

Case Study

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One Health Approach in Investigation of Human Brucellosis: A Case Report and its Investigation

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ABSTRACT

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Brucellosis is an important zoonotic disease, affecting high-risk occupational groups who are in close contact with animals. This report describes a young field veterinarian who suffered from high fever, night sweat, chills, myalgia, tremors, and distinct cervical lymphadenopathy. The laboratory test for tuberculosis and Human Immunodeficiency Virus (HIV) infection revealed negative. The individual was suspected of brucellosis due to his occupational thrust and endemicity of brucellosis in this region and tested positive by Rose Bengal Precipitation Test (RBPT) and Standard Agglutination Test (SAT). He was treated with doxycycline and rifampicin for 6 weeks and resolved from infection after treatment. Human brucellosis is the tip of the iceberg for animal brucellosis and to identify the source of infection, one health strategy was applied and identified the sheep which he was treating for dystocia as a source of infection. Further investigation revealed a higher prevalence of 21.42% among small ruminants in his working region by serological tests viz. RBPT, SAT, and I-ELISA. By this case report and investigation, we emphasize, Human brucellosis along with the high prevalence of animal brucellosis warrants an integrated approach in the prevention and control of brucellosis.

Introduction

Brucellosis is essentially a disease of animals, caused by bacterium of the genus *Brucella* with humans acting as an accidental host (Corbel, 2000). *Brucella* is a non-motile, non-encapsulated, facultative intracellular, Gram-negative coccobacillus. Among *Brucella* species, *B. melitensis* and *B. suis* are more virulent for humans than *B. abortus* and *B. canis* (Corbel, 2000; Mantur *et al.*, 2007; Acha *et al.*, 2011). The symptoms and clinical signs most commonly reported in humans are

fever, fatigue, malaise, chills, sweats, headaches, myalgia, arthralgia and weight loss (Mantur *et al.*, 2007). It also affects multiple organs including the bones, joints, heart, lungs, central nervous system, kidneys, liver, spleen and testes (Varona *et al.*, 2002). Brucellosis has been more prevalent in the Mediterranean region, the Middle East, Central Asia, and parts of Latin America, making it a global problem (Sancho *et al.*, 2015). In India, prevalence of brucellosis in humans varies between from 0.8 to 26.6% in different states (Mangalgi *et al.*, 2015) and

Prevalence of brucellosis ranging from 2.26 to 34% was reported among veterinarians and para-veterinarians from various parts of India (Shome *et al.*, 2017). In animals, prevalence of the disease ranging from 6.5% to 16.4% in different species of livestock since first reported in India during the year 1887 (Singh *et al.*, 2015). The occurrence of human cases can be one of the first indicators of the presence of disease in the animal population, since the prevention of human brucellosis cannot be achieved without the control of the disease in the animals, so "One World, One Health" strategy is the need of the hour paradigm in control of brucellosis (Sancho *et al.*, 2015; Plumb *et al.*, 2013).

To our knowledge, this is the first case study applied one health approach in investigation of human brucellosis and identified the possible source of infection with the aim of prevention and control of brucellosis.

Case report and its investigation

A 31 year old male veterinary practitioner suffered from high fever, night sweats, chills, myalgia, tiredness, tremors, back pain with distinct left cervical lymph node enlargement for one week. Consulting the physician, he was examined with painful cervical lymphadenopathy measuring 1.5 x 2 cm². Further, physical examination found no other adenopathies, facial / oral inflammatory lesion and respiratory problems. Initially, he was treated with cefixime - ofloxacin regimen for 5 days, but on and off symptoms persisted. Consequently, physician ordered for Fine Needle Aspiration Cytology (FNAC), Acid fast staining with aspirate, Tuberculin skin test (TST) and Serological assay to rule out Tuberculosis and HIV respectively. Fine needle aspiration had whitish aspirate and microscopically had polymorphous lymphocytes, plasma cells, histiocytes, macrophages and epithelioid cell granulomas. Staining of aspirate was negative for Acid fast

bacilli and also individual is negative for TST. The serologic test ELISA was performed for HIV, which was also negative. Hematological parameters were within normal range. The patient was psychologically depressed due to the persistent clinical symptoms. Patient consulted our department about his conditions. Since he had animal contact regularly, we suspected for brucellosis among various zoonotic diseases, due to his occupational thrust and endemicity of brucellosis in this region. He was tested for brucellosis and found positive by RBPT performed by commercial *Brucella abortus* antigen (IVRI, Izatnagar) and SAT performed by suspension of *B.abortus* strain 99 (IVRI, Izatnagar) with the titre of 1: 640. Polymerase Chain Reaction from sera found to be negative. To know the possible source of infection, retrospective investigation revealed he had treated a cow for retained fetal membranes and relieved sheep from dystocia with dead fetus within 15 days. He also recollected that while removing the fetal membranes from the sheep, there was spillage on to his face in spite of taking utmost care in the field conditions.

Sera were collected from both cow and sheep were tested for Brucellosis by RBPT, SAT as per Alton *et al.*, 1990 & Indirect ELISA (Genomix kit). The cow was found to be negative while the sheep was positive in RBPT, SAT & Indirect-ELISA. The patient resolved completely from clinical signs and cervical lymphadenopathy after the initiation of treatment with doxycycline (100mg) - rifampicin (300 mg) regimen orally twice daily for 6 weeks. To investigate the prevalence status of brucellosis in that region, serum samples from 84 animals were collected from randomly selected five flocks in the surrounding region and tested, which revealed 21.42 % brucellosis prevalence rate by serological tests.

Results and Discussion

Brucellosis poses high occupational threat to people working with farm animals, slaughterhouse workers, butchers, veterinarians, inseminators, laboratory workers, health care workers and the highest risk of brucellosis is assumed to be attracted towards individuals working with animals during abortion or parturition and during other contacts with infected animals (Karadzinska-Bislimovska *et al.*, 2010). In this case, the veterinarian had occupational risk while handling aborted sheep and also its clinical symptoms is often difficult to differentiate infectious abortion from others in field conditions. In the present case, the patient had high fever, night sweats, chills, myalgia, fatigue and cervical lymphadenopathy. The latter is the rare form of clinical manifestation of brucellosis in India, which led to suspicion of Tuberculosis and HIV. The probable reason for cervical lymphadenopathy might be due to splashing of aborted contents into the face & oral cavity, which corroborates with the previous report of cervical lymph nodes as selective niche for oral route of transmission (Von Bargen *et al.*, 2015). The study conducted by Sathyanarayanan *et al.*, 2011 and Kumar *et al.*, 2010 did not explore the plausible source of infection for cervical lymphadenopathy in brucellosis. In the present case, the veterinarian might got infection from the sheep treated for dystocia, could be explained by experiencing symptoms of brucellosis and positive result for brucellosis by serological test in treated animal, which is also correlated by incubation period of 1-3 weeks. One health approach of human brucellosis revealed the source of infection as well as diseases prevalence status which highlights small ruminants poses a significant health risk and further efforts will be needed to control brucellosis in goats and sheep.

In conclusion, this case report of human brucellosis with rare clinical manifestation,

unavailability of vaccine and high prevalence of brucellosis in animals, we emphasize occupational risk of brucellosis among veterinarian and animal handlers. Also ahead, the one health approach need to be overemphasized in diagnostic stewardship especially in occupational diseases which plays a crucial role in prevention and control of brucellosis in humans.

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