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Measures Taken for Bovine Tuberculosis Prevention among Butchers in Two Major Abattoirs in Ibadan, South-Western Nigeria

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Abstract: Correct measures towards prevention are important in achieving global tuberculosis eradication. A study was conducted to determine the measures taken by butchers for bovine tuberculosis (BTB) prevention at Akinyele and Bodija Municipal Abattoirs in Ibadan, south-western Nigeria, with a view to providing vital information for BTB control. Four hundred and fifty butchers from the two abattoirs were randomly selected for this study and data were collected through the method of questionnaires and analysed using SPSS version 12.0. The response rate was 97.1% (437/450). Our findings revealed that their approach towards BTB prevention included practice of good hygiene (17.6%), hand washing (15.6%) after each day's work, wearing protective materials like gloves and boots (14.4%), use of preventive medicine (14.2%), immunization (12.6%), prayer (10.1%), use of herbs (9.8%) and limited contact with animals or carcasses (5.7%). On limiting cattle to cattle spread of bovine tuberculosis, early isolation of infected animals (29.2%), avoidance of close contact with the infected animals (23.3%), prompt reporting to the veterinarians (22.2%), avoidance of overcrowding of cattle in the kraal (14.9%) and early notification by the cattle handlers (10.3%) were the practices highlighted. Age groups (p= 0.006), sex (p=0.019) and length of working experience (p=0.033) were significant factors associated with the butchers' correct preventive measures against the spread of bovine tuberculosis. This study provides vital information for the stakeholders in the Public Health Sector for informed steps to be taken to better position the livestock workers especially butchers in the drive towards eradication of tuberculosis including BTB in Nigeria.

Key words: Bovine Tuberculosis · Prevention · Nigeria

INTRODUCTION

Tuberculosis is a chronic, wasting and debilitating disease of man and animals, characterized by fever, cough, night sweats, emaciation and general body weakness mostly in humans. It is the leading cause of death due to a single infectious agent among adults in the world today. It is caused primarily by a bacterium, usually the *Mycobacterium tuberculosis* and any member of the *Mycobacterium tuberculosis* complex [1, 2]. Tuberculosis (TB) is the humanities greatest killer which is out of control in many parts of the world. The disease is preventable but it has been grossly neglected and no country worldwide is immune to it [3]. It is still a major health concern worldwide and the disease spreads more easily in overcrowded settings and in the conditions of malnutrition and poverty [4].

Nigeria with a population of over 150 million was ranked 13th among the countries with highest burden of human tuberculosis [5]. Earlier studies conducted on bovine TB (BTB) in Nigeria have established prevalence rates of 8.8% [6] and 10.5% [7] among trade and farm cattle respectively. Adesokan [8] also reported a prevalence of 2.86% of *M. bovis* among livestock workers in Ibadan, Nigeria. Meanwhile, earlier reports indicated existing cultural practices that could facilitate

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transmission between cattle and humans including consumption of unpasteurized milk by most herders, cattle kept in close proximity to the homes of farmers for fattening before they are sold off at the markets, butchers performing their work wearing minimal protective clothing or nothing at all and using their bare hands to process offal from diseased carcasses [6]. However, very few studies have been conducted to explore preventive measures taken especially among butchers against the spread of BTB in cattle and humans in Nigeria. The butchers constitute a major stakeholder in the prevention or spread of BTB. We therefore conducted this study in order to assess measures being taken by butchers in two major abattoirs in Ibadan towards stemming the spread of BTB.

MATERIALS AND METHODS

Study Site, Population and Data Collection: This study was conducted in Akinyele and Bodija Municipal Abattoirs, Ibadan. These sites were chosen because they constitute two major abattoirs in Ibadan where an average of 350 cattle are slaughtered on a daily basis. A total of 450 butchers were recruited for this survey from the two abattoirs. To guarantee anonymity of responses and easy identification of questionnaires by respondents, identity numbers were randomly assigned to each questionnaire. Each questionnaire took approximately 10 min to complete.

Questionnaire Design: A self-administered questionnaire for this study was prepared based on the information needed from the butchers. The modified questionnaires included two parts. The first part was designed to obtain information about the demographic characteristics of the respondents. The second part consisted of five major questions covering aspects of measures taken to prevent BTB spread among butchers

Pre-Test: The reliability of the measures for BTB prevention questionnaires designed was determined by pre-study on 10 butchers. These respondents were not included in the final study. As a result of the item analysis, several test questions were modified to improve clarity.

Data Analysis: The SPSS 12.0 statistical package was used for all analyses. Percentage of the responses in each category was calculated and presented in tabular form. Measures taken by butchers towards BTB prevention were rated with reference to answers to five major questions. Positive responses were scored 1 and negative 0. Ratings ranged between 0 and 5. Ratings ≥ 3 were taken as good measures while ratings < 2 were taken as poor measures. The chi-square test was used to investigate association between selected test parameters such as sex, age, education levels and working experiences with respect to good measures for BTB prevention.

RESULTS

Demographic Characteristics of Respondents: Out of the 450 recruited for this study, only 437 questionnaires were found suitable for analysis giving the response rate of 97.1% as some questionnaires were either not returned or not completed. Table 1 shows the socio-economic and demographic data of respondents. Out of the 437 respondents involved in this research, 315 were men and 122 were women. The various age groups involved were less than 30 years (9.4%), 30-39 years (38.2%), 40-49 years (31.6%), 50 -59 years (13.7%) and 60 years and above (7.1%). Majority of them had either secondary (48.5%) or primary education (32.7%) while a few (18.8%) did not have any formal education. Based on religion, 67.5% were Muslims, 26.3% were Christians; the least (6.2%) being of traditional religion. The highest proportion (90.2%) was married while others were either single (4.1%), divorced (2.5%) or widow/widower (3.2%). With reference to the years of experience in the abattoir work, 14.9% had spent more than 30 years.

With respect to the type of animals they traded in, 87.0% traded in cattle only, 7.1% in goats, 4.8% in cattle and goats and 1.1% in pigs. Most (97.3%) of the butchers kept their animals in the kraal while the rest (2.7%) kept their animals close to their residence (Table 1).

Measures Taken Towards BTB Prevention by Butchers: Most (96.6%) of the butchers said that they allowed veterinarians to carry out routine meat inspection on their animals; out of these, 83.8% confirmed that they did this on a daily basis. When asked what the butchers would do if their animals were condemned for having tuberculosis, 274 (62.7%) said that they would pour chemical on it and then bury the carcasses. Their approach towards protecting themselves from being infected with bovine tuberculosis included practice of good hygiene (17.6%), hand washing (15.6%), wearing protective materials like gloves and boots (14.4%), use of preventive medicine (14.2%), immunization (12.6%), prayer (10.1%), use of

Table 1: Distribution of the socio-demographic characteristics of the respondents (N = 437)

Characteristic	Frequency	Percentage
Sex		
Male	315	72.1
Female	122	27.9
Age in years		
<30	41	9.4
30-39	167	38.2
40-49	138	31.6
50-59	60	13.7
60+	31	7.1
Level of education		
None	82	18.8
Primary	143	32.7
Secondary	212	48.5
Religion		
Muslim	295	67.5
Christian	115	26.3
Traditional	27	6.2
Marital status		
Single	18	4.1
Married	394	90.2
Divorced	11	2.5
Widow/widower	14	3.2
Years of experience		
<10	79	18.1
10-19	181	41.4
20-29	112	25.6
=30	65	14.9
Animals type traded		
Cattle only	380	87.0
Goats	31	7.1
Cattle and goats	21	4.8
Pigs	5	1.1
Animal housing		
Kraal	425	97.3
Close to residence	12	2.7

herbs (9.8%) and limited contact with animals or carcasses (5.7%). On limiting cattle to cattle spread of bovine tuberculosis, the butchers said they employed early isolation of infected animals for treatment (29.2%), avoidance of close contact with the infected animals (23.3%), prompt reporting to the veterinarians (22.2%), avoidance of overcrowding of cattle in the kraal (14.9%) and early notification by the cattle handlers (10.3%) Table 2.

More people in the age group 30-39 years and the males exhibited good measures towards BTB prevention and this was statistically significant. The location of the abattoir and the level of education of the butchers did not have any significant positive influence on the measures taken by the butchers for BTB prevention. However, more of those who had spent more than 20 years in the business demonstrated correct measures towards BTB prevention (Table 3).

Table 2: Measures taken by butchers at Akinyele and Bodija Municipal Abattoirs, south-western Nigeria towards BTB prevention (N = 437)

Question	Frequency	Percentage
Do veterinarians carry out routine meat inspection?		
Yes	422	96.6
No	1	0.2
Indifferent	14	3.2
Frequency of routine meat inspection by Veterinarians		
Daily	366	83.8
Weekly	15	3.4
Monthly	10	2.3
Quarterly	21	4.8
Yearly	1	0.2
Occasionally	5	1.1
Indifferent	19	4.3
Actions taken when an animal is condemned for BTB infection		
Pour chemical and bury the infected carcasses	274	62.7
Pour chemical on it	50	11.4
No response	48	11.0
Bury the condemned animal alive	42	9.6
Sell the condemned animal alive	12	2.7
Bribe the inspector	8	1.8
Remove the infected parts	3	0.7
Actions taken to protect themselves from BTB		
Good hygiene practices	77	17.6
Washing of hands after touching live or processed animals	68	15.6
Wearing of protective gloves, mask and boot	63	14.4
Use of preventive medicine	62	14.2
Immunization	55	12.6
Prayer	44	10.1
Use of herbs	43	9.8
Limited contact with animals or carcasses	25	5.7
What do you do to limit the spread of BTB in your cattle population?		
Early isolation	128	29.2
Avoidance of overcrowding	65	14.9
Early reporting by cattle handlers	45	10.3
Prompt reporting to veterinarians	97	22.2
Avoidance of human contact with infected animal	102	23.3

DISCUSSION

We reported the measures taken by butchers towards prevention of BTB transmission in two major abattoirs in Ibadan, south-western Nigeria. Globally, there is increasing contact between humans and animals due to increasing population density and growth especially in poor developing countries where livestock offers important socioeconomic, cultural and religious pathways out of poverty [9]. Meanwhile, the incidence of *M. bovis* in humans probably remains underestimated, as a distinction between the *Mycobacterium* species, i.e. *M. bovis* and *M. tuberculosis*, is not systematically

Table 3: Measures' ratings of butchers on BTB prevention

	Good No. (%)	Poor No. (%)	Total No. (%)	$\chi 2$, p value
Age groups (years)				
<30	10 (4.8)	31 (13.5)	41 (9.4)	14.6; 0.006*
30-39	76 (36.7)	91 (39.6)	167 (38.2)	
40-49	75 (36.2)	63 (27.4)	138 (31.6)	
50-59	34 (16.4)	26 (11.3)	60 (13.7)	
60 and above	12 (5.8)	19 (8.3)	31 (7.1)	
Sex				
Male	138 (66.7)	177 (77.0)	315 (72.1)	5.7; 0.019*
Female	69 (33.3)	53 (23.0)	122 (27.9)	
Location				
Akniyele	94 (45.4)	117 (50.9)	211 (48.3)	1.3; 0.292
Bodija	113 (54.6)	113 (49.1)	226 (51.7)	
Level of education				
No formal education	46 (22.2)	36 (15.7)	82 (18.8)	4.9; 0.088
Primary	71 (34.3)	72 (31.3)	143 (32.7)	
Secondary	90 (43.5)	122 (53.0)	212 (48.5)	
Working experience (yrs)				
<20	108 (53.2)	152 (65.0)	260 (59.5)	4.6; 0.033*
20 and above	95 (46.8)	82 (35.0)	177 (40.5)	

*Significant at 5% level

performed [10]. Since the real incidence of *M. bovis* on human health is still unknown, this formative study therefore focuses on prevention of transmission of BTB to humans.

Our findings showed that most (96.6%) of the butchers usually had their animals inspected for BTB by veterinarians. Previous studies conducted in Nigeria and other countries [11-14] have indicated the usefulness of post-mortem meat inspection in detecting BTB in cattle and hence prevent its transmission to consumers through total condemnation of such infected organs or carcasses. However, few previous studies have indicated that not all cattle infected with *M. bovis* have visible tuberculous lesions at slaughter [11, 15]. This may therefore limit the sensitivity of this detection technique at abattoirs, although detection of tuberculous lesions through abattoir inspection is so far the common procedure in most developing countries including Nigeria.

Furthermore, the practices of good hygiene, hand washing and wearing of protective materials such as gloves and boots were observed as the major protective measures towards preventing transmission of BTB by the butchers. These measures have earlier been reported among food handlers in previous studies [16, 17].

Also, it was observed that the butchers practiced early isolation of infected animals (29.2%) and avoidance of close contact with the infected animals (23.3%). As previously reported, certain occupations have a higher risk of contracting zoonoses such as BTB [18-20]. This is clearly the case where the disease is transmitted through direct contact with infected animals or infected animal materials. Livestock workers, veterinarians, abattoir workers, laboratory workers and people handling raw livestock products belong to these at-risk groups [21]. Therefore, these measures taken by those butchers are steps in the right direction towards preventing transmission of BTB to humans. This is owing to the fact that early isolation of infected animals would limit the spread of the disease to other animals as aerosol transmission has been previously reported [22, 23] for the spread of BTB.

Age groups (p= 0.006), sex (p=0.019) and length of years spent in the livestock work (p=0.033) were significant factors associated with the butchers' preventive measures against the spread of bovine tuberculosis. The age groups 30-39 and 40-49 years constituted the majority of the study population as these are the age groups who are often found in such services that require some physical strength and energy inputs. This is similar to the assertion made by Genc [24] who reported that tuberculosis is common among age group 16-35 years and people involved in heavy working conditions. Also, the male are often the major gender involved in butchering and hence, no valid conclusion can be drawn using this observation. Given the report that males are more vulnerable to infections than females [25], it therefore suggests that these butchers who were predominantly males need adequate proper measures towards checkmating disease transmission to the larger society. Meanwhile, the level of education did not significantly influence the approach of these butchers towards preventing BTB transmission. Although this was not statistically significant, those who had at least primary education and also secondary education demonstrated good practices towards BTB prevention. This is in agreement with the report of Abubakar [26] who linked education to BTB prevention.

Notwithstanding these findings, this study had some limitations. First, the two abattoirs chosen were more or less of similar socio-economic status. A rural-urban approach might better indicate the influence of education and socio-economic differences. Second, most of the butchers were males. Hence, we could not draw a valid conclusion on the impact that difference in gender has on the measures taken by these butchers towards BTB prevention. Nonetheless, this study shows the various measures being taken by these butchers towards BTB prevention in the major abattoirs study.

In conclusion, this study provides vital information for the stakeholders in the Public Health Sector in their drive towards eradication of tuberculosis including BTB. It gives them an opportunity for informed steps to be taken to better position the livestock workers especially butchers for effective measures required for the prevention of BTB in both animals and humans.

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