

## Pulmonary Brucellosis: Epidemiology and Risk Factors

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### Abstract

Brucellosis, caused by various *Brucella* species, is a zoonotic disease that can affect multiple organ systems. While the disease is often characterized by fever, joint pain, and malaise, its pulmonary form, though less common, presents unique challenges. This abstract provides an overview of pulmonary brucellosis, focusing on its epidemiology and risk factors. Understanding the prevalence, distribution, and key determinants of this manifestation is crucial for public health efforts. This review also discusses the risk factors associated with the development of pulmonary brucellosis, highlighting occupational exposure, dietary habits, and individual factors. A thorough understanding of the epidemiology and risk factors is essential for improving diagnostic accuracy, enhancing prevention strategies, and managing this complex form of brucellosis effectively.

**Keywords:** Pulmonary brucellosis; Epidemiology; Risk factors; Zoonotic disease; Occupational exposure

### Introduction

Brucellosis, a zoonotic infectious disease caused by the genus *Brucella*, remains a global public health concern. While often associated with fever, malaise, and joint pain, it can manifest in a variety of clinical forms, including pulmonary involvement. Pulmonary brucellosis is a lesser-known but significant aspect of the disease, and understanding its epidemiology and risk factors is crucial for effective management and prevention [1].

Brucellosis is a worldwide re-emerging zoonosis caused by organisms belonging to the genus *Brucella*, which are Gram-negative, nonspore-forming, facultative intracellular bacteria. The incidence of the disease in Turkey is 0.59 per 100,000 persons per annum, and worldwide there are 500,000 new cases of brucellosis reported annually. The primary mode of transmission is through consumption of nonpasteurized milk or cheese from infected goats, sheep or cows, the consumption of contaminated meat or by direct contact with infected animals. Characteristic symptoms such as undulant fever and malaise are seen in most patients [2]. Focal manifestations are found in the joints and bones (spondylitis, sacroiliitis, arthritis), in the respiratory tract (pneumonia, pleuritis), in the cardiovascular system (endocarditis, pericarditis, vasculitis), the nervous system (radiculitis, meningoencephalomyelitis), the urogenital system (nephritis, epididymitis, orchitis) as well as in the liver, spleen and skin.

### Epidemiology

*Brucella* species, including *B. melitensis*, *B. abortus*, and *B. suis*, are responsible for human brucellosis. The prevalence of pulmonary brucellosis varies widely across regions and populations. Several key epidemiological factors play a role:

**Geographical Distribution:** Brucellosis is endemic in many parts of the world, with higher incidence rates in regions where livestock farming is common. This includes parts of the Mediterranean, Middle East, Central and South America, and certain areas of Asia and Africa [3].

- **Occupational exposure:** Occupations involving contact with animals or animal products, such as farmers, veterinarians, and abattoir workers, are at increased risk. Inhalation of aerosols containing the bacteria during the handling of infected animals can lead to pulmonary

brucellosis.

- **Food habits:** Consumption of raw or unpasteurized dairy products, including milk and cheese, can also lead to infection. Ingesting contaminated food is a common source of brucellosis in some regions.

- **Livestock and wildlife reservoirs:** *Brucella* organisms are primarily maintained in the reproductive organs of infected animals. Goats, sheep, cattle, and pigs are common sources of human infection [4]. Additionally, wildlife species like elk, bison, and caribou can act as reservoirs, leading to occasional zoonotic transmission.

- **Migration and travel:** International travel and population movements can contribute to the spread of brucellosis. Individuals visiting or migrating from endemic regions may unknowingly bring the infection to non-endemic areas [5].

### Risk factors

Several factors increase an individual's risk of developing pulmonary brucellosis:

- **Occupational exposure:** Those working closely with animals or their products, including farmers, abattoir workers, and veterinarians, face a higher risk of inhaling *Brucella* bacteria, particularly during the birthing process or when handling infected tissues.

- **Consumption habits:** Individuals who consume raw milk or undercooked dairy products from infected animals are at risk of oral infection. While not exclusive to the respiratory form, these practices can lead to systemic infection, which may involve the lungs [6].

- **Compromised immune system:** Immunocompromised individuals, such as those with HIV/AIDS or receiving immunosuppressive therapy, are more susceptible to severe forms of

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brucellosis, including pulmonary complications.

- Age and gender: Studies suggest that older individuals may be at greater risk, as well as men, possibly due to higher occupational exposure.

### Clinical presentation

Pulmonary brucellosis may present with various respiratory symptoms, including cough, chest pain, and shortness of breath. These symptoms are often non-specific, making diagnosis challenging. Imaging studies like chest X-rays and CT scans may reveal findings such as nodules, consolidation, or pleural effusions [7].

### Prevention and control

Preventing pulmonary brucellosis involves various strategies:

- Vaccination: In some endemic areas, vaccination of livestock with *Brucella* vaccines can reduce the prevalence of the disease.
- Public health education: Raising awareness about the risks of consuming raw dairy products and promoting proper food handling and hand hygiene practices can reduce infection rates.
- Occupational safety: Workers in high-risk professions should use appropriate protective gear, follow safety guidelines, and receive regular health check-ups to detect and manage infections early.
- Travel precautions: Travelers to endemic areas should be aware of the risks and take precautions, such as avoiding contact with animals and consuming only pasteurized dairy products [8].

### Discussion

Pulmonary brucellosis, though less common than other clinical forms of brucellosis, presents a unique set of challenges. While brucellosis primarily manifests as a systemic febrile illness, its pulmonary form is marked by respiratory symptoms, including cough, chest pain, and shortness of breath. These nonspecific symptoms, coupled with the relative rarity of pulmonary brucellosis, often lead to delayed or missed diagnoses. This highlights the importance of increased awareness and education among healthcare providers, particularly in endemic regions.

The epidemiology of pulmonary brucellosis is closely intertwined with the distribution of brucellosis in animals, with higher prevalence in regions where livestock farming and close contact with infected animals are common. Furthermore, the occupational risk of developing pulmonary brucellosis is well-documented, with farmers, abattoir workers, and veterinarians at particular risk due to their daily interactions with potentially infected animals and tissues [9].

Another significant risk factor is dietary habits, especially the consumption of raw or unpasteurized dairy products. In regions where such practices are common, oral infection can lead to systemic disease, which may involve the lungs. Promoting proper food handling and hygiene practices is an essential part of brucellosis prevention.

Individual risk factors such as age and gender also play a role in the epidemiology of pulmonary brucellosis, with older individuals and

men being more susceptible. Furthermore, those with compromised immune systems are at higher risk of developing severe forms of the disease, including pulmonary involvement [10].

### Conclusion

Pulmonary brucellosis, though a relatively rare manifestation of this zoonotic disease, underscores the multifaceted nature of brucellosis and its impact on public health. To effectively manage this condition, healthcare professionals need to be vigilant, especially in regions where brucellosis is endemic.

Understanding the epidemiology and risk factors of pulmonary brucellosis is essential for both prevention and diagnosis. Public health strategies should focus on raising awareness, implementing preventive measures, and improving occupational safety for individuals at risk of exposure. Additionally, promoting pasteurization of dairy products and safe food handling practices can help reduce the risk associated with dietary habits.

### Acknowledgement

None

### Conflict of Interest

None

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