CASE REPORT

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Brucella melitensis in a couple in Jos, Plateau State

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Abstract

Human brucellosis commonly occurs through contact with infected animals, from working with livestock or consumption of unpasteurized dairy products. Although rare, human-to-human and possible sexual transmission of Brucella has been reported. In this report, we describe a case of a couple with likely contact and sexual transmissions of Brucella in Jos and Kafanchan, Nigeria. In February 2024, a couple (29-year-old female and a 35-year-old male) sought medical attention at the Jos University Teaching Hospital (JUTH), where they complained of recurrent abortions, all of which happened during the third trimester of pregnancy. The hospital then referred them to the National Veterinary Research Institute, Vom, Nigeria, to be screened for leptospirosis and brucellosis. The Rose-Bengal plate test (RBPT) revealed the presence of high levels of antibody, and the lateral flow assay test, performed as a second serology test to support the diagnosis, also revealed clear positive bands. PCR test revealed an amplified 78bp amplicon belonging to the genus Brucella. The result from the serological analysis, based on history, suggests a high probability of transmission via ingestion and subsequently transmission via sexual means from husband to wife. Although these events are rare, this report highlights the importance of improving clinical awareness. Animal products should be properly processed before consumption and livestock owners should take special precautions when handling animals or their abortive materials which include: proper gloving of hands and wearing of nose mask and thoroughly washing and disinfecting hands after handling. Further studies on brucellosis with semen/ vaginal swab cultures may help in assessing the true potential of sexual transmission in future cases.

Keywords: Clinical awareness, Human brucellosis, Recurrent abortions, Serology, Sexual transmission

Introduction

Human brucellosis is a highly infectious, contagious and zoonotic disease caused by members of the genus *Brucella* (Pinn-Woodcock *et al.,* 2023). It affect humans but primarily domestic animals and pets, posing serious human hazards worldwide. In humans, it often develops as a result of consuming unpasteurized, contaminated milk or soft cheese that has been infected with *Brucella* species (Islam *et al.,* 2023). Brucellosis affects the reproductive system, where it causes infertility, late abortion and impaired productivity (Islam *et al.,* 2023). Although transmission is commonly associated with contact with livestock (cattle, sheep, goats, and swine) and consumption of unpasteurized dairy products, human-to-human and possible sexual transmission of *Brucella* has been reported (Meltzer *et al.,* 2010; Tian *et al.,* 2017). In Nigeria, Kabiru *et al.* (2022) reported a national seroprevalence rate of 17.6% and 13.3% in humans and animals, respectively.

Most studies on *Brucella* in Nigeria have focused on animals, with limited reports involving humans. However, human brucellosis may be more prevalent because diagnosis relies on clinical evaluation supported by laboratory techniques such as blood culture, serological testing, and molecular methods (Moriyon *et al*., 2023).

In this report, we describe a case of probable sexual transmission of *Brucella* in a couple in Jos, Plateau State, Nigeria. This will add valuable information to existing knowledge on brucellosis and its potential transmission in humans.

Case Management

History and clinical manifestation

A couple (a 29-year-old female and a 35-year-old male), sought medical attention at the Jos University Teaching Hospital (JUTH), where they complained of recurrent abortions on three occasions, all of which happened during the third trimester of pregnancy. The hospital referred them to the National Veterinary Research Institute (NVRI), Vom, Plateau State, for leptospirosis and brucellosis.

History revealed the couple had no contact with animals nor had they recently consumed animal products. However, the male spouse lived with his elder brother in Kafanchan (57 miles to Jos) for about one year before he got married and moved to Jos. His brother`s wife had the same recurrent abortions. The brother reared a large number of goats, from which they got fresh milk and made cheese. History further revealed that the goats in his brother`s house also aborted, and his brother`s wife handled the aborted foetus and materials without protective wear. The presenting couple have been treating malaria and typhoid fever, and were on the treatment when they were referred.

Ethical statement

Ethical approval to publish this report was granted by the Jos University Teaching Hospital Health Research Ethics Committee with approval number JUTH/DCS/IREC/127/XXX/2859.

Sample collection

Blood was aseptically collected from the couple, and divided into two for serological analysis at the Bacterial Zoonoses Laboratory and PCR at the Biotechnology Division, both of the National Veterinary Research Institute, Vom, Nigeria. This test was repeated one month into the treatment.

Laboratory analysis

The *Brucella melitensis* antigen for the Rose Bengal Plate Test (RBPT) was obtained from the Animal Health Veterinary Laboratory Agency, Weybridge, United Kingdom, and was used. The Lateral Flow Assay (LFA) was also performed as a second serology test to support the diagnosis.

DNA was also extracted from the sample and used for PCR analysis following standard laboratory procedure (Alamian *et al*., 2017).

Results

The Rose-Bengal plate test (RBPT) revealed agglutination of the tested samples, indicating positivity to RBPT (Plate I). The lateral flow assay test revealed clear positive bands (Plate II) suggestive of brucellosis. The RBPT result one month into the treatment showed a reduction in areas of agglutinations (Plate III). Conventional PCR for *B. melitensis* produced an amplification product of 78 bp across both samples in lanes 1 & 2 (Plate IV).

Based on the history, symptoms and serological tests, a diagnosis of brucellosis was made.

Discussion

History revealed that the hospital kept treating the couple repeatedly for malaria and typhoid due to the persistent fever and musculoskeletal pain symptoms (arthralgia), which were the common symptoms, thereby misdiagnosing the case. This is usually the case as it has been well established that human brucellosis is often confused with malaria, typhoid, or other acute febrile illnesses in places where these

Plate I: RBPT result showing areas of agglutinations in Specimen B (Female spouse) indicate by blue arrows

Plate II: The lateral flow assay test showing clear positive bands

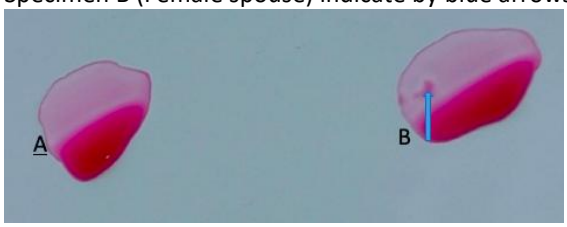

Plate III: RBPT result one month into the treatment with Specimen B (Female spouse) showing reduction in areas of agglutinations (blue arrow) and no agglutination in Specimen A (Male spouse)

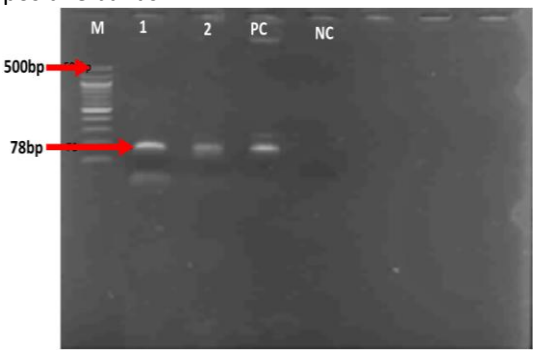

Plate IV: Conventional PCR for *B. melitensis.* The samples on agarose gel with an amplification product of 78 bp produced across both samples in Lanes 1&2. Lane M is the ladder, lane PC the positive control (known *B. melitensis* isolates) and lane NC- Negative Control (Distilled water). Lane 1= male & Lane 2= female

diseases are endemic due to the nonspecific signs and symptoms shared between these diseases (Moriyon *et al*., 2023). Moriyon *et al*. (2023) also reported misdiagnosis of human brucellosis in Tanzania. The couple had repeatedly treated malaria and typhoid after probably being exposed to the infection through the consumption of unpasteurized goat milk by the male spouse and probably sexually transmitting the same to his spouse. This reflects their limited awareness or neglect of preventive practices. This finding is consistent with the incubation period of the disease, which ranges from 5 days to 6 months and may disappear and then return several weeks or months later. Similar risks have been reported among farm workers, veterinarians, and herders who are exposed to handling livestock and consume unpasteurized products and are consequently at higher occupational risk (Tiwari *et al.,* 2022).

Although sexual transmission of brucellosis is uncommon, this study demonstrates its possible occurrence. The couple with recurrent fevers and repeated abortions, typically during the third trimester, despite the woman not having any direct contact with animals or animal products. The transmission pattern involves possibly ingestion of contaminated milk products by the male spouse while living with his brother in Kafanchan, where they reared goats and regularly consumed unpasteurized goat milk. This suggests that the male spouse acquired the infection and subsequently transmitted it sexually to his wife, after marriage, since she had no known exposure to animals or their products. An epidemiological link has been established between the couple and his brother. This report is similar to that of Meltzer *et al.* (2010), who also reported a case of *Brucella* infection via ingestion and subsequent transmission to a spouse sexually.

This hypothesis is further supported by the observation that the second couple from Kafanchan, who maintained close contact with goats and their products, experienced similar recurrent abortions and febrile episodes. These findings also align with the report of Tian *et al*. (2017), which documented sexual transmission of human brucellosis following exposure through contaminated animal products. Furthermore, history indicated that, aside from the male spouse in Jos who was probably exposed to infected materials and had sexual contact with his

spouse, no other family members exhibited clinical symptoms of brucellosis. This observation reinforces previous findings that although sporadic cases of nosocomial, congenital, and sexual transmission occur, brucellosis is generally not considered a human-to-human communicable disease (Pinn-Woodcock *et al.,* 2023). It is, however, not known if the members of the hospital where she was received and managed during the period, during which she had the abortions, have any clinical knowledge of the infection.

The couple from Jos experienced three abortions between the year 2022 and 2024. Information gathered from history revealed that the female couple from Jos experienced contractions and bleeding usually at the 5th-6th months of pregnancy for all three abortions, and was taken to a nearby hospital for management in all three instances. This finding is consistent with existing evidence that foetal death that occurred during at 20-24th week of gestation is considered to be a spontaneous abortion, which is one of the clinical signs associated with Brucellosis (Eyal *et al*., 2010). The relationship between human brucellosis and abortion, with a substantial proportion of pregnant women with active brucellosis experiencing pregnancy loss, is known (Eyal *et al*., 2010; Tian *et al*., 2017).

Following treatment with a six-month combination therapy of doxycycline, rifampin, and streptomycin, the couple from Jos responded positively; the wife later conceived and successfully delivered a child. This is consistent with the recommended regimen therapy of doxycycline for 45 days combined with streptomycin for 14 days (Mode *et al*., 2022). Antibiotic therapy typically results in clinical recovery; however, complete elimination of *Brucella* organisms is not always achieved (Mode *et al.,* 2022).

The Rose Bengal Plate Test (RBPT) used targets antigens specific to *B. melitensis*, while the Lateral Flow Assay (LFA) detects corresponding antigens and antibodies. Both are cost-effective, field-suitable diagnostic tools, with RBPT offering high specificity and LFA demonstrating high sensitivity. However, each test also has limitations. RBPT may yield false negatives, while LFA can produce false positives in certain circumstances. Consequently, the Polymerase Chain Reaction (PCR) was utilized to provide superior sensitivity and specificity. It is a relatively rapid and affordable diagnostic test with high sensitivity, reproducibility and technical ease (Tian *et al.,* 2017).

The rationale for using multiple tests for brucellosis diagnosis lies in improving diagnostic accuracy and reliability. No single test is fully sensitive or specific across all stages of infection. Serological tests such as the Rose Bengal Test (RBT) are useful for screening, while molecular assays like PCR detect *Brucella* DNA for definitive confirmation. Combining tests helps minimize false positives or negatives, distinguishes between active and past infections, and ensures better epidemiological interpretation of results. Our use of multiple diagnostic tests is due to the fact that there is potential for increasing diagnostic accuracy when several serological tests are combined in diagnostic algorithms.

Globally, under-reporting of brucellosis is a significant problem, especially in low- and middle-income nations with inadequate monitoring systems and because the disease has non-specific symptoms, like fever, malaise, and joint pain, which can be mistaken for typhoid or malaria, thereby enabling many cases to remain misdiagnosed (Moriyon *et al*., 2023). Inadequate diagnostic facilities and biosecurity issues when handling *Brucella* spp. further impede laboratory confirmation. This study underscores a major diagnostic challenge in endemic areas like Nigeria, where brucellosis often mimics common febrile illnesses such as malaria and typhoid (Moriyón *et al.,* 2023).

This study underscores a major diagnostic challenge in endemic areas like Nigeria, where brucellosis often mimics common febrile illnesses such as malaria and typhoid (Moriyón *et al*. 2023). The repeated misdiagnosis and mistreatment of the couple highlight the need for improved clinician awareness and inclusion of brucellosis in the differential diagnosis of persistent or recurrent fevers, arthralgia, and reproductive failure. Increased awareness among physicians and laboratory professionals can promote earlier diagnosis and prevent complications, including infertility and recurrent pregnancy loss. The findings reveal the continued public health relevance of brucellosis in Nigeria. The case demonstrates the zoonotic link between animal and human infections and the potential for indirect transmission even among individuals with no current livestock contact. This stresses the necessity of coordinated human-animal surveillance under the One Health framework, integrating veterinary and medical sectors for effective control and reporting. Although rare, this case provides supporting evidence for possible sexual transmission of *Brucella* in humans. The epidemiological link between the two couples (Jos and Kafanchan) and the exclusion of direct animal contact in one couple highlight a potential overlooked route of human-to-human transmission. This has implications for reproductive health counselling,

clinical screening of spouses, and guidance on preventive sexual practices among infected individuals. The study provides evidence-based justification for strengthening national brucellosis control policies. It calls for: Routine screening of at-risk populations such as animal handlers, abattoir workers, and livestock-owning families. Public health education promoting pasteurization of milk and safe handling of aborted animal materials. Integration of brucellosis testing into antenatal screening programs, particularly for women with unexplained pregnancy losses. The successful use of combined serological (RBPT and LFA) and molecular (PCR) tests illustrates the diagnostic value of using multiple complementary methods for accuracy. This finding encourages the development of diagnostic protocols in regional laboratories to ensure timely and reliable detection of brucellosis, particularly where culture facilities are limited. Furthermore, future studies incorporating semen, vaginal, or tissue cultures could clarify the mechanism and frequency of sexual transmission. Recurrent abortions and chronic illness associated with brucellosis not only affect individual health but also impose economic and emotional burdens on families. This reinforces the need for preventive programs that safeguard both human health and livestock productivity in rural communities dependent on animal husbandry.

Despite the findings generated from the study, there were some limitations

1. Absence of culture confirmation: The study relied primarily on serological (RBPT and LFA) and molecular (PCR) tests without bacterial culture, which remains the gold standard for definitive diagnosis of brucellosis. The slow-growing nature of the organism also contributed to the difficulty in isolation.
2. Incomplete epidemiological data: The inability to obtain full reproductive and exposure histories from all suspected contacts limited the tracing of the transmission pathway.
3. Lack of direct evidence for sexual transmission: While history and clinical patterns suggest sexual transmission, the study did not include semen or vaginal swab cultures or PCR testing to confirm the route of transmission.
4. Geographical and clinical scope limitation: The study was conducted in a single health facility and represents a localized case report, which may not reflect the broader epidemiological situation in Nigeria.

The following are therefore recommended:

1. State governments should organize public awareness and education programs targeting animal owners, professionals from the human counterparts and other at-risk groups on brucellosis.
2. Clinical signs compatible with brucellosis and not associated with other infections should serve as an indication for *Brucella* screening, as early and appropriate treatment is essential.
3. Animal handlers, including veterinarians, breeders and butchers, should observe strict hygiene practices such as wearing protective gloves and thoroughly washing and disinfecting their hands before and after handling animals to prevent infection.
4. Comprehensive thermal cooking of milk and dairy products before consumption should be done as a measure to reduce the risk of brucellosis

In conclusion, this report documents a probable case of sexual transmission of brucellosis between a couple as well as via ingestion. Although such occurrences are rare, it emphasizes the need for improved clinical vigilance. Clinical signs compatible with brucellosis and not associated with other infections should serve as an indication for *Brucella* screening. Early and appropriate treatment is essential. Ingestion as well as sexual transmission of brucellosis was the likely route of transmission in these cases, according to the case history.

Sexual transmission is common in animals but rarely reported in humans. It is not properly understood and poorly diagnosed in humans because it shares similar symptoms with common diseases like malaria and typhoid.

Conflict of Interest

The authors declare no conflict of interest.

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