Letter to the Editor

Neonatal septicemia isolates and resistance patterns in a tertiary care hospital of North India

Neelam Kaistha, Manjula Mehta, Nidhi Singla, Ritu Garg, Jagdish Chander

Department of Microbiology, Government Medical College and Hospital, Chandigarh 160030, India

Abstract

Background: Septicemia continues to be a major cause of neonatal mortality and morbidity worldwide. Methodology: To know the rate of neonatal septicemia in our tertiary care centre, a retrospective analysis of 2,247 blood samples was done over a period of four years and three months (July 2003 to October 2007). Results: During that period, a total of 296 (13.17%) blood samples were found to be positive for bacterial isolates. Gram-negative septicemia (80.40%) was identified in more cases than Gram-positive septicemia (20.60%) with *Klebsiella* species 84 (28.3%) being the most common isolate. Maximum resistance among Gram-negative organisms was seen in amoxycillin/ampicillin and third-generation cephalosporins. Amikacin, cefoperazone/sulbactam and imipenem were found to be good alternative drugs. Among Gram-positive organisms, all strains were sensitive to Vancomycin.

Conclusion: Continued surveillance for various pathogens and their susceptibility profile should be done to effectively and timely treat the patients of neonatal septicaemia.

Key Words: neonates, septicemia, bacteriology, antimicrobial susceptibility

J Infect Dev Ctries 2010; 4(1):055-057.

(Received 28 October 2009 -- Accepted 29 October 2009)

Introduction

Neonatal mortality rate is one of the indicators for measuring the health status of a nation. There could be various reasons for neonatal mortality but septicemia continues to be a major cause of neonatal mortality and morbidity worldwide [1]. Incidence varies from country to country but it is much higher in developing countries than in developed nations. Reasons are not only related to good prenatal, perinatal and post natal care and the efficient antibiotic policies in developed countries, but also to the high rate of home deliveries, often overseen by unskilled attendants, in developing countries. In India, the National Neonatal Perinatal Database (NNPD) reported an incidence of 8.5 per 1,000 live births for blood culture proven sepsis for the year 2002-2003 [2]. As high as 47.5% - 64% incidence of bacteremia has been reported in neonates previously with Gram-negative organisms such as *Klebsiella* being the main isolate [3,4]. However, in the last two decades, the isolation of Gram-positive organisms has increased significantly, although the incidence of Group B Streptococcus bacteremia still remains low in our country [5]. Administration of empirical therapy is justified in patients suspected of septicemia considering the possible severe outcome which can occur in its absence. Classic empiric treatment consists of amoxicillin and an aminoglycoside (more recently being replaced by third generation cephalosporins). However, in the present era of increasing antimicrobial resistance, determining appropriate empiric therapy has also become a challenge.

To know the rate of neonatal septicemia in our tertiary care centre, a retrospective analysis of 2,247 blood samples was done over a period of four years and three months (July 2003 to October 2007). Sepsis was suspected if the mother showed evidence of chorioamniotis, prolonged rupture of membranes (> 24 hours), diarrhoea, fever or urinary tract infection and the neonate manifested systemic signs such as lethargy, chest retraction, grunting, abdominal distension, tachycardia, hypothermia, etc. within the first 72 hours of life. After 72 hours of life, if any of the systemic signs listed above in the neonate were not explained by any other illness, then sepsis was

suspected even in the absence of maternal risk factors.

Blood for culture was collected under strict aseptic conditions. Two millilitres of blood was added to each of two bottles containing liquoid broth and bile broth. Both the bottles were incubated aerobically at 37˚C for seven days. Routine subculturing was done on 5% sheep blood agar and MacConkey agar after 24 hours, 48 hours and then at 7 days. In between these time points, subculturing was done only if there was visible turbidity. The growth of an organism was considered pathogenic if the same organism was isolated from both broths and contaminated if either the growth was obtained in only one bottle or a mixed growth was obtained. In cases where the organisms obtained were coagulase negative *Staphylococci*, a repeat blood culture was performed.

A total of 296 blood samples were found to be positive for bacterial isolates, giving a percentage of 13.17%. Comparatively higher positivity rates have been reported in India earlier [3,6]. In a previous study (July 1998 to June 2003) from our own institution, we had reported a slightly higher rate of 19.2% positivity from cases of neonatal septicemia[7]. In early-onset disease (from birth to 6 days of life), the number of isolates was 254 (85.81%) and in late-onset disease, 42 (14.18%) isolates were obtained.

Unlike in Western countries where Group B streptococci are mainly isolated, in our study Gram-negative septicemia (80.40%) was more prevalent than Gram-positive septicemia (20.60%) with *Klebsiella* species (84; 28.3%) being the most common isolate (Table 1). The role of *Acinetobacter* in cases of neonatal septicemia has also been stressed previously [1].

Maximum resistance among Gram-negative organisms was seen against amoxycillin/ampicillin (62%-83%). The resistance level to third-generation cephalosporins—cefotaxime (34%-86%), ceftriaxone (57%- 80%) and ceftazidime—(33%-62%) was also high, indicating that the use of these drugs alone may be ineffective. The high level of resistance could be due to extended spectrum β lactamases (ESBL) expression in bacteria. In our country, indiscriminate and overuse of the drugs occur due to their easy over-the-counter availability [3]. Previous studies from India have reported ESBL production among Gram-negative isolates (varying from 18%-86%) from neonatal septicemia patients [8]. However, organisms were still susceptible to fourth-generation cephalosporin (cefepime; 11-33%), which should be used as a reserve drug only. Amikacin, cefoperazone/ sulbactam and imipenem were also found to be good alternative drugs.

Table 1 Various isolates obtained from neonatal septicemia patients

Sr. No.	Organism Isolated	Number (Percentage)
1	*Klebsiella* spp.	84 (28.3%)
2	*Acinetobacter* spp.	54 (18.24%)
3	*Escherichia coli*	43 (14.5%),
4	*S. aureus*	43 (14.5%)
5	*Enterobacter* spp.	24 (8.1%)
6	*Pseudomonas aeruginosa*	21 (7.09%)
7	*Enterococcus* spp.	18 (6.08%)
8	*Citrobacter* spp.	9 (3.04%)

S. aureus showed a high level of resistance to gentamicin (50%), erythromycin (46.5%) and cotrimoxazole (44.44%). About 11.11% strains were methicillin resistant *Staphylococcusaureus* (MRSA). Resistance levels were higher in *Enterococcus* species ranging from 70% against gentamicin to 85% against amoxicillin. However, all Gram-positive organisms were sensitive to vancomycin.

In view of our findings, we conclude that the longitudinal surveillance to describe the varied pathogens causing sepsis, as well as their changing antimicrobial susceptibility profile, is important. Clean and safe deliveries, early and exclusive breastfeeding, and strict postnatal cleanliness might reduce the incidence of neonatal sepsis. Prompt use of antibiotics according to standard policy is warranted to save newborns from septicemia.

References

1. Mondal GP, Raghavan M, VishnuBhat B, Srinivasan S (1991) Neonatal Septicemia Among Inborn and Outborn Babies in a Referral Hospital. Indian J Pediatr 58: 529-33.
2. National Neonaal Perinatal Database (2005) Report for the year 2002-2003. National Neonatology Forum, India.
3. Roy I, Jain A, Kumar M, Agarwal SK (2002) Bacteriology of neonatal septicemia in a tertiary care Hospital of Northern India. Indian J Med Microbiol 20: 156-9.
4. Tallur SS, Kasturi AV, Nadgir SD, Krishna BVS (2000) Clinico-bacteriological sudy of neonatal septicemia in Hubli. Indian J Pediatr 67: 169-74.
5. Kuruvilla KA, Thomas N, Jesudasan MV, Jana AK (1999) Neonatal Group B Streptococcal bacteremia in India: ten years' experience. Acta Pediatr 88: 1031-2.
6. Mathur M, Shah H, Dixit K *et al.* (1994) Bacteriological Profile of neonatal septicemia cases (for the year 1990-91). J Postgrad Med 40: 18-20.

7. Agnihori N, Kaistha N, Gupta V (2004) Antimicrobial susceptibility of isolates from neonatal septicemia. Jpn J Infect Dis 57: 273-5.
8. Bhattacharya A, Sen MR, Prakash P, Gaur A, Anupurba S (2008) Increased prevalence of extended spectrum β Lactamase producers in neonatal septicemic cases at a tertiary referral hospital. Indian J Med Microbiol 26(4): 356-60.

Corresponding Author
Dr. Nidhi Singla
H. No. 1205, Sector 32 -B
Chandigarh 160030
India
Email: nidhi0402@hotmail.com

Conflict of interest: No conflict of interest is declared.