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Investigation of the Prevalence of Bovine Tuberculosis in a Dairy Farm in Kaduna State Nigeria

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Abstract: Fourteen out of 120 lactating Friesian cows, were screened for bovine tuberculosis with tuberculin test. 42.8% of cows screened tested positive for *Mycobacterium bovis* 72 h after administration of Single Comparative Intradermal Tuberculin Test (SCITT). Meanwhile 14.2% were positive on acid fast staining of milk samples collected. The latter result is of prime public health significance, given the fact that pasteurization of milk is most often not adequately carried out. In most dairy farms, consumption of raw fermented milk is a very common practice by the herdsmen and with the spread of droplet nuclei from infected animals to susceptible in-contact animals and humans on the increase, because of the intensive management system practice in dairy farms, there is therefore a high risk of *M. bovis* spreading through milk and milk products. This study establish the overall prevalence of 5.0% of *M. bovis* base on tuberculin testing and a prevalence of 1.7% based on acid fast staining of milk samples collected from PPD positive animals in the dairy farm.

Key words: *Mycobacterium bovis*, purified protein derivatives, avian (PPDA), bovine (PPDB), friesian cattle

INTRODUCTION

Bovine tuberculosis due to *Mycobacterium bovis* is the major cause of human gastrointestinal tuberculosis in developing countries where bovine milk is often not, pasteurized before use (Bonus *et al*., 2000). In countries where pasteurization of milk is not properly done, the prevalence of bovine tuberculosis in humans was 10-15% of cases of tuberculosis reported (Ashford *et al*., 2001). It is also hypothesized that *M. bovis* is the precursor of *M. tuberculosis* (Stead, 1997).

The world health organization reported that the incidence and mortality rates of human tuberculosis were 88 and 30 million respectively with most cases occurring in developing countries (Anon, 1994), The first report of the existence of bovine tuberculosis in Nigeria was made by Manley in 1929 (Alhaji, 1976) this, was made based on tuberculin test, postmortem and laboratory examinations. Reports from the abattoirs in Nigeria also confirmed the existence of the disease in most part of the country (Alhaji, 1976; Ayanwale, 1984; Dusai and Abdullahi, 1994; Cadmus *et al*., 1999). Both *M. bovis* and *M. tuberculosis* have also been found in the sputum of infected humans (Idrisu and Schnurrenberger, 1977; Idigbe *et al*., 1986) and in milk samples in Nigeria (Idrisu and Schnurrenberger, 1977). Thus, serious public health implications of potentially contaminated milk and milk products should not be underestimated. With the upsurge of HIV-infections the epidemiology of tuberculosis has been drastically affected as many HIV infected individuals are co-infected with tuberculosis which suggest an increased globally in the incidence of the disease.

The aim of this study is to investigate the prevalence of bovine tuberculosis in a dairy farm in Kaduna state.

MATERIALS AND METHODS

Fourteen lactating Friesians out of 120 cattle's in the farm were presented for screening because of history of persistent coughing, emaciation and drop in milk production. Each of these animals was prepared for tuberculin test according Monaghan. 2,500 International Unit (IU) of bovine and avian Purified Protein Derivatives (PPD) (veterinary laboratory, weybridge, U.K) was intradermally administer around the neck region to all the fourteen friesians. Reading of the skin thickness/reaction using vernier caliper was taken before administering the PPD and 72 h after the administration of the PPD. Results were recorded (Table 1) and interpreted as described by Fred *et al*. (2003). Milk samples (5 mL) were taken from all positive reactors into a bijou bottles packed with ice and transported to microbiology laboratory for acid fast staining.

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Table 1: Measurement of skin thickness before and 72 h after single comparative intradermal tuberculin injection of PPD

		After 72 h		
PPDA (mm)	PPDB (mm)	PPDB (mm)	PPDA (mm)	Remarks
0.5	0.5	0.5	0.5	
0.5	0.5	0.5	1.3	Positive
0.5	0.5	0.5	1.4	Positive
0.5	0.5	0.6	0.6	
0.6	0.6	0.6	1.1	Positive
0.6	0.6	0.6	0.6	
0.4	0.4	0.4	4.1	Positive
0.5	0.5	0.5	0.5	
0.5	0.8	0.5	0.8	
0.5	0.5	0.5	1.8	Positive
0.6	0.6	0.6	0.5	
0.6	0.6	0.6	1.6	Positive
0.7	0.7	0.7	0.7	
0.5	0.5	0.5	0.5	

RESULTS AND DISCUSSION

Of the 14 lactating Friesians cows presented for screening 42.8% (6/14) tasted positive for *M. bovis* 72 h after administering Single Intradermal Comparative Tuberculin Test (SCITT). Out of the 6 positive reactors, 14.3% (2/14) were positive on acid fast staining of milk sample collected. The study established the overall prevalence of 5.0% (6/120) based on tuberculin test and a prevalence of 1.7% (2/120) based on acid fast staining of milk sample. This study showed that 1.7% (2/125) of the animals in the farm are actively secreting tuberculosis bacilli in the milk, the implication is that herdsmen in the farm may acquire the disease by inhaling cough sprays from infected cattle during milking or get infected through consumption of unpasturized milk. The disease Tuberculosis (TB) caused by *M. bovis* is clinically indistinguishable from TB caused by *M. tuberculosis.* Cervical lymphadenopathy, intestinal lesions, chronic skin TB (*lupus vulgaris*) and other non pulmonary forms are particularly common with *M. bovis* and can also be caused by *M. tuberculosis.* The direct correlation between *M. bovis* infection in cattle and disease in human has been well documented in industrialized countries, whereas little information is available from developing countries like Nigeria (Collins and Grange, 1983; Cosivi *et al.*, 1995) .

The physical contact and closeness between humans and potentially infected animals are high with the herdmens and milkers, as they represent population at risk for *M. bovis.* Consumption of milk contaminated by *M. bovis* is the principal cause of cervical lymphadenopathy (scrofula) abdominal and other forms of pulmonary T B. Food hygiene practices play a major role in these forms of TB (Cosivi *et al.*, 1998). Such practices are often difficult to control or standardized because most dairy processing and marketing enterprises are informal sector. They can ignore standards of hygiene and quality and producers often sell milk directly to the final consumers with serious public health implications.

According to world health organization 9.4 million people are infected with both H I V and TB in mid 1996, 6.6 million (70%) live in sub Sahara Africa (Raviglione *et al.*, 1995). The greatest impact of HIV infection on TB is in population with high prevalence of TB infection among young adults.The occurrence of both infections in one person makes TB infection very likely to progress to active disease (Cosivi *et al.*, 1998).

CONCLUSION

Observations from this study show the importance of a cycle of infection that exist between the infected herdsmen, their families, the general population and infected cows particularly the lactating cows. From the study 1.7% of animals in the farm are actively secreting tubercle bacilli in milk. The implication of this is that majority of Nigerians in that particular area are at risk of TB infection because of inadequately pasteurized milk use by the herdsmen for “Nono” (locally fermented milk) this can serve as a vehicle for spread of tuberculosis caused by *M. bovis.* In addition the herdsmen who get infected from aerosol droplets from infected animals in the herd, can equally contaminate milk and also help in the spread of the infection.

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