

# Prevalence of Brucellosis in Camels in Different Districts of Interior Sindh, Pakistan

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## ABSTRACT

Brucellosis affects a broad range of animal species, including humans, and is more severe in humans than in animals. This zoonotic disease poses a significant health burden. Our study involved testing 100 serum samples and 50 milk samples from camels across three districts of Sindh province, Pakistan. Screening tests—Rose Bengal Plate Test (RBPT), serum agglutination test (SAT), and competitive-ELISA (c-ELISA)—revealed an overall prevalence of brucellosis of 21%, 21%, and 13%, respectively. The prevalence was higher among females (26%) than males (16%) based on RBPT and SAT results, and also among camels younger than 9 years (13.33%). Despite testing, none of the milk samples showed positive results for brucellosis antibodies. In conclusion, our findings indicate that brucellosis is prevalent among camels in the studied areas of Sindh province.

**Keywords:** Brucellosis, Camels, Zoonosis, Sindh.

## INTRODUCTION

Brucellosis is a well-known disease affecting a wide range of animal species, including humans, and is caused by bacteria belonging to the genus *Brucella* [1]. The causative agent is typically transmitted vertically or horizontally through close contact such as sexual intercourse, contact with secretions, and by ingesting contaminated materials like aborted fetuses [2]. In humans, brucellosis manifests with clinical symptoms resembling a debilitating chronic flu-like illness, whereas in domestic animals it often leads to abortion, infertility, and reduced milk production [3].

Due to its zoonotic nature, brucellosis poses a significant global burden on both human health and animal productivity [2]. Studies indicate that the highest risk of transmission occurs through indirect contact with animals, particularly through the consumption of unpasteurized milk and dairy products [1]. Sheep and goats are identified as higher-risk species compared to camels and cattle. Additionally, assisting animals during parturition can facilitate disease transmission [4].

Ruminants infected with *Brucella* spp. are recognized as the primary

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source of human infection [5]. The prevalence of human brucellosis has notably increased in Middle Eastern and Central Asian countries, including Syria, Saudi Arabia, Iraq, Iran, and Turkey, with annual incidence rates ranging from 21 to 160 cases per 100,000 individuals [6].

According to the World Organization for Animal Health (OIE), brucellosis accounts for approximately 500,000 human cases annually, making it the second most important zoonotic disease [7]. Recent years have seen descriptions of *Brucella abortus* seroprevalence in cattle and buffaloes in Pakistan [8]. *Brucella melitensis* and *Brucella abortus* are responsible for brucellosis in camels, presenting challenges in diagnosis due to the limited clinical signs these organisms provoke [9].

Camels serve as vital sources of meat and milk in many desert regions worldwide, including Pakistan [7]. This study represents a cross-sectional survey on the seroprevalence of brucellosis in Sindh province, Pakistan.

## MATERIALS AND METHODS

### Ethical approval

This experiment was performed considering to all animal rights (Society for Protection and Care of Animals. Sindh Agriculture University Tandojam, Pakistan).

### Objective of the Study

The main objective of this study is to record the prevalence of brucellosis disease in camels in different districts of Sindh for which take the preventive steps to prevent the economic loss of farmers and GDP of the country.

### Selection of Sites

In 2024, three primary districts of Sindh province Thatta, Badin, and Tharparkar were selected to assess the seroprevalence of *Brucella* infections in camels and to identify associated risk factors.

### Collection of Sample

A total of n=100 blood samples were collected and refrigerated overnight to separate serum.

### Lab Analysis Protocol

Serum was subsequently used for the Rose Bengal Plate Test

(RBPT), serum agglutination test (SAT), and competitive-ELISA (c-ELISA) tests. In the c-ELISA test, strongly positive samples exhibited a clear transparent appearance, while negative samples appeared orange. Additionally, 50 milk samples obtained from lactating female camels were subjected to the Milk Ring Test (MRT).

## RESULTS AND DISCUSSION

A total of 100 serum samples, comprising 50 from males and 50 from females, were collected and examined using the Rose Bengal Plate Test (RBPT), Serum Agglutination Test (SAT), and competitive ELISA (c-ELISA). The tests identified 21, 21, and 13 positive cases of brucellosis, respectively. The highest prevalence of brucellosis was detected in Tharparkar across all serological tests [10]. This high prevalence may be attributed to the free movement and grazing of animals on open pastures, close contact with infected animals, and the lack of proper treatment for infected animals [11]. Our study found a higher prevalence of brucellosis in camels, which contrasts with another study reporting a lower prevalence of 9.26% but aligns with studies indicating an 11.42% prevalence [12]. RBPT and SAT detected the highest prevalence, although there is a risk of false positives due to cross-reactions with antibodies from other bacterial species [13]. Conversely, c-ELISA is considered more reliable than the other two tests [14]. The variation in prevalence may be due to factors such as parity, breed, management practices, seasonal variations, or potential issues in observation recording during the investigation.

A similar cross-sectional study conducted in Ethiopia recorded a brucellosis prevalence of 11.9% by RBPT and 7.6% by the Complement Fixation Test (CFT), concluding that camel brucellosis was widely distributed across the Afar province [15]. Although a lower prevalence was found in Ethiopia, our study's findings in the Badin district of Sindh showed a similar prevalence to that recorded in two Ethiopian districts via RBPT [16]. Thus, the prevalence results in the three districts of Sindh align with those demonstrated in Ethiopia [17].

The prevalence of brucellosis was detected in 26% of females and 16% of males using RBPT and SAT. However, lower prevalence rates of 10% in males and 16% in females were found using c-ELISA (Table 1).

**Table 1.** Brucellosis positive samples from blood samples of animals of different genders and age groups

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

The higher prevalence in females compared to males may be due to the increased risk of infection during estrus when the cervix remains open for more than a week [16]. Our findings align with a study reporting a higher prevalence of brucellosis (38.5%) in adult females with reproductive issues such as abortion, stillbirth, and retained fetal membrane [18]. However, another study found no statistically significant difference, contradicting our results [18].

Table 1 indicates a higher prevalence of brucellosis in camels under 9 years of age, while a lower prevalence was recorded in camels over 10 years of age. This higher prevalence in younger camels might be due to their lower immunity levels [19]. Our study considered the age of sampled camels, revealing that 28.33% of camels under 9 years were more prone to the disease, whereas only 10% of camels over 10 years were affected [12]. This finding is inconsistent with other studies suggesting that brucellosis commonly persists in sexually mature camels [6].

Additionally, we collected 50 milk samples to detect *Brucella* antibodies using the Milk Ring Test (MRT). None of the milk samples tested positive, which contradicts a study reporting 2 out of 3 milk samples positive using the same test [11]. Factors contributing to the high prevalence of brucellosis in camels may include the management systems in the studied districts [15]. The mixing of camels during migration, at watering points, and in night enclosures can facilitate disease transmission from infected to healthy animals [20,21].

## CONCLUSION

Brucellosis is prevalent among camels in the study districts, with sex and age identified as significant risk factors for individual animal prevalence. Therefore, it is assumed that the disease will likely spread to unaffected camels and herds during grazing and at watering points.

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#### CONFLICT OF INTERESTS

The authors declare that they have no conflict of interest with respect to this article's research, authorship, and/or publications.

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