SHORT COMMUNICATION

Seroprevalence of Brucellosis in Camels in Bikaner and nearby Villages in Thar Desert of Rajasthan

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Abstract

Brucellosis is a hideous illness of camels in India. It is caused by *Brucella melitensis* and *Brucella abortus*. The main symptoms of this disease in camels are hygroma and orchitis. Seroprevalence of Brucellosis was studied by RBPT and ELISA. A total of 177 blood samples were collected from camels, aged from 0.2 to 20 years (108 males and 69 females), from Thar Desert of Rajasthan (India). Overall prevalence rate of 8.47% (11/177) and 2.25% (4/177) was observed by RBPT and ELISA, respectively. Variable prevalence was observed age-wise as well as sex-wise. The highest prevalence was observed in the camel more than 12 years of age and the lowest in camels aged 8-12 years. ELISA results indicated prevalence of 3.22% (2/62) in the 5-8 years age group and 1.85 (1/54) in camels aged 8-12 years and over 12 years. This investigation highlights the presence of Brucellosis among camels in Bikaner and surrounding areas of Rajasthan, underlining its zoonotic potential and the associated public health risk for individuals exposed to infected animals, raw milk, or meat.

Key words: Bikaner, Brucellosis, Camel, ELISA, Prevalence, RBPT.

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Introduction

According to the FAO (2019), the worldwide camel population is about 35 million. As per the 20th Livestock Census, total camel population in India was 2.5 lakhs in 2019 with only Rajasthan having the highest number at about 213000 (Keelery, 2021). Camels are mostly reared by nomads in Africa and Asia for meat, fiber (hair and wool), milk, and transport. Its dung is used for fuel. In the arid areas of many developing countries of Asia and Africa, camel holds a key position as livestock for nomadic and rural populations. They contribute to food security, job creation, poverty alleviation, and economic diversification and are used for racing, transportation, and tourism. Brucellosis in camel is primarily caused by two human pathogens, *viz*., *Brucella melitensis* and *Brucella abortus* (Omer *et al.,* 2010; Chauhan *et al*. 2017). Humans can easily contract Brucellosis via camel milk or its byproducts (Dawood, 2008). Brucellosis is a significant but underappreciated illness of camels in India. Camel Brucellosis is an issue of growing concern in terms of public health. Little research has been done on the incidence of the disease in camels and the risk of Brucellosis at the camel-human interface in India's Thar Desert, hence, this study was planned and executed.

Materials and Methods

This study on camels was conducted at the Department of Veterinary Public Health and the Department of Microbiology and Biotechnology at the College of Veterinary and Animal Science, Bikaner, RAJUVAS (Rajasthan) following approval of the Animal Ethics Committee of the University (Approval no. 3062). The study employed the common serological techniques, *viz.,* Rose Bengal Plate Test (RBPT) and Enzyme Linked Immunosorbant Assay (ELISA) to identify Brucellosis in camels.

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Collection of Camel Blood Samples

A total of 177 blood samples were collected from camels, aged from 0.2 to 20 years (108 males and 69 females), from Bikaner (62 samples) and nearby villages (Gadwala 36 samples, Gadola 30 samples and Naurangdesar 49 samples). Some of these adult camels had signs suggestive of Brucellosis or had visible lesions such as hygroma and orchitis. All serum samples were preserved at -20°C.

The Rose Bengal Plate Test was conducted in accordance with the standard protocol described by Morgan (Morgan *et al*., 1978). The RBPT antigen used in the test was obtained from the Punjab Veterinary Vaccine Institute, Ludhiana, India. After 4 min, visible agglutination indicated a positive reaction, whereas the absence of clumping signified a negative result.

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ELISA was performed on camel serum to detect the presence of antibodies against *Brucella* organisms. The analysis was conducted with the AsurDx™ Brucella Antibodies Testing Kit (Biostone Animal Health, Inc., Dallas, USA) as per the manufacturer's instructions, which is designed to identify IgG antibodies specific to *Brucella melitensis* and *Brucella abortus*. Absorbance was recorded at a wavelength of 450 nm using a Multiskan Go Microplate reader (Thermo Scientific, USA).

The percent positivity (PP) for each sample was determined and expressed as a percentage relative to the average OD of the positive control, using the formula:

$$PP = \frac{\text{Optical density } OD_{450} \text{ of sample to be tested}}{\text{Mean optical density } OD_{450} \text{ of positive control}} \times 100$$

The data was analysed using an online statistical tool, MedCalc software.

Results and Discussion

The data presented in Table 1 reveals the prevalence of Brucellosis in camels as 8.47% by RBPT and 2.25% by ELISA. Shome *et al*. (2013) Chauhan *et al*. (2017) also recorded higher seroprevalence of camel Brucellosis by RBPT (8.9% and 11.64%) as compared to ELISA (4.9% and 4.54%) from Rajasthan and north Gujarat, respectively.

By RBPT method, age-wise prevalence was found to be higher in camels of more than 12 years of age as 13.33%, followed by camels of age group of 5-8 years (8.06%) and younger camels (6.25%). It was found to be least in camels aged between 8-12 years of age as 5.55%. By ELISA method age-wise prevalence was found to be higher in camels of age group 5-8 years (3.22%), followed by camels aged more than 12 years (2.22%) and the least in camels aged between 8-12 years of age (1.85%). It is noteworthy that by ELISA no brucellosis was found in animals of below 5 years of age. Adult camels aged 8 to 18 years appeared to be more prone to infection. The average age of infected females was 11.12 years, while for males it was 11.42 years.

Variable prevalence rates of camel Brucellosis have been reported by many workers. A lower prevalence rate of 3.8% was reported by Mathur and Bhargav (1979), whereas higher prevalence rate from 16.5 % to 32.5 % has been reported by others (Musa, 1995; Bitter, 2002; Dawood, 2008).

Table 1: Age wise prevalence of Brucellosis in camels by RBPT and ELISA

Age	Result		
	Total examined	RBPT Positive	ELISA Positive
<5 years	16	1 (6.25%)	0 (0%)
5-8 years	62	5 (8.06%)	2 (3.22%)
8-12 years	54	3 (5.55%)	1 (1.85%)
>12 years	45	6 (13.33%)	1 (2.22%)
Total	**177**	**15 (8.47%)**	**4 (2.25%)**

Sex-wise, higher prevalence of Brucellosis was observed in female (11.59%) as compared to males (6.48%) by RBPT. Females also showed higher rate of Brucellosis by ELISA that was found to be 4.34% as compared to 0.92% in males. These findings concurred with those of Chauhan *et al.* (2017) from Gujarat.

Table 2: Sex wise prevalence of Brucellosis in camels by RBPT and ELISA in camels

Sex	Total Examined	RBPT Positive	ELISA Positive
Male	108	7 (6.48%)	1 (0.92%)
Female	69	8 (11.59%)	3 (4.34 %)
Total	**177**	**15 (8.47%)**	**4 (2.25 %)**

Location-wise by RBPT, the overall seroprevalence of 12.90% was recorded in Bikaner. This was followed by village Gadwala (8.33%), Naurangdesar (6.12%) and Gadola (3.33%). The distribution of positive cases by ELISA across locations showed a prevalence of 1.61% in Bikaner and 6.12% in Naurangdesar, while no positive case was recorded from camels of Gadwala and Godala.

Although various diagnostic techniques have been developed to detect Brucellosis in both camels and humans, only RBPT (Rose Bengal Plate Test) and CFT (Complement Fixation Test) are officially recognized by the European Union for animal trade within the community (Council Directive 91/68/EEC). Due to its simplicity and rapid results, RBPT is widely used as an initial screening tool. The RBPT serves as a quick diagnostic method, but it can produce false-negative results, particularly in long-term infections (Hosein *et al*., 2016). Despite its high sensitivity, the test sometimes lacks specificity, which can affect its overall dependability (Barroso *et al*., 2002). False positives may also occur because of immune cross-reactions or previous vaccinations with the S19 strain (OIE, 2009). Taking ELISA as the reference standard, the RBPT demonstrated a sensitivity of 100% and specificity of 93.21%. The positive predictive value (PPV) was calculated at 26.67%, while the negative predictive value (NPV) was 100%.

The I-ELISA has been found in earlier studies to have a sensitivity of 84.09% and specificity of 85.38%, respectively (Sanaei *et al*., 2012). RBPT had a low positive predictive value of 15.62% and a high negative predictive value of 96.77%. RBPT had the highest positive likelihood ratio of 28.50 and the highest negative likelihood ratio of 0.51. It is concluded that one single sero-diagnostic test may not be reliable and to get a more accurate diagnosis, a combination of RBPT and ELISA may be recommended.

The study concludes that in camels in and around Bikaner region of Rajasthan, the overall prevalence of Brucellosis is 8.47% by RBPT and 2.25% by ELISA. The findings suggest that prevalence of Brucellosis in camels is a serious public health concern in the region studied.

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References

Barroso, G.P., Pelayo, R.C., & Extremera, G. (2002). Study of 1595 Brucellosis cases in the Almeria province based on epidemiological data from disease reporting. *Revista Clinica Espanola, 202*(11), 577-582.

Bitter, H. (2002). Disease resistance in dromedaries with particular reference to *Trypanosoma evansi* infection. *Dissertation*. University of Hanover, Germany, p. 105.

Chauhan, H.C., Patel, K.B., Patel, S.I., Patel, B.K., Chandel, B.S., Bhagat, A.G., & Shome, R. (2017). Serological survey of Brucellosis in camel of Gujarat. *International Journal of Current Microbiology and Applied Sciences, 6*(4), 1815-1821.

Dawood, H.A. (2008). Brucellosis in camels (*Camelus dromedorius*) in the South Province of Jordan. *Journal of Agriculture and Biological Science*, *3*(3), 623-626.

FAO (2019). Dairy Production and Products: Camels. FAO, 2019, 1-10. Retrieved from. www.fao.org/dairy-production-products/production/dairy-animals/camels/en/.2019.

Hosein, H.I., Rouby, S., Menshawy, A., & Ghazy, N. (2016). Seroprevalence of camel Brucellosis and molecular characterization of *Brucella melitensis* recovered from dromedary camels in Egypt. *Research Journal for Veterinary Practitioners, 4*(1), 17-24.

Keelery, S. (2021). Indian states with the highest number of camels in 2019. Retrieved from https://www.statista.com/statistics/1078163/camel-inventory-by-state-india/

Mathur, K.N., & Bhargava, S.C. (1979). Sero-prevalence of Q fever and Brucellosis in camels of Jorbeer and Bikaner, Rajasthan State. *Indian Journal of Medical Research, 70*(11), 391-393.

Morgan, W.J.B., Mackinnon, D.T., Gill, K.P.W., Gower, S.G.M., & Norris, P.I.W. (1978) *Brucellosis Diagnosis: Standard Laboratory Techniques*. 1st edn., England: Weybridge Press, p. 10-15.

Musa, M.T. (1995). Brucellosis in Darfur States: The magnitude of the problem and methods of diagnosis and control of the disease. *Dissertation.* University of Khartoum, Sudan, p. 83-96.

OIE (2009). *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals*. World Organization for Animal Health, Paris, France, 1(2), 10-11.

Omer, M.M., Musa, M.T., Bakhiet, M.R., & Perrett, L. (2010). Brucellosis in camels, cattle, and humans: Associations and evaluation of serological tests used for diagnosis of the disease in certain nomadic localities in Sudan. *Review of Science and Technology, 29*(3), 663-669.

Sanaei, D.A., Karimi, A., Javad, V., Shiva, F., Fallah, F., Alaei, M.R., Angoti, G., & Pournasiri, Z. (2012). ELISA cut-off point for the diagnosis of human Brucellosis: A comparison with serum agglutination test. *Iranian Journal of Medical Science, 37*(1), 9-14.

Shome, R., Gupta, V.K., Bhardwaj, B., Shome, B., Mohandoss, N., & Rahman, H.A. (2013). Report of seroprevalence of camel Brucellosis in India. *Journal of Camel Practice and Research, 20*(2), 183-186.