

Listeriosis in the far South of Brazil: neglected infection?

**Dulcinéa Blum-Menezes^[1], Ivânia Deliberalli^[1], Najara Carneiro Bittencourt^[1],
Carlus Augustu Tavares do Couto^[1], Liana Nunes Barbosa^[1],
Alessandro Marques dos Santos^[2] and Gabriel Godinho Pinto^[3]**

[1]. Laboratório Genética de Microrganismos, Departamento de Microbiologia e Parasitologia, Instituto de Biologia, Universidade Federal de Pelotas, Pelotas, RS.
[2]. Hospital Universitário São Francisco de Paula, Universidade Católica de Pelotas, Pelotas, RS. [3]. Programa de Pós-Graduação em Patologia, Universidade Federal de Ciências da Saúde de Porto Alegre, Porto Alegre, RS.

ABSTRACT

Listeriosis is an under-diagnosed and under-reported infection; however, listeriosis is not a compulsorily notifiable disease in Brazil. We provide an overview of the rates of listeriosis in the United States of America (USA), Europe, Latin America, and Brazil during the past decade. We also report a case of miscarriage caused by listeriosis in which there was no suspicion of this infection. This overview and the case we report serve as reminders of the often-neglected threat of listeriosis and its potential to cause miscarriage while highlighting the necessity of recognizing listeriosis as a compulsorily notifiable disease in Brazil.

Keywords: *Listeria monocytogenes*. Listeriosis. Miscarriage. Brazil. South America.

OVERVIEW

Listeriosis is a foodborne disease that is a public health concern. More than 70% of all cases of listeriosis occur in individuals with recognized predisposing conditions, such as pregnancy. Listeriosis in pregnant women and maternal intra-uterine infection caused by *Listeria monocytogenes* are typically mild *flu-like* illnesses but may lead to severe complications, such as premature delivery, miscarriage, stillbirth, and neonatal sepsis.

In the United States of America (USA), an average of 2.4 outbreaks of listeriosis per year, each representing 1,600 cases, were reported between 1998 and 2008, according to the Centers for Disease Control and Prevention (CDC), Atlanta¹.

In the USA, sporadic cases of human listeriosis occur with an annual incidence of approximately 0.27 per 100,000 people². The incidence of nonperinatal listeriosis decreased by 24% over the last 2 decades^{3,4}, largely as a consequence of the zero-tolerance policy deployed in 1987 by the Food Safety and Inspection Service of the USA Department of Agriculture⁵, which prohibited the sale of ready-to-eat meats contaminated with *L. monocytogenes*. However, the same decrease was not observed in the frequency of perinatal listeriosis^{3,4}.

Since 2004, the CDC has requested that listeriosis patients be interviewed using the CDC standardized *Listeria* Initiative

questionnaire. Together with the application of PulseNet, a molecular subtyping network for the surveillance of foodborne diseases, this measure has enabled rapid recalls of potentially contaminated products by tracing them to stores where the foods were purchased by the patients⁶.

However, even this zero-tolerance policy for ready-to-eat food has not prevented major outbreaks of listeriosis in the USA, where a multistate outbreak of *L. monocytogenes* infections occurred in 2011. The CDC reported that of the 147 individuals infected with *L. monocytogenes* during that outbreak, 33 died, and a woman who was pregnant at the time of illness had a miscarriage¹.

In Europe, the annual epidemiology report on communicable diseases during 2011 showed a small decrease in the number of listeriosis cases between 2006 and 2009⁷. The overall rate of notification during 2009 (0.35 per 100,000 individuals) was slightly higher than that during 2008 (0.31) but was relatively stable between 2006 and 2009, with values of 0.35 and 0.36 for 2007 and 2006, respectively⁷.

Sisó et al.⁸ described the variation in the incidence of listeriosis infection among pregnant women in Barcelona between 1985 and 2010. Over this time period, 43 cases of perinatal listeriosis were diagnosed among 82,320 hospitalized pregnant women in Barcelona (incidence 0.05%). The incidence remained almost constant at 0.024% until 2,000, with an increasing incidence thereafter, reaching 0.086% during the last 10 years of the study period.

Goulet et al.⁹ estimated the risk of listeriosis associated with pregnancy and other underlying conditions among residents of France. They reported that when the incidence of listeriosis ranges from 0.1 to 1 cases per 100,000 members of the general population, the frequency of listeriosis among pregnant women increases to 5.6 cases per 100,000 pregnancies, and the case fatality percentage is 31%.

Address to: Dr^a Dulcinéa Blum Menezes. Laboratório Genética de Microrganismos/ Dept^o de Microbiologia e Parasitologia/IB/UFPel. Caixa Postal 354, 96001-970 Pelotas, RS, Brasil.

Phone: 55 53 3275-7626

e-mail: dulceblum@uol.com.br

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In Denmark, during the period from 1989 to 2008, the annual incidence of listeriosis varied between 0.4 and 1.1 per 100,000 members of the general population¹⁰. In the United Kingdom, Khatamzas et al.¹¹ reported that the incidence of listeriosis was twice as high between 2000 and 2008 compared with the incidence between 1990 and 2000.

Data collected in Latin American show a similar recent increase in rates of listeriosis. In a major private maternity hospital in Santiago, Chile, the frequency of neonatal listeriosis increased 15-fold between 2007 and 2008, and some reports¹² of listeriosis were described in the literature related to abortions and preterm deliveries.

In Brazil, listeriosis is not a compulsorily notifiable disease. To date, few sporadic cases of listeriosis have been reported, and no outbreaks have been reported among non-hospitalized patients in Brazil. Martins et al.¹³ reported an outbreak of listeriosis that affected 6 elderly hospitalized patients in Rio de Janeiro.

There are reports of *L. monocytogenes* in foods in the State of Rio Grande do Sul, specifically in the City of Pelotas¹⁴⁻¹⁶, although no cases of listeriosis were diagnosed. In 2011, an etiological investigation of a miscarriage case revealed histological evidence suggestive of listeriosis following the analysis of a placental sample even though the presence of *L. monocytogenes* was never demonstrated using microbiological methods¹⁷. In the same year, according to the Municipal Health Department of Pelotas, the average monthly number of curettages after miscarriage was 37.5. However, to our knowledge, there has been no report of a case of listeriosis associated with a miscarriage.

CASE REPORT

Herein, we report a case of listeriosis in Pelotas, Brazil, in which the diagnosis was confirmed by the isolation of *L. monocytogenes* from placental membrane tissue without prior clinical suspicion of this infection.

On February 23, 2011, a 21-year-old afebrile woman in her twelfth week of pregnancy was admitted for an emergency caesarean section due to placental abruption. Placental tissue and blood samples were collected in addition to a vaginal swab and a rectal swab for microbiological analysis during curettage procedures. The samples were directly inoculated in half Fraser broth (Laborclin, PR, Brazil) and cultured at 30°C for 5 days. Aliquots of each culture were then plated on Agar Listeria (Ottaviani & Agosti; ALOA, Laborclin) and incubated at 37°C for 7 days. Typical colonies (short Gram-positive rods, motile at 25°C, oxidase-negative, positive for both aesculin hydrolysis and catalase) were characterized at the molecular level using polymerase chain reaction (PCR) and restriction fragment length polymorphism (RFLP) analyses, according to procedures described by Paillard et al.¹⁸. From the placental membrane tissue, colonies with characteristics that were typical of *L. monocytogenes* were isolated, and the presence of the pathogen was confirmed using RFLP molecular profiling. The PCR-amplified product, an 890-base pair (bp) fragment,

was cleaved by the enzyme *XmnI* to generate 770- and 120-bp fragments and by the enzyme *CfoI* to generate 470-, 170-, 130-, and 120-bp fragments. These cleavage patterns confirmed the isolation of *L. monocytogenes*. The vaginal and rectal samples were negative for *L. monocytogenes*.

DISCUSSION

In the present case, the infection was characterized by the absence of prodromal signs, which caused the diagnosis to be inconclusive. Unfortunately, the placental sample that enabled a causal diagnosis to be made was obtained belatedly, precluding an early diagnosis.

Listeriosis can affect neonates even if the mother does not present symptoms of listeriosis. Accordingly, Sisó et al.⁸ reported the diagnosis of neonatal listeriosis in 5 babies whose mothers were completely asymptomatic. Similarly, following a listeriosis outbreak¹⁹ of 16 babies with maternal-neonatal cases of listeriosis, 2 babies were born to asymptomatic mothers. This phenomenon may be explained by vertical transmission of the infection despite the fact that it does not produce a systemic inflammatory response in the mother⁸.

A negative blood culture does not eliminate the possibility of listeriosis in cases of miscarriage. The ability of *L. monocytogenes* to colonize and persist in the gallbladder and cause chronic infection demonstrates its ability to survive within the various microenvironments of the gastrointestinal tract. Because *L. monocytogenes* has an intracellular life cycle¹⁹, infection does not necessarily manifest clinically with an immune response typical of a bacterial infection.

This review and case report serve as a reminder that listeriosis is often not considered as a cause of miscarriage and emphasize the necessity of classifying listeriosis as a compulsorily notifiable disease in Brazil.

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