

Brucella Laboratory Exposures in Brazil: Rare or Unnoticed?

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Abstract. Laboratory exposures to *Brucella* spp. are preventable. After an outbreak in Brazil, human brucellosis was made statutorily reportable as well as laboratory accidents. After the implementation of this law, three laboratorial accidents with *Brucella abortus* were reported in a Brazilian city, and 58 workers were exposed from January 2019 to April 2020. We describe the exposure level, prophylaxis, and serosurvey after 6 months, and we highlight the importance of disease report.

Human brucellosis (HB) is a zoonotic bacterial infection caused by *Brucella* spp. and is transmitted from several sources to humans. The primary sources are cattle, sheep, goats, and pigs, which transmit the microorganism to humans through direct contact with infected animals or ingestion of contaminated food products.¹ In Brazil, brucellosis in cows, dogs, buffalos, sheep, goats, deer, horses, dolphin, and other animals has been reported.² Human cases have been described sporadically; however, serosurvey studies suggest that the infection is more prevalent than reported.^{3,4} Since the first case that was published in Brazil in 1934,⁵ HB has been reported throughout the country, but it is generally restricted to workers of slaughterhouses, consumers of unpasteurized milk from areas of a high incidence of bovine brucellosis, and agricultural workers. Only one study reported a laboratory-acquired infection, but no other laboratory accidents have been reported.⁶ The aim of this study was to highlight the importance of the disease report to the state health organization, improving detection of laboratory accidents.

In May 2015, HB was made statutorily reportable in Parana, Brazil. A working group was established to restructure and upgrade the State Protocol on HB. We convened a panel of 20 experts, including specialists in infectious diseases, biologists, veterinary specialists, laboratory specialists, epidemiologists, and pharmacists from the State of Paraná, Brazil.⁷ All probable or laboratory-confirmed new brucellosis cases were required to be reported. This decision was taken by the State Department of Health of Parana (SDHP) because of an outbreak comprising 51 HB cases in a slaughterhouse at Paiçandu in 2014, previously reported by our group.² Active surveillance of human cases was established and serum tests tracked by the SDHP zoonosis division.

After the implementation of this work group, three laboratory accidents were identified in the city, occurring in different laboratories from January 2019 to April 2020. All of them were not enabled to manipulate with *Brucella* spp.; however, the isolates were misunderstood in the routine as other Gram-negative bacilli. The clinical samples (blood

culture) had not any mention of the possibility of *Brucella* spp. Consequently, laboratory technicians managed the samples following the usual procedures, such as smearing and sniffing the colonies outside of a biosafety cabinet. The pathogen was subsequently identified as *Brucella abortus* using real-time PCR and matrix-assisted laser desorption/ionization time-of-flight Vitek MS (BioMérieux, Durham, NC).

In three laboratories, 58 workers were exposed in different levels of exposition, most of them could be considered as high risks, like sniffing the plate with the bacteria ($n = 37$, 63.7%), work in the same room without an adequate biosafety level (100%) (Table 1). The most substantial review about this issue is that 167 workers were exposed in 28 laboratories in nine countries between 1985 and 2006.⁸ However, the number of symptomatic infection was low (5%). In our survey, no worker developed the disease. The serology was performed, and the tests were negative. The antibiotic postexposure prophylaxis (PEP) was not performed according to CDC recommendation with doxycycline.⁹ Only 53 workers (91.3%) received 21 days of PEP.

Laboratory exposures to *Brucella* spp. is a preventable public health problem. The exposures described earlier were caused by routine work with clinical specimens where brucellosis was not suspected. It should be remembered that all unknown specimens be manipulated in a biological safety cabinet until a highly infectious pathogen is ruled out. The exposure to *Brucella* spp. must receive prophylaxis according to current recommendations. Furthermore, monitoring for any highly infectious pathogen should be continuously performed to protect the health of laboratory workers. The implementation a working group on brucellosis allowed for improvement in the detection of laboratory accidents, probably never previously notified.

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TABLE 1
Description of three laboratory accidents with *Brucella* spp. in the Curitiba city between January 2019 and April 2020

Laboratory	Number of workers	Sniffed or opened the culture plate using a maximum of biosafety level-2 precautions	Person performing activity and any person within a 5-ft radius	All persons present in the laboratory room with aerosol generating procedures	Present in the laboratory at the time of manipulation of a <i>Brucella</i> isolate on an open bench, but who do not have high-risk exposures as defined previously	Positive serum test to <i>Brucella</i>	Serum test collected after exposure	Antibiotic prophylaxis	Follow-up (6 months)
#1	31	12/31 (38.7%)	12/31 (38.7%)	24/31 (77.4%)	31/31 (100%)	0/31 (0%)	Between 60 and 70 days	31/31 (100%)	All asymptomatic
#2	5	3/5 (60%)	5/5 (100%)	0/5 (0%)	5/5 (100%)	0/5 (0%)	Days 30, 60, and 90 days	0/5 (0%)	All asymptomatic
#3	22	22/22 (100%)	22/22 (100%)	0/22 (0%)	0/22 (0%)	0/22 (0%)	–	22/22 (100%)	All asymptomatic
Total	58	37/58 (63.7%)	39/58 (67.2%)	24/58 (41.3%)	36/58 (62.0%)	0/58 (0%)	–	53/58 (91.3%)	–

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