



Evaluating the frequency of bacteremia in Iranian neonates admitted with jaundice: A systematic review and meta analysis

Mehran Hesaraki¹, Mohammad Hasan Mohammadi¹

¹Department of Pediatrics, Zabol University of Medical Sciences, Zabol, Iran

*Corresponding author : Mohammad Hasan Mohammadi

Abstract

Objective : The aim of this systematic review and meta-analysis was to evaluate the frequency of bacteremia in Iranian neonates admitted with jaundice.

Method: Two separate researchers conducted studies until November 2018 at international (PubMed, Google Scholar, and WOS) and national (SID and Magiran) databases in English and Persian, without any time limit. The key words used in the research strategy included: Bacteremia, jaundice, Icter, prevalence, frequency and Iran, which were combined with Boolean agents such as AND, OR, NOT. The final data extracted using the STAT 14.0 statistical software

Result: 5 studies were conducted on 1152 Iranian children admitted with jaundice the frequency of bacteremia in Iranian neonates admitted with jaundice was 4.7% (95% CI: 0.4%, 0.5%, I²: 97.8).

Discussion and conclusion:

bacteremia was found in 4.7% of asymptomatic, a febrile, jaundiced infants. Therefore, we recommend that testing for a bacteremia be included as part of the evaluation in asymptomatic, jaundiced infants presenting to the emergency department.

Keywords: Bacteremia, jaundice, Icter, prevalence

Introduction

Jaundice is one of the most common problems developing during neonatal period; 60% of term infants (more than 37 weeks of gestational age) and 80% of preterm infants (less than 37 weeks of gestational age) develop jaundice in the first week after birth(1,2). Neonatal jaundice appears when Bilirubin is high in infants and the liver fails to convert enough bilirubin from pure plasma into direct bilirubin; thus, increase in the level of bilirubin in the blood affects the brain and causes the encephalopathy of the bilirubin(3,4). This is one of the most severe complications of indirect jaundice in neonates, because it might cause, visual and auditory disorders. In order to prevent this risk, newborns should be monitored to keep the concentration of bilirubin in the blood lower than

dangerous levels(5,6,7). To achieve this goal, three therapeutic methods can be used, including drug therapy, phototherapy and blood transfusion. Blood transfusion is carried out through umbilical cord catheterization in neonates(8). Nephrotoxicity catheterization is a useful method in the treatment of newborns and is widely used in neonatal blood transfusion. Interventional treatment of blood transfusions through the infusion vein puts the neonate at the risk of nosocomial infection. Infusion vein catheterization is associated with a significant risk of infection and disinfection is quite difficult even with regular methods(9). Applying umbilical catheter increases the risk of bacteremia significantly due to inflammation(10).

Materials and Methods

The present systematic investigation applies developed methods that are consistent with the accurate instructions in the PRISMA check list.

Inclusion and exclusion criteria

Observational studies, including posting to editors, publications, poor quality articles (based on the Hoy's tool) and studies on adult subjects were only excluded from the study. Only articles in English and Persian are included.

Sampling methods and sample size

All observational studies with any sampling and statistical surveys were included in the present systematic study.

Research strategy

Two separate researchers conducted studies until November 2018 at international (PubMed, Google Scholar, and WOS) and national (SID and Magiran) databases in English and Persian, without any time limit. We examined a list of available articles sources for further related article searches. Specific research strategies have been developed using the MESH vocabulary explorer and free vocabularies, according to the PRESS standard, by a Health scientist librarian specializing in research on systematic review. We used the MEDLINE research strategy to investigate other databases. The key words used in the research strategy included: Bacteremia, jaundice, Icter, prevalence, frequency and Iran, which were combined with Boolean agents such as AND, OR, NOT.

Selection of research and data extraction: Two separate researchers examined the titles and abstracts by considering qualifying criteria. After removing the repetitive research, the full text of the research was examined depending on the qualifying criteria and the required data was extracted.

To answer questions regarding qualifications, additional research information was obtained from the authors in case it is required. The general information (first author, province, and year of publication), research characteristics (sampling method, research design, location, sample size and bias risk), and the measurement of results (frequency of bacteremia) were also collected.

Quality assessment and abstraction: Hoy's et al. tool was used to assess the methodological quality and the risk of getting away from the truth (bias) for each one of the observational studies. This tool evaluates 10 items for assessing the quality of studies in two dimensions such as foreign (items 1-4, target population, sampling frame, sampling method and the minimum deviation from response) and domestic credits (the issues 5-9 of the data collection method, case definition, research tool, data collection mode were assessed while the issue 10 of the bias evaluation was related to data analysis). The higher index indicated that the bias is likely to reduce and the lower index indicated the risk of more bias. The separate bias risk was investigated by two researchers. Consensus was used to solve the disagreements.

Data combination: The final data extracted using the STAT 14.0 statistical software, including studies combined with stock diagram and the frequency of bacteremia, were assessed with random effect of the model.

Results

Selection of research: A total of 264 primary studies were reviewed from PubMed, Google scholar, SID, Magiran, and Web of Science from the beginning to November 1, 2018. Out of the 86 non-repetitive studies in the title and abstract of the screening process, 78 were excluded since their titles were unrelated. Out of the 8 studies, 5 had qualifying criteria. Out of 3 removed cases, one was review, one was letter to the editor, and one did not meet the minimum quality requirements for inclusion in the article [Figure 1].

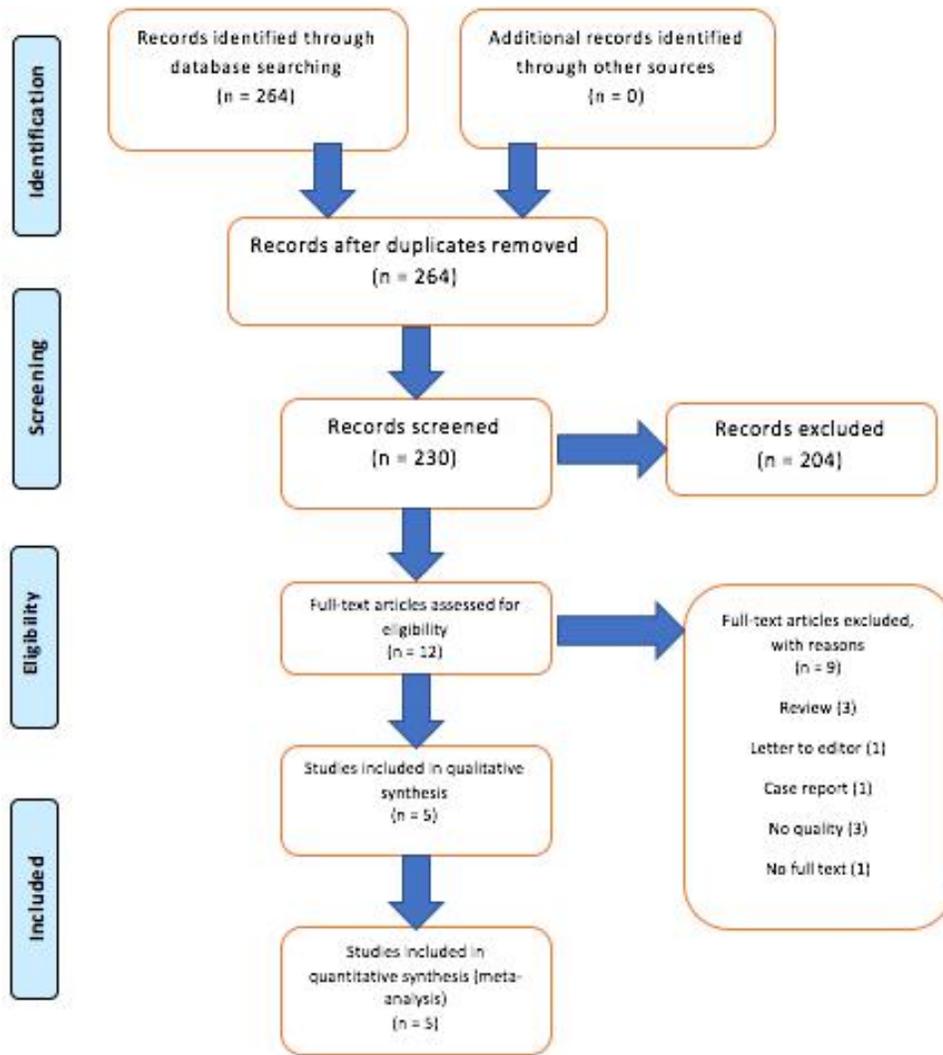


Fig 1

Research characteristics

These 5 studies were conducted on 1152 Iranian children admitted with jaundice .all of the 5 studies, provided cross-sectional data. Out of the 5 studies, one was from Lorestan province, one from Baboland threewere from Tehran provinces .The most commonly used sampling method was convenience

(easiness), (n = 5). All of the of the studies had a low bias risk. The most common place to conduct the studies was in the hospital (n =5). all of the 5 studies, were included in the final analysis context..the frequency of bacteremia in Iranian neonates admitted with jaundicewas 4.7%(95% CI:4%,5.5%,I2:97.8%).(Table 1).

Table 1. Studies included in the systematic review

First Author	year	Province	Sample size	Male-Female	Risk of bias
Khosravi ^[15]	2002	Tehran	402	1.06	Low
Shiva ^[16]	2002	Tehran	112	0.75	Low
Fallahi ^[17]	2009	Tehran	201	0.57	Low
Javadi ^[18]	2005	Lorestan	123	0.38	Low
Zahedpasha ^[19]	2006	Babol	314	0.09	Low

Frequency of bacteremia in Iranian neonates admitted with jaundice:

Frequency of bacteremia was 4.7%(95% CI:4%,5.5%, I^2 :97.8%).(5 studies conducted on 1152

Iranian children admitted with jaundice, were included in the meta-analysis. the overall frequency of bacteremia in Iranian neonates admitted with jaundice was 4.7%(95% CI:4%,5.5%, I^2 :97.8%).([Table 2].

Table 2: frequency of bacteremia in Iranian neonates admitted with jaundice

ID	First Author	Year	Province	ES	95% CI for ES		% Wight
					low	up	
1	Khosravi	2002	Tehran	0.010	0.00	0.020	63.45
2	Shiva	2002	Tehran	0.19	0.117	0.263	1.08
3	Fallahi	2009	Tehran	0.10	0.086	0.114	31.09
4	Javadi	2005	Lorestan	0.163	0.092	0.234	1.17
5	Zahedpasha	2006	Babol	0.183	0.14	0.226	3.21
Sub-total Random pooled ES	-----	-----		0.047	0.040	0.055	100

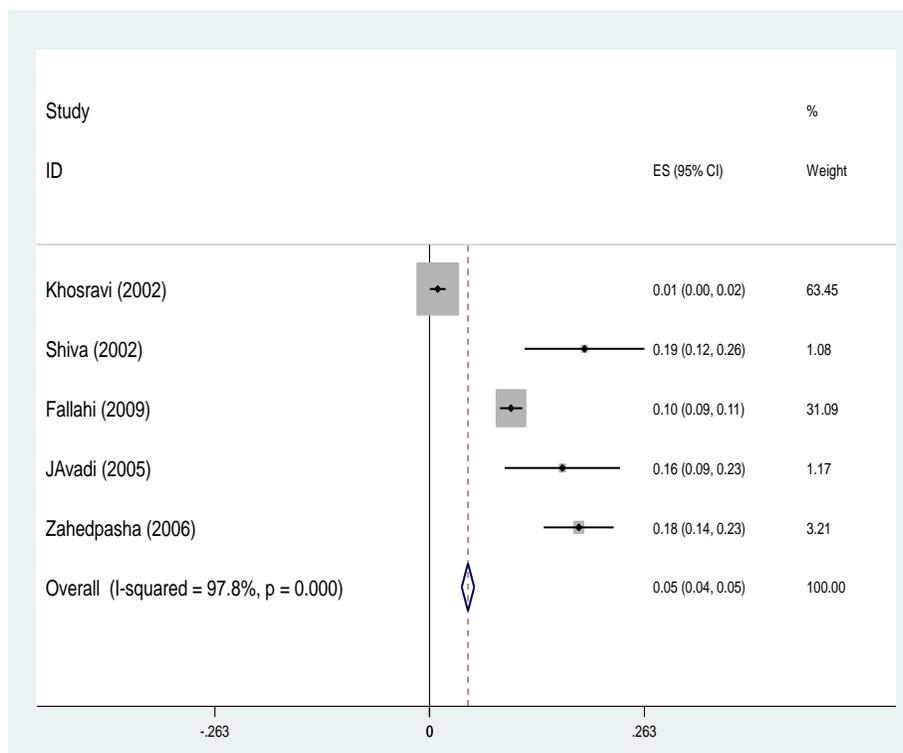


Fig. 2 :The frequency of bacteremia in Iranian neonates admitted with jaundice and its 95% interval for the studied cases according to the year and the city where the study was conducted based on the model of the random effects model. The midpoint of each section of the line estimates the% value and the length of the lines showing the 95% confidence interval in each study. The oval sign shows frequency of bacteremia in Iranian neonates admitted with jaundice for all studies.

Discussion

The overall frequency of bacteremia in Iranian neonates admitted with jaundice was 4.7% (95% CI: 4%, 5.5%, I^2 : 97.8%). Jaundice is one of the most common neonatal problems, which, if left untreated, might have irreparable complications (11, 12). 60% of term neonates and 80% of preterm infants develop jaundice in the first week of life, the majority of cases of which are due to unconjugated and physiologic hyperbilirubinemia (13, 14). Given that the maximum mortality rate occurs for infants less than one year of age, a timely diagnosis of the infant's disease with particular attention to clinical and laboratory symptoms and the rapid onset of appropriate treatment can prevent disastrous repercussions to a large extent; thus, timely diagnosis functions as an effective factor in the survival of the neonate and guaranteeing recovery in health.

Conclusion

Bacteremia was found in 4.7% of asymptomatic, afebrile, jaundiced infants. Therefore, we recommend that testing for a bacteremia be included as part of the evaluation in asymptomatic, jaundiced infants presenting to the emergency department.

References

1. Polin RA. Management of neonates with suspected or proven early-onset bacterial sepsis. *Pediatrics*. 2012 Apr 30; peds-2012.
2. Mohammadi, M. H., & Hesaraki, M. (2018). Acidemia in the fetus: A review. *International Journal of Pharmaceutical and Biological Science Archive*, 6(03). <https://doi.org/10.32553/ijpba.v6i03.95>
3. Anderson-Berry A, Brinton B, Lyden E, Faix RG. Risk factors associated with development of persistent coagulase-negative staphylococci bacteremia in the neonate and associated short-term and discharge morbidities. *Neonatology*. 2011;99(1):23-31.
4. Mehran Hesaraki, Mohammad Hasan Mohammadi. (2018). Frequency of urinary tract infection in children
5. Pammi M, Zhong D, Johnson Y, Revell P, Versalovic J. Polymicrobial bloodstream infections in the neonatal intensive care unit are associated with increased mortality: a case-control study. *BMC infectious diseases*. 2014 Dec;14(1):390.
6. Mohammadi MH, Hesaraki M. Related items. Reading. 2016 Jun;6(2)..
7. Tsai MH, Chu SM, Hsu JF, Lien R, Huang HR, Chiang MC, Fu RH, Lee CW, Huang YC. Risk factors and outcomes for multidrug-resistant Gram-negative bacteremia in the NICU. *Pediatrics*. 2014 Jan 1; peds-2013.
8. Cheung GY, Otto M. Understanding the significance of *Staphylococcus epidermidis* bacteremia in babies and children. *Current opinion in infectious diseases*. 2010 Jun;23(3):208.
9. Lee JW, McElrath T, Chen M, Wallace DK, Allred EN, Leviton A, Dammann O. Pregnancy disorders appear to modify the risk for retinopathy of prematurity associated with neonatal hyperoxemia and bacteremia. *The Journal of Maternal-Fetal & Neonatal Medicine*. 2013 May 1;26(8):811-8.
10. Chu SM, Hsu JF, Lee CW, Lien R, Huang HR, Chiang MC, Fu RH, Tsai MH. Neurological complications after neonatal bacteremia: the clinical characteristics, risk factors, and outcomes. *PLoS One*. 2014 Nov 3;9(11):e105294.
11. Vijayakanthi N, Bahl D, Kaur N, Maria A, Dubey NK. Frequency and characteristics of infections caused by extended-spectrum beta-lactamase-producing organisms in neonates: a prospective cohort study. *BioMed research international*. 2013;2013.
12. Pereira PM, Binatti VB, Sued BP, Ramos JN, Peixoto RS, Simões C, de Castro EA, Duarte JL, Vieira VV, Hirata Jr R, Santos KR. *Staphylococcus haemolyticus* disseminated among neonates with bacteremia in a neonatal intensive care unit in Rio de Janeiro, Brazil. *Diagnostic microbiology and infectious disease*. 2014 Jan 1;78(1):85-92.
13. Hasson SO, Al-Mrzoq JM, Naher HS. Gram-positive bacteremia in febrile children under two years of age in Babylon province. *Al-Qadisiyah Medical Journal*. 2012;8(13):1-9.
14. Hamer DH, Darmstadt GL, Carlin JB, Zaidi AK, Yeboah-Antwi K, Saha SK, Ray P, Narang A, Mazzi E, Kumar P, Kapil A. Etiology of bacteremia in young infants in six countries. *The Pediatric infectious disease journal*. 2015 Jan;34(1):e1.
15. Khosravi N, Arabmohammadhosseini A. Prevalence of bacteremia and determining the prevalent organisms after transfusion in newborns admitted to Akbarabadi Hospital during 1999-2006 (in Persian).

16. Shiva F. Neonatal Jaundice and the Need for Sepsis workup in Icteric Infants. Research in Medicine. 2002 Jun 1;26(2):111-4. (in persian)
17. Falahati M, Basir F, Ahmadpour M. Evaluation of frequency of bacteremia in neonates hospitalized with jaundice in Shohada-e-Tajrish Hospital. (in persian)
18. Javadi T, Mohsenzade A. Investigating the causes of jaundice in infants admitted to Madani Hospital in Khorramabad in 2001. 2013 Dec 26;4(2). (in persian)
19. Zahedpasha Y, Ahmadpour M, Hajiahmadi M, Alizade M. Bacteremia and septicemia following exchange of blood in infants with severe jaundice in Amirkola Hospital, Babol. (in persian)

Access this Article in Online	
	Website: www.ijarbs.com
	Subject: Medical Sciences
Quick Response Code	
DOI: 10.22192/ijarbs.2018.05.12.010	

How to cite this article:

Mehran Hesaraki, Mohammad Hasan Mohammadi. (2018). Evaluating the frequency of bacteremia in Iranian neonates admitted with jaundice: A systematic review and meta analysis. Int. J. Adv. Res. Biol. Sci. (12): 75-80

DOI: <http://dx.doi.org/10.22192/ijarbs.2018.05.12.010>