



ARTHRITIS IN BRUCELLOSIS: CLINICAL INSIGHTS FROM AN ENDEMIC REGION

Dr. Sweety Kakoti Consultant, Nephrology, Institute of Urology And Kidney Diseases, Guwahati

Dr. Himanish Goswami* DrNB PDT, Nephrology, Apollo Hospitals, Guwahati *Corresponding Author

Dr. Bikashita Mahanta Registrar, Paediatrics, Gauhati Medical College & Hospital, Guwahati

Prof. Sanjeeb Kakati Professor of Internal Medicine; Principal, Assam Medical College and Hospital, Dibrugarh

Prof. Reema Nath Professor of Microbiology; Vice-Principal, Assam Medical College and Hospital, Dibrugarh

ABSTRACT **Background:** Brucellosis is endemic in many regions, with osteoarticular complications posing significant clinical challenges. Brucella-related arthritis is frequently underdiagnosed due to its varied clinical presentation. This study aims to assess the prevalence of Brucella seropositivity in arthritis patients and characterize the clinical, radiological, and risk exposure patterns in a tertiary care centre in Northeast India. **Methods:** This cross-sectional study included 184 adult patients presenting with acute or chronic arthritis. Serological testing for Brucella antibodies was performed using ELISA. Patients were evaluated clinically and radiologically. Data on demographics, risk factors and clinical features were collected and statistically analysed. **Results:** Out of 184 patients, 46 (25%) were seropositive for Brucella of which 69.6% were acute, and oligoarthritis was the predominant joint involvement (68.8% of acute, 42.9% of chronic cases). Polyarthritis was more common in chronic arthritis (57.1%). Asymmetrical joint involvement was observed in 81.3% of acute cases and 78.6% of chronic cases, with an additive pattern of involvement being most frequent. Sacroiliac joint involvement affected 40.6% of acute and 35.7% of chronic cases. Radiologically, sacroiliitis was bilateral in 78.6% of chronic cases. 43.5% of seropositive patients raised livestock, and 65.2% unaware of milk pasteurization practices. **Conclusions:** Brucella-related arthritis is an underdiagnosed cause of arthritis in endemic regions, with significant implications for long-term joint health if not treated early. This study highlights the need for routine serological testing for Brucella in patients with unexplained arthritis, particularly those with livestock exposure or a history of consuming unpasteurized dairy products.

KEYWORDS : Brucellosis, Arthritis, Zoonosis, Brucella Arthritis

INTRODUCTION

Brucellosis is a zoonotic infection caused by various species of the genus *Brucella*, primarily transmitted to humans through direct or indirect contact with infected animals. In particular, the consumption of unpasteurized dairy products remains a significant mode of transmission in endemic regions. While brucellosis is classically known for its systemic manifestations, its osteoarticular complications, including arthritis, are of growing concern. Among the wide spectrum of brucellosis-related complications, arthritis is particularly relevant due to its potential to cause significant morbidity if not diagnosed early and managed appropriately.¹

In regions with a high burden of brucellosis, particularly rural areas where livestock rearing and consumption of unpasteurized dairy products are common, awareness of the infection as a differential diagnosis for arthritis is crucial. Despite its global relevance, the diagnosis of brucellosis-related arthritis is frequently delayed due to its protean clinical manifestations, mimicking other forms of inflammatory and non-inflammatory joint diseases. The serological diagnosis of brucellosis in patients presenting with arthritis offers an opportunity to institute appropriate antimicrobial therapy, which can mitigate joint damage and improve clinical outcomes.²

This study aims to assess the proportion of seropositive brucellosis cases in patients presenting with arthritis at a tertiary care center in Northeast India. The study also seeks to characterize the clinical and radiological features of brucellosis-related arthritis in comparison to seronegative cases. By enhancing our understanding of the burden and clinical profile of brucellosis-related arthritis, this research may contribute to more timely diagnoses and effective treatment strategies in endemic areas.

MATERIALS AND METHODS

This hospital-based, observational, cross-sectional study was conducted at the Department of Medicine, Assam Medical College and Hospital, Dibrugarh. The study aimed to evaluate the proportion of seropositivity for *Brucella* among patients presenting with arthritis and

to characterize the clinical features associated with brucellosis-related arthritis. The study was approved by the Institutional Ethics Committee (H) of Assam Medical College, Dibrugarh (No. AMC/EC/PG/2556), and written informed consent was obtained from all participants.

The study included 184 adult patients (≥ 18 years) with acute or chronic arthritis who presented to the Rheumatology OPD, other outpatient departments, or inpatient wards, excluding those with traumatic arthritis or who declined consent. Demographic data such as age, gender, occupation, and brucellosis risk factors were recorded. Clinical evaluation involved detailed history and physical examination, categorizing joint involvement by number, symmetry, and inflammatory status, along with noting systemic signs like fever, hepatosplenomegaly, and lymphadenopathy. Blood samples were tested for Brucella-specific IgM and IgG antibodies using ELISA, with seropositive cases identified by positive IgM and/or IgG results. Radiological investigations, including X-rays and MRI, assessed joint damage and conditions like osteomyelitis, spondylitis, and sacroiliitis. Statistical analysis involved presenting categorical variables as percentages, continuous variables as mean $\pm$ SD, and comparing seropositive and seronegative cases using chi-square and t-tests.

RESULTS AND OBSERVATIONS

Table 1 shows the demographic characteristics of the patients included in the study.

Table 1: Demographic Details			
Demographic Characteristics	Total Cases (n=184)	Seropositive Cases (n=46)	Seronegative Cases (n=138)
Seropositive	IgM	35 (19.02%)	
	IgG	8 (4.34%)	
	IgG + IgM	3 (1.63%)	
Seronegative	138 (75%)		
Age (in years)			
<20	4	1	3
20–29	33	6	27

30-39	56	11	45
40-49	51	17	34
50-59	28	6	22
60-69	9	3	6
≥70	3	2	1
Sex			
Male	76	15 (19.74%)	61 (80.26%)
Female	108	31 (28.70%)	77 (71.30%)

Seropositivity for Brucella: Out of the total 184 patients included in the study, 46 (25%) were found to be seropositive for Brucella antibodies, while the remaining 138 (75%) were seronegative. Among the seropositive cases, 35 (19.02%) had positive IgM antibodies, 8 (4.34%) tested positive for IgG antibodies, and 3 (1.63%) showed both IgM and IgG antibodies.

Brucella Arthritis patterns: Among 46 cases seropositive cases, the majority (69.6%) were in the acute phase (≤6 weeks). Of these, 32 patients (91.4%) were positive for IgM, while none had IgG or a combination of IgM and IgG. In contrast, among the 14 chronic cases (>6 weeks), 3 patients (8.6%) were positive for IgM, while 8 patients (100%) were positive for IgG, and 3 patients (100%) had both IgM and IgG. Chronic cases represented 30.4% of the total.

Joint Involvement Patterns Among Seropositive Patients are detailed in Table 2.

Table 2: Joint Involvement in Seropositive Cases

Category	Acute (n = 32)	Chronic (n = 14)	Total (n = 46)
Number of Joints Involved			
Monoarthritis	3 (9.4)	0 (0.0)	3 (6.5)
Oligoarthritis	22 (68.8)	6 (42.9)	28 (60.9)
Polyarthritis	7 (21.9)	8 (57.14)	15 (32.6)
Symmetry			
Symmetrical	6 (18.8)	3 (21.4)	9 (19.6)
Asymmetrical	26 (81.3)	11 (78.6)	37 (80.4)
Pattern of Joint Involvement			
Additive	28 (87.5)	11 (78.5)	39 (84.8)
Migratory	0 (0.0)	0 (0.0)	0 (0.0)
Intermittent	4 (12.5)	3 (21.5)	7 (15.2)
Joint Involved			
Sacroiliac Unilateral	13 (40.6)	5 (35.7)	18 (39.13)
Sacroiliac Bilateral	0 (0.0)	1 (7.1)	1 (2.17)
Knee	8 (25.0)	8 (57.1)	16 (34.8)
Hip	5 (15.6)	1 (7.1)	6 (13.04)
Ankle	8 (25.0)	3 (21.4)	11 (23.9)
Wrist	3 (9.3)	4 (28.6)	7 (15.2)
Elbow	8 (25.0)	2 (14.3)	10 (21.7)
Shoulder	4 (12.5)	2 (14.3)	6 (13.04)
Small Joint of Hands	3 (9.4)	4 (28.6)	7 (15.2)
Small Joints of Foot	3 (9.4)	0 (0.0)	3 (6.5)

Occupational profile revealed that 30.4% were farmers, 4.3% were milk handlers, and 56.5% were housewives and 8.7% fell into the "Others" category. Detailed breakdown on the risk exposure patterns is depicted in Table 3.

Table 3: Risk Exposure Patterns Among Seropositive Cases

	n = 46	Percentage
Occupational Profile		
Farmer	14	30.4
Milk Handler	2	4.3
Housewife	26	56.5
Veterinarian	0	0
Slaughterhouse Worker	0	0
Laboratory Worker	0	0
Others	4	8.7
Livestock Reared		
Cattle	20	43.5
Goat	4	8.7
Poultry	8	17.4
Pig	10	21.7
None	4	8.7
Dietary Habits		
Milk Consumers	46	100
Pasteurized Milk	9	19.5
Unpasteurized Milk	7	15.2

Pasteurization Unknown	30	65.2
Cheese Consumers	46	100
Yoghurt Consumers	46	100
Other Milk Products	46	100

In our study, we found the different clinicopathological and radiological Features of Seropositive cases to be different based on duration (acute/chronic) of the arthritis. (Table 4).

Table 4: Clinicopathological and Radiological Features of Seropositive Cases

	Acute (n=32)	Chronic (n=14)	Total(n=46)
Clinical Features			
Fever	12 (37.5%)	2 (14.28%)	14 (30.43%)
Fatigue/Weakness	20 (62.5%)	11 (78.57%)	31 (67.39%)
Myalgia	6 (18.75%)	0 (0.0)	6 (13.04%)
Low Backache	15 (46.87%)	4 (28.57%)	19 (41.3%)
Uveitis/Conjunctivitis	4 (12.5%)	0 (0.0)	4 (8.6%)
Loss of Weight	0 (0.0)	0 (0.0)	0 (0.0)
Constipation	0 (0.0)	1 (7.1%)	1 (2.1%)
Cough	4 (12.5%)	0 (0.0)	4 (8.6%)
Rash, Abdominal Pain, Diarrhoea	0 (0.0)	0 (0.0)	0 (0.0)
Haematological Parameters			
Total Count (<4)	0 (0.0)	0 (0.0)	0 (0.0)
(x109/l) (>11)	7 (21.8%)	0 (0.0)	7 (15.2%)
Lymphocytes (%) ≥45	7 (21.8%)	0 (0.0)	7 (15.2%)
Platelets (<100)	0 (0.0)	0 (0.0)	0 (0.0)
(x109/l) (>450)	0 (0.0)	6 (42.9%)	8 (17.4%)
Hemoglobin (g/dl) (≤10)	2 (6.3%)	3 (21.4%)	8 (17.4%)
Inflammatory Markers			
ESR (<20 mm/h)	5 (15.6%)	5 (35.7%)	12 (26.1%)
(20-50 mm/h)	7 (21.9%)	6 (42.9%)	26 (56.5%)
(>50 mm/h)	20 (62.5%)	12 (85.7%)	25 (54.3%)
CRP Normal	13 (40.6%)	2 (14.3%)	21 (45.6%)
Raised	31 (96.9%)	14 (100.0%)	45 (97.8%)
Others			
RA Factor Negative	1 (3.1%)	0 (0.0)	1 (2.2%)
Positive	31 (96.9%)	14 (100.0%)	45 (97.8%)
Uric Acid Normal	1 (3.1%)	0 (0.0)	1 (2.2%)
Raised	24 (75.0%)	13 (92.9%)	37 (80.4%)
LFT Normal	8 (25.0%)	1 (7.1%)	9 (19.6%)
Deranged	0 (0.0)	2 (14.3%)	2 (4.34%)
Radio-imaging			
Sacroilitis Unilateral	0 (0.0)	1 (7.1%)	1 (2.17%)
Bilateral	32 (100.0%)	11 (78.6%)	43 (93.5%)

Various forms of arthritis were diagnosed in patients positive for Brucella and our study findings indicate that Brucella seropositivity can be associated with multiple types of arthritis, including reactive arthritis, infectious arthritis, spondyloarthropathy, and even less common forms like rheumatoid arthritis, polyarticular gout, and ankylosing spondylitis (Table 5).

Table 5: Seropositivity in other forms of Arthritis

	IgM (n=35)	IgG (n=8)	IgM + IgG (n=3)	Total (n=46)
Reactive Arthritis	13 (37.1%)	0 (0.0%)	0 (0.0%)	13 (28.2%)
Infectious Arthritis	9 (25.7%)	0 (0.0%)	0 (0.0%)	9 (19.5%)
Undifferentiated Spondyloarthropathy	11 (31.4%)	6 (75.0%)	3 (100%)	20 (43.5%)
Ankylosing Spondylitis	0 (0.0%)	1 (12.5%)	0 (0.0%)	1 (2.2%)
Rheumatoid Arthritis	1 (2.9%)	0 (0.0%)	0 (0.0%)	1 (2.2%)
Polyarticular Gout	1 (2.9%)	0 (0.0%)	0 (0.0%)	1 (2.2%)
Seronegative Rheumatoid Arthritis	0 (0.0%)	1 (12.5%)	0 (0.0%)	1 (2.2%)

DISCUSSION

Our study is significant as it highlights the clinical patterns and joint involvement in Brucella seropositive arthritis, a condition often underdiagnosed in endemic areas. Understanding the patterns can

improve diagnostic accuracy and guide treatment decisions.

We found the most common age group among arthritis cases was 30-39 years (30.4%), followed by 40-49 years (27.7%). Among the 46 seropositive *Brucella* cases, the most common age group was 40-49 years (36.9%), followed by 30-39 years (23.9%). For seronegative cases, 81.82% were aged 20-29 years. Monther I. Khateeb et al. found 77.1% of brucellosis with arthritis cases were under 40 years of age, while Anindita Sen et al. reported most cases were in the 61–70-year range, and J. Rotes Querol et al. noted more frequent locomotor involvement in those over 50 years. 41.3% of arthritis patients in this study were male and 58.7% were female (1.4:1 ratio). Among seropositive cases, 67.4% were female, giving a female-to-male ratio of 2.1:1. Khateeb et al. reported a 2:1 male-to-female ratio, while Sen et al. observed a 2.4:1 male-to-female ratio for chronic arthritis. Rotes Querol et al. found osteo-articular signs in 89% of men and 67% of women.^{3,5}

The mean duration of chronic arthritis in this study was 23.14 ± 13.76 weeks, while acute arthritis had a mean duration of 2.71 ± 1.32 weeks. In the study by Monther I. Khateeb et al., 44% of brucellosis cases with arthritis had symptoms lasting more than 2 months, with 56% classified as acute, 25% subacute, and 19% chronic.³

We found that 60.9% of *Brucella* seropositive cases presented as oligoarthritis, while 32.6% presented as polyarthritis. Monoarthritis was only seen in 9.3% of acute cases, with no chronic cases showing this pattern. This aligns with Gotuzzo et al., who reported 38.8% of brucellosis cases presenting with peripheral arthritis, often as an asymmetric oligoarthritis.⁶

Most seropositive cases (84.8%) showed an additive pattern of joint involvement, with none exhibiting a migratory pattern. Asymmetry was common, with 81.3% of acute and 78.9% of chronic cases presenting asymmetrically, consistent with findings from Gotuzzo et al.⁶

The sacroiliac joint was the most commonly affected in 41.3% of cases, primarily unilaterally. The knee joint was the second most affected (34.8%), followed by the ankle (23.9%). This is similar to findings by Monther I. Khateeb et al., who found sacroiliac involvement in 26% of cases and knee involvement in 25%.³ Colmenero J.D. et al. also reported sacroiliitis in 45% of cases but we did not observe any cases of spondylitis, unlike their study which reported it in 58% of osteoarticular brucellosis cases.⁷ These results differ from Anindita Sen et al., where the hip joint was the most commonly involved (44.2%).⁴ This difference may reflect variations in study populations and diagnostic criteria.

We found that 56.6% of the seropositive arthritis patients were housewives, followed by 30.4% who were farmers. Milk handlers made up only 4.3%, and there were no cases among slaughterhouse workers, veterinarians, or laboratory workers. This is consistent with Anindita Sen et al., where farmers constituted the majority of seropositive cases (48 out of 86), followed by housewives (24). In terms of dietary habits, all seropositive and seronegative patients reported consuming milk or milk products, with 65.2% unaware of pasteurization status and 15.2% consuming unpasteurized milk. This mirrors findings by Monther I. Khateeb et al., who also noted unpasteurized milk as a common source of infection. Livestock exposure was common, with 91% of seropositive cases rearing livestock, primarily cattle (43.5%), and all cases reporting animal contact, similar to findings by Anindita Sen et al.. The majority of seropositive cases presented as undifferentiated spondyloarthropathy (43.5%), followed by reactive arthritis (28.2%) and infectious arthritis (19.5%).^{3,4}

Fatigue was the most common clinical feature among seropositive cases (67.39%), especially in chronic cases, followed by low backache (42.3%), predominantly seen in acute cases. Fever occurred in 30.43% of cases, mostly in the acute phase. This is lower than reported by Monther I. Khateeb et al., where fever (93%), fatigue (84%), and low backache (69%) were the most common features in acute cases.³

Lymphocytosis was observed in 15.2% of seropositive cases, all of which were acute arthritis, and 17.4% had hemoglobin levels <10 g/dl, mostly in chronic cases. No leukopenia, thrombocytosis, or thrombocytopenia was noted.

Regarding inflammatory markers, 82.6% had elevated ESR and 45.6%

had raised CRP levels. These findings align with Khateeb et al., who noted raised ESR in 81% of patients, but our CRP positivity was lower than their 55%, and Anindita Sen et al., who reported CRP positivity in 77 patients. RA factor was positive in 1 acute seropositive case, and 19.6% of patients had abnormal liver function tests, which is lower than the 32% reported by Khateeb et al.^{3,4}

Radiologically, sacroiliitis was seen in 6.5% of our cases, with 2 unilateral and 1 bilateral case. This contrasts with Khateeb et al., who found no major radiographic changes, but aligns with Colmenero J.D. et al., who reported axial site abnormalities in 72% of cases.^{3,7}

Our study, however, had some limitations. It was conducted in a single tertiary care hospital, which may limit the generalizability of the findings. The relatively small sample size of seropositive cases could have affected the statistical power of the study. The reliance on serological testing for *Brucella* may miss cases that present with low antibody titers or cases where there is cross-reactivity with other infections

CONCLUSION

Brucella remains a significant public health concern in regions with high livestock exposure and unpasteurized dairy consumption. Its potential to cause chronic, debilitating arthritis highlights the need for greater awareness in diagnosing joint diseases. This study sheds light on the clinical features of *Brucella*-related arthritis in an endemic region, emphasizing the importance of including *Brucella* serology in the evaluation of joint symptoms in high-risk areas. Early recognition can reduce delays in treatment, improve patient outcomes, and address the broader impact of zoonotic diseases on global health.

REFERENCES

1. Qureshi KA, Parvez A, Fahmy NA, Abdel Hady BH, Kumar S, Ganguly A, Atiya A, Elhassan GO, Alfady SO, Parkkila S, Aspatwar A. Brucellosis: epidemiology, pathogenesis, diagnosis and treatment-a comprehensive review. *Ann Med*. 2023;55(2):2295398
2. Wang, J., Zhang, Q. Early diagnosis and treatment of acute brucellosis knee arthritis complicated by acute osteomyelitis: two cases report. *BMC Infect Dis* 22, 430 (2022)
3. Khateeb MI, Lulu AR, Araj GF, Mustafa MY, Yusuf AR, Fenech FF. Human brucellosis in Kuwait: a prospective study of 400 cases. *Q J Med*. 1988; 66:39-54.
4. Sen A, Chakraborty U, Chatterjee D, Quila P, Banerjee P, Das S. Brucellosis presenting as chronic Arthritis: A study in eastern India with a review of Brucellar Arthritis. *European Journal of Biomedical and Pharmaceutical sciences*. 2017;8(4):538-43
5. Querol JR. Osteoarticular sites of Brucellosis. *Ann. rheum. Dis*. 1957;16: 63.
6. Gotuzzo E, Alarcón GS, Bocanegra TS, Carrillo C, Guerra JC, Rolando I, et al. Articular involvement in human brucellosis: A retrospective analysis of 304 cases. *Semin Arthritis Rheum*. 1982;12(2):245-55.
7. Colmenero JD, Reguera JM, Fernandez-Nebro A, Cabrera-Franquelo F. Osteoarticular complications of brucellosis. *Ann Rheum Dis*. 1991;50(1):23-6.