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Short Communication

Seroprevalence of Brucellosis in Camels in Sindh, Pakistan

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ABSTRACT

Brucellosis affects a wide range of animal species including human beings and is more severe in human than in animals. It imposes a huge burden on human health due to its zoonotic nature. Our study involves the testing of 100 sera samples and 50 milk samples from camels of three districts of Sindh province of Pakistan. Rose Bengal Plate Test (RBPT), serum agglutination test (SAT) and competitive-ELISA (c-ELISA) were used as screening tests, and overall seroprevalence of brucellosis was found to be as 21%, 21% and 13% by RBPT, SAT and c-ELISA tests, respectively. Seroprevalence was higher in females (26%) than in males (16%) by RBPT and SAT tests, and also in camels less than 9 years of age (13.33%). Milk samples were collected to detect the antibodies against the disease, however, none of the sample was found to be positive for brucellosis. It was concluded that the brucellosis is prevalent among camels of studied areas.

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Authors' Contributions

RR, JKS, ALB, RB designed the study. ASB, AR, PD and MFA executed the experimental work. PD and AR wrote the article.

Key words

Brucellosis, Camels, Zoonosis.

Brucellosis is a notorious disease affecting a wide range of animal species including human beings, and caused by the genus *Brucella* (Moreno and Moriyón, 2002). The causative agent is transmitted vertically or horizontally under normal conditions, due to close contacts like sexual intercourse, secretions and by licking the aborted fetuses. Brucellosis is more severe in human beings than in domestic animals producing different clinical symptoms, just like debilitating chronic flu with illness (Dalrymple-Champneys, 1960; Pedro-Pons *et al.*, 1968), while in animals it causes abortion, infertility and decreased milk production (Hegazy *et al.*, 2011). Due to its zoonotic nature it imposes a huge global burden on human health and animal productivity (WHO, 2005). Studies have shown that greatest risk of transmission of this disease is mainly associated with indirect contact with animals (consumption of unpasteurized milk/dairy products). Products from sheep and goat presented more risk than the camels and cattle, and this disease also transfers through assisting animals in parturition (Cooper, 1992; El Sherbini *et al.*, 2007).

The ruminants infected with the *Brucella* spp. are known to be primary source of human infection (Marcotty *et al.*, 2009). Furthermore prevalence of human brucellosis has increased in Middle Eastern and central Asian countries, especially in Syria, Saudi Arabia, Iraq, Iran and Turkey with annual incidence rates of 160, 21, 28, 24, and 26 cases per 100,000 persons-years at the risk, respectively (Pappas *et al.*, 2006).

According to the OIE, the brucellosis accounts 500,000 human cases per annum, thereby making it the second most

important zoonotic disease (Pappas *et al.*, 2006). Seroprevalence of *Brucella abortus* was described few years back in the cattle and buffaloes in Pakistan (Ali *et al.*, 2013). *Brucella melitensis* and *Brucella abortus* cause brucellosis in camels, and it is also difficult to diagnose brucellosis in camels since these organisms provoke only few clinical signs.

Camels are the prime source of meat and milk in many desert areas of world and Pakistan (Ali *et al.*, 2009). Present study is a cross-sectional survey on seroprevalence of brucellosis in Sindh province of Pakistan.

Materials and methods

Three main districts of Sindh province *i.e.*, Thatta, (Latitude 24° 47' North, Longitude 67° 23' East) Badin (Latitude 24° 5' to 25° 25' North, Longitude 68° 21' to 69° 20' East) and Tharparkar were selected in 2013 to determine the seroprevalence of *Brucella* infections in camels and also to identify potential risk factor associated with seropositivity.

A total of 100 blood samples were collected and kept in refrigerator overnight for reparation of serum which was used for Rose Bengal Plate Test (RBPT) according to Gabbar (1992), serum agglutination test (SAT) and competitive-ELISA (c-ELISA) tests. In latter test a strong positive sample showed a clear transparent appearance while, the negative sample appeared orange.

A total of 50 milk samples collected from lactating female camels were used for Milk Ring Test (MRT) according to Gabbar (1992).

Results and discussion

A total of 100 serum samples, 50 each from males and females were collected and examined through RBPT, SAT

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and c-ELISA; 21, 21 and 13 sera were found positive for brucellosis, respectively, by these tests. The highest prevalence of brucellosis was found in Tharparker detected by all used serological tests. High prevalence of brucellosis might be due to free moving and grazing on open pastures and close contacts with infected animals. Secondly, the proper treatment is not provided to the infected animals.

In our present study we found higher prevalence of brucellosis in camels, which is not consistent with results of other study in which lower prevalence (9.26%) was recorded (Fathey and Moghney, 2004), and is consistent with other studies (11.42) (Junaidu *et al.*, 2006; Mukhtar and Kokab, 2007). Highest prevalence of brucellosis was detected in camels by RBPT and SAT, however, there are chances of false positive due to cross reaction with antibodies of other bacterial species whereas the c-ELISA is more reliable than two aforementioned tests. This difference in seroprevalence might be due to parity, breed, managemental and seasonal variations or might be problem in recording the observation during investigation. Such kind of cross-sectional study was also conducted in Ethiopia and the overall prevalence of brucellosis was recorded as 11.9% by RBPT and 7.6% by CFT (Complement Fixation Test), and it was concluded that camel brucellosis was widely distributed in districts of Afar province. However, Sisay and Wereta (2012) found lower prevalence of camel brucellosis in Ethiopia, while in our study prevalence was higher, but seroprevalence determined in camels of Badin district by various techniques is similar to seroprevalence of brucellosis recorded in camels of two districts of Ethiopia through RBPT. Hence, results regarding seroprevalence in three districts of Sindh are in similar pattern as demonstrated in Ethiopia.

The prevalence of brucellosis was detected in 26% females and in 16% males by RBPT and SAT, however lower prevalence of brucellosis was found in males (10%) and females (16%) camels by c-ELISA (Table I). It was found that the prevalence of brucellosis in females were higher than that of males. It might be due to opening of cervix during estrus for more than a week, gets infected with *brucella* spp.

The prevalence of brucellosis in females and males was 26% and 16%, respectively. We found that prevalence of brucellosis in females was higher than in males, suggesting that females are at high risk of brucellosis than males. This is consistent with study of Ismail *et al.* (2012) as their study found that a higher seroprevalence of brucellosis (38.5%) was observed in adult females having the history of reproductive problems such as abortion, still birth and retained fetal membrane. However, no statistically significant difference was recorded in the study of Bekele *et al.* (2013); hence their findings are not in the agreement with our study and findings of Adamu and Ajogi (1999) and Junaidu *et al.* (2006).

Table I shows higher prevalence of brucellosis in camels less than 9 years of age, while lower prevalence was recorded in camels above 10 years of age. Higher prevalence of brucellosis in camels under 9 years of age might be due to lesser immunity.

Table I.- Brucellosis positive samples from blood samples of animals of different genders and age groups from Thatta, Badin and Tharparkar districts of Sindh.

A. Different districts	RBPT	SAT	c-ELISA
Thatta			
No. of samples examined	33	33	33
Positive samples No. (%)	6 (18.18%)	6 (18.18%)	2 (6.06%)
Tharparker			
No. of samples examined	34	34	34
Positive samples No. (%)	11 (32.35%)	11 (32.35%)	8 (23.0%)
Badin			
No. of samples examined	33	33	33
Positive samples No. (%)	4 (12.12%)	4 (12.12%)	3 (9.09%)
B. Different genders			
Females			
No. of serum samples	50	50	50
Positive samples No. (%)	13 (26.0%)	13 (26.0%)	8 (16.0%)
Males			
No. of serum samples	50	50	50
Positive samples No. (%)	8 (16.0%)	8 (16.0%)	5 (10.0%)
C. Different age groups			
Age under 9 years			
No. of serum samples	60	60	60
Positive samples No. (%)	17 (28.33%)	17 (28.33%)	8 (13.33%)
Age above 10 years			
No. of serum samples	40	40	40
Positive samples No. (%)	4 (10.0%)	4 (10.0%)	5 (12.5%)

RBPT, Rose bengal plate test; SAT, Serum agglutination test; C-ELISA, competitive ELISA.

In our study we also considered the age of sampled camels, and of 60 sera samples, camels falling under the age of 9 years were more prone to the disease (28.33%), while on the other hand, camels aging more than 10 years (40 sera samples) were less prone (10%) to brucellosis. We think that camels that were less than 9 years lacking/ or have lesser immunity, and this is not consistent with other studies, as this disease commonly persists in sexually mature camels (Radostitis *et al.*, 1994; Walker, 1999).

We also collected the milk samples in order to detect the *Brucella* antibodies and the MRT was performed accordingly, for 50 milk samples. Interestingly, none of milk samples were found positive, which is not in agreement with the study of Al-Khalaf and El-Khaladi (1989), as they found 2 out of 3 milk samples positive by performing the same test.

Factors that contribute to the high prevalence rate of brucellosis in camels may be linked with the management system of camels in the studied districts. The mixing of camels during the time of migration, at watering time and/ or in night enclosure can also play the transmission of the disease from infected animals to healthy ones.

Conclusion

The brucellosis is prevalent among the camels of study districts and the risk factors identified for individual animal seroprevalence included the sex and age. Hence, it is assumed that the disease likely spreads to unaffected camels and also the herds during the grazing and at watering points.

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Conflict of interest statement

We declare that we have no conflict of interest.

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