Neonatal Sepsis in A Tertiary Care Hospital: Evaluation of Causative Agents and Antimicrobial Susceptibilities

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Abstract

***Background**: Neonatal sepsis is an important issue with a high morbidity and mortality rate in spite of new advances in antibiotic therapy. Identifying the causative agents and their antibiotic sensitivity in a neonatal care unit (NCU) helps the physician to choose the most appropriate antibiotic therapy.*

***Objectives**: This study was aimed to find out the etiological agent and antibiotic susceptibilities in newborn with culture positive sepsis.*

***Methodology**: This was a cross sectional study carried out in the neonatal care unit (NCU) of Sir Salimullah Medical College Mitford Hospital (SSMC) from June 2010 to May 2011. Seventy five neonates both preterm and term with culture proven sepsis were analyzed from admitted sick newborn to find out their etiology and antimicrobial sensitivity pattern. Blood culture was done in the department of Microbiology of the same medical college hospital.*

***Results:** In this study, out of 75 cases, early onset sepsis was observed in 55(73.33%) cases. Whereas late onset sepsis was in 20(26.66%) cases. Gram negative organisms were isolated in 59 (78%) of 75 cases. Pseudomonas aeroginosa 27 (46.55%), E Coli 15(25.86%) and Serratia 8 (13.79%) were the common microbes. Coagulase negative staphylococcus (CONS) was 10 (62%), followed by Staphylococcus aureus 6 (38%) were the major Gram positive isolates. Gram negative isolates were sensitive to Imipenem, Ceftazidime and Ciprofloxacin whereas 80 % gram positive isolates were sensitive to Amikacin.*

***Conclusion :** It was observed from this study that gram negative organisms like pseudomonas aeroginosa and E.coli were the common organisms for neonatal sepsis in hospitalized neonates and imipenem was the most sensitive drug against gram - ve septicaemia.*

***Key words:** Neonate, Sepsis, Blood culture, Micro-organism*

Introduction

Sepsis is defined as systemic inflammatory response syndrome (SIRS); an inflammatory cascade that is initiated by the host in response to infection[1].Severe bacterial infection of the newborn in the first month of life is neonatal sepsis. This sepsis can be divided into two main subtypes like early onset and late onset sepsis depending on whether the onset is during the first seven days of life or later. Neonatal sepsis is an important issue with a high mortality and morbidity rate in spite of new advances in antibiotic therapy[2,3]. An early and accurate aetiological diagnosis is not always easy. As the disease may start with minimal or nonspecific symptoms delayed treatment until clinical recognition of signs and symptoms of sepsis entails risk of preventable mortality. On the other hand presumptive antibiotic therapy may result in over treatment. Of necessity, many more babies are treated for sepsis than the numbers who actually have the condition. Various studies on bacteriological profile of neonatal sepsis have already been done in different hospital like Dhaka Shishu Hospital and BIRDEM

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hospital[4]. It is important to remember that bacterial flora is dynamic, different from one place to another and it changes in the same place over a period of time. It is essential to closely monitor the bacterial flora of the NICU and the antibiotic sensitivity pattern of pathogens to evolve rational antibiotic policy which is suitable for each neonatal care unit. As there was no study on this topic in Sir Salimullah Medical College Mitford Hospital(SSMC) in the past; So this study has been designed in the neonatal care unit of SSMC Mitford Hospital to evaluate the common organism associated with neonatal sepsis of our neonatal care unit.

Methodology

This was a cross sectional study carried out in the neonatal care unit (NCU) of Sir Salimullah medical college Mitford hospital(SSMC) from June 2010 to May 2011. Seventy five neonates both preterm and term with culture proven sepsis were analyzed from admitted sick newborn to find their etiology and antimicrobial sensitivity pattern. Any newborn with congenital anomaly and sepsis were excluded from the study.

Early onset neonatal sepsis (EONS) was defined as sepsis that occurred within seven days of life[1,2]. On the other hand late onset sepsis (LONS) was considered when it occurred after that period[1,2].

Clinical clues to provisional diagnosis of neonatal sepsis were poor feeding or feeding difficulty, respiratory distress, jaundice, convulsion, fever or hypothermia. abdominal distention, loose motion and umbilical sepsis. To make a clinical diagnosis of sepsis blood was sent for Complete blood count, CRP and blood culture and X- ray chest was done in relevant cases.

Blood culture was done in the department of Microbiology of SSMC. With all aseptic precaution 2 ml of blood was drawn mostly from anticubital vein directly inoculated to 20 ml of blood culture media. Media used was trypticase soya broth. Subculture was done at 24 and 36 hours to respective solid enriched media for isolation of pure culture. Identification was done by respective biochemical test. All the records of the study population were carefully reviewed and data including sex , birth weight, gestational age, clinical feature consistent with sepsis, results of cultures, antibiotic sensitivity of the patients were entered into a data collection sheet.

Results:

In this study, out of 75 cases 40(53.33%) babies were delivered by normal vaginal delivery. It had male preponderance with weight ranging from 1-4 kg, median was 2.6 kg. Fifty two (69.3%) were term and the gestational age ranged from 27-42 weeks.(Table- I) Early onset sepsis was observed in 55(73.33%) cases. Whereas late onset sepsis was in 20(26.66%) cases. History of delayed cry was an important associated feature followed by respiratory and feeding problem (Table-II). Gram negative organisms were isolated in 59 (78%) of 75 cases. With Pseudomonas aeroginosa 27 (46.55%), E Coli 15(25.86%) and Serratia 8 (13.79%) were the common microbes. Coagulase negative staphylococcus (CONS) was10 (62%), followed by Staphylococcus aureus 6(38%) were the major Gram positive isolates(Table-III). Gram negative isolates were sensitive to Imipenem, Ceftazidime and Ciprofloxacin (Table-IV). Whereas 80 % gram positive isolates were sensitive to Amikacin(Table-V).

Table- I

Distribution of neonates according to neonatal characteristics.(n=75)

Characteristics	Preterm=23	Percentage	Term=52	Percentage	Total=75	Percentage
Gestational age(weeks)	27-<37		37-42		27-42	
Sex M/F	17/6		32/20		49/26	
Birth weight(kg)	1-2.5		2.1-4		1-4	
Mode of delivery						
LUCS	11	47.82	24	46.15	35	46.66
NVD	13	56.52	27	51.92	40	53.33
Sepsis						
EONS	18	78.26	37	71.15	55	73.33
LONS	6	26.08	14	26.92	20	26.66

Table II
Distribution of neonate according to clinical features (n= 75)

Features	EONS (55)	Per-centage	LONS (20)	Per centage
Delayed cry	30	54.5	1	5
Respiratory problem	16	29.1	4	20
Feeding problem	16	29.1	7	35
Jaundice	11	20.0	6	30
Convulsion	10	18.2	3	15
Fever	8	14.5	4	20
Abdominal Distension	5	9.1	2	10
Umbilical Sepsis	2	3.6	0	0
Oral Thrush	2	3.6	0	0
Loose motion	1	1.8	1	5
Bleeding	1	1.8	1	5

Table III
Spectrum of isolated microorganisms from blood culture (n=75)

Gram negative bacteria	Number	Percentage
	59	78
Pseudomonas	27	46.5
E coli	15	25.9
Serratia	8	13.8
Acinatobactor	5	8.6
Klebsiella	2	3.4
Enterobactor	1	1.7
Salmonella typhi	1	1.7
Gram positive bacteria	16	21.3
CONS	10	62.0
Staph Aureus	6	38.0

Table IV
Antibiotic sensitivity pattern of gm-ve organisms in neonate with sepsis

Organisms	No.	Imipenem	Ceftazidime	Ciprofloxacin	Amikacin	Ceftriaxone	Levofloxacin
Pseudomonas	27	19	24	20	11	8	0
E coli	15	13	7	1	8	0	7
Serratia	8	8	3	5	3	0	1
Acinatobactor	5	3	3	2	0	3	0
Klebsiella	2	2	1	1	1	1	1
Enterobactor	1	1	1	1	0	1	0
Salmonella Typhi	1	1	0	0	0	0	0
Total	59	47	39	30	23	13	9

Table V
Antibiotic sensitivity pattern of gram positive isolates of neonates with sepsis.

Organisms	Number	Imipenem	Ceftazidime	Ciprofloxacin	Amikacin	Ceftriaxone	Levofloxacin
CONS	10(62%)	0	0	1	8	0	3
Staph Aureus	6(38%)	0	0	0	5	1	2
Total	16	0	0	1	13(81%)	1	5

Discussion:

The expectancy of life of neonates is advancing with new life support and new treatment modalities. As a result of increased life expectancy, duration of hospitalization is also increasing and in spite of new antibiotics and new supportive measures, neonatal sepsis and its treatment has become a major problem in NCU. To overcome this problem it is important to know the distribution of etiological agents and their antimicrobial sensitivity[6-8]

Microbiological aetiology of Neonatal sepsis is diverse. Several studies on neonatal sepsis have documented the diversities of bacteria. In developed countries Listeria monocytogens, Group B Streptococcus, E Coli, Staph Aureus, CONS and Gram- negative enteric bacilli are the most common causes of sepsis in NCU.

Recent studies from developing countries have shown that the most common microorganism in neonatal sepsis are CONS, Klebsiella, Enterobactor, Serratia,

E Coli, Staph Aureus and Pseudomonas[9,10]. In another study done in the special care baby unit, BIRDEM Hospital in 2008 showed that commonly isolated organisms were Klebsiella and Enterobacter.[11] The finding of our study regarding organism pattern or causative aetiological agents is consistent with the studies [12-13] Coagulase negative staphylococcus followed by Staphylococcus aureus were the major gram positive isolates. This finding is consistent with the study of Shahsanam[15]. Pseudomonas was sensitive to Ceftazidime and Imipenem/ Meropenem in 100% cases. Pseudomonas was sensitive to Cipro/ Levofloxacin in 87.5% cases. E coli was sensitive to the above mentioned drug including Amikacin in 83% cases. Majority of gram positive isolates was sensitive to Amikacin. This type of sensitivity pattern is also evident in other study[15]

Group B Streptococcus, a common cause of neonatal sepsis in the Western countries is infrequent in India and in other tropical countries.[15-16] Our study also shows the absence of this organism causing sepsis in newborn.

Conclusion:

Sepsis was more prevalent among term, male newborns of normal birth weight. History of delayed cry was an important associated feature followed by respiratory and feeding problem. Most common organisms were Pseudomonas Aeruginosa followed by E coli and Serratia. These were sensitive to Imipenem, Ceftazidime and Ciprofloxacin. On the other hand Gram positive organisms mainly CONS and Staphylococcus aureus were sensitive to Amicacin.

Limitations of this Study

Culture and sensitivity tests were done on available drugs only.

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