

## CURRENT POSITION OF BRUCELLA INFECTION AMONG THE HOSPITALIZED HUMAN POPULATION

Feroz Khan<sup>1</sup>, Sarmir Khan<sup>2</sup>, Rahmat Ali Khan<sup>3</sup>, Matiullah<sup>4</sup>, Shafiq ur Rehman<sup>1</sup>, Ihsan Ullah<sup>5</sup>

<sup>1</sup>Department of Zoology, University of Science and Technology, Bannu Pakistan, <sup>2</sup>Academy of Medical Sciences, Department of Reproductive Medicine, The First Affiliated Hospital of Zhengzhou University, Henan, China, <sup>3</sup>Department of Biotechnology University of Science and Technology Bannu Pakistan, <sup>4</sup>Department of Botany, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan, <sup>5</sup>Department of Botany, University of Science and Technology, Bannu Pakistan

### Correspondence:

Feroz Khan  
Department of Zoology,  
University of Science  
and Technology, Bannu  
Pakistan.

Email:  
[rahmatgul\\_81@yahoo.com](mailto:rahmatgul_81@yahoo.com)

DOI:  
10.38106/LMRJ.2024.6.3-  
06

Received: 23.03. 2024

Accepted: 21.08.2024

Published: 30.09.2024

### ABSTRACT

This study aimed to examine the incidence of Brucella infection among hospitalized patients. This study was conducted during February to August 2022 in District Headquarters Teaching Hospital (DHQTH) district Bannu, Pakistan. A 2mL of venous blood was collected from those individuals who visited the hospital with the complaint of joint inflammation and high grade fever. The Brucella infection was detected by Standard Plate Agglutination Test (SPAT) and Serum Tube Agglutination Test (STAT). A total of 150 samples were examined in the present study, 100 (66.66%) of them were found to be negative and 50(33.33%) to be positive for various bacterial infections. Among male positive patients 17 (56.66%) reported to have *B. melitensis* and 13 (43.33%) had *B. abortus* while in female patients 9 (45.00%), 11(55.00%) were positive of *B. melitensis* and *B. abortus* respectively. The study showed that prevalence of the disease appears to be more common in males as compared to female and age group between 41 to 50 years were more prone to the infection. In Pakistan, brucellosis continues to be a persistent and posing public health risk. Individuals who are exposed to brucellosis at work are more likely to develop infection; therefore all the exposed persons should get themselves screened.

**Key words:** Brucellosis, Gram negative bacteria, District Bannu, Health risk, Pakistan

### INTRODUCTION

Brucellosis is caused by gram-negative bacteria namely bacilli of Brucella genus, but their species are *Brucella canis*, *B. suis*, *B. melitensis* and *B. abortus* (1). There are seven species of Brucella bacteria; among these three species were unknown yet who infect the human, but these species like *B. ovis* causes disease in sheep, *B. neotomae* in rodents and *B. maries* in aquatic animals like dolphins and whales. The remaining four species such as *B. abortus*, *B. melitensis*, *B. suis* and *B. canis* are considered more infectious to the human life. The human species are also infecting the cattle's like goat, sheep, camels and buffalo etc (2). Human life is also infectious by the direct attachment with infected animals and their use of unboiling dairy products (3). It is simply transmitted from one person to other during sexual relations and blood or bone marrow transformation (4, 5). In humans the most common symptoms including weight loss, depression, sweating, weakness and chill etc. It infects some other organs like liver and spleen also and most common cases are orchitis and epididymitis (6). It is a zoonotic, which causes abortions in animals and humans (7, 8). Brucellosis is considered endemic that attack human in various regions of the world like America, Mediterranean and middle East respectively (9). In neurobrucellosis it is causes meningitis. The *B. melitensis* is destroyed the central nervous system of about five percent cases (10). The present study was aimed to diagnose the status of brucellosis among the hospitalized human population district Bannu.

---

## METHODS

### Study site description

The study was conducted in district Bannu, lies diagonally in between the 31.28° North latitude and 73.25° East longitudes. It is situated in the southern region with its borders contain Karak, Lakki Marwat districts and the North South Waziristan Agencies. The total area of district Bannu is 1,227 square kilometers, but the cultivated area is 74196 Hectors. The climate is warm in summer (48° C) and cooled in winter (6° C) season.

### Blood samples collection

The current study was conducted during February to August 2022 in District Headquarters Teaching Hospital (DHQTH) district Bannu for the assessment of Brucellosis in human's population. For this study those individuals were selected who visited to the hospital with the complaint of joint inflammation and high fever. 2mL of venous blood was taken in a sterile syringe from each patient and directly brought to the veterinary hospital district Bannu for further process.

### Serum plate agglutination test (SPAT)

On a glass slide 20 micro litter of serum was taken with micropipette to which a drop of each antigen, i.e., antigen for *B. abortus* and *B. melitensis* was added, the antigens and serum were mixed with tooth picks and then the slide was moved clockwise and anticlockwise, therefore, the antigens react properly with the serum then it was examined with the help of magnifier glass serum and antigens showing agglutination was considered as positive while the one having no agglutination was considered as negative.

### Statistical analysis

Data analysis using Statistical Package for Social Sciences (SPSS version 20.0) was used to analyze the collected data. A chi square test was employed to compare that the P value minimum level of significance when less than  $p \leq 0.05$ .

## RESULTS

A total of 150 samples were examined in the present study, 100 (66.66%) of them were found to be negative and 50(33.33%) to be positive for various bacterial infections. Out of the overall gender, 86 (57.33%) were reported as male and 64 (42.66%) were recorded as female. Of the males, 56 (65.11%) and 44 (68.75%) female were reported as negative. Among the positive of males 17 (56.66%) of *B. melitensis* and 13 (43.33%) of *B. abortus* were reported. In female, 9 (45.00%), 11(55.00%) of *B. melitensis* and *B. abortus* was recorded ( $p=0.162$ ).

Divided into five sets of ages (years), the 20-30 years had 35 total, of which 28 (80.00%) individuals were negative and 4(57.14%), 3(42.85%) were positive of *B. melitensis* and *B. abortus* respectively. There were 21 people in the 31–40 age group, 15(71.42%) were considered negative and 6(75.00) were *B. melitensis* and 2 (25.00%) of *B. abortus*. Of the 43, 19 individuals in the 41–50, 51–60 ages range, 9 (56.25%), 7 (43.75%), 5 (83.33%) and 1 (16.66%) were positive. >60 age group obtained 32 individuals with 7 (53.84%) and 6 (46.15%) were positive for both bacteria ( $p=0.61$ ). With regard to locality, rural area 21 (56.75%), 16 (43.24%) was more vulnerable to the both species of bacteria as compared to urban area ( $p = 0.017^*$ ). In terms of socioeconomic status (SES), there were 16 (88.88%), 2 (11.11%) more infected patients of both bacteria from the poor class with  $p < 0.001^*$ , respectively.

In terms of poor hygienic condition, patients have 19 (61.29%), 12 (38.70%) higher infection rates of both bacteria with a significant difference of  $p=0.04^*$ . Clinical characteristics showed that patients had high level of bodyache 10 (83.33%), 2 (16.66%), and headache 9 (75.00%), 3 (25.00%) for both infections with high significant  $p=< 0.0001^*$  shown in Table 1.

## DISCUSSION

A total of 150 samples were examined, among the positive of males 17 (56.66%) of *B. melitensis* and 13 (43.33%) of *B. abortus* were reported. In female, 9 (45.00%), 11(55.00%) of *B. melitensis* and *B. abortus* was recorded ( $p=0.162$ ).

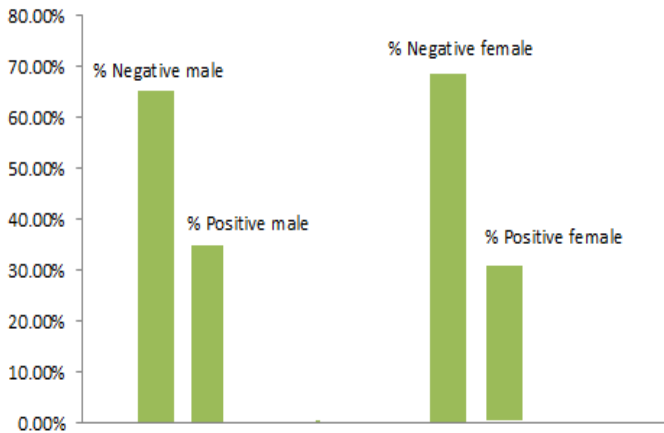
A study was conducted by the Din<sup>11</sup> total of 150 serum samples of human were collected randomly from District Bhimber Azad Jammu and Kashmir. Among these 4 (2.66%) blood samples of males were infected with *B. abortus* by SPAT while 7 (4.66%) blood samples of females were infected with *B. melitensis* by SPAT, the total prevalence of brucellosis was recorded 7.32% respectively. These results were higher from the present findings because of careless. Another study from Pakistan was conducted by the Riaz<sup>12</sup> recorded 5.33% prevalence in males, while in females were reported 9.33% by SPAT respectively, these results were also higher from the present research.

**Table 1: Incidence of current Brucella infection in human population**

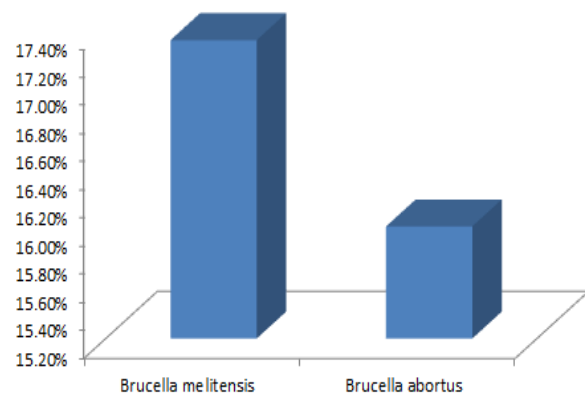
Variables	Category	Number	Negative	Positive		p-value
				<i>B. m</i>	<i>B. a</i>	
Gender	Male	86	56 (65.11%)	17 (56.66%)	13 (43.33%)	0.162
	Female	64	44 (68.75%)	9 (45.00%)	11(55.00%)	
Age (Years)	20-30	35	28 (80.00%)	4 (57.14%)	3 (42.85%)	0.61
	31-40	21	15 (71.42%)	6 (75.00%)	2 (25.00%)	
	41-50	43	27 (62.79%)	9 (56.25%)	7 (43.75%)	
	51-60	19	15 (78.94%)	5 (83.33%)	1 (16.66%)	
	>60	32	19 (59.37%)	7 (53.84%)	6 (46.15%)	
Socio-economic status (SES)	Poor class	65	47 (72.30%)	16 (88.88%)	2 (11.11%)	<0.001*
	Middle class	55	37 (67.27%)	11 (61.11%)	7 (38.88%)	
	Rich class	30	16 (53.33%)	9 (64.28%)	5 (35.71%)	
Locality	Rural	87	50 (57.47%)	21 (56.75%)	16 (43.24%)	0.017*
	Urban	63	50 (79.36%)	8 (61.53%)	5 (38.46%)	
Hygienic condition	Poor	79	48 (60.75%)	19 (61.29%)	12 (38.70%)	0.04*
	Good	71	52 (73.23%)	11 (57.89%)	8 (42.10%)	
Clinical Features	Fatigue	26	16 (61.53%)	3 (30.00%)	7 (70.00%)	< 0.0001*
	Bodyache	37	25 (67.56%)	10 (83.33%)	2 (16.66%)	
	Anorexia	23	19 (82.60%)	3 (75.00%)	1 (25.00%)	
	Headache	25	13 (52.00%)	9 (75.00%)	3 (25.00%)	
	Fever	21	14 (66.66%)	3 (42.85%)	4 (57.14%)	
	Sweating	18	13 (72.22%)	3 (60.00%)	2 (40.00%)	

*B. m*: *Brucella melitensis*; *B. a*: *Brucella abortus*.

The negative male patients were 56 (65.11%) and negative female patients were 44 (68.75%) respectively. The overall incidence of *B. melitensis* was 17.33% and *B. abortus* was 16.00% respectively shown in figure 1&2.



**Figure 1: Sex wise Brucella infection**



**Figure 2: Species wise Brucella infection**

The study was conducted by the Fevziye13 documented 3.7% brucellosis in females, 2.9% was in males respectively. The serological tests were done by the SPAT and findings were in agreement with the present study. A study was put forwarded by the (Junaidu14 reported the prevalence of *B. abortus* in human was 4.66%, while *B. melitensis* was recorded as 6.00% by SPAT respectively. Another study was put forwarded by the Azhar15 documented high

---

prevalence of human brucellosis by SPAT in district Swat Pakistan. The total prevalence of human brucellosis was recorded in different regions of the Libya; the regions were Yafran (40%), Jado (47%) and Yifrin (46%) respectively Ahmed (16). The prevalence of human brucellosis was documented by the Al Sekait<sup>17</sup> in Saudi Arabia different in different ranked people. For example the higher percentile value was documented in butchers (8.9%) and lower value was in administrative peoples (1.1%). The prevalence was also recorded in abattoir workers as 4.0% and veterinarians and veterinary assistants were 5.4% respectively. A study was conducted by the Ebrahimpour (18) reported the prevalence of brucellosis in males and females were 54.37% and 45.63% respectively. Another study was conducted by the Haji Abdolbaghy (19) on Khouzestan (Iran) nomads indicated reported that the prevalence of Brucellosis in males were 38.02% and in females were 61.98% respectively. A study was conducted by the Kadhum and AL-Khafaji<sup>20</sup> on Babylon province, Iraq reported the overall prevalence of brucellosis was 68.56%, among these *B. melitensis* and *B. abortus* were 143 (38.75%) and 110 (29.81%) respectively, in this study the females were more affected than males.

## CONCLUSION

The study showed that prevalence of the disease is more in male as compared to female and age group 41-50 years were more prone to the infection. In Pakistan, brucellosis continues to be a persistent and difficult health risk. People who are exposed to brucellosis at work are more likely to have it; therefore they should take precautions like routine screening. It is imperative to update and standardize the current serological instruments and surveillance systems, particularly in light of the harsh strains of *Brucella*. Regulations pertaining to food safety and consumer education must to be reinforced. Ultimately, the human health sector must enhance brucellosis diagnostic facilities, raise patient awareness, and treat brucellosis cases properly.

### Conflict of interest:

The authors declare no conflict of interest

### Ethical consideration:

The study was approved by local research ethics committee

## REFERENCES

1. Young E. *Brucella* species. In Principles and practice of infectious diseases. Edited by: Mandell, G., Bennet, JE, Dolin R. Philadelphia: Churchill-Livingstone 2000;2386-2393.
2. Khoudier RM. Map of cattle Brucellosis in some governorate of Egypt. Ph.D Thesis; Department of Microbiology, faculty of Medicine, Alexandria university 2004.
3. Mantur BG, Amarnath SK, Shinde RS. 2007. Review of clinical and laboratory features of human brucellosis. *Ind J Med Microbiol* 2007;25(3):188-202.
4. Mantur BG, Mangalgi SS, Mulimani B. 1996. Brucellosis melitensis- a sexually transmitted agent. *Lancet* 1996;347:1763.
5. Mesner O, Riesenberk K, Biliar N, Borstein E, Bouhnik L, Peled L, Yagupsky P. 2007. The many faces of human-to-human transmission of brucellosis: congenital infection and outbreak of nosocomial disease related to an unrecognized clinical case. *Clin Infect* 2007;45(12):135-40.
6. Chin J. Control of Communicable Diseases Manual. 17 edition. Washington: American Public Health Association 2000;624.
7. Boschioli ML, Foulongne VO, Callaghan D. Brucellosis: Worldwide zoonosis. *Curr Opin Microbiol* 2001;4(1):58-64.
8. Cobrel MJ. Food and Agriculture organization of the United Nations, World health organization, World organization for animal health. Brucellosis in humans and animals 2006;4-9.
9. Nemanqani D, Yaqoob N, Khoja H. 2009. Breast brucellosis in Taif, Saudi Arabia: cluster of six cases with emphasis on FNA evaluation. *J Infect Dev Cties* 2009;3(4):255-9.
10. Kochar, DK, Kumawat BL, Agarwal N, Shubhakaran N, Aseri S, Sharma BV. Meningoencephalitis in brucellosis. *Neurol India* 2000;48:170-3.

- 
11. Din AMU, Khan SA, Ahmad I, Rind R, Hussain T, Shahid M, Ahmad S. A study on the seroprevalence of Brucellosis Human and Goat populations of District Bhimber, Azad Jammu and Kashmir. *J. Animal and plant Sci* 2013; 23(1):113-118.
  12. Riaz R. Seroprevalence of brucellosis in human and goats' population of North Waziristan Agency Pakistan. M. Sc Thesis, Hazara University, Abbotabad 2006.
  13. Fevziye CM, Nacer, Koc AN, Selma G, Lay T. Prevalence of brucellosis in the rural areas Kayseri, Central Anatolia, Turkey. *Turk J. Med. Sci* 2005;(35):121-126.
  14. Junaidu AUA, Daneji I, Salihu MD, Magaji AA, Tambuwal FM. Seroprevalence of brucellosis in Goat in Sokoto, Nigeria. *Current Research J. of Biol. Sci* 2013;2(4):275-277.
  15. Azhar KM, Rabbani K, Muhammad A, Maqbool MZ, Shabbir. Seroprevalence of brucellosis in buffalo and human in Swat Valley, NWFP, Pakistan. *Pak. J. Zool* 2009;(9):111-114.
  16. Ahmed MO, Elmeshri SE, Abuzweda AR, Blauo M, Abouzeed YM, Ibrahim A, Salem H, Abid S, Elfaham A, Elrais A. Seroprevalence of brucellosis in animals and human population in the wesern mountain region in Libya. *Research Article* 2010;1-3.
  17. Al Sekait MA. Prevalence of brucellosis among abattoir workers in Saudi Arabia. *J.R.Soc. Health* 1993;113:230-233.
  18. Ebrahimpour SMR, Youssefi, Karimi N, Kaighobadi M, Tabaripour R. The prevalence of human Brucellosis in Mazandaran province, Iran. *Af. J. Microbiol Rese* 2012;6(19):4090-4094. Available online at <http://www.academicjournals.org/AJMR>. ISSN 1996-0808.
  19. Haji Abdolbaghy M, Nejad MR, Zadeh MRZ. The epidemiologic, clinical, diagnostic and treatment Investigation of 5.5 percent of people infected with Brucellosis, *Med. Univ. J* 2000;12(4):34- 46.
  20. Kadhum TJ, AL-Khafaji. Brucellosis among human populations in AL-Musaib district, Babylon province/Iraq AL-Mustansiryia Sc.J 2003;14.