Short Communication

Prevalence of brucellosis markers in milk samples from Jos and neighboring regions

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A total of 200 milk samples comprising 100 from Fulani cattle herds and 100 from milk sellers in and around Jos metropolis were screened for *Brucella* antibodies by milk ring test (MRT). About 5 ml of bulk milk was collected immediately after milking into sterile bijou bottles with screw caps. Similarly, 5 ml of milk were also collected from milk sellers at various selling points within the Jos metropolis. This study was carried out within a period of four months, from March to June, 2005. The herds for this study were randomly selected and vaccinated herds and mastitic cows were excluded to avoid false positive reactions. 15% of the milk samples from Fulani herds were positive for *Brucella* antibodies while 12% of the samples obtained from milk sellers in designated sheds were positive for *Brucella* antibodies. The overall prevalence was 13.5%. The result showed a higher prevalence rate in herds where fresh milk was collected compared to those from milk sellers in designated shed. Since the milk samples were collected from pooled milk in the herd, the infected animals could not be easily identified. About 90% of the milk sold in the study area is neither pasteurized nor boiled. The finding of this study is of public health significance. Local milk producers and sellers should therefore be educated on the importance of pasteurization or boiling of milk and making these regulations mandatory for milk intended for human consumption.

Key words: Prevalence, *Brucella* antibodies, milk, Jos, milk ring test.

INTRODUCTION

Milk is an important source of nutrient to man and animals. Milk meant for human consumption must be free from pathogenic organisms. Brucellosis is an infectious zoonotic disease commonly caused by *Brucella* species. The disease in animals causes abortion, infertility, neo-natal mortality and hygroma and is spread by materials contaminated by body fluids including milk. It is therefore a disease of great economic importance as well as public health significance. The most important means of acquiring brucellosis is through the consumption of raw milk. The risk of infection by milk borne Brucellosis is the reason for public health regulation, which discourages the informal milk markets that sell unpasteurized milk (Kang'ethe et al., 2000). This is because of the risk it poses to human health.

However, these regulations are never implemented in many developing countries including Nigeria. Over 70% of milk sales in Nigeria is in the hands of illiterate pastoral farmers who do not believe that milk could be a potential source of infection to humans and are not ready to subject their milk to any form of treatment. Brucellosis in human is a febrile flu-like illness with intermittent fever (Berman, 1981; Chukwu, 1987; Nicoletti, 1984; Seifert, 1996) . The prevention of brucellosis in human is the basis for the advocacy of milk pasteurization worldwide. Despite the existence of regulations that require milk pasteurization, most (over 75%) of milk marketed in many developing countries is sold raw through local informal pathways (Staal, 2000) . This is typical of milk sold in and around Jos metropolis as most of those involved in milk marketing are the rural Fulani maids (Ajogi,1988) and the milk is consumed raw or fermented (fura and nono). These informal milk markets thrive because they are of

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Table 1. Prevalence of *Brucella* antibodies in marketed milk in Jos and environs by milk ring test.

Source of milk	Number tested	Number tested +ve	% +ve
Milk sellers	100	12	12
Herds	100	15	15
Total	200	27	13.5

financial benefit to these smallholder producers and milk agents. It is also a source of employment to many of these milk marketers (Kang'ethe et al., 2000). The human health risk from these informal pathways of milk marketing is the main objective of this paper. That is why the use of more sensitive tests such as Rose Bengal plate test (RBPT), serum agglutination test (SAT) and complement fixation test (CFT) was not appropriate as they can only be used with serum samples and not milk. The indirect milk ELISA is also more sensitive compared to Milk ring test (MRT) but could not be used because the kits were not available at the time this study was conducted. Therefore, MRT with a sensitivity of 87.5 and a specificity of 98.6 was the only appropriate and available test to determine the prevalence of *Brucella* antibodies in these milk samples.

MATERIALS AND METHODS

Sample collection and study area

About 5 ml of bulk fresh milk was collected immediately after milking from 100 Fulani cattle herds around Jos metropolis. These herds were selected by random sampling. Those herds that had been vaccinated against brucellosis were excluded from the study and cows with mastitis or those newly calved were not sampled. Also another 5 ml of milk from non-vaccinated cows was collected from 100 mobile milk sellers and those at designated sheds within Jos metropolis. These were all collected into sterile 10 ml plastic tubes with screw caps. The samples were then taken to the laboratory where they were tested on the same day of collection after being allowed to rest for at least one hour. The duration of sample collection and analysis was four months (March to June, 2005).

Milk ring test (MRT)

This test works on the principles that antibodies to *Brucella* attach themselves to fat globules agglutinins in milk, which rise to the surface of the milk and cluster at the cream layer. When haematoxylin stained *Brucella abortus* antigen is added to the milk (Hunter and Allen, 1972), antibodies in the milk if present form a complex. The complex attaches to the fat globules in the milk giving a blue ring at the cream layer level leaving the normal white skimmed milk below, indicating a positive result. If antibodies are absent, the whole mixture remains homogenously bluish-white, indicating a negative result. The antigen prepared from *Brucella abortus* at pH 4.0 was obtained from Veterinary Laboratories Agency (VLA), UK. The test was carried out by pipetting 1 ml of milk into a 10 ml glass tube. One drop of the MRT was then added gently on to the milk. The tube was rocked gently to allow for proper

mixing of the antigen and the milk. They were then incubated in an incubator at 37°C for one hour. The results were then read and interpreted.

RESULTS AND DISCUSSION

15% of the 100 fresh milk samples from Fulani herds were positive for *Brucella* antibodies while 12% of the 100 milk collected from mobile milk sellers and those in designated sheds tested positive for *Brucella* antibodies. This gives an overall prevalence of 13.5% (Table 1). Since only non-vaccinated herds and those cows without signs of mastitis were sampled during the study, the result is indicative of response to brucella infection and not due to vaccination. Although serological diagnosis of brucellosis requires the use of more than one test, indirect milk ELISA could not be carried out due to non-availability of the test kits. Other tests such as RBPT, CFT and SAT are used only for testing serum samples and are therefore not appropriate for testing milk. The sensitivity of MRT was 87.5 while its specificity was 98.6. The result shows a slightly higher prevalence among fresh samples compared to those from sellers, which were mainly fermented milk. The overall prevalence was lower compared to that reported by Ajogi (1988) where a similar study conducted previously in part of the study area revealed 40% prevalence.

All the samples collected were from bulk milk from various herds and milk sellers each representing a herd. The prevalence obtained is therefore herd prevalence rather than individual animal prevalence. The infected animals serve as sources of infection to healthy animals within the herds as well as other neighbouring herds. This is because the animals graze around unrestricted, making contact between different herds possible. The Fulani herdsmen and their families are also at risk of infection as they handle and milk these animals on daily basis. They can easily get infected because of this close contact with the animals (Chukwu, 1987; Seifert, 1996).

In the course of this work, it was understood that most of the milk sold in and around Jos do not undergo any form of treatment such as pasteurization or boiling. The Fulanis believe that the milk is wholesome and could even be taken directly from the cow. Milk being sold by the Fulanis is either fresh or soured (fermented). This means therefore that the milk being consumed by the public in the study area is mostly not boiled and is there-

fore a potential health risk to the consumers.

Concerns about human health risks from these market pathways needs to be addressed in the context of consumer practices such as boiling to reduce or eliminate potential infection by milk-borne health hazards, without discouraging the markets through which the smallholders sell their milk (Kang'ethe et al., 2000). Boiling of raw milk achieves higher temperatures and duration than those attained through pasteurization (Kang'ethe et al., 2000) and could destroy all zoonotic pathogens. This means that if these smallholder milk sellers ensure regular boiling of milk before it is sold to the public, such milk could be said to be safe, as most infectious agents in the milk might have been destroyed during boiling.

There is the belief that traditionally fermented milk (nono) is safe since it has undergone fermentation. Fermentation (souring) only lowers the pH of milk from about 6.8 to about 4.5. Under this acidic pH, *Brucella* organisms are only mildly affected (Farrell, 1996). Minja (1999) in a similar study found that the low pH level in sour milk only destroyed *Mycobacterium bovis* after 66 h. This implies that homemade fermented milk is still a possible source of infection with brucellosis to human. Although the herdsmen and the milk sellers do not believe that they could get infected by drinking raw milk or unboiled fermented milk, it is a major source of infection with brucellosis.

Despite the existence of pasteurization and its advocacy worldwide, most of the milk marketed in Nigeria and in Jos metropolis is raw and is sold mostly through local informal channels. Boiling is not also considered a beneficial means of treating milk to make it safe for human consumption.

Milk is a nutritious food for animals and human consumption and must be free of pathogenic organisms to achieve its nutritive value. The risk of infection by milk borne brucellosis is the reason for public health regulations, which discourage the informal milk markets that sell unpasteurized milk.

Adequate pasteurization or boiling of milk before consumption must be enforced. This is the only means by which milk can be made safe for human consumption. Small holder milk producers and the general public needs to be educated on the danger of drinking raw milk. A further study on the isolation and characterization of brucella from marketed milk in the study area is suggested.

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