

Full Length Research Paper

# Serological survey of brucellosis in livestock animals in Sarab City (East Azarbayjan province), Iran

J. Akbarmehr\* and M. Ghiyamirad

Department of Microbiology, Islamic Azad University Sarab Branch, Sarab, Iran.

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Brucellosis is an infectious and zoonotic disease of worldwide distribution. Despite its control program, the disease is endemic in Iran and remains one of the most important public health problems. The aim of this survey was to determine the seroprevalence of brucellosis in livestock animals in Sarab City, Iran. A total of 1500 animals (600 cattle, 740 sheep and 160 goats) were examined for brucellosis from February 2007 to September 2008. The examined animals were divided into two sex groups (male and female). Moreover cattle were divided into four breed groups (Holstein, Brown Swiss, Native and Mixed). Serological examinations including Rose Bengal plate test (RBPT), serum agglutination test (SAT) and 2-mercaptoethanol test (2ME) were performed on serum samples obtained from examined animals. In overall, out of 1500 blood samples 61 (4.06%) were positive for brucellosis. The prevalence of brucellosis in cattle, sheep and goats were found 3.66, 4.18 and 5%, respectively. The prevalence rates of brucellosis in different breeds of cattle, Holstein, Brown Swiss, native and mixed breeds were determined as: 4.72, 2.22, 2.50 and 3.75%, respectively. The prevalence rates of the disease in male and female animals were determined as follows: Male cattle, 1.53%, female cattle, 3.92%, male sheep, 2.8%, female sheep, 4.89%, male goats, 2.22%, and female goats, 6.08%. There were differences in the prevalences of brucellosis in different breeds and sexes of examined animals however statistically were not significant ( $P > 0.05$ ,  $X^2 < 3.84$ ). The results of the present study indicated that the prevalence of brucellosis in livestock animals in Sarab City is relatively high and effective control program of the disease should be recommended.

**Key words:** Brucellosis, Sarab, prevalence, livestock.

## INTRODUCTION

Brucellosis is an infectious disease of domestic and wild animals with serious zoonotic implication in humans. The disease is an important public health problem in many parts of the world. Cattle, goats, pigs, sheep, horses and dogs play an important role in the transmission of brucellosis to man (Cadmus et al., 2006; Acha et al., 2003). The disease is caused by members of the genus *Brucella*, a facultative and gram negative bacteria. The importance of this highly contagious disease is due both to its economic impact on the animal industry and to the severe hazard it represents to human health. Brucellosis is defined as a contagious bacterial disease primarily of ruminants, characterized by inflammation of the genital

organs and fetal membrane, abortion, sterility, and formation of localized lesions in the lymphatic system and joints (Cadmus et al., 2006). In female animals, the bacteria are localized in the udder followed by excretion via milk and in male animals orchitis and epididymitis can lead to infertility (Gwida et al., 2010). The disease in animals causes tremendous economic losses due to abortion, premature birth and reduced production rate. Five out of the nine known *Brucella* species can infect humans and the most pathogenic and invasive species for human is *Brucella melitensis* followed in descending order by *Brucella suis*, *Brucella abortus* and *Brucella canis* (Seleem et al., 2010). In places where brucellosis is endemic, humans can be infected through contact with animals or consumption of their products mostly dairy products made from unpasteurized milk. The disease also is an occupational hazard to persons engaged in

\*Corresponding author. E-mail: [ja\\_mehr@yahoo.com](mailto:ja_mehr@yahoo.com).

certain professions such as: Veterinarians, farmers, slougheterhouse workers, buchers and laboratory workers. The mode of transmission of the bacteria varies with the epidemiological area, the animal reservoir and the occupational exposed groups. The prevalence of infection in animal reseviors provides a key to its prevalence in humans. *B. abortus* and *B. suis* infections usually affect occupational groups while *B. melitensis* infections occur more frequently than other *Brucella* species in the general population. Consumption of sheep or goat milk containing *B. melitensis* is an important source of human brucellosis (Seleem et al., 2010).The disease exists worldwide especially in the Mediterranean basine, the Arabian peninsula, Western Asia, parts of Africa and latin America. Despite the advances made in surveillance and control, the prevalence of brucellosis is increasing in many developing countries (Gwida et al., 2010). The incidence of the disease has decreased markedly in industerilized countries. A few countries are expected to be free including: USA, France, Belgium, Malasia (Palmer et al., 1998). In China, *B. melitensis* is prevalent in the Northern provinces and *B. suis* in the South. In the other countries, particularly in the Middle East, the prevalence is high or unknown. Iran is an endemic area for brucellosis. Several authors have reported the prevalence of brucellosis in both animals and humans in various parts of Iran (Salari, 2002; Rafeipour et al., 2007; Ramezani et al., 2008; Alavi et al., 2007; Nowroozi et al., 2007). Sarab city is located in East Azarbayjan province in Northwest of Iran. The weather of this city is cold and its natural pastures are very suitable for animal husbandry. Livestock rearing has an important role in economy of this area. A documented study on the prevalence of brucellosis has not been carried out in this city. The aim of this study was to investigate the determination of the status of brucellosis in cattle, sheep and goats in Sarab City.

## MATERIALS AND METHODS

In this study, a total of 1500 livestock animals which composed 600 cattle, 740 sheep and 160 goats were examined in Sarab city and its 50 different villages from February 2007 till September 2008. The examined animals were selected by random cluster sampling. Cattle were divided into four breed groups (Holstein breed, Brown Swiss breed, native breed and mixed breed) and two sex groups (male and female). Small ruminants (sheep and goats) were divided into two sex groups (male and female). 5 ml of venous blood was collected from the jagular vein of each animal into serum vacuum blood tubes (venoject). The place and the date of sampling and also the breed and the sex of animals were recorded in a data collection form. The blood samples were allowed to clot by laying them down in slanting position and transported to laboratory in a container with ice packs. Samples were centrifuged at 1000 rpm for 5 min to allow for separation of blood serum from blood cells. The diagnosis of brucellosis was made by three serological tests including: Rose Bengal plate test (RBPT), serum agglutination test(SAT) and 2 mercaptoethanol test (2ME), described by Alton et al. (1988). *B. abotrus* antigen used in this study for both RBPT and SAT tests was provided from Razi Research Institute, Karaj, Iran.

Sera were first screened using RBPT and then the positive samples were confirmed by serum agglutination and 2ME tests. The serum samples with an antibody titer of 1/40 and higher were considered as a positive result. Finally data obtained from serological examinations were subjected to statistical analysis using Chi square.

## RESULTS

In overall out of 1500 blood samples, 61(4.06%) were positive for brucellosis. Out of 600 blood samples which were obtained from cattle 22 (3.66%) had positive results. The prevalence of brucellosis in sheep and goats were determined as 4.18 and 5%, respectively (Table 1). Based on serological tests, the prevalence rates of brucellosis for different breeds of cattle Holstein, Brown Swiss, native and mixed breed were determined as 4.72, 2.22, 2.50 and 3.75%, respectively (Table 2). The prevalence of brucellosis in different sexes of examined animals were determined as follows: Male cattle, 1.53%, female cattle, 3.92%, male sheep, 2.8%, female sheep, 4.89%, male goat, 2.22%, and female goat, 6.08% (Tables 3 and 4).

## DISCUSSION

Domestic animals are a major source of meat supply in Sarab City. Moreover, dairy products marketing play a key role in the economy of this city. The city is located on a mountain region with a cold weather. The animal husbandry practice in this city is extensive management and the animals are kept in close to each other for a long period during cold seasons. Keeping of livestock animals with together even with domestic poultry provides an opportunity for distribution of many infectious disease including brucellosis. Despite of control program and vaccination of uninfected herds, the disease is endemic in this area and has a major economic and public health importance. As Table 1 shows in overall the prevalence of brucellosis in livestock animals of Sarab City was determined as 4.06%. Several authors reported different prevalences of brucellosis in various parts of Iran.

A study which was conducted by Tabarsa (1994) in Gorgan City in Iran; the prevalence of brucellosis in livestock was determined as 2.4% (unpublished document) which is lower compared to our results. The prevalence of brucellosis in industrial cattle farms in Iran was reported as 0.6% (Shimi, 1998) which showed brucellosis is more prevalent in native farms compared to industrial farms in Iran (In the present study the blood samples were collected from native farms) .Doomari (2009) in a recent survey which was conducted in Jiroft City in Iran reported the prevalence of bovine brucellosis in Sardueyeh region of this city as 11.37% which is higher compared to our study. Rafeipour et al. (2007) in a study which carried out in Baft City in Iran reported the

**Table 1.** The results of the serological tests of livestock animals examined in Sarab City.

Animal	Total sample	Positive serological results for brucellosis	
		No.	%
Cattle	600	22	3.66
Sheep	740	31	4.18
Goat	160	8	5
Total	1500	61	4.06

**Table 2.** The prevalence of bovine brucellosis among the different breeds of cattle in Sarab City.

Breed	Total sample	Positive serological results for brucellosis	
		No.	%
Holstein	275	13	4.72
Brown Swiss	45	1	2.22
Native	200	5	2.50
Mixed	80	3	3.75
Total	600	22	3.66

**Table 3.** The prevalence of bovine brucellosis among the different sexes of cattle in Sarab City.

Sex of animal	Total sample	Positive serological results for brucellosis	
		No.	%
Male	65	1	1.53
Female	535	21	3.92
Total	600	22	3.66

**Table 4.** The prevalence of brucellosis in sheep and goats among different sexes of animals in Sarab City.

Animal	Total sample		Positive serological results for brucellosis			
	Male	Female	Male		Female	
			No.	%	No.	%
Sheep	250	490	7	2.8	24	4.89
Goat	45	115	1	2.22	7	6.08

prevalence of brucellosis in camel as 10.5% which is also higher compared to the prevalence of the disease in cattle and small ruminant which was reported in the present study. Another research which was conducted in Ahvaz City in Iran, the prevalence of brucellosis in dog was reported as 4.90% (Mosallanejad et al., 2009). Brucellosis has worldwide distribution and has been also reported in other countries around the world. The research conducted by Bertu et al. (2010) in Plateau State in Nigeria reported the prevalence of brucellosis in sheep and goats as 14.5 and 16.1%, respectively. Our results in the present study were 4.18 (for sheep) and 5% (for goats) which showed lower prevalence compared to

Bertu et al.'s (2010) study. Otlu et al. (2007) reported the prevalence of bovine brucellosis in the Kars district of Turkey 34.64% which is significantly high compared to our study.

In another research which was conducted in Western Tigray in Ethiopia, the prevalence of bovine brucellosis was determined as 4.9% (Mekonnen et al., 2010) which is relatively higher compared to our result (3.66%). Another outcome of this study was the different prevalence rates of brucellosis in the various breeds of cattle. As Table 2 shows, the Holstein breed has a higher prevalence rate of brucellosis (4.72%) compared to the three other breeds but it was not statistically significant

( $P > 0.05$ ,  $\chi^2 < 3.84$ ). However it must be considered that native and locally born animals are more resistant to *Brucella* infection compared to foreign breeds (Shimi, 1998). According to Table 3, the prevalence rates in male and female cattle were 1.53 and 3.92%, respectively and Table 4 shows the prevalence rates in male and female sheep as 2.8 and 4.89% and for goats 2.22 and 6.08%, respectively which indicated the higher prevalence in female animals although statistically were not significant ( $P > 0.05$ ). In conclusion the results of the present study indicated that the prevalence of brucellosis in livestock animals in Sarab City is relatively high and should be considered as an important economic and public health problem in this area. In our previous study which was carried out in this city, we determined the contamination rate of the local cheese produced in Sarab City with *B. abortus* and *B. melitensis* 2.2% (underpublication in AJMR) which revealed the relationship between animal brucellosis and the contamination of the dairy products. Therefore people of this area can be easily infected by *Brucella* after consumption of raw dairy products. Finally attempts should be made by government and farmers to encourage routine screening of domestic animals, separation and slaughter of the infected animals, vaccination of uninfected herds. Moreover public health consideration should be focused on the zoonotic aspect of the disease as it relates to consumption of raw milk and dairy products obtained from infected animals.

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