animals, that is in sharing the same micro-environment and dwelling premises as seen in rural areas (Corbett et al., 2006; Cadmus et al., 2008). Nigeria been the most populous country in Africa with over 160 million people, with an estimated cattle population of 19.5 million and unknown wildlife ruminants' population provide an opportunity for the easy transmission and spread of bovine type of TB with the country having the thirteenth highest burden of human tuberculosis among the world's 22 countries with high Tb burden (Krauss et al., 2003; Lees et al., 2004). Due to the lack of existence of a national control strategy and high degree of zoonotic transmission of tuberculosis from animals to humans, the situation with animal tuberculosis is less clear; Preventive measures such as culling of cattle with tuberculosis should be done without the treatment of such cattle due to the fact that most species especially *Mycobaterium bovis* have been reported to be resistant to drugs; regular testing and removal of infected cattle at abattoirs by Veterinarians should be carried out to prevent contact and consumption of contaminated carcasses by butchers, meat sellers and the general public; specific hygiene rules can be put in place at abattoirs that discourages butchers from consuming raw meat and milk products (Jemal et al., 2016; Fekadu et al., 2018).

CONCLUSIONS

This study evaluated the knowledge of butchers and meat handlers in abattoir in relation to tuberculosis; which have shown that males had better knowledge and practice than the females and this could be proportional to the male/ female ratio in the Abuja abattoirs; those that have worked for longer period and have either secondary or tertiary education had a better knowledge of tuberculosis and practice. This have proven that butchers and meat sellers over time have acquired knowledge about the nature of tuberculosis lesions through repeated meat inspection carried out by veterinarians in Abuja abattoirs. The practice of disinfecting materials such as knifes and other utensils with appropriate disinfectants used in the abattoirs by some of the butchers is good and should be encouraged as this prevent the transmission of the bacterium responsible tuberculosis; enlightenment of butchers and meat handlers on the public importance of bovine tuberculosis and danger or consequences of consumption of raw meat and dairy product as done by some should be carried

out; the use of protective clothing such as hand glove, booth should be encouraged to prevent direct contact when handling infected animals and or contaminated carcasses.

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AUTHOR CONTRIBUTIONS

Hajara Asabe Muhammad designed the experiment. Hajara Asabe Muhammad and Stephen Kyari were involved in administration of questionnaires at abattoirs. Stephen Kyari carried out the statistical analysis of result. The authors were involved in the discussion as well as read and approved the final manuscript.

CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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