



ORIGINAL ARTICLE

# Aetiology and outcomes of potentially serious infections in febrile infants less than 3 months old<sup>☆,☆☆</sup>



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Received 18 April 2016; accepted 15 July 2016

Available online 13 June 2017

## KEYWORDS

Fever without source;  
Bacteraemia;  
Serious bacterial infection;  
Urine culture;  
Blood culture;  
Cerebrospinal fluid culture

## Abstract

**Background:** Recent studies have shown changes in the aetiology of serious bacterial infections in febrile infants  $\leq 90$  days of age. The aim of this study was to describe the current microbiology and outcomes of these infections in Spain.

**Material and methods:** Sub-analysis of a prospective multicentre study focusing on febrile infants of less than 91 days of life, admitted between October 2011 and September 2013 to Emergency Departments of 19 Spanish hospitals, members of the Spanish Paediatric Emergency Research Group of the Spanish Society of Paediatric Emergencies (RISeuP/SPERG).

**Results:** The analysis included 3401 febrile infants  $\leq 90$  days of age with fever without source. There were 896 positive cultures: 766 urine (85.5%), 100 blood (11.2%), 18 cerebrospinal fluid (2%), 10 stool, and 2 umbilical cultures. Among the 3401 infants included, 784 (23%) were diagnosed with a serious bacterial infection, and 107 of them (3.1%) with an invasive infection.

*E. coli* was the most common pathogen isolated from urine (628; 82%), blood (46; 46%), and cerebrospinal fluid cultures (7; 38.9%), followed by *S. agalactiae* that was isolated from 24 (24%) blood cultures and 3 (16.7%) cerebrospinal fluid cultures. There were only 2 *L. monocytogenes* infections. Four children died, and seven had severe complications.

<sup>☆</sup> Please cite this article as: de la Torre M, de Lucas N, Velasco R, Gómez B, Mintegi S, Grupo para el estudio del lactante febril de la Red de investigación de la Sociedad Española de Urgencias de Pediatría (RISeuP-SPERG). Etiología y evolución de las infecciones potencialmente graves en lactantes menores de 3 meses febriles. An Pediatr (Barc). 2017;87:42–49.

<sup>☆☆</sup> Previous presentations: this study was presented at the 19 Reunión de la Sociedad Española de Urgencias de Pediatría; April 3–5, 2014; Sabadell, Spain; and the 9th European Congress on Emergency Medicine EUSEM; September 28–October 1, 2014; Amsterdam, the Netherlands.

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**PALABRAS CLAVE**

Fiebre sin foco;  
Bacteriemia;  
Infección bacteriana potencialmente grave;  
Cultivo de orina;  
Hemocultivo;  
Cultivo de líquido cefalorraquídeo

**Conclusions:** Among infants  $\leq 90$  days of age with fever without source, *E. coli* was the most common pathogen isolated from urine, blood, and cerebrospinal fluid cultures.

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## Etiología y evolución de las infecciones potencialmente graves en lactantes menores de 3 meses febriles

### Resumen

**Introducción:** Estudios recientes han demostrado cambios en la etiología de las infecciones bacterianas potencialmente graves en lactantes menores de 3 meses de vida con fiebre. El objetivo es describir la microbiología y la evolución de estas infecciones en nuestro entorno.

**Material y métodos:** Subanálisis de un estudio prospectivo y multicéntrico sobre lactantes febriles con menos de 3 meses de edad que consultaron desde el 1 de octubre de 2011 hasta el 30 de septiembre de 2013 en los servicios de urgencias de 19 hospitales infantiles españoles de la Red de investigación de la Sociedad Española de Urgencias de Pediatría/Spanish Pediatric Emergency Research Group (RISeuP/SPERG).

**Resultados:** Se incluyó a 3.401 lactantes menores de 91 días de vida con fiebre sin foco. Hubo 896 cultivos positivos: 766 urocultivos (85,5%), 100 hemocultivos (11,2%), 18 cultivos de líquido cefalorraquídeo (2%), 10 coprocultivos y 2 cultivos umbilicales. Fueron diagnosticados de una infección bacteriana potencialmente grave 784 niños (23%), de los cuales 107 (3,1%) tenían una infección invasora.

*Escherichia coli* (*E. coli*) fue la bacteria más frecuente de urocultivos (628; 82%), hemocultivos (46; 46%) y cultivos de líquido cefalorraquídeo (7; 38,9%) seguido por *Streptococcus agalactiae*, que fue aislado en 24 (24%) hemocultivos y 3 (16,7%) cultivos de líquido cefalorraquídeo. Solo hubo 2 infecciones producidas por *Listeria monocytogenes*. Fallecieron 4 niños y 7 desarrollaron complicaciones graves.

**Conclusiones:** *E. coli* fue la bacteria más frecuente en urocultivos, hemocultivos y cultivos de líquido cefalorraquídeo de los lactantes con menos de 3 meses de vida y fiebre sin foco, incluso entre los neonatos.

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## Introduction

Potentially serious bacterial infections (PSBIs) in febrile infants aged less than 3 months are more frequent, carry a poorer prognosis and have a different aetiology compared to older children. *Streptococcus agalactiae* (*S. agalactiae*, historically the leading causative agent of bacteraemia and meningitis in infants <3 months), gram-negative rods, especially *Escherichia coli* (*E. coli*), *Listeria monocytogenes* (*L. monocytogenes*) and *Enterococcus* species are the agents typically involved in PSBIs in this age group. With the exception of *E. coli*, which continues to be the aetiological agent most frequently involved in urinary tract infections throughout childhood, the prevalence of infection by these microorganisms is low in older children.<sup>1-7</sup> All of the above warrants the performance of diagnostic tests and hospital admission with antibiotic therapy (ampicillin and an aminoglycoside or a third-generation cephalosporin to cover the bacteria detailed above) in the management of all febrile infants aged less than 3 months with risk factors.<sup>6-9</sup>

A study of febrile infants aged less than 3 months that received care in a Spanish emergency department over a

period of 5 years described changes in the aetiology of bacteraemia; *E. coli* was the most prevalent bacterium and there were no cases of infection by *L. monocytogenes*.<sup>10</sup> Recent studies in the United States have also shown that the incidence of bacteraemia and meningitis caused by *S. agalactiae* is decreasing, so that *E. coli* is currently the most prevalent pathogen not only in urinary tract infections, but also in cases of bacteraemia and meningitis in infants aged less than 3 months.<sup>11-14</sup>

The main objective of this study was to describe the microbiology and outcomes of infants aged less than 91 days with fever without source (FWS) that received a diagnosis of PSBI in Spain.

## Materials and methods

We performed a subanalysis in the framework of a prospective, multicentric study conducted between October 1, 2011 and September 30, 2013 in 19 Spanish Children's hospitals in 8 autonomous communities (Table 1) members of the Working Group on the Febrile Infant of the Spanish

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