



Neonatal septicemia in Iranian newborns infants: A systematic review and meta-analysis

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Abstract

Aim: The aim of this systematic review and the meta-analysis was to evaluate the Neonatal septicemia in Iranian newborns infants.

Methods: The proposed protocol and the methods used in this systematic study were developed based on the Cochrane Handbook for Systematic Reviews of Interventions and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Observational studies conducted on the general population are attached and studies on specific populations (acute conditions, home care centers) were excluded.

Results: According to the results of the randomized method (95% CI), the overall Neonatal septicemia prevalence rate among 2189 newborns was 9.6%(95% CI 8.2-10.8), $I^2 = 90.7\%$.

Conclusion: The baby, as a vulnerable host, does not localize the infection, and in about 10 to 25% of infected babies, the invasion of meninge or other places occurs (16 and 17). On the other hand, the demonstration of neonatal septicemia is often very vague and nonspecific, so it may be confused with many symptoms, thereby leading to a misdiagnosis and an improper or over treatment in infants who do not really have septicemia.

Keywords: Septicemia, Neonates, Aerobic Bacteria

Introduction

Neonatal septicemia is referred to as invasive bacterial infections, which primarily affect the baby's bloodstream during the first month of life (1). Its major risk factors include prematurity, chorioamnionitis, premature rupture of membrane (PROM), and infection and colonization in the genitourinary and gastrointestinal tract of pregnant women with group B streptococcus (2).

The prevalence of neonatal septicemia and its antibiotic susceptibility pattern vary from country to country and from one city to another, and even in one section of a hospital at different times, depending on the conditions that make up the base of septicemia (3). Therefore, getting information and the identification of

the most common bacteria in neonatal septicemia factors are of particular importance (4). Also, it is imperative that an antibiotic appropriate to the epidemiology of the area be started prior to preparing the test results (5).

Methods

Enrollment and Inclusion Criteria

The proposed protocol and the methods used in this systematic study were developed based on the Cochrane Handbook for Systematic Reviews of Interventions and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-

Analyses (PRISMA). Observational studies conducted on the general population are attached and studies on specific populations (acute conditions, home care centers) were excluded. The results were formulated as reported in the study. The minimum sample size was 25 patients per study. The target population was the entire Iranian newborns infants.

International databases (PubMed, Google Scholar, WOS, and Scopus) and national databases (SID, MAGIRAN) and national publications were reviewed to find similar studies without language and regional constraints from September 1 to 30, 2019. The MEDLINE research strategy was used to search for other databases. Specific research strategies were developed by the Health Sciences Library specializing in systematic reviews based on the Peer Review of Electronic Search Strategies (PRESS) . Also, PROSPERO was used for ongoing and recently completed systematic reviews. Boolean operator (AND, OR, and NOT), Medical Subject Headings (MeSH), cut "*", and related textual words were used to search for titles and abstracts with the following keywords: Septicemia, Neonates, Aerobic Bacteria, and IRAN.

Research Selection and Data Extraction

According to the research protocol, two researchers separately reviewed the research titles and abstracts based on the inclusion criteria. In the next step, after excluding repeated studies, the full manuscripts of the studies were reviewed according to the inclusion criteria and the required data and information were extracted. The consensus method was used to resolve differences and inconsistencies between the two researchers. The data extracted included general information (first author, year, and place), research characteristics (the research design, the sample size, location, study period, and bias risk), participants' characteristics, and output (prevalence) calculations.

Quality Assessment

To assess the quality of the methodology and the bias risk, each observational study was evaluated using the instrument developed by Hoy et al. This 10-item instrument assessed the quality of the study in two dimensions, including external validity (items 1 to 4 assessed the target population, the sampling frame, the sampling method, and the minimum indirect neglect) and internal validity (items 5 to 9 assessed the methods of data collection, case definitions,

instruments, and data collection modes, and item 10 evaluated the analysis-related bias). The bias risk was assessed separately by two researchers and any inconsistency was resolved by consensus.

Data Synthesis

All studies that met the inclusion criteria were synthesized after a systematic evaluation. The data were combined with the accumulation graph. The random-effects model was evaluated based on the overall quality of life. The heterogeneity of the initial studies was assessed by I^2 tests. The subgroup analysis was performed to determine heterogeneity based on gender and age. The meta-analysis was performed using STATA14 software (STATA CORP, COLLEGE STATION, TX, USA).

Results

General Findings

Research Selection

In the initial review, 190 articles were selected from different databases. Of the 183 non-useful studies identified in the review of titles and abstracts, 81 articles were deleted because they had inappropriate titles. Of the 113 studies, 6 met the inclusion criteria. Of the 92 excluded studies, 16 were review studies, 5 letter to editor, 71 articles did not meet the minimum requirements to be included in the review (Fig. 1).

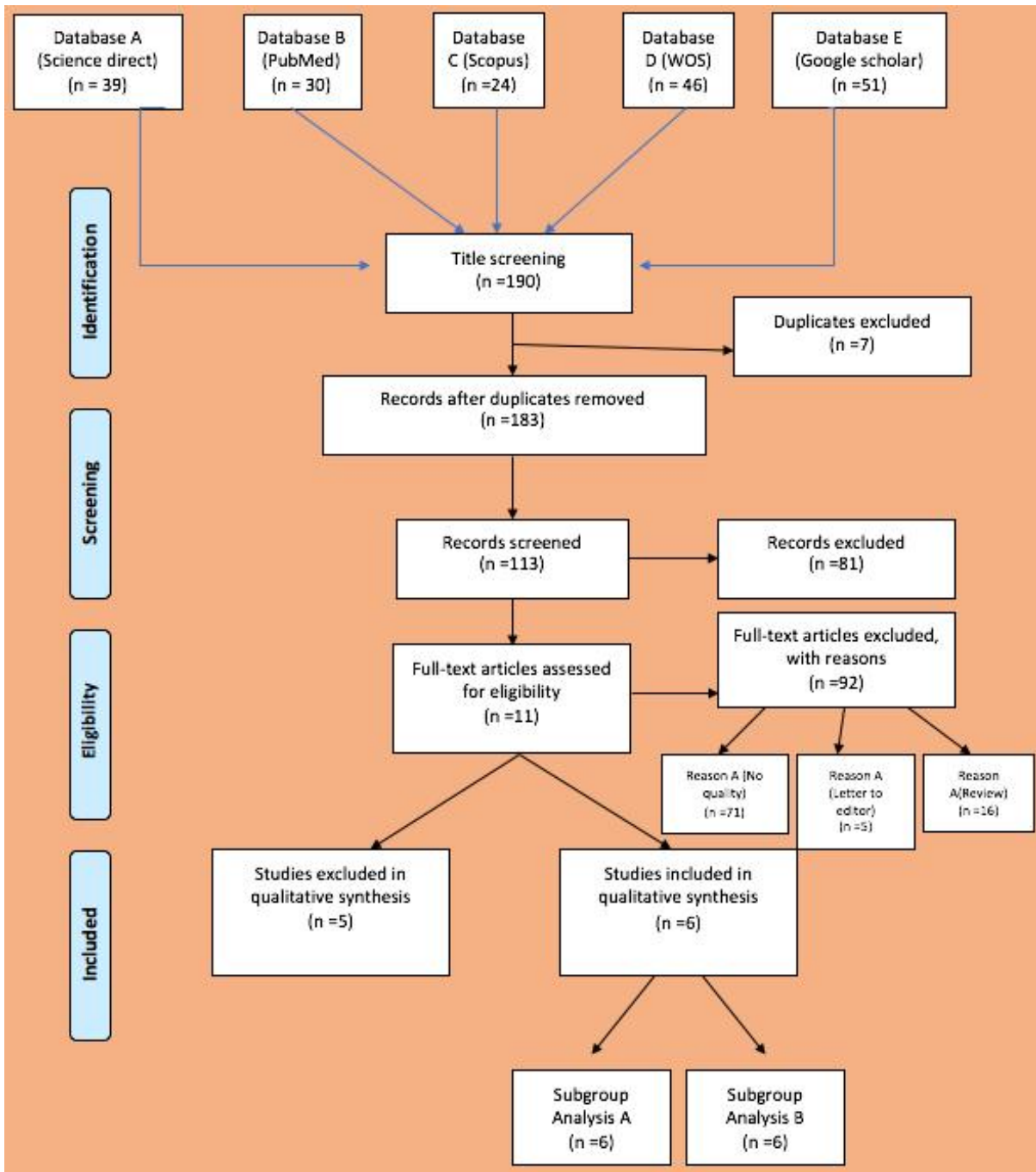


Fig 1 : PRISMA flow diagram

Research Characteristics

The study was conducted on 2189 participants. All 6 included studies had cross-sectional data. 6 studies were selected from 6 provinces .Arak ,Babol , shahrkord ,Birjand , Hamadan and Kermanshah, each with one study. The most frequently used sampling method was multistage random sampling (N = 4). All studies had a low bias risk. (Table 1).

Main Results

According to the results of the randomized method (95% CI), the overall Neonatal septicemiaprevalence rate among 2189 newborns was 9.6%(95% CI 8.2-10.8), $I^2 = 90.7\%$, (Fig. 2).

Table 1: Characteristics of final included studies about Neonatal septicemia in Iranian newborns infants

	First author	Publication year	Participants	prevalence	City or province
1	Hashemiye	2001	474	5.27%	Arak
2	Zahedpasha	2006	628	11.8%	Babol
3	Sherafati	1998	310	11.9%	Shahrkord
4	Fsharakiniya	2004	67	14.2%	Birjand
5	Rasoul	2000	620	16.8%	Hamadan
6	Dezfooli	2010	90	4.13%	Kermanshah

Table 2: Neonatal septicemia in Iranian newborns infants

Author	Publication year	95% conf. Interval			Weight
		ES	LOW	UP	
Hashemiye	2001	0.053	0.033	0.072	37.45
Zahedpasha	2006	0.118	0.093	0.143	23.32
Sherafati	1998	0.119	0.083	0.155	11.41
Fsharakiniya	2004	0.142	0.059	0.225	2.11
Rasoul	2000	0.168	0.139	0.197	16.98
Dezfooli	2010	0.043	0.002	0.084	8.75
Pooled ES	-----	0.096	0.082	0.108	100

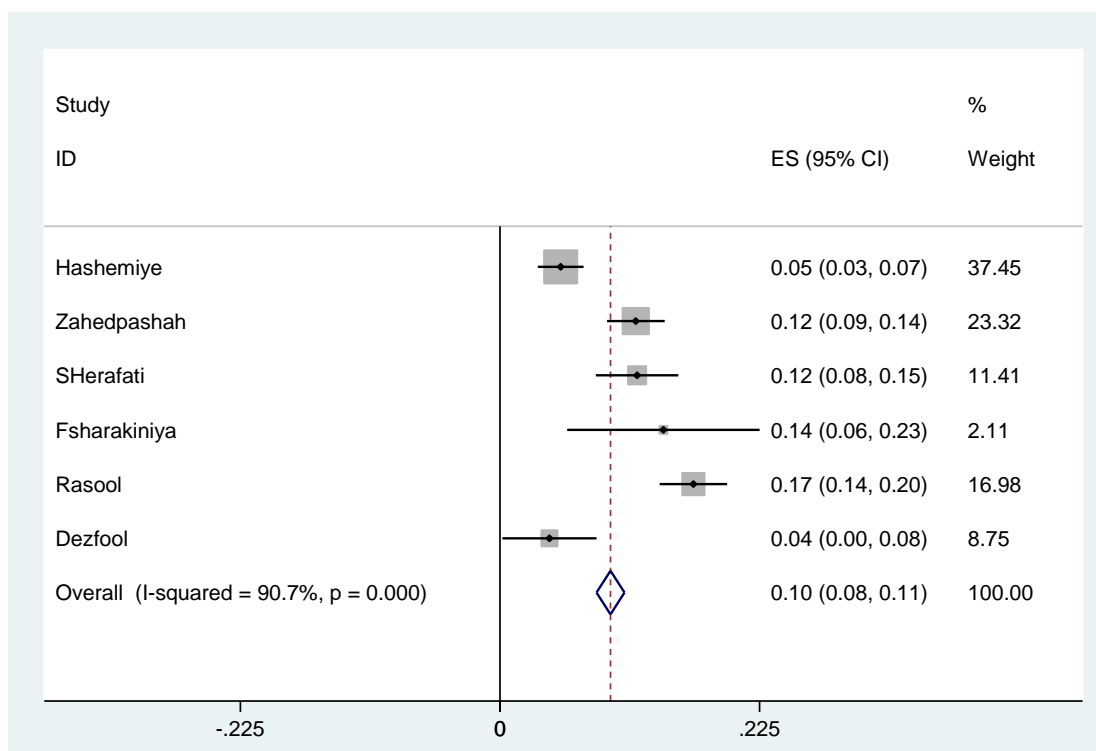


Fig 2: The prevalence of Neonatal septicemia in Iranian newborns infants and its 95% interval for the studied cases according to the year and the city where the study was conducted based on the model of the random effects model. The midpoint of each section of the line estimates the % value and the length of the lines showing the 95% confidence interval in each study.

Discussion

According to the results of the randomized method (95% CI), the overall Neonatal septicemia prevalence rate among 2189 newborns was 9.6%(95% CI 8.2-10.8), $I^2 = 90.7\%$. Neonatal septicemia is one of the major causes of infant mortality and morbidity in the world, especially in developing countries (6). It affects various organs of the body, which in some cases are associated with increased mortality and morbidity (7). The term septicemia refers to a clinical state in which microorganisms enter the bloodstream, thereby causing severe systemic symptoms such as fever and shock (8). Septicemia is divided into early and late types. Neonatal septicemia in developed countries is less than 1 in 8 cases per 1000 babies, while in poor and developing countries, this number is several times greater (9). The infant mortality rate is 15-50%. Septicemia-producing microorganisms include Group B Streptococcus, Other Streptococcus, Staphylococcus Aureus, Escherichia Coli, Staphylococcus Epidermidis and Listeria Monocytogene (10). In preterm infants, infection caused by Coagulase-negative staphylococci is common. Group B Streptococcus, Pseudomonas Aeruginosa and Klebsiella are recently found pathogens (11).

The prevalence of Septicemia-causing microorganisms in different locations is different. Sepsis caused by Gram-negative bacteria has been more reported in Asian countries. In the US, Group B Streptococcus is more common, but Golden staphylococcus and Gram-negative bacilli are more common in developing countries (12-15).

The baby, as a vulnerable host, does not localize the infection, and in about 10 to 25% of infected babies, the invasion of meninge or other places occurs (16 and 17). On the other hand, the demonstration of neonatal septicemia is often very vague and nonspecific, so it may be confused with many symptoms, thereby leading to a misdiagnosis and an improper or over treatment in infants who do not really have septicemia (18 and 19).

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