

Research Article

Assessments of Prevalence of Brucellosis in Camels Through the Contrast of Serological Assessments in South Punjab, Pakistan

Mahnoor Khan Jamali¹, Adnan Yousaf^{2,*}, Inayatullah Sarki², Abdullah Babar², Sadia Nusrat Sharna³

¹Faculty of Veterinary Sciences, University of Veterinary and Animal Sciences, Lahore, Pakistan

²Faculty of Animals Husbandry and Veterinary Science, Sindh Agriculture University, Tandojam, Sindh, Pakistan

³Department of Fisheries Biology & Genetics, Bangladesh Agricultural University, Mymensingh, Bangladesh

Email address:

dr.adnan011@gmail.com (A. Yousaf)

*Corresponding author

To cite this article:

Mahnoor Khan Jamali, Adnan Yousaf, Inayatullah Sarki, Abdullah Babar, Sadia Nusrat Sharna. Assessments of Prevalence of Brucellosis in Camels Through the Contrast of Serological Assessments in South Punjab, Pakistan. *American Journal of Zoology*. Vol. 4, No. 4, 2021, pp. 65-68. doi: 10.11648/j.ajz.20210404.14

Received: September 2, 2021; **Accepted:** September 22, 2021; **Published:** November 5, 2021

Abstract: A study was done to investigate the incidence of *Brucella abortus* in Camels in different districts of South Punjab. Brucellosis is a disease that affects a variety of animals, including humans, and it is more severe in humans than in animals. Because of its zoonotic nature, it poses a significant threat to human health. In this study, we tested $n = 170$ sera samples and $n = 60$ milk samples from camels in four districts of Pakistan's South Punjab province. Different diagnostic test was used to investigate the efficacy of detecting *Brucella* in the blood of infected animals after serum samples were proven to be positive for *B. abortus* by serology. Serological techniques such as the c-ELISA, Serum Agglutination Test, and Rose Bengal Plate Test were used to diagnose *Brucella abortus*. The screening tests employed were the Rose Bengal Plate Test, serum agglutination test, and competitive-ELISA (c-ELISA), and the overall prevalence of brucellosis was found to be 18.24%, 18.24%, and 12.94%, respectively, by the RBPT, SAT, and c-ELISA tests. RBPT and SAT tests revealed that females 20% had a higher prevalence than males 16.47%. Antibodies to the infection were detected in milk samples, however none of the samples were determined to be brucellosis diagnostic. According to the findings, brucellosis is widespread among camels in the studied areas.

Keywords: Brucellosis, Camels, Zoonosis, South Punjab

1. Introduction

Brucellosis is a well-known disease produced by the genus *Brucella*, which affects a wide range of animal species, including humans [19]. Under typical circumstances, the causal agent is transmitted vertically or horizontally through close contact, such as sexual intercourse, secretions, and licking aborted fetuses [30]. Brucellosis is more severe in humans than in domestic animals, causing a variety of clinical symptoms similar to a debilitating chronic flu with illness [13, 26], while it causes abortion, infertility, and decreased milk production in animals [13, 26]. It has a large global impact on human health and animal output due to its zoonotic nature [25,

27]. According to studies, the highest risk of disease transmission is connected with indirect contact with animals (consumption of unpasteurized milk/dairy products) [7]. Sheep and goat items were found to be more dangerous than camel and cattle products, and the infection could also be transmitted by saving animals give birth. [8, 15]. Animals infested through *Brucella* spp. have remained known as a major cause of human infection [18]. Human brucellosis has also become more common in Middle Eastern and Central Asian nations, particularly in Syria, Saudi Arabia, Iraq, Iran, and Turkey, with yearly incidence rates of 160, 21, 28, 24, and 26 cases per 100,000 people at risk, respectively [10, 21]. The annual report of the WHO about more than 0.5 million human

cases for brucellosis reported. [12], making it the second most common zoonotic illness [21]. *Brucella abortus* was first discovered in Pakistani cattle and buffaloes a few years ago [4]. *Brucella melitensis* and *Brucella abortus* produce brucellosis in camels, and brucellosis in camels is difficult to identify due to the lack of clinical signs caused by these organisms [11]. In many desert places around the world, including Pakistan, camels are the primary source of meat and milk [3, 28]. The existing research study is to evaluate the incidence of brucellosis in South Punjab.

2. Materials and Method

In July, 2021, Layyah, DG Khan, Rajan Pur, and Muzaffargarh were chosen as the four main districts of South Punjab province to establish the prevalence of *Brucella* infections in camels and to investigate potential risk factors linked with positive. A total of n=170 blood samples were

obtained and maintained in the refrigerator overnight for serum separation, which was utilised for the Rose Bengal Plate Test (RBPT), serum agglutination test (SAT), and competitive-ELISA (c-ELISA) tests. A strong positive sample appeared clear and transparent in the latter test, while the negative sample appeared orange. According to Gabbar (1992), 60 milk samples from lactating female camels were used in the Milk Ring Test (MRT).

3. Results and Discussion

A total of n=170 serum samples were collected, 85 from males and females, and tested using RBPT, SAT, and c-ELISA; these tests revealed that 31, 31, and 22 sera were positive for brucellosis, respectively (Table 1). In DG Khan, the highest prevalence of brucellosis was discovered. The high frequency of brucellosis may be due to free mobility and grazing on open pastures, as well as close contact with infected cattle.

Table 1. *Brucellosis positive samples from blood samples of animals of different districts of South Punjab.*

District	Sample Exam	RBPT (%)	SAT (%)	c-ELISA (%)	Total Positive (%)
Layyah	45	7 (15.56)	7 (15.56)	4 (8.89)	18 (40.00)
DG Khan	38	9 (23.68)	9 (23.68)	5 (13.16)	23 (60.53)
Rajan Pur	42	7 (16.67)	7 (16.67)	6 (14.29)	20 (47.62)
Muzaffargarh	45	8 (17.78)	8 (17.78)	7 (15.56)	23 (51.11)
Total	170	31 (18.24)	31 (18.24)	22 (12.94)	84 (49.41)

Second, the afflicted animals do not receive sufficient treatment. We found a higher prevalence of brucellosis in camels in our current study, which contradicts the findings of other studies that indicated a lower prevalence 9.26% [9], but is consistent with the findings of other studies 11.42% [17, 20]. While there is a danger of false detection due to cross reactive with antibodies from other species of bacteria, RBPT and SAT obtained the maximum incidence of brucellosis in camels, whereas the c-ELISA is much more reliable than the two tests described. This variance in incidence might be associated with differences in symmetry, species, management, or season, or it could be due to a problem recording the finding during in the investigation. A cross-sectional research in Ethiopia found that the total prevalence of brucellosis was 11.9% by RBPT

and 7.6% by CFT (Complement Fixation Test), implying that camel brucellosis was common in Afar province districts. Regrettably, [24] discovered a low incidence of camel brucellosis in Ethiopia, so although our report revealed a higher incidence; even so, the incidence calculated in Muzaffargarh area camels utilizing different techniques is comparable to the incidence of brucellosis documented in two Ethiopian districts have used RBPT [5]. As a result, the prevalence results in four districts of South Punjab follow the same trend as those in Ethiopia [14]. By RBPT and SAT, brucellosis was detected in 20% of females and 16.47% of males; however, by c-ELISA, the prevalence of brucellosis was shown to be lower in males 11.76% and females 14.12% camels (Table 2).

Table 2. *Brucellosis positive samples from blood samples of animals of different gender of South Punjab.*

Sex	Sample Exam	RBPT (%)	SAT (%)	c-ELISA (%)	Total Positive (%)
Females	85	17 (20)	17 (20)	12 (14.12)	46 (54.12)
Males	85	14 (16.47)	14 (16.47)	10 (11.76)	38 (44.71)
Total	170	31 (18.24)	31 (18.24)	22 (12.94)	84 (49.41)

The prevalence of brucellosis in females was found to be greater than in males. It's possible that infection with *brucella* spp. occurs as a result of the cervix opening for more than a week during estrus. The prevalence of brucellosis was 54.12% in females and 44.71% in male, respectively. Females had a higher prevalence of brucellosis than male, implying that females are more susceptible to brucellosis than males. This is in line with the findings of [16], who discovered a greater

frequency of brucellosis 38.5% in adult females with a history of reproductive issues such as abortion, stillbirth, or retained fetal membrane. However, in the study of [6], no statistically significant difference was found; thus, their findings diverge from ours and those of [2, 17]. It reveals that camels older than 9 years old have a higher prevalence of brucellosis, whereas camels younger than 8 years old have a lower prevalence (Table 3).

Table 3. Brucellosis positive samples from blood samples of animals of different ages of South Punjab.

Age	Sample Exam	RBPT (%)	SAT (%)	c-ELISA (%)	Total Positive (%)
Below 8 years	105	19 (18.10)	17 (18.10)	13 (12.38)	51 (48.57)
Above 9 Years	65	12 (18.46)	12 (18.46)	9 (13.85)	33 (50.77)
Total	170	31 (18.24)	31 (18.24)	22 (12.94)	84 (49.41)

The higher prevalence of brucellosis in camels over the age of 9 years may be attributed to a lack of immunity [22]. RBPT stands for Rose Bengal Plate Test; SAT stands for Serum Agglutination Test; and c-ELISA stands for Competitive ELISA. In our study, we also looked at the age of the camels who were sampled, and found that camels above the age of 9 years were more susceptible to the disease 50.77%, whereas camels under the age of 8 years (105 sera samples) were less susceptible to brucellosis (Table 3). We believe that camels older than 9 years old are immune deficient, despite the fact that other research show that this condition remains in sexually mature camels [12]. In order to determine Brucella antibodies, milk samples also were taken, and MRT were conducted on 60 milk samples as a consequence. Surprisingly, none of the milk samples tested positive, in contradiction to [1] research, that reported two out of three milk samples positive using the same test [29]. The management system of camels in the examined districts may be one of the factors contributing to the high incidence rate of brucellosis in camels [23]. Mixing camels during migration, watering time, and/or in the night enclosure can all contribute to disease transfer from sick to healthy animals.

4. Conclusion

The camels in the study districts have brucellosis, and the sex and age of the animals were identified as risk factors for individual animal incidence. As a result, it's thought that the disease spreads among unaffected camels as well as herds during grazing and watering.

Conflict of Interest

The authors declare that they have no competing interests.

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