A sero-surveillance of Brucella spp. antibodies and individual risk factors of infection in cattle in Bangladesh

Md. Shamim Ahasan, Md. Siddiqur Rahman1*, Hee-Jong Song2

Department of Medicine, Surgery and Obstetrics, Hajee Mohammad Danesh Science and Technology University, Dinajpur-5200, Bangladesh

1Department of Medicine, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

2Korea Zoonoses Research Institute, Chonbuk National University, Jeonju 561-756, Korea

(Received 17 May 2010, accepted in revised from 18 June 2010)

Abstract

Brucellosis is a serious zoonosis, recognized worldwide. It primarily affects animals, which act as reservoirs for human infection as well as being of economic significance to the agri-food industry. Bangladesh has been reported as an endemic area for brucellosis. So a cross sectional study was conducted to determine the seroprevalence and potential risk factors of brucellosis in cattle in Dinajpur and Mymensingh districts of Bangladesh. A total of 182 cattle were examined by Rose Bengal Plate Test (RBPT) between September 2008 and October 2009. Then Positive, doubtful, and negative samples were further confirmed with slow agglutination test (SAT) and both indirect and competitive enzyme linked immunosorbent assay (iELISA and cELISA). A questionnaire was used to collect epidemiological information of the animals. The overall animal-level prevalence was 3.30%. Brucellosis seroprevalence was higher (4.76% by cELISA) in cattle above 48 months than those under 48 months. Female showed higher seroprevalence (10.67%) than male (6.25%). Higher seroprevalence was also found in cattle bred naturally (20.0%) than artificially (8.77%) and cattle that aborted or with previous abortion record (22.22%) showed higher seroprevalence than non-abortion (7.69%). The sensitivity of RBT and SAT was found 100% as compared to cELISA standard test, whereas specificity of RBT (95.35%) was higher than that of SAT (94.32%).

Key words: Brucella spp., Epidemiology, Serology, Cattle, Bangladesh

INTRODUCTION

Brucellosis is an emerging disease since the discovery of Brucella melitensis as the cause of Malta fever of fatal human case by David Bruce in 1887 in the island of Malta and so called “Malta Fever”. In 1897, the isolation of B. abortus from aborted cattle by Bernard Bang and named “Bang’s Disease” (Nicoletti, 1990). The disease also called as “Undulant Fever” and “Mediterranean fever” (WHO, 2006). It is an important zoonotic disease caused by small non-motile coccobacilli shaped facultative anaerobic gram-negative bacteria genus Brucella (Kakoma et al, 2003; Baek et al, 2003). It is a disease of economic and public health significance and had a worldwide distribution.

Brucellosis mainly affects reproduction and fertility, reduces the survival rate of newborns and reduce milk yield (Roth et al, 2003; Franco et al, 2007). It is essentially a disease of sexually matured animals. In human beings, the symptoms of disease are weakness, joint and muscle pain, headache, undulant fever, hepatomegaly, splenomegaly and night sweats. Sometimes it is characterized by influenza like clinical disease, which may be severe and may be followed by chronic intermittent relapses (Hugh-Jones, 2000). If untreated, recurrent
fever (undulant fever) in humans can be developed and may persist for several months. Recently it has been reported that brucellosis can affect the central and peripheral nervous system of human (Al-Sous et al, 2004) and Domingo (2000) revealed that good relations exist between veterinary and health personnel in the field.

Brucellosis is a widespread zoonosis. *B. melitensis* mainly responsible for brucellosis in sheep and goats, but *B. melitensis* in cattle has emerged as an important problem in some southern European countries such as Israel, Kuwait, and Saudi Arabia. *B. melitensis* infection is particularly problematic because *B. abortus* vaccine do not protect effectively against *B. melitensis* infection; the *B. melitensis* Rev.1 vaccine has not been fully evaluated for use in cattle. Thus, bovine *B. melitensis* infection is emerging as an increasingly serious public health problem in some countries. A related problem has been noted in some South American countries, particularly Brazil and Colombia, where *B. suis* biovar 1 has become established in cattle (Garcia Carrillo, 1990). In some areas, cattle are now more important than pigs as a source of human infection.

The factors influencing the epidemiology of brucellosis in cattle in any geographical region can be classified into factors associated with the transmission of the disease among herds and the factors influencing the maintenance and spread of infection within herds (Crawford et al, 1990). The density of animal populations, the herd size, the type and breed of animal (dairy or beef), the type of husbandry system and other environmental factors are thought to be important determinants of the infection dynamics (Salman and Meyer, 1984).

Worldwide, Brucellosis remains a major source of disease in humans and domesticated animals. The true incidence of human brucellosis is clearly not known. However, most cases of brucellosis in human are occupational and occur in the farmers, lab technicians, veterinarians, people working in meat processing industry, sheep herders etc (Radostits, 2000; Al-Ani et al, 2004) although other factors such as methods of food preparation, heat treatment of dairy products, and direct contact with animals also influence risk to the population.

Rose bengal test (RBT), serum agglutination test, tube agglutination test, mercaptoethanol test and/or ELISA are generally used for the serological detection of *Brucella* infections in livestock. The serological assay allows the detection of *Brucella* specific antibodies in a whole blood sample collected at a farm or in the field from an animal directly after the sample is collected.

In Bangladesh, the current status of brucellosis is not clearly known. There are a lot of undiagnosed cases of abortion, stillbirth and retained placenta which is thought to be brucellosis. This brucellosis in animals plays an important constraint to the development of livestock in Bangladesh and may have a considerable impact on both human and animal health as well as socioeconomic effects.

Recent serosurveys (Rahman et al, 2008; Rahman et al, 2006) for brucellosis in Bangladesh indicated a low level of seropositivity for brucellosis. However, seropositivity often indicates the presence of a larger problem rather than the absolute number of serologic reactors detected and also, because those animals were tested with *B. abortus* antigen, seropositivity to *B. melitensis* may not have been detected. In Bangladesh, brucellosis was first detected in cattle in 1967 (Mia and Islam, 1967) but there are no study conducted with ELISA. Therefore, the study was carried out with the following objectives: (1) Determination of brucellosis seroprevalence by RBT and Slow Agglutination Test (SAT) in Mymensingh and Dinajpur Districts of Bangladesh, (2) Application of ELISA to confirm the seroprevalence of brucellosis, and (3) Epidemiological study of brucellosis in Dinajpur and Mymensingh Districts.

**MATERIALS AND METHODS**

**Experimental design**

The study was conducted for 14 months from September 2008 to October 2009 in the Department of Medicine, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh. Venous blood samples were randomly and aseptically obtained from sexually matured cattle of both sexes. A total number of 182 blood samples were collected from cattle in...