

# SEROPOSITIVITY FOR *LISTERIA MONOCYTOGENES* IN WOMEN WITH SPONTANEOUS ABORTION: A CASE-CONTROL STUDY IN IRAN

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## SUMMARY

**Objective:** There are many studies supporting the role of certain asymptomatic infections such as *Listeria monocytogenes* (*L. monocytogenes*) in spontaneous abortion. In some cases, latent listeriosis may complicate the pregnancy, and serologic tests can, therefore, be used to detect the disease. This study was designed to assess the relationship between seropositivity for *L. monocytogenes* and spontaneous abortion.

**Materials and Methods:** A total of 250 women with previous spontaneous abortion and a control group of 200 women with normal full-term deliveries entered the study as case and control groups, respectively. Demographic characteristics were recorded for each subject, and serum samples were obtained from all participants. All serum samples were examined using the indirect immunofluorescence antibody test for *L. monocytogenes* antibody. Data was analyzed using Chi-squared and *t* tests.

**Results:** The average age of participants was  $25.6 \pm 7.6$  years in cases and  $25.3 \pm 6.5$  years in controls. Eighty-nine (35.6%) of the cases with abortion and 35 (17.5%) of the control group were positive for *L. monocytogenes* antibody ( $p=0.001$ ). No relationship was observed between the number of pregnancies and infection with *L. monocytogenes* ( $p=0.4$ ), or between the number of previous abortions and *L. monocytogenes* seropositivity ( $p=0.2$ ).

**Conclusion:** We suggest monitoring *L. monocytogenes* seroprevalence in pregnant women at high risk of threatened abortion, and further microbiological assessment of symptomatic women for detection of *L. monocytogenes* and insidious infection. [*Taiwan J Obstet Gynecol* 2009;48(1):46–48]

**Key Words:** *Listeria monocytogenes*, pregnancy, spontaneous abortion

## Introduction

In 2000, infections caused by *Listeria monocytogenes* were reported in a total of 7.4 per million pregnant women, accounting for about 30% of all cases [1,2]. Overall, pregnant women are more susceptible to acquiring listeriosis, and the risk of listeriosis in pregnant women

has been reported to be 17 times that of the normal population [3]. Listeriosis during pregnancy can lead to intrauterine infection resulting in severe complications such as preterm labor, spontaneous abortion, stillbirth or neonatal infection, resulting in high morbidity and mortality [3,4].

In humans and other mammals, *L. monocytogenes* is able to cross the intestinal barrier [5]. Invasive disease is thought to occur secondary to hematogenous dissemination and typically leads to infection of the placento-fetal unit during pregnancy, or meningitis in immunocompromised individuals [6]. Most cases of listeriosis lead to symptomatic complications, but some cases of latent listeriosis lead to fetal complications



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and in these cases of latent listeriosis, serologic diagnostic methods are used, mostly agglutination, and in some cases, the indirect immunofluorescence test [7,8].

In this study, serologic markers for *L. monocytogenes* infection were studied in two groups of women with and without a history of spontaneous abortion, to determine any relationship between seropositivity for this microorganism and abortion.

## Materials and Methods

This case-control study was carried out in two groups of women. The patient group consisted of 250 Iranian women with a definite diagnosis of spontaneous abortion admitted to Shariatee Hospital of Bandar Abbas, Iran, during 2002–2003 for treatment. The second group, consisting of 200 asymptomatic women with normal full-term deliveries who were admitted to the same center for a normal delivery, served as the control group.

All subjects gave written consent for having blood samples taken for research purposes. The study protocol was approved by the ethics committee of Kerman University of Medical Sciences, Iran.

Blood samples were taken from all patients at the time of miscarriage. Blood samples were collected from all controls at the time of delivery. Whole blood samples from both groups were centrifuged at 2,000g for 20 minutes to isolate the serum samples. The indirect immunofluorescence test was used to determine immunoglobulin G (IgG) seropositivity for *L. monocytogenes* in serum samples. A *L. monocytogenes* 1/2a- and 4b-specific kit with bacteria-coated smear was purchased from Euroimmun AG, Germany (order no. FI 2141-1010-1 G), to detect specific IgG antibodies in the serum.

Normally distributed continuous variables were compared using the two independent samples *t* test. Cross-tabulation and Chi-squared or Fisher's exact tests were used to examine the relationship between categorical variables. All data analyses were performed using SAS version 8 software (SAS Institute Inc., Cary, NC, USA).

## Results

The average age of participants was  $25.6 \pm 7.6$  years in the case group and  $25.3 \pm 6.5$  years in the control group. In the case group, 89 (35.6%) of women were seropositive for *L. monocytogenes*, whereas only 35 (17.5%) of women in the control group were seropositive. The results showed a significant difference between case and control groups for *L. monocytogenes* seropositivity ( $p = 0.001$ ; Table 1).

Seropositivity for *L. monocytogenes* was not age-dependent. Moreover, no relationship was observed between the number of pregnancies and infection with *L. monocytogenes*, or the number of previous abortions and *L. monocytogenes* seropositivity (Table 2).

**Table 1.** Baseline data of case and control groups\*

Variables	Case (n = 250)	Control (n = 200)	p
Age (yr)	$25.6 \pm 7.6$	$25.3 \pm 6.5$	0.6
Residence			
City	208 (83.2)	150 (75.0)	0.03
Village	42 (16.8)	50 (25.0)	
<i>Listeria</i> -positive	89 (35.6)	35 (17.5)	0.002

\*Data are presented as n (%) or mean  $\pm$  standard deviation.

**Table 2.** Descriptive data of the case group (n = 250)\*

	<i>Listeria</i> -positive (n = 89)	<i>Listeria</i> -negative (n = 161)	p
Abortion			
Early (< 12 wk)	54 (60.68)	127 (78.88)	0.002
Late (12–20 wk)	35 (39.32)	34 (21.12)	
Past history of abortion	20 (22.47)	26 (16.14)	0.2
Gestational age for abortion (wk)	$10.8 \pm 3.2$	$11.3 \pm 3.5$	0.2
Gravidity			
< 2	58 (65.17)	108 (67.08)	0.4
2–4	19 (21.35)	31 (19.26)	
> 4	12 (13.48)	22 (13.66)	
Mean age (yr)	$25.6 \pm 7.6$	$25.7 \pm 7.5$	0.9

\*Data are presented as n (%) or mean  $\pm$  standard deviation.

## Discussion

Pregnant women are susceptible to *L. monocytogenes* infection. It would appear this organism invades the placenta and precipitates preterm labor and fetal death [7,9]. In addition, during pregnancy, listeriosis can be asymptomatic or can give rise to subclinical symptoms such as a nonspecific fever despite the insidious development of placento-fetal infection resulting in abortion, stillbirth or disseminated neonatal infections, notably granulomatosis infantiseptica [3,10].

In a retrospective chart review of 65,022 pregnant women during a 10-year period (1990–1999) in Israel, 11 pregnant patients and their offspring were identified with *L. monocytogenes* infection [11]. Chorioamnionitis with multiple placental abscesses were observed in all five placenta examined. Clinically, four of 11 parturients had a cesarean section for fetal distress (36.3%), as compared with a mean cesarean rate of 14% in our general population. Two of 11 had a late abortion (18.1%) [11]. In our study, there was a significant difference between seroprevalence of *L. monocytogenes* in women with previous spontaneous abortion and the control group (35.6% vs. 17.5%;  $p=0.001$ ).

One study in Bosnia evaluated the serologic response to *L. monocytogenes* by the agglutination method in 60 female patients of reproductive age. Patients with spontaneous abortion acted as the case group, and patients without spontaneous abortion acted as the control group. The serologic response was positive in 18 (60%) of the case group and in eight (26.7%) of the control group. Our study showed a greater serologic response to *L. monocytogenes* in women with spontaneous abortion compared with women without a history of abortion [12]. Another study in the Reus area evaluated the seroprevalence of *L. monocytogenes* in pregnant women without clinical symptoms using the immunofluorescence method. In this study, the incidence of anti-*L. monocytogenes* antibody carrier was high (12%) [8]. Another study in Barcelona identified that this infection affects the fetus and causes abortion or stillbirth. In this study, anti-*L. monocytogenes* antibody was detected by the indirect immunofluorescence method. Of the 309 women, 207 cases had abortions and high antibody positivity without any other cause to explain this problem. Treatment of pregnant antibody-positive women led to the birth of 152 normal children; therefore, finding latent *L. monocytogenes* infection at the

onset of pregnancy is important [13]. Also, detecting *L. monocytogenes* chorioamnionitis and treating with high-dose penicillin or trimethoprim-sulfamethoxazole is possible and may avoid preterm delivery [7].

Therefore, we recommend further microbiological surveys to detect *L. monocytogenes* in clinical samples for diagnosis of symptomatic *L. monocytogenes* infection in pregnant women and also monitoring of *L. monocytogenes* seroprevalence of asymptomatic *L. monocytogenes* infection in pregnant women who are at high risk of complications, such as women with a threatened abortion.

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