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Short communication

BRUCELLOSIS: A MAJOR ZOONOTIC DISEASE OF PUBLIC HEALTH AND VETERINARY IMPORTANCE

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ABSTRACT

Brucellosis is a global zoonotic illness that affects both animal and human populations. This disease, which affects numerous animal species, can be transmitted to humans through direct contact with or consumption of contaminated food sources. Despite the significant health risks posed by brucellosis, its public health implications have often been overlooked in several nations. In humans, it manifests as an acute febrile illness and can lead to a chronic, debilitating infection, while its presence in livestock carries substantial socioeconomic consequences. Over the last two decades, considerable progress has been made in comprehending various facets of brucellosis in both animals and humans. Nevertheless, particularly in developing regions, significant obstacles persist in the control and eradication of brucellosis, including the need for innovative diagnostic tools and effective vaccines. This discussion will focus on critical aspects of epidemiological surveillance, as well as the priorities and challenges associated with brucellosis.

1. INTRODUCTION

Brucellosis, a zoonotic disease, is caused by various *Brucella* species and affects both humans and animals, including cattle, dogs, sheep, and goats (Bennett., 2023; WHO., 2023). Recent studies indicate that the global incidence of this infection is higher than previously estimated, with 1.6–2.1 million new human cases reported annually (CDC., 2023; Laine *et al.,* 2023). In Europe, *Brucella canis* has emerged as a cause of canine brucellosis, posing a public health threat. The effective management of this disease is hindered by a lack of comprehensive surveillance and insufficient awareness of *B. Canis* among veterinarians and dog owners. In Punjab, Pakistan, epidemiological data on brucellosis showed a seroprevalence of 13.13%, with higher rates observed in males aged 25-40. Risk factors identified included a lack of education, involvement in farming, keeping animals at home, animal slaughter, and the consumption of raw milk. This highlights the importance of avoiding unpasteurized dairy products to reduce the spread of this often-underestimated zoonotic disease, which has a high regional morbidity rate (Nawaz *et al.,* 2021). A four-year study in China revealed varying trends in brucellosis incidence, with a national average annual incidence of 3.0 per 100,000 people. While the rate significantly decreased in Xinjiang, it more than doubled in Inner Mongolia, contributing to a higher incidence in Northern China (Tao *et al.,* 2021). Another study in Inner Mongolia from 2012 to 2016 found a declining incidence but an increasing seroprevalence of human brucellosis, with genetic evidence suggesting both sporadic cases and cross-infections, possibly exacerbated by long-term livestock trade (Liu *et al.,* 2020). Brucellosis is primarily transmitted through direct contact with infected animals or their bodily fluids, such as vaginal

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discharges, aborted materials, and semen. Individuals who work closely with livestock, including farmers, veterinarians, and livestock handlers, face an elevated risk of contracting the disease due to their frequent animal interactions (Laine *et al.,* 2023). The consumption of raw or unpasteurized dairy products, such as milk and cheese, from infected animals can also transmit brucellosis. This emphasizes the critical role of food safety practices in preventing human infection from contaminated food products (Bennett., 2023). In certain occupational environments, such as slaughterhouses and meat processing facilities, airborne transmission of *Brucella* bacteria can be a concern. Workers in these settings may inhale airborne agents, potentially leading to infection, underscoring the necessity of implementing effective measures. It is noteworthy that brucellosis is considered a potential type B bioweapon (Shakir., 2021). Furthermore, the unhygienic processing of milk, milk products, and meat has contributed to the spread of human brucellosis, highlighting its zoonotic nature (Shakir., 2021). In conclusion, occupational exposure is a significant concern in brucellosis transmission. Professionals in specific fields need to be vigilant and take appropriate precautions to reduce the risk of infection, and public health measures should address these potential transmission sources. Indirect transmission can occur through contact with contaminated materials or environments. People encountering surfaces or objects contaminated with Brucella can become infected. Proper sanitation and hygiene practices are essential in reducing the risk of indirect transmission (Laine *et al.,* 2023).

Brucellosis, though infrequently transmitted, can pass from an infected mother to her unborn child during gestation, highlighting the importance of prenatal care and monitoring for pregnant individuals with the disease (CDC., 2023, Laine *et al.,* 2023). Consequently, a comprehensive understanding of its various transmission routes is critical for preventing its dissemination. Implementing effective preventative strategies, such as livestock vaccination and public health education, is crucial for managing this zoonotic illness. The Brucella genus consists of six species, each identified by its primary host: *B. meltiness* (sheep and goats), *B. abortus* (cattle), *B. suis* (pigs), *B. Ovis* (sheep), *B. Canis* (dogs), and *B. Neotoma* (wood desert rats). *B. meltiness* is the most virulent bacterium in humans (Laine *et al.,* 2023). Diagnostic tools for brucellosis encompass blood culture, serological assays, and molecular methods. The selection of a diagnostic approach depends on the clinical presentation and available resources. Three main techniques are employed for the microbiological identification of human brucellosis: blood cultures, serology assays, and molecular assays. Here, we summarize recent advancements in evaluating diagnostic techniques, their clinical utility, and their respective benefits and drawbacks (Yagupsky *et al.,* 2019). A definitive diagnosis of Brucella infection can be established by isolating the bacteria from tissue samples obtained during autopsy, milk, or abortion. The most practical method for diagnosing Brucella infection is serology, which can be used to screen cattle with the Rose Bengal Test (RBT) and to confirm infection in specific animals using the enzyme-linked immunosorbent assay (ELISA) or Complement Fixation Test (CFT). For surveillance, milk samples can be screened using the milk ring test or ELISA. However, no serological test can confirm infection in specific animals such as sheep, goats, and pigs. Serological testing should be applied at the herd or flock level, and the skin test is useful for screening at this level, particularly when immunization is not utilized. For diagnosing *B. Canis* infection, a 'rough-specific' antigen is necessary (Joshi, 2021). Aminoglycosides are frequently added during the initial 2–3 weeks of treatment (Bosilkovski., 2021). Bridging the gap between socioeconomic challenges and research priorities necessitates prioritizing funding for infrastructure and human resources. International collaboration is essentials demonstrated by the World Bank's recent $82 million grant to India for zoonosis and endemic disease prevention (WHO., 2023). This collaborative effort is vital for effectively managing and controlling zoonoses globally.

3. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interest regarding the publication of this article.

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