

## ORIGINAL RESEARCH

### **Seroprevalence of Brucellosis Among Patient of Pyrexia of Unknown Origin at Tertiary Care Center of North-West Zone of Rajasthan**

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#### **ABSTRACT**

**Introduction:**Brucellosis, which is an important public health problem, is a zoonotic disease seen all over the world.

**Aim:** To detect the magnitude of problem of Brucellosis in this arid zone of Rajasthan.

**Methods:** This study was carried out on a total of 522 samples of suspected clinical cases between June 2019 to December 2019, at department of Microbiology, S.P Medical College, Bikaner. Serodiagnosis of brucella was done using serological tests and clinical findings.

**Results:** A total of 522 samples were screened and seroprevalence of Brucellosis was found 22.60%, maximum were in age group 0-15 year (39.83%), males (53.38%), rural (67.79%), animal owners (47.7%) followed by dairy farmers (22%) and minimum in butchers (0.84%). Most common clinical feature present was fever followed by headache and back pain.

**Conclusion:** Our study shows the high seroprevalence because agriculture activities, cattle rearing, and dairy farming were the main occupation in area of study.

**Keywords:** Brucella, Sociodemography, Seropositive.

#### **INTRODUCTION**

Brucellosis is an anthroozoonosis of both public health and economic significance in most developing countries (WHO 2006).<sup>1</sup> According to OIE (Office International Des Epizooties), it is second most important zoonotic disease in the world after rabies causing extensive losses. *Brucella* has been listed by CDC as a possible bioterrorist agent.<sup>2</sup> (CDC, 2002).

It is known across the world by several names, Mediterranean fever, Malta fever, Gastric remittent fever, and Undulant fever. More than 500000 new cases are reported globally every year, and the annual incidence varies from  $\leq 2$  to 500/1,000000 populations in different geographical region.<sup>3</sup> The rising prevalence of Brucellosis has been attributed to increased international tourism and mass immigration from endemic countries. It is more prevalent in western part of Asia, India, Middle Eastern, Southern European and Latin American countries.<sup>4</sup> Although in India this zoonotic infection has been presumed to be endemic to

north Karnataka, it has been reported from only two centres, namely, Belgaum and Bijapur, consistently.<sup>5</sup>

*Brucella* is small, aerobic, non-fermenting, non-motile, non-capsulated, non-sporing, and facultative intracellular, gram negative coccobacillus.<sup>6</sup> The main species in human are *B. abortus* and *B. melitensi*, Brucellosis is caused mainly by *B. melitensis* (particularly biovar 3) and *B. abortus*.<sup>7</sup> The pathogenicity of *Brucella* varies according to its species; *B. melitensis* have the highest pathogenicity; *B. suis* have high pathogenicity; *B. abortus* and *B. canis* have moderate pathogenicity.<sup>8</sup>

Human Brucellosis is often misdiagnosed or under diagnosed due to overlapping clinical manifestation with many bacterial infections. Undulant fever, weight loss and night sweats are the major symptoms of Brucellosis in human. It is one of the causes of fever of prolonged duration in endemic areas and one of the important causes of pyrexia of unknown origin (PUO).<sup>9</sup> The other common clinical symptom includes weakness, scrotal swelling and pain, lethargy, joint pain, chills, headache, back pain and psychological symptoms.<sup>10</sup> Brucellosis is diagnosed either by isolation of *Brucella* organisms in culture or by a combination of serological test and clinical findings consistent of Brucellosis. Accurate diagnosis of Brucellosis is the key to control the spread of this disease.

As no enough study had been undertaken for seroprevalence of Brucellosis among patient of pyrexia of unknown origin in this arid zone of Rajasthan. Therefore, the present study is to be carried out to find the seroprevalence and comparison of efficacy of serological test for Brucellosis in PUO patients.

## AIM

To detect the magnitude of problem of Brucellosis in this arid zone of Rajasthan.

## METHOD

This study was carried out on a total of 522 samples of suspected clinical cases between June 2019 to December 2019, at department of Microbiology, S.P Medical College, Bikaner. Serodiagnosis of brucella was done using serological tests and clinical findings.

## INCLUSION CRITERIA

1. All patients with temperature higher than 38.3-degree Celsius.
2. Duration of fever more than 2 weeks.
3. Patient with history of joint pain.
4. History of contact with animal / infected animals of consumption of their raw products such as milk or cheese and aerosols inhalation from infected secretion or body fluid.
5. Cause of fever could not be diagnosed by the other laboratory test.

## EXCLUSION CRITERIA

1. All patients whom fever is not a predominant symptom or less than 38.3 degree Celsius.
2. Duration of fever less than two weeks.
3. Patients diagnosed other than Brucellosis.

Three to five ml of blood was collected from patient by veinpuncture, transferred into sterile tube and allowed to clot. The clotted blood sample was centrifuged at 3000 rpm for 5 min to obtain serum which was then collected in a separate tube. Enzyme linked immunosorbent assay (ELISA) was carried out by employing the technique as directed by The Calbiotech, Inc (CBI) Brucella IgM kit for a qualitative measurement of IgM antibody in serum of patient against Brucella. The data obtained from all these samples was then critically analyzed.

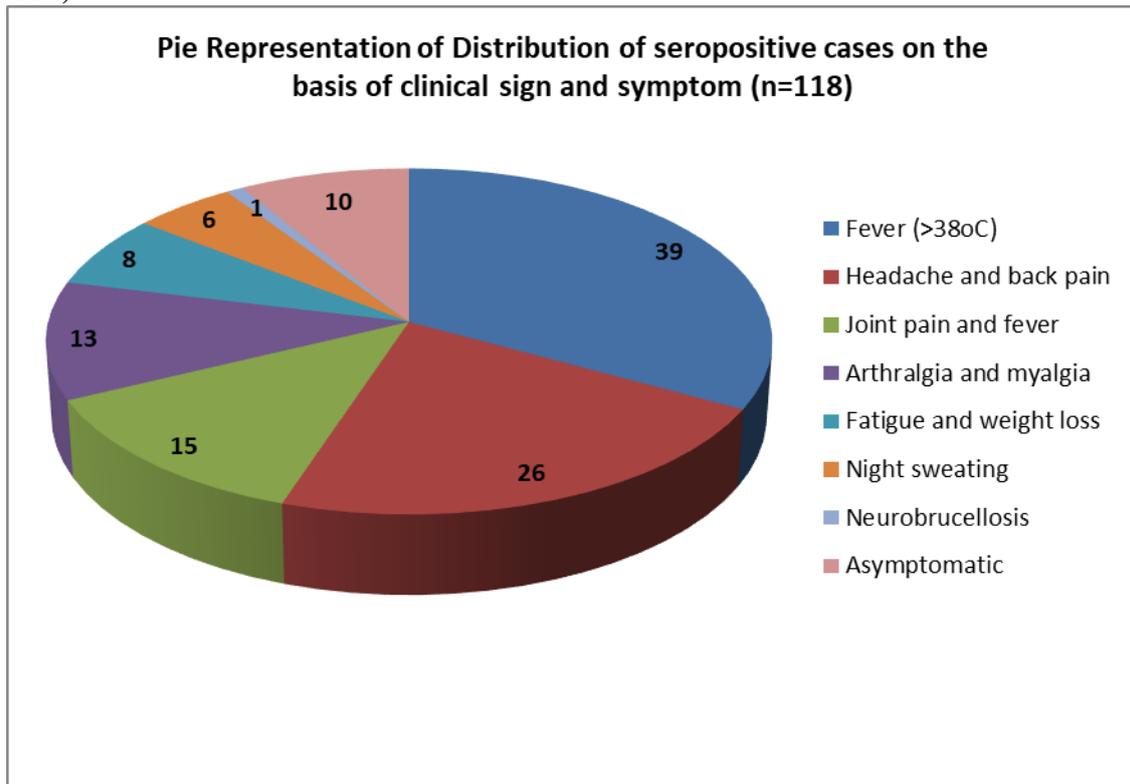
**RESULTS**

Out of 522 samples studied the seroprevalence was found to be 118 (22.60 %). the highest number of samples belong to pediatrics age group 0-15 year followed by age group 16-30 year, the number of positive samples were also found highest among age group 0-15 year, followed by 16-30, 31-45. Age-group difference is found to be not statically significant. ( $p > 0.05$ ). Majority of positive samples were from male 63 (53.38%) than females 55 (46.61%). The male female ratio being 1.14:1. Out of 118 cases found positive by serological tests maximum cases were of animal owners 54 (45.7 %), followed by dairy farmers 26 (22 %), household worker 15 (12.7 %), veterinarian 10 (8.47 %), animal handler 9 (7.62 %). 3 (2.54 %) of the positive cases were working as slaughter while only 1 (.84 %) case was working as butcher. the prevalence of brucellosis was significantly higher in rural 80 (67.79 %) as compared to urban population 38 (32.20 %). (table 1)

Out of 118 positive cases most common clinical feature presented was fever 39 (32.77%), followed by Headache and back pain 26 (21.84%), Joint pain & fever 15 (12.60%), Arthralgia & myalgia 13 (10.92 %), Fatigue and weight loss 8 (6.77%), Night sweating 6 (5.04 %) and, 1 (.84 %) case was clinically diagnosed as Neurobrucellosis. While 10 (8.40 %) cases were asymptomatic. (fig 1)

**Table1: Distribution of cases of brucellosis (n=118).**

Age wise	No. of sample (N = 522)	Positive (N= 118) No. %	P- value
0-15 Yr.	236	47 (39.83)	0.7153
16-30 Yr.	141	36 (30.50)	
31-45 Yr.	71	17 (14.40)	
46-60 Yr.	50	13 (11.01)	
61-75 Yr.	24	5 (4.23)	
<b>Sex</b>			
Male	276	63 (53.38)	0.999
Female	246	55 (46.61)	
<b>Occupation</b>			
Veterinarian	41	10 (8.47)	0.405
Butchers	11	1 (0.84)	
Slaughter	13	3 (2.54)	
Animal Owner	206	54 (45.7)	
Dairy farmer	133	26 (22.0)	
Household Worker	97	15 (12.7)	
Animal handler	23	9 (7.62)	
<b>Area</b>			
Rural	366	80(67.79)	0.701
Urban	156	38 (32.20)	

**Fig 1: Distribution of seropositive cases on the basis of clinical sign and symptom (n=118)**

## DISCUSSION

Brucellosis which is an important public health problem, is a zoonotic disease seen all over the world as well as in our country. Brucella disease is present in India, in both livestock as well as humans. Moreover >70 percent of Indian population is rural which is constantly exposed to the infected animals resulting in the continuous transmission of disease to humans (Park, 2009).<sup>11</sup> Therefore, the presence of disease in farmers, veterinarians and other occupationally exposed groups can never be questioned.

It is difficult to compare seroprevalence of Brucellosis in different studies as it varies from place to place and from time to time. The magnitude of problem differs from state to state in India. Even within the states in which prevalence is known, it differs from place to place. The diagnosis of brucellosis also depends upon the type of antigen, diagnostic techniques used, and on levels of antibody titers considered as diagnostic. Selection criteria of cases for laboratory investigation for brucellosis also play an important role in determining seroprevalence of brucellosis in a particular geographical area. The clinical findings and serological tests may play an important role in such circumstances. Serological tests measuring specific antibodies to Brucella lipopolysaccharide are of great importance in the initial diagnosis of the disease.

In the present study, a total of 522 samples were screened and seroprevalence of Brucellosis was found 22.60%. Which was lower than that of Bansal Y et al. (2019)<sup>12</sup> and Prakash et al. (2012)<sup>13</sup> their seroprevalence of Brucellosis was 33% and 25.72% respectively and higher than that reported by Mrunalini et al. (12%)<sup>14</sup>, Sharma et al. (9.96%)<sup>15</sup>, Appannanavar et al. (9.94%)<sup>16</sup> and Sen et al. (6.8%)<sup>17</sup>

Our study shows the high seroprevalence (22.60%). This could be because agriculture activities, cattle rearing and dairy farming were the main occupation of the cases included the study.

In the present study, maximum number of positive cases were found to be in the age group 0-15 year that was 47 (39.83%), followed by age group 16-30 year that was 36 (30.50%), age group 31-45 year that was 17 (14.40%), age group 46-60 year that was 13 (11.01%) and age group 61-75 year that was 5 (4.23%). Higher incidence in the age group of 0-14 year was also reported by Smita S et al. (26.4%).<sup>18</sup>In most of the studies, the maximum number of cases belong to the 20-30 year of the age group which could be due to their higher occupational exposure to animal rearing and management practice.

In our study the higher number of positive cases in the age group 0-15 years were detected because the higher number of samples were received from pediatric age group and probably due to the fairly weak and immature immune system which leave them vulnerable for infection.

In present study, the number of positive cases for Brucellosis were found to be higher in males 63 (53.38%) as compared to females 55 (46.62%). The male and female ratio being 1.14:1. Male-female ratio of our study correlates with Thakur S.D. et al. (2002)(2:1).<sup>19</sup>Other studies also reported higher incidence of Brucellosis in males than females these were by Sharma et al. (2016)<sup>15</sup> and Patil et al. (2019).<sup>20</sup>The higher incidence in males during the present study may be attributed to the fact that the majority of the males is exposed to animals compare to females due to their outdoor occupations.

Brucellosis is a disease more often seen in specific occupational groups like Veterinarian, Dairy Farmer, Slaughter, Butchers, and Animal Owners, etc.<sup>21</sup> The present study reveals higher seroprevalence of brucellosis among animal owners 54 (47.7%) followed by dairy farmers 26 (22%), household workers 15 (12.7%), veterinarians 10 (8.47%), animal handlers 9 (7.62%), slaughters 3 (2.5%) and butchers 1 (0.84%). The study conducted by Kochar et al. (2003)<sup>22</sup> in Bikaner over a period of 6 year also found majority of patients in their study were shepherds from rural area.

Other study by Aniyappanavaret al. (2013)<sup>16</sup> found seroprevalence among veterinarian (30.76%), butchers (9.76%) and animal owner (3.79%).

In the present study the most common clinical feature present was fever (33.77%) followed by headache and back pain (21.84%), joint pain and fever (12.60%), arthralgia and myalgia (10.92%), fatigue and weight loss (6.77%), night sweating (5.04%) and one case was of neurobrucellosis. While 10 (8.40%) cases were asymptomatic. These results are similar to the study done by Bansal et al. (2019)<sup>12</sup> and Prabhu P et al. (2011)<sup>13</sup> who has reported fever to be the most common symptom in patient with brucellosis. Our study results were similar to the study done by Moti et al. (2011)<sup>23</sup> they found most common clinical symptom was fever (10.4%) headache and back pain (11.6%), arthralgia and myalgia (11%), fatigue and weight loss (3.3%), night sweating (2.1%) and 28 (11.6%) case were found asymptomatic. Asymptomatic cases were from the family of infected person with history of animal contact.

Bansal et al. (2019)<sup>12</sup> and Patil et al. (2019)<sup>20</sup> found 2 (1%), 2 (2.7%) cases of clinical complication neurobrucellosis respectively.

In the present study, the seroprevalence of brucellosis was higher in rural population 80 (67.79%) as compared to the urban population 38 (32.20%). This can be associated with the more of human animal interaction in rural areas. Other study Hashemi et al. (2007)<sup>24</sup> similar to our study reported that 77.6% of patients from rural areas and 22.4% of patients from the urban area. In contrast to other study by Nourbakhsh et al. (2019)<sup>25</sup> found 54.8% cases were living in urban and 45.2% in the rural areas. While Haddadi et al.<sup>26</sup> reported 40.5% patient from rural and 59.5% patients from the urban areas.

**CONCLUSION**

Our study shows the high seroprevalence because agriculture activities, cattle rearing and dairy farming were the main occupation in area of study.

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