Case Series

Brucella abortus and *Brucella melitensis* infections in humans: a case series highlighting diagnostic and epidemiological profile

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ABSTRACT

Brucellosis is a major zoonotic infection caused by *Brucella* species, commonly acquired through contact with infected animals or ingestion of unpasteurized dairy products. Its varied clinical manifestations and nonspecific symptoms often delay diagnosis, complicating patient management. This case series describes the clinical, diagnostic, and epidemiological features of eight confirmed brucellosis cases from a tertiary care centre. Diagnosis was established using rose Bengal plate test (RBPT), serum agglutination test (SAT), enzyme-linked immunosorbent assay (ELISA) IgM antibody detection, and real-time PCR. Species identification was performed through conventional PCR targeting the IS711 gene, followed by Sanger sequencing. Clinical data, laboratory findings, risk factors, co-infections, and treatment outcomes were systematically documented. Of the eight cases, five were infected with *B. abortus* and three with *B. melitensis*. Joint pain was universal, with sacroiliitis in two patients and rheumatoid arthritis in another two. Most patients had normal haematological parameters, with mildly elevated inflammatory markers (CRP, ESR). Rural exposure, livestock contact, and consumption of animal products were the predominant risk factors in *B. abortus* cases. In contrast, *B. melitensis* cases occurred in urban residents with no direct animal exposure, suggesting foodborne transmission. Three patients presented with co-infections (Leptospira, dengue, malaria and salmonella), while two patients with underlying malignancies succumbed. All were treated with doxycycline and rifampicin for six weeks, as per WHO guidelines. This series emphasizes the persistence of brucellosis in rural India and the emergence of *B. melitensis* in urban settings. Early diagnosis, molecular species identification, and integrated one health interventions are critical to reducing disease burden.

Keywords: Brucellosis, *Brucella abortus*, *Brucella melitensis*, Zoonosis, Joint pain and sacroiliitis

INTRODUCTION

Brucella species are facultative intracellular pathogens that are small Gram-negative coccobacilli that cause the zoonotic disease brucellosis, which is quite common around the world.[1,2] Of these, *B. suis*, *B. melitensis*, and *B. abortus* pose the most frequent and serious risks to human health.[3] Mostly found in domestic animals, the disease is found in wildlife reservoirs as well as goats, sheep, cattle, and pigs.[4,5] Ingestion of *unpasteurized* dairy products; direct contact with infected animals (particularly after parturition); and inhalation of contaminated aerosols a risk in laboratory and abattoir settings-are the main ways that humans become infected.[6,7] Approximately 500,000 instances are predicted to occur globally each year. Brucella enters macrophages during pathogenesis and

endures in the system of mononuclear phagocytes, such as the liver, spleen, and bone marrow. It can take anywhere from one week to several months for the infection to incubate.[8,9]

Brucellosis's clinical features include a vague flu-like illness, frequently accompanied by intermittent or fluctuating fever, headache, exhaustion, sweating, migratory arthralgia or myalgia, which can occasionally develop into arthritis or sacroiliitis, hepatosplenomegaly, and uncommon side effects like endocarditis, neurobrucellosis, and abscesses.[4,7,10]

The diagnosis of brucellosis necessitates a combination of laboratory confirmation through culture/molecular approaches (PCR with IS711 target) or serology (e.g., ELISA, agglutination tests) and clinical suspicion, particularly in those with occupational or dietary concerns.[11,12] Doxycycline for at least six weeks and either rifampicin (600-900 mg daily) or an aminoglycoside (such as streptomycin/gentamicin) for the first one to two weeks are the best treatments for brucellosis.[13] Pasteurization of dairy products and livestock immunization (e. g., cattle *B. abortus* strain RB51/strain 19; goats/sheep *B. melitensis* Rev-1) are examples of preventive measures. Occupational precautions include wearing safety equipment and handling animals and tissues safely.[14,15]

CASE SERIES

Case 1

A 25-year-old female from a rural area was hospitalized with fever, headache, chills, myalgia, and joint pain, without signs of arthritis. C-reactive protein (CRP) was elevated, but erythrocyte sedimentation rate (ESR) remained within the normal range. Haemoglobin was slightly low, and white blood cell (WBC) count was normal. The diagnosis of brucellosis was confirmed through RBPT, SAT, ELISA IgM antibodies and real-time PCR. The patient was treated with doxycycline 100 mg twice daily and rifampicin 600 mg once daily for six weeks. Species identification via conventional PCR targeting the IS711 gene, followed by Sanger sequencing, revealed *B. melitensis* (GenBank accession number: OR514141). Travel was identified as a common risk factor. The patient was co-infected with Leptospira.

Case 2

A 19-year-old male from a rural area was hospitalized with fever, headache and joint pain, without signs of arthritis. Both CRP and ESR were within normal limits. Haemoglobin was slightly low, and WBC count was normal. Brucellosis was diagnosed based on RBPT, SAT, ELISA IgM antibodies and real-time PCR. Treatment involved doxycycline 100 mg twice daily and rifampicin 600 mg once daily for six weeks. Species identification through conventional PCR for the IS711 gene and Sanger sequencing confirmed *B. abortus* (GenBank accession

number: OR684951). Risk factors included contact with cows and consumption of animal products. The patient succumbed due to comorbidity with malignancy.

Case 3

A 31-year-old male residing in a rural area was hospitalized with fever, headache, chills, and joint pain, without signs of arthritis. CRP and ESR were within normal ranges; haemoglobin and WBC counts were normal. Brucellosis diagnosis was confirmed via RBPT, SAT, ELISA IgM antibodies and real-time PCR. The patient received doxycycline 100 mg twice daily and rifampicin 600 mg once daily for six weeks. Species identification using conventional PCR for the IS711 gene and Sanger sequencing revealed *B. abortus* (GenBank accession number: OR729010). Risk factors included contact with cows and buffaloes, as well as consumption of animal products. The patient died due to comorbidity with malignancy.

Case 4

A 42-year-old female from a rural area was hospitalized with fever, headache and joint pain, without signs of arthritis. CRP and ESR were within normal limits. Haemoglobin was slightly low, and WBC count was normal. Brucellosis was diagnosed through RBPT, SAT, ELISA IgM antibodies and real-time PCR. Treatment included doxycycline 100 mg twice daily and rifampicin 600 mg once daily for six weeks. Species identification via conventional PCR for the IS711 gene and Sanger sequencing confirmed *B. abortus* (GenBank accession number: OR729011). Risk factors involved contact with cows and buffaloes. The patient was co-infected with malaria.

Case 5

A 24-year-old female residing in a rural area was hospitalized with fever, joint pain and sacroiliitis arthritis. CRP was within normal limits, while ESR was elevated. Haemoglobin was slightly low, and WBC count was normal. Brucellosis was confirmed using RBPT, SAT, ELISA IgM antibodies and real-time PCR. The patient was treated with doxycycline 100 mg twice daily and rifampicin 600 mg once daily for six weeks. Species identification through conventional PCR for the IS711 gene and Sanger sequencing revealed *B. abortus* (GenBank accession number: OR729012). Risk factors included contact with cows and consumption of animal products. No co-infection was detected.

Case 6

A 50-year-old male from an urban area visited the outpatient department (OPD) with fever, myalgia and joint pain, presenting with sacroiliitis. CRP was elevated, while ESR remained within normal limits. Haemoglobin and WBC counts were normal. Brucellosis diagnosis was

established via RBPT, SAT, ELISA IgM antibodies and real-time PCR. The patient received doxycycline 100 mg twice daily and rifampicin 600 mg once daily for six weeks. Species identification using conventional PCR for the IS711 gene and Sanger sequencing confirmed *B. melitensis* (GenBank accession number: OR888712). No history of animal contact or consumption of animal products was reported. The patient was co-infected with Leptospira IgM.

Case 7

A 21-year-old female from an urban area was hospitalized with fever, joint pain and rheumatoid arthritis. CRP was elevated, and ESR was within normal limits. Haemoglobin and WBC counts were normal. Brucellosis was diagnosed through RBPT, SAT, ELISA IgM antibodies and real-time PCR. Treatment involved doxycycline 100 mg twice daily and rifampicin 600 mg once daily for six weeks. Species identification via conventional PCR for the IS711 gene and Sanger sequencing revealed *B. melitensis* (GenBank accession number: OR917985). No history of animal contact or consumption of animal products was noted. The patient was co-infected with dengue IgM and *Salmonella typhi* IgM.

Case 8

A 50-year-old female from a rural area visited the OPD with fever, joint pain and rheumatoid arthritis. CRP was within normal limits. Haemoglobin was slightly low, and WBC count was normal. Brucellosis diagnosis was confirmed using RBPT, SAT, ELISA IgM antibodies and real-time PCR. The patient was treated with doxycycline 100 mg twice daily and rifampicin 600 mg once daily for six weeks. Species identification through conventional PCR for the IS711 gene and Sanger sequencing confirmed *B. abortus* (GenBank accession number: OR917986). No history of animal contact or consumption of animal products was reported. No co-infection was detected.
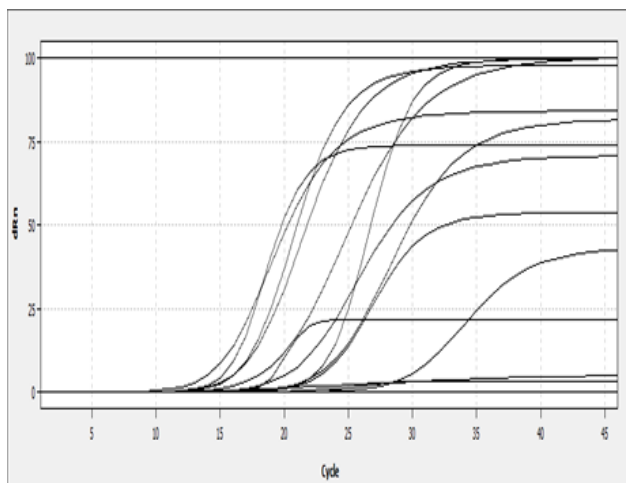

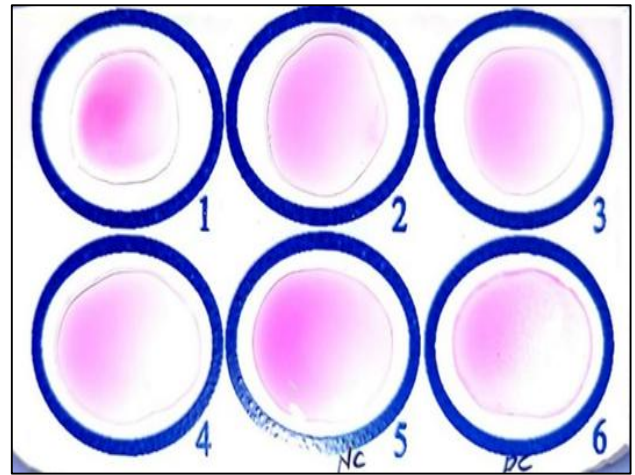**Figure 1: Multiplex RT PCR graph showing positive result for *Brucella* species.**

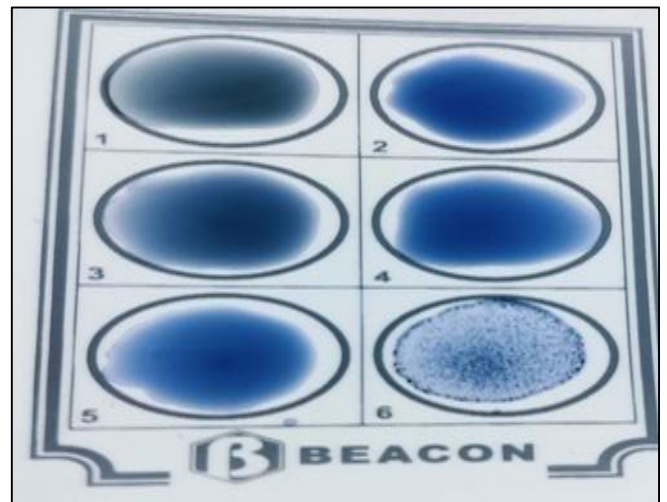**Figure 2: RBPT for *Brucella* species.**

Figure 3: Serum agglutination test for *B. abortus*.

DISCUSSION

Brucellosis is a zoonotic illness that can infect people who eat unpasteurized milk or milk products or who are exposed to tainted animal products. A considerable history of clinically suspected brucellosis cases was present in all the patients in our research who had either consumed unpasteurized milk products or had come into contact with animals.[16]

In our case series, all cases were having complain of joint pain. The clinical manifestation of brucellosis varies. Initially, the constitutional symptoms, which include fever with joints pain, chills, myalgias, headaches, and perspiration by using PCR ELISA IgM, RBPT and SAT the diagnosis of brucellosis was verified. A crucial diagnostic technique for brucellosis is laboratory testing. Total leukocyte count (TLC) and other laboratory parameters are found to be within normal limits in brucellosis, whereas inflammatory indicators like ESR and CRP show a little increase that is consistent with the current investigation.[17,18]

Treatment

WHO guidelines state that the treatment consists of streptomycin 1 g daily for 15 days and doxycycline 100 mg BD for 45 days. The alternate treatment consists of rifampicin at 15 mg/kg/day for 45 days and doxycycline at 100 mg BD for 45 days. The world health organization also recommends using gentamicin 5 mg/kg/daily for 7-10 days in place of streptomycin.[4]

In our study all the patients were treated with doxycycline 100 mg orally twice daily and rifampicin 600 mg IM once daily for six weeks. Follow up was not included in our study.

In this case series, we had two cases of rheumatoid arthritis, two case of sacroiliitis and four cases were with no arthritis.

CONCLUSION

Out of eight confirmed brucellosis cases, five were identified as *Brucella abortus* and three as *B. melitensis*. *B. abortus* is widespread in cattle-rearing regions and typically associated with contact exposures like livestock handling or consumption of unpasteurized dairy products.

In our study the majority of cases follow this pattern, with exposure documented in rural, animal-related contexts.

Although less frequent in our study, *B. melitensis* is globally recognized as the more virulent and transmissible species in humans, often causing more severe and acute infections.

The dominance of *B. abortus* aligns with the rural epidemiology and established zoonotic pathways in cattle regions.

The occurrence of *B. melitensis* even as a smaller proportion underscores a heightened risk of severe disease, especially where sheep or goat interactions or contaminated food sources are involved.

This dual presence supports a one health approach, aimed at controlling both species through livestock vaccination (e.g., cattle vaccinated against *B. abortus*, goats/sheep against *B. melitensis*) and promoting food safety practices such as milk pasteurization.

Early recognition of brucellosis signs such as fever, arthralgia, myalgia, and headache-and initiating prompt treatment can significantly reduce morbidity and prevent progression to chronic or life-threatening complications. Clinical data and guidelines consistently show that when brucellosis is diagnosed and managed early, treatment outcomes improve markedly, with markedly reduced risks of relapse, chronic arthritis, endocarditis, and rare mortality.

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