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「Short communication」

Tube agglutination test is superior than other serological tests for diagnosis of brucellosis in small ruminants

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Abstract

Brucella spp. are small, non-motile Gram-negative coccobacilli known to cause disease in a number of vertebrate species including humans and brucellosis is one of the world's major zoonoses, alongside bovine tuberculosis and rabies. There are about 33.55 million goats and 1.16 million sheep in Bangladesh. The sheep and goats can significantly play an important role in the economic well being of the resource-poor farmer in Bangladesh. Sexually matured 362 female small ruminants (300 goats and 62 sheep) were examined. Approximately 3-5 ml of blood was collected from the jugular vein of each animal and sera samples were prepared. Samples were then tested for brucellosis by using Rose Bengal test (RBT), plate agglutination test (PAT) and tube agglutination test (TAT). Among 362 small ruminants, irrespective of species (sheep or goat), diagnosed highest in TAT, 2.21% (n=8) and lowest both by RBT & PAT, 1.93% (n=7) and it is concluded that TAT is superior than RBT and PAT.

Key words : Brucellosis, Small ruminants, Rose Bengal test, Plate and tube agglutination test

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Introduction

Brucella spp are small, non-motile gram-negative coccobacilli known to cause disease in a number of vertebrate species including humans and brucellosis is one of the world's major zoonoses, alongside bovine tuberculosis and rabies [1]. *Brucella* infection is endemic in humans and domestic animals in Mediterranean countries and it is also present in Asia including Bangladesh, sub-Saharan Africa, and Latin America [1-3].

Bangladesh hosts large number of small ruminants that are raised usually under free range system or in adjunct to crop production. The ruminants especially small (sheep and goat) ruminants in Bangladesh are mainly utilized for meat purposes, although goat milk is used some extent for human consumption. The small ruminants are not only important for meat and milk but also important for good quality leathers and source of income to farmers. Among the Asiatic countries Bangladesh has got the second highest population of goats which accounted for 34.47 million [4]. The goat rank second in terms of meat, milk and skin production representing about 28.0, 23.0 and 28.0 percent among the total contribution of livestock, in Bangladesh [4]. There are about 33.55 million goats and 1.16 million sheep in Bangladesh [5]. The sheep and goats can significantly play an important role in the economic well being of the resource-poorfarmer.

In this study we have reported that tube agglutination is superior than other serological tests for diagnosis of brucellosis in small ruminants.

Materials and Methods

A total of 362 small ruminants (300 goats and 62 sheep) were used in this study. In Mymensingh, Bangladesh Agricultural University (BAU) Nutrition Farm, goats attended at Veterinary Clinic, BAU and the sheep and goat population living around the BAU campus were included in this study. Besides, samples were collected sera from sheep and goat of Boyra, Char Nilakhia, Vangnamari villages of Ishwargonj upazilla, Mymensingh and some villages of Dhamrai upazila, Dhaka. The sexually matured female sheep and goat populations were randomly selected for this study. All of the study animals were indigenous breeds.

Approximately 3-5 ml of blood was collected from the jugular vein of each animal using a sterile disposable syringe and needle. Serum samples were prepared by centrifugation and stored in vials at -20℃. Samples were then tested for brucellosis by using Rose Bengal test (RBT), plate agglutination test (PAT) and tube agglutination test (TAT). For all three tests, the *Brucella abortus* strain 1119-3 (DaeSung Microbiological Laboratories, Korea)was used as the antigen following their instruction.

Table 1. Overall diagnosis of brucellosis in sheep and goats

Species	Total number of sera samples collected and tested	Total number (%) of positive cases
Sheep	62	3 (4.84%)
Goat	300	7 (2.33%)

Result and Discussion

The overall diagnosis of brucellosis in sheep and goat shown in Table 1. It has shown that 4.84% (3 sheep) and 2.33% (7

goats) in among 62 sheep and 300 goats, respectively were positive for brucellosis.

The result of diagnosis by RBT, PAT and TAT has presented in Table 2. Among 362 small ruminants, irrespective of species (sheep or goat), diagnosed highest in TAT, 2.21% (n=8) and lowest both by RBT and PAT, 1.93% (n=7).

Table 2. Diagnosis of brucellosis in small ruminants irrespective of species by Rose Bengal test (RBT), Plate Agglutination test (PAT), Tube Agglutination test (TAT).

Total number of sera samples	Number (%) of sera positive by		
	RBT	PAT	TAT
362	7 (1.93)	7 (1.93)	8 (2.21)

Brucellosis is a wide spread disease of livestock and human beings resulting in reproductive inefficiency and abortion. Small ruminant brucellosis is mostly caused by *B. meltensis* [6]. *B. ovis* is also an important cause of orchitis and epididymitis in sheep but it is not recognized as a cause of natural infection in goats. Persistent infection is a common feature of the disease with frequent shedding of the bacterium in reproductive and mammary secretions. Brucellosis is an important zoonosis threatening the public health in many countries of the world [7].

The diagnosis of brucellosis is confirmed by isolation of *Brucella* by bacteriological culture or by the detection of an immune response by serological test to its antigens [8,9]. The diagnosis of brucellosis based exclusively on *Brucella* isolation presents several drawbacks. The slow growth of *Brucella* may delay diagnosis for more than 7 days [10-12]. Also, the sensitivity is often low, ranging from 50 to 90% depending on disease stage, *Brucella* species, culture medium, quantity of bacteria and culture technique employed [12,13].

Among the serological tests, RBT is a screening test for diagnosis of *Brucella* infection [14] and the TAT has become the standard method, is the test recommended for collection of quantitative information on immune responses, and is the most frequently used confirmatory serological test [15]. In many countries, the PAT, which may give false-negative results, is the routine test and is sometimes the only one used [15]. The PAT was originally developed to provide a rapid test and it would approximate the results of the TAT. TAT was the first test used for the diagnosis of brucellosis in human and was soon adapted for use in animals [16].

In Bangladesh, 0% of brucellosis in sheep and 1% of brucellosis in goats was diagnosed by Amin [17] and in another study caprine brucellosis were determined 23.64% at Modhupur in Tangail district, 31.82% at Bhalukain Mymensingh district, 34.00% in Manikganj district and 16.66% in BAU campus and adjacent villages by PAT [2]. In this study, we have tested 362 sera of small ruminants and we have found by TAT, 2.21% (n=8) and both by RBT and PAT, 1.93% (n=7). The similar results (1.93 %) were observed both by RBT and PAT but the result was 2.21% by TAT. Therefore, it may be concluded that TAT is superior than RBT and PAT.

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