

A Bacteriological Profile of Neonatal Septicemia (Study in tertiary care hospital, Rajkot)

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Abstract: Background: Neonatal septicemia is the major cause of Neonatal mortality. It might be possible to reduce these deaths by early diagnosis and proper management. Objectives: (1) To find out various bacteriological agents involved in neonatal septicaemia in PDU Medical college & Hospital Rajkot (2) to find out the organisms responsible for early onset and late onset neonatal sepsis. Methods: A hospital based prospective study was carried out in 100 clinically suspected cases of neonatal septisemia in New Born Intensive Care Unit (NICU) at P.D.U Medical College & Hospital Rajkot. Results: Out of 100 neonates with clinically suspected neonatal septicemia, 62(62%) were blood culture positive. Gram negative bacteria accounted for 50(80.65%) & Gram positive bacteria accounted for 12(19.35%) of all cases. Among Gram Negative bacteria Klebsiella spp 25(40.32%) being the most common organism & Staphylococcus aureus 8(12.90%) being the most common organism among Gram Positive bacteria. Late sepsis was most commonly associated with klebsiella spp19 (41.3%). Conclusion: Neonatal septicaemia should be diagnosed urgently to reduce the mortality. Suspected infection based on clinical criteria need to supported by microbial investigation to find causative organisms and their antibiotic sensitivity pattern. [Gosalia E et al NJIRM 2013; 4(2) : 44-47]

Key Words: Blood culture, Neonatal septicaemia, early onset sepsis, late onset sepsis

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Introduction: Neonatal sepsis is the term used for systemic inflammatory response to infection in first month of life. It is manifested by nonspecific signs and symptoms. It is caused by invasion of micro-organisms, their active multiplication in blood and release of toxic substances. It is diagnosed by a positive blood culture during the first month of life^{1,2}.

Neonatal mortality rate in India is 44 per 1000 live birth, which accounts for nearly 2/3rd of Infant mortality rate. Prematurity, Low birth weight, Birth asphyxia & neonatal septicemia are most common causes of neonatal mortality and morbidity. Out of all these, neonatal septicemia is the major hurdle in achieving our goals³.

The detection of microorganisms in a patient's blood is very important to know the nature of organisms & the antibiotic susceptibility. For that, blood culture always remains the gold standard method for laboratory diagnosis. In utero, the environment is sterile and the immune system of the fetus is solely dependent upon his or her mother's immune system. So the newborn is prone to get infected. Such infections usually spread

rapidly and if not recognized and treated promptly, may be fatal⁴.

Apart from this, there is always a changing pattern of causative organisms so there is a threat of emergence of fulminant sepsis. So with the help of blood culture we can reach to early diagnosis & treatment & also reduce the indiscriminate use of antibiotics. This will all result in decreasing the neonatal mortality. Therefore, present study is undertaken to find out the common organisms of neonatal septicemia admitted in a tertiary care hospital in Rajkot.

Material and Methods: This study was carried out in P.D.U Medical College and Hospital, Rajkot from a period of July 2009 to June 2010. Blood Samples were collected from 100 clinically suspected cases of neonatal septicemia, admitted in New Born Intensive Care Unit (NICU) at P.D.U Medical College & Hospital Rajkot. The sample was collected from all neonates less than 4 weeks who presented with clinical history suggestive of neonatal septicemia were included in this study. Blood samples were collected by aseptic vein puncture and inoculated into a blood culture

bottle containing 20 ml of Brain Heart Infusion broth. After inoculation, the blood culture bottles were incubated at 37°C under aerobic conditions in the incubator for 7 days. The first subculture was done after 24 hours of incubation, the second on third day & final on the seventh day. Subcultures were done onto, 5% sheep blood agar and McConkey agar plates. The inoculated plates were incubated aerobically in the incubator at 37°C for 24 hours, and the plates were observed for growth. The growth was identified by colony characteristics, gram's stain and standard biochemical tests described in Mackie & McCartney, Practical Medical Microbiology⁵ & Bailey and Scott's Diagnostic Microbiology⁶ & Koneman⁷. Samples which did not yield any growth following three subcultures were reported negative at the end of 7 days. Data of 100 cases were collected and analyzed.

Result: In our study out of 100 cases of neonatal septicemia, blood culture were positive in 62(62%) & negative in 38(38%). Among them, 37(59.67%) male & 25(40.27%) were female. out of 62 cases 50(80.65%) were Gram negative organisms & 12(19.35%) were Gram Positive organisms.

Table 1: Results Of positive bacterial culture(N=62)

Bacteria Isolated	No. of Cases	Percentage
A Gram Negative bacteria		
1 Klebsiella spp	25	40.32
2 E.coli	8	12.90
3 Acinetobacter spp	8	12.90
4 Pseudomonas spp.	4	6.45
5 Enterobacter spp.	4	6.45
6 Proteus spp	1	1.61
Total	50	80.65
B Gram Positive bacteria		
1 Stap.aureus	8	12.90
2 CONS	3	4.84
3 Enterococci	1	1.61
Total	12	19.35

Table 1 shows that among Gram negative organisms, most common organism was Klebsiella spp 25 (40.32%) followed by E.coli, 8 (12.90%) & Acinetobacter spp 8(12.90%). Whereas the most common Gram positive organisms was Stap.aureus 8 (12.90%) followed by CONS 3(4.84%).

Figure 1 shows that 16 (25.80%) cases having Early Onset Septicemia (EOS) within 3 days of life & 48 (74.20%) cases have Late Onset Septicemia after 3 days of life. So Late onset sepsis cases were found to be three times higher than early onset sepsis.

Fig 1: Distribution of cases according to age of onset

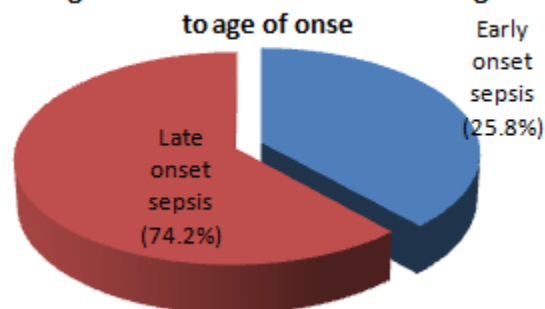


Table 2 shows that the most common bacteria isolated was klebsiella in early and late sepsis.

Table 2: Prevalence of Organism in early and late sepsis

Organisms	Early Sepsis <3days	Late sepsis >3days
Klebsiella spp	06 (37.5)	19 (41.3)
E.coli	02 (12.5)	06(13)
Acinetobacter spp	03 (18.8)	05 (10.9)
Pseudomonas spp.	01 (6.2)	03 (6.5)
Enterobacter spp.	01 (6.2)	03 (6.5)
Proteus spp	00	01 (2.2)
Stap.aureus	03 (18.8)	05 (10.9)
CONS	00	03 (6.5)
Enterococci	00	01 (2.2)
Total	16	46

Discussion: In present study, blood culture was positive in 62%. Choudhary VP *et al*⁸ conducted a prospective study in special care nursery of Indira Gandhi Institute of Child Health, over a period of one year. They observed septicemia in 51.5% neonates in their study.

In our study most common isolated organisms were gram negative 37(80.65%) & 25 (19.35%) Gram positive organisms. It was supported by Vinod Kumar CS⁹ & reported gram negative bacilli as predominant organisms isolated.

In the present study klebsiella (40%) is most frequently encountered organisms causing neonatal septicemia followed by Staph.aureus, E.coli, Acinetobacter, Pseudomonas and Enterobacter spp. In recent past most of the studies have reported higher incidence of klebsiella septicemia. Same observations were found by Neelam Kaistha¹⁰ (28.3%) & Bhattacharjee *et al* (25%)¹¹.

In the present study, 16(25.80%) cases having Early Onset Septicemia (EOS) within 3 days of life & 46(74.20%) cases have Late Onset Septicemia after 3 days of life. In the study of Khatau S.P *et al*¹² clinical septicemia developed within 5 days in (70.64%).

Boo, N.Y *et al*¹³ has observed that more than 50% of neonatal septicemia occurred after the age of two days. Prolong stay in NICU, neonates having congenital malformation, focal infection; LBW and premature exposure to external instrumentation have more chances to develop late sepsis. In our study *klebsiella* was the most common organism in both early onset sepsis. After klebsiella, the most common organism were acinetobacter & staph aureus. However, in contrast with our study the Movahedian AH found that gram-positive organisms constituted the majority of early onset sepsis. This result could be because of predominance of *Group B Streptococcus* (GBS) in developed countries.

Conclusion: Varieties of microorganisms like gram negative and gram positive bacteria are

responsible for neonatal septicemia. Therefore early diagnosis & effective treatment with appropriate antibiotics is the only way to prevent neonatal morbidity & mortality. For definitive diagnosis of septicemia causative microbes are required to be isolated from blood culture which takes minimum time of 48 hours. It also provides correct guideline to institute rational antibiotic therapy.

References:

1. Behrman R, Martin R, Fanaroff A, Behrman's Neonatal Perinatal Medicine, 3rd Ed 1983; 650-656.
2. Behrman R, Kleigman R, Nelson Textbook of Pediatrics. 17th Ed 623-638:847-848.
3. Park K. Parks Textbook of Preventive & Social Medicine, 18th Ed 352-404
4. Cloherty J.P. *et al*, Infections, Manual of Neonatal Care. 4th Ed, 255-340
5. Collee JG, Fraser AG, Marmion BP, Simmons A. Mackie and McCartney Practical Medical Microbiology. 14th ed.
6. Betty A. Forbes, Daniel F. Sahm, Alice S, Weissfeld. Bailey & Scott's Diagnostic Microbiology. 12th ed, 216-247
7. Koneman EW, Allen Stephen D. *Colour Atlas and Textbook of diagnostic microbiology*. 6th edition
8. Choudhary P, Farel MI, Choudhary M, A Ghapar, Neonatal infection and their outcomes. Indian Pediatr 1987; 24: 1019-1024.
9. Vinod Kumar CS, Neelagund YF, Kalsunath Suneeta, Banapurmath Sudha *et al* : Perinatal risk factors and microbial profile of neonatal septicemia. A multicentred study. J. Obst. Gynaec. India, Jan.-Feb. 2008; vol. 58, no. 1 : 32-40.
10. Neelam Kaistha, Manjula Mehta, Nidhi Singla, Ritu Garg, Jagdish Chander *J Infect Dev Ctries* 2010; 4(1):055-057
11. Bhattacharjee A, Sen MR, Prakash P, Gaur A *et al* : Brief communication. Increased prevalence of ESBL producer in Neonatal Septicemia cases at a Tertiary Referral Hospital. Ind J. Med. Microbiol, 2008, 26, 4 : 356-360.
12. Khatua SP, Das AK, Chatterjee BD, Ghose B,

Saha A, Khatua S : Neonatal Septicemia. Ind. J. Ped 1986; 53 : 509-514.

13. Boo YN, Chor CY *et al* : Six year trend of neonatal septicemia in large Malaysian hospital. J. Ped. Child Health. Feb 94 : 36.
14. Movahedian AH, Moniri R and Mosayebi Z. Bacterial culture of neonatal Sepsis, Iranian J Publ Health 2006;33:84-89

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