

Neonatal sepsis and its associated factors among neonates admitted in a rural tertiary Care Centre.

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Abstract

Background: Neonatal sepsis is a bloodstream infection, and it remains a significant cause of morbidity and mortality.

Objectives:

- 1) To find out the prevalence of neonatal sepsis among neonates.
- 2) To determine the factors associated with it among them.

Materials & Methods: This retrospective study was done in rural tertiary care hospital, Kuppam, Andhra Pradesh for 2 months. Data were collected from the hospital records of those reported with neonatal sepsis in the past 1 years. 60 such records with data regarding factors associated with neonatal sepsis among the neonates admitted to NICU were included.

Results: Among the 60 neonates with neonatal sepsis cases maternal factors showed that majority were found to be Primi gravida (65%), Sepsis work up done on admission revealed low total leukocyte count in 5% (n = 3), high total leukocyte count in 15% (n = 9) and normal leukocyte count in 80% (n = 48). Platelet count was low in 15 babies (25%) and normal in 45 babies (75%). C reactive protein was elevated 35 babies (58%) and normal in 15 babies (42%). Culture of blood samples showed positive growth in 18 babies (30%) and no growth in 42 babies (70%). Of the 60 babies included in the study, 48 babies (80%) improved and were successfully discharged while 12 babies (20%) did not survive. Blood culture report showed positive growth in 18 babies.

Conclusion: Understanding of the risk factors for neonatal sepsis will help in better management of such cases, especially in a rural setup.

Keywords: Neonatal sepsis, CRP, PROM, Apgar score

Introduction

Neonatal sepsis is a bloodstream infection. Neonatal sepsis remains a significant cause of morbidity and mortality.¹ Neonatal sepsis can be divided into early-onset neonatal sepsis and late-onset neonatal sepsis. Early neonatal sepsis (EOS) is defined as the occurrence of sepsis within 72 hours after birth, or within 7 days after birth. This is mainly due to the vertical transmission of bacteria from maternal to child at birth. Late neonatal sepsis (LOS) is an infection that occurs after 72 hours or after 1 week following birth and it is related to the horizontal transmission of pathogens after birth². Clinical features are non-specific and are inefficient for identifying neonates with early-onset sepsis (EOS). Culture results take up to 48 hours; have been found to be positive in 25% to 45% of cases; and run the risk of false-positive/ low-yield results after antenatal antibiotic exposure.³ Even though clinical parameters play an important role in diagnosing neonatal sepsis, laboratory investigation is the gold standard. Laboratory parameters include neutrophil count (<1500 cells/mm³ or >7500 cells/mm³), platelet count less than 100, and C-reactive protein >15 mg/acidosis with base excesses 40 mg/dL.⁴

Therefore, this study is aimed to assess prevalence of neonatal sepsis and associated factors at rural tertiary care hospital.

Aims and objectives

To find out the prevalence of neonatal sepsis among neonates. 2) To determine the factors associated with it among them.

Materials and method

This retrospective study was done in rural tertiary care hospital, Kuppam, Andhra Pradesh for 2 months. Data were collected from the hospital records of those reported with neonatal sepsis in the past 1 years. 60 such records with data regarding factors associated with neonatal sepsis among the neonates admitted to NICU were included.

Inclusion criteria

All neonates with symptoms and clinical signs suggestive of sepsis with or without maternal and/or neonatal risk factors.

Exclusion criteria

- 1) Birth Asphyxia
- 2) MAS
- 3) Physiological jaundice
- 4) Nosocomial infections (infants who were admitted for causes other than sepsis but develop features of sepsis thereafter)
- 5) ELWB<1kg.

This study was approved by the Ethical Committee of our institute.

Newborn infants who were thought to have sepsis and whose parents agreed to participate in the trial were enrolled. Neonates with suspected sepsis whose parents gave consent were enrolled for the study. This included taking note of maternal risk factors such as prematurity, intrapartum fever, PROM >18 hours, per vaginal examination >3 during delivery, etc., as well as neonatal risk factors such as feeding pattern, administration of native medicines, etc. For all newborns who were admitted with these symptoms, maternal risk factors such as prematurity and intrapartum fever were A proforma that had been developed beforehand was used to record the findings. At the time of admission, a chest

x-ray, blood culture, C-reactive protein test, lumbar puncture (if necessary), and peripheral smear investigations for total WBC count, IT Ratio, and toxic granules were performed on all neonates who were thought to be suffering from septic newborn syndrome. Antibiotics were prescribed on an ad hoc basis to the patients, and treatment was adapted in light of the findings of the investigations. Analyses will be performed using all of these data to determine risk factors, clinical presentation, the aetiology of sepsis, and the outcome of sepsis in response to therapy.

Statistical analysis

Data will be entered in excel sheet; Statistical analysis of the data will be performed by statistical software SPSS. Outcome variables will be categorized as normal or abnormal and their prevalence will be expressed as percentage and p value of < 0.05 will be considered significant. **Ethical issues**

Parents of all babies recruited in the study were explained about the methodology and investigations in detail and consent obtained.

Results & observation

In this study 60 neonates with suspected sepsis admitted in the newborn ward were enrolled. Which included 19 male and 41 female patients.

Among the 60 noenates with neonatal sepsis cases maternal factors showed that majority were found to be multigravida (65%), h/o maternal fever reported in 2 cases, h/o APH in 1 case .11% of the mothers had a history of prolonged ruptured membranes and majority delivered through normal vaginal delivery. neonatal factors associated with sepsis among the neonates include neonatal age between 1- 7 days (45%), preterm (55%), male sex (32%), Apgar score < 7(53.3%), birth weight <2500 gms (32%).

Table 1:

Characteristics		Frequency	Percent
Gravida	Primi	39	65
	Multigravida	21	35
Maternal risk factors	APH	1	2
	h/o foul smelling liquor	8	13
	h/o chorioamniotitis	5	8
	PROM	7	11
	Maternal fever	9	15
Age	1-7 days	27	45
	8-28 days	33	55
sex	Male	19	32
	Female	41	68
Birth weight	< 2.5 kg	41	68
	> 2.5 kgs	19	32
Gestational age	Preterm	33	55
	Term	27	45
Apgar score	<7	32	53
	>7	28	47
WBC Count	Normal	48	80
	Low	3	5
	High	9	15
Platelet count	Normal	45	75
	Low	15	25
CRP	high	35	58
	Normal	15	42
Culture and sensitivity	Negative	42	70
	Positive	18	30

Sepsis work up done on admission revealed low total leukocyte count in 5% (n = 3), high total leukocyte count in 15% (n = 9) and normal leukocyte count in 80% (n = 48). Platelet count was low in 15 babies 25%) and

normal in 45 babies (75%). C reactive protein was elevated 35 babies (58%) and normal in 15 babies 42%). Culture of blood samples showed positive growth in 18 babies (30%) and no growth in 42 babies (70%). Of the 60 babies included in the study, 48 babies (80%) improved and were successfully discharged while 12 babies (20%) did not survive. Blood culture report showed positive growth in 18 babies.

Discussion

Sepsis is the commonest cause of neonatal morbidity and mortality. It is responsible for about 30-50% of total neonatal deaths.⁵ Sepsis related morbidity and mortality is largely either preventable or treatable with rational antimicrobial and supportive therapy. Female neonates were reported to be affected more with sepsis as compared to males. LBW is a strong risk factor for neonatal sepsis due to multiple reasons. Unsafe delivery or unclean delivery at inappropriate place is another important predisposing factor for sepsis. LBW is a strong risk factor contributing to sepsis. In this study birth weight is inversely related to development of sepsis which is statistically highly significant ($p < 0.000$).

This is in concordance with other studies where low birth was found to be important risk factor for sepsis.^{6,7} LBW babies are mostly also premature and are predisposed to sepsis due to multiple reasons like immune incompetence at various levels of defense, more subjected to invasive interventions etc.

culture positive cases were seen in neonates in the present study. This could be due to ascending infection following rupture of membranes or through the infected birth canal or at the time of resuscitation of the newborn in the labour room. Immature immunological responses of the neonates in the first week of life makes them more susceptible to infections in this period. Similar

observations were made in the studies by other authors^{8,9,1}

The proportion of culture positive septicemia cases in this study was higher among the low-birth-weight neonates as compared to the normal birth weight neonates¹¹. The rate of infection is inversely proportional to the birth weight, and low IgG levels due to impaired cellular immunity in the low-birth-weight neonates contributes to the increased susceptibility to infections in these neonates.

Preterms are more susceptible to infections due to inherent deficiencies of both humoral and cellular defense mechanisms. It is suggested that the incidence of septicemia increases with the decreased gestational age of the neonates¹¹, thereby making preterms more vulnerable to infection. Studies by some authors showed a higher proportion of cases among the term neonates compared to the preterm neonates.⁸ In this study, the mean duration of hospitalization in proven sepsis group was significantly longer. The CRP test had high sensitivity but had low positive predictive value in diagnosing septicaemia.

Various studies by other authors show variable results to this test.^{12,13,14} The differences in the results of this parameter shown by the different studies is due to variations in the diagnostic criteria, the time of onset of infection (early or late) and different methods of CRP estimation. Neonatal septicemia is associated with leucopenia.¹⁵ In the present study, Leucopenia i.e., Total WBC counts < 5000 cells/cu.mm was taken as the diagnostic criteria for detecting neonatal septicemia. Leucopenia had a low sensitivity, and positive predictive value but, a very high specificity, negative predictive value similar to the observation made by another study.¹⁶ The differences in the results of this parameter

in different studies may be due to variations in the blood sampling time, the severity of infection, the diagnostic criteria followed, the age of the neonates.

Maximum number of cases was seen in neonates delivered by spontaneous vaginal delivery in the present study. The higher rates of neonatal septicemia in vaginally delivered neonates may be due to the surface colonization of the neonate with the microbial flora of the birth canal during vaginal delivery. In the present study, the higher proportion of culture positive septicemia among hospital inborn neonates' points to a probable hospital acquired source of infection in them. In the present study, 18/60 cases studied were culture positive, these results were comparable with the studies conducted by other authors while, some authors showed a very low culture positivity rate (range = 25% to 42%) in their study. The low culture positivity in these studies may be due to intrapartum administration of antibiotics to mothers which can affect the blood culture results in neonates.

Conclusion

- The incidence of sepsis was shown to be higher among neonates with Perinatal risk factors such as risk factors, multiple vaginal examination during labour, low birth weight and preterm neonates
- Neonatal septicemia is still a leading cause of mortality and morbidity in developing countries like India. It is more common among low birth weight and preterm neonates. It is also found to be more common among the hospital inborn neonates with spontaneous vaginal delivery.
- Blood culture is still the "Gold standard" for the diagnosis of septicemia in neonates and should be done in all cases of suspected septicemia. In view of the changing spectrum of the causative agents of neonatal

septicemia and their antibiotic susceptibility patterns from time to time and from one hospital to another, a positive blood culture and the antibiotic susceptibility testing of the isolates are the best guide in choosing the appropriate antimicrobial therapy in treating neonatal septicemia.

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