

**NOSOCOMIAL BACTERAEemia IN CHILDREN**Basawaraj S. Patil<sup>1</sup>, Sharanabasava<sup>2</sup>, Aditi Garg<sup>3</sup>, Asharani S<sup>4</sup>**HOW TO CITE THIS ARTICLE:**

Basawaraj S. Patil, Sharanabasava, Aditi Garg, Asharani S. "Nosocomial Bacteraemia in Children". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 09, January 29; Page: 1528-1532, DOI: 10.14260/jemds/2015/215

**ABSTRACT:** In this study 2500 children admitted to tertiary care hospital Gulbarga were observed for nosocomial bacteraemia for 1 year. The blood sample for culture is collected from patient who developed fever 48 hours or more after admission. Incidence of nosocomial bacteremia is 101(4%). The following microorganisms are isolated (Table-1). Staphylococcus aureus is commonest 34(34%) followed by Klebsiella pneumoniae 27(27%), coagulase negative staphylococcus 18(18%), Escherichia coli 14(14%), Pseudomonas aeruginosa 8(8%). Intravenous catheters are a major source of nosocomial blood stream infection. The risk factors for nosocomial bacteraemia are intravenous catheters and mechanical ventilation.

**KEYWORDS:** Bacteraemia, Nosocomial infection.

**INTRODUCTION:** The aim of this study was to analyze the hospital data on hospital acquired bacteraemia in children – the pathogens involved, the antibiotic susceptibility pattern and the most common risk factor for hospital acquired bacteraemia.

**MATERIAL AND METHODS:** Blood cultures were done from patient who developed fever 48 hours or more after admission in tertiary hospital Gulbarga for one year.

For convenient analysis patient were divided into four groups:

Group-I	0-1 month old (neonates)
Group-II	1 month - 1 year old
Group-III	1-5 year old and
Group-IV	5-14 years old

0.5ml of blood was inoculated in 5ml of trypticase soy broth with 0.05% liquid for group-I. Two to three ml of blood was inoculated in 20-30 ml of the same medium, for other groups. Bottles were incubated at 37°C for 10 days. Four subcultures were made, first after 24 hours, then at 72 hours, on the 6<sup>th</sup> day and on the 10<sup>th</sup> day, on blood agar and MacConkey agar plates. Organisms were identified by standard methods – Gram staining, motility and various biochemical reactions. Antibiotic sensitivity test of the isolated were performed on Mueller-Hinton agar plates by the disc method of Kirby-Bauer.

**RESULTS:** Out of the 2500 children admitted in hospital, 101 showed bacterial growth. Incidence of bacteraemia in children is 4%. The incidence is more in neonatal and infants and also mortality is more in age group-I. The table-1 shows the organism isolated.

## ORIGINAL ARTICLE

Organisms	Number	Percentage
Staphylococcus aureus	34	34
Klebsiella pneumoniae	27	27
Coagulase negative staphylococcus	18	18
Escherichia coli	14	14
Pseudomonas aeruginosa	8	8
	101	

**Table 1: Microorganism isolated**

Staphylococcus aureus is commonest and the strains are multidrug resistant. Coagulase negative staphylococcus are isolated from Group-I. Coagulase negative staphylococci, formerly regarded harmless inhabitants of the skin and mucosal linings, are now recognized as a major cause of nosocomial infections in neonates. The skin of new born babies is colonized by CONS during the first days after birth. CONS account for a major part of nosocomial bacteraemias, especially those events related to the insertion and maintains of intravascular catheters and risk factors are premature infants, length of stay in the NICU. Klebsiella pneumoniae is isolated more from the age group-II.

Groups	Bacteraemia	Percentage
I	40	(40%)
II	45	(45%)
III	10	(10%)
IV	6	(6%)

**Table 2: Incidence of bacteraemia in children according to age group**

Ciprofloxacin, Cefuroxime and Cefotaxime proved to be some effective antibiotics against gram negative bacilli. Polymyxin-B and Ceftazidime showed the highest efficacy of 100% against pseudomonas aeruginosa. Methicillin (cefoxitin) resistance was noted in 6% of staphylococcus aureus and 6% of coagulase negative staphylococcus (Table-3a and 3b).

Antibiotic	Staphylococcus aureus isolated 34		Coagulase Negative Staphylococcus-18	
	No	Percentage Sensitivity	No	Percentage Sensitivity
Penicillin	5	14	3	17
Cefoxitin	32	94	17	94
Erythromycin	15	44	9	50
Ampicillin	17	50	6	33
Chloramphenicol	10	29	8	44
Cephalexin	20	60	13	72
Cotrimoxazole	20	60	10	55

## ORIGINAL ARTICLE

Cloxacillin	32	94	17	94
Nitrofurantoin	17	50	11	61
Ofloxacin	31	91	17	94
Amikacin	30	88	16	89
Linezolid	34	100	18	100
Vancomycin	34	100	18	100

Table-3a: Antibiotic resistance pattern of the isolates

Antibiotic	Klebsiella Pneumoniae isolated 27		Escherichia Coli isolated 14		Pseudomonas aeruginosa isolated 8	
	No.	Percentage Sensitivity	No.	Percentage Sensitivity	No.	Percentage Sensitivity
Ampicillin	0	0	7	50	-	-
Cephalexin	7	26	6	43	1	12.5
Tetracycline	2	7	4	28	1	12.5
Chloramphenicol	13	48	8	57	1	12.5
Carbencillin	-	-	-	-	8	100
Amikacin	9	23	85	93	6	75
Cotrimoxazole	5	18	9	64	1	12.5
Ofloxacin	24	89	13	93	7	87.5
Norfloxacin	21	78	11	78	2	25
Ceftazidime	27	100	14	100	8	100
Cefotaxime	27	100	14	100	7	87.5
Ceftriaxone	27	100	14	100	7	87.5
Polymyxin-B	-	-	-	-	8	100

Table 3b: Antibiotic resistance pattern of the isolates

**DISCUSSION:** Incidence of nosocomial bacteraemia in children is 4%. Incidence and mortality is more in neonatal and infants. Our prevalence is much less compared to the report of Karpuch J et al.<sup>1</sup> Guha DK et al, study showed blood culture rate was 64.8%, Klebsiella species commonest pathogen. In our study Klebsiella species 2nd commonest and is present in age group 2.<sup>2</sup> Winchester PD et al have studied on Bactek PED medium, in their Staphylococcus aureus is predominant followed by enterobacter.<sup>3</sup> The risk factor in neonates and infants is low birth weight especially those undergoing interventions such as mechanical ventilation. The finding of present study correlates with Guha DK et al.<sup>2</sup> In addition to endogenous flora causing pneumonia, infection can also result from the use of contaminated respiratory equipment.

Fierer J et al, study shows Pseudomonas aeruginosa infection among infants in neonatal ICU that are associated with carriers of organisms on the hand of health care workers<sup>4</sup>. Colonization of throat in children may occur in hospital. The organism is transmitted by respiratory droplets or direct oral contact with colonized individuals.

## ORIGINAL ARTICLE

---

Beck Sague CM et al showed that infants in NICU, the blood stream is most frequent site of nosocomial infection followed by pneumonia and CONS is predominant organism<sup>5</sup>. For reducing nosocomial infection, standard labor room and nursery manual should be followed and proper aseptic precaution maintained in the hospital.

When analyzed by age, there was a much higher incidence in the first year of life than in older children, a fact that has been reported previously<sup>5</sup> and probably related to immaturity of the immune system.

Another risk factor for nosocomial bacteraemia is vascular catheter sepsis. The risk of catheter associated sepsis increases by 1-2% per day after 72 hours. Skin flora migrates along the dermal tunnel and settles in the fibrin sheath that forms in 3 days around the intravascular portion of the catheter. Silicon catheters are less thrombogenic and show fewer tendencies to form a fibrin sheath. CONS is commonest catheter induced sepsis in children, similar study is done by Gray JE et al<sup>6</sup>. Goldmann DA et al showed that Cons commonest organism isolated due to catheters that can be left in place for very long period.<sup>7</sup>

Our study differs from Chaturvedi et al, as it shows Klebsiella Sps predominant and our study shows Staphylococcus is predominant.<sup>8</sup>

**CONCLUSION:** The incidence of nosocomial bacteraemia in infants is more.<sup>9,10</sup> The risk factors are low birth weight, immature immune system. The risk factors for all age group are contamination of respiratory equipment and vascular cannula.<sup>11</sup> The source of infection is exogenous or colonization of throat from hospital environment.

For reducing nosocomial infection, standard labor room and nursery manual should be followed rigidly and proper aseptic precautions maintained in the hospital.

### REFERENCES:

1. Karpuch J, Azizi I. and Beer S. Bacteraemia among hospitalized children—a four year prospective study. *J Infect* (1984) 9: 139.
2. Guha DK, Jaspal D, Das KMS, Guha RA, Khatri RL. And Srikumar R, Outcome of neonatal septicemia: A clinical and bacteriological profile. *Indian Pediatr* (1978) 15: 423.
3. Winchester PD, Todd JK. and Roe MH. Bacteraemia in hospitalized children. *American J Dis Child* (1977) 131: 753.
4. Fierer J, Taylor PM, Gerzon HM. Pseudomonas aeruginosa epidemic traced to delivery-room resuscitators. *N Engl J Med* 1967; 276: 991-996.
5. Beck-Sague CM, Azimi P, Fonseca SN, et al. Bloodstream infections in neonatal intensive care unit patients: results of a multicenter study. *Pediatr Infect Dis J* 1994; 13:1110-1116. Chugh K, Aggarwal DB, Kaul VK. and Aryase. Bacteriological profiles of neonatal septicemia. *Indian J Pediatr* (1988) 55: 961.
6. Gray JE, Richardson DK, McCormick MC, et al. Coagulase-negative staphylococcal bacteraemia among very low birth weight infants: relation to admission illness severity, resource use, and outcome. *Pediatrics* 1995; 95: 225-230.
7. Goldmann DA. Bacterial colonization and infection in the neonate. *Am J Med* 1981; 70: 417-422.
8. Chaturvedi P, Agarwal M. and Narang P. Analysis of blood culture isolates from neonates of a rural hospital. *Indian Pediatr* (1989) 26: 460.

## ORIGINAL ARTICLE

9. Freedman RM, Ingram DL, Gross I, Ehrenkranz RA, Warshaw JB. and Baltimore RS. A half century of neonatal sepsis at Yale. American J Dis Child (1981) 135: 140.
10. Khatua SP, Das AK, Chatrjee BD, Khatua S, Ghosh B. and Saha A. Neonatal septicemia. Indian J Pediatr (1986) 53: 509.
11. Nandy AK and Mukherjee MK. Neonatal sepsis. J. Indian Med. Assoc. (1992) 90: 104.

### **AUTHORS:**

1. Basawaraj S. Patil
2. Sharanabasava
3. Aditi Garg
4. Asharani S.

### **PARTICULARS OF CONTRIBUTORS:**

1. Professor and HOD, Department of Microbiology, KMC.
2. Post Graduate Student, Department of Microbiology, KMC.
3. Post Graduate Student, Department of Microbiology, MCI.
4. Post Graduate Student, Department of Microbiology, KMC.

### **NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:**

Dr. Basawaraj S. Patil,  
HOD and Professor,  
Department of Microbiology, MRMC,  
Gulbarga-585105.  
E-mail: drsharanu72@gmail.com

Date of Submission: 06/01/2015.  
Date of Peer Review: 07/01/2015.  
Date of Acceptance: 20/01/2015.  
Date of Publishing: 28/01/2015.