

Clinical profile of cases of neonatal septicemia

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Abstract

Introduction: Neonatal septicemia is a clinical syndrome characterized by a nonspecific signs and symptoms in association with bacteremia that occurs in the first month of life. It is an important cause of morbidity and mortality among neonates in India with an estimated incidence of approximately 4% in intramural live births. Blood culture remains the gold standard for the diagnosis of neonatal septicemia. *Methodology:* Patients presented to department of pediatrics (NICU), were examined clinically by pediatricians and 122 cases of neonatal septicemia were identified on the basis of the signs and symptoms and were included for the study. *Results:* The distribution of 122 suspected cases of neonatal septicemia studied according place of birth was, 106 (86.88%) babies were inborn followed by 16 (13.12%) outborn babies. Of 16 outborn, 14 (11.48 %) neonates were born in the hospital and 2 (1.63%) babies had born in ambulance. *Conclusion:* In the present study, among 122 cases, 41(33.30%) were preterm babies, 80 (65.59%) were term babies and 1 (0.81%) neonate was found to be post term.

Keywords: Neonatal Septicemia; EOS; LOS.

Introduction

Sepsis in EOS and LOS manifests as clinical syndromes such as generalized sepsis, meningitis and respiratory symptoms. Asymptomatic bacteremia is a known characteristic feature in patients, in particular, with EOS.

The patients generally present with irritability, lethargy, temperature instability, poor feeding, vomiting, poor perfusion and hypotension. Patients with meningitis may present with seizures, apnoea, neck rigidity and altered sensorium. Respiratory symptoms can range in severity from mild tachypnoea, grunting, to respiratory distress and failure. Persistent pulmonary tension of the newborn can also accompany sepsis. Severe sepsis patients may present with disseminated

intravascular coagulation (DIC) with purpura and petechiae [1].

In fact, French midwives and obstetricians have made the major contributions in beginning the history of neonatology and not the pediatrician even after specialized care of infants was introduced to the United States, however it was observed that some of the most early practitioners and researchers were obstetricians and anesthesiologists. Another interesting evidence of the early history of neonatology was the existence of "incubator baby side shows" at global fair in America over a 40 years period from 1898, also by Transmississippi exposition in Omaha and New York world's fair in 1939. These made possibility of regionalized intensive care for hundreds of newborn by bringing down the rate of mortality [13].

The first scientific epidemiological study carried out by Ignaz Semmelweis suggested how diseases were transmitted and measures to interrupt transmission [2].

Ignaz Semmelweis who was a Hungarian obstetrician observed the pregnant women dying of puerperal sepsis (child bed fever) during labour in his hospital and found that disease was more prevalent in the ward handled by medical students suggesting the mode of transmission which involved medical students and the source of contagion could be cadavers on which the medical students had previously performed autopsies. In 1847, Semmelweis directed his staff and students to wash their hands with chlorine water before entering the maternity ward. This simple hygienic practice could result in the reduction of mortality associated with childbed fever [3].

Providing of neonatal care facilities, mainly the primary and some secondary care began in India during 1960s. However Neonatal intensive care unit (NICU) concept in India began to make its appearance only in the 1980s in a selected teaching institutions across the country when few neonatologists decided to import/implement the western modes of NICU facilities but still in the early 1990s there were very small number of NICU facilities available across the country [3].

Neonatal septicemia is a clinical syndrome characterized by a nonspecific signs and symptoms in association with bacteremia that occurs in the first month of life. It is an important cause of morbidity and mortality among neonates in India with an estimated incidence of approximately 4% in intramural live births. Blood culture remains the gold standard for the diagnosis of neonatal septicemia [4,5].

Neonatal septicemia is classified as "EOS" if it occurs within the first week of life and as "LOS" if occurring after the first week until the end of the neonatal period as noted above. EOS is conventionally regarded as maternally-acquired, with causative organisms such as *Escherichia coli* (*E.coli*) and GBS usually found in the maternal genital tract, whereas LOS is considered environmental in origin either hospital or community acquired. Commonly implicated organisms in hospital acquired are CONS, *Staphylococcus aureus* (*S.aureus*) and Gram negative bacilli (GNB) such as *Klebsiella* and *Pseudomonas* species [6].

Kaistha and colleagues [7] in their study, suspected sepsis - when neonates had systemic signs such as lethargy, chest retraction, grunting, abdominal distension, tachycardia, hypothermia in presence or absence of maternal risk factors such as chorioamnionitis, prolonged rupture of membranes (>24hrs), diarrhea, fever or urinary tract infection.

Camacho-Gonzalez and coworkers⁸ in their review enlisted maternal risk factors like GBS colonization, chorioamnionitis, prolonged rupture of membranes, multiple pregnancies, preterm delivery and neonatal risk factors such as prematurity and low birth weight for the occurrence of neonatal septicaemia. A total of 46(19%) mothers of septicaemic neonates had prolonged or obstructed labour, 34(14%) had prolonged rupture of membranes, 25(10%) had PROM where as pre-eclampsia was reported in 13(5%).

Methodology

Patients presented to department of pediatrics (NICU), were examined clinically by pediatricians and 122 cases of neonatal septicemia were identified on the basis of the signs and symptoms and were included for the study. This is followed by collection of blood for culture after obtaining informed expressed written consent.

A total of 122 neonates clinically suspected of neonatal septicaemia reported to Hospital, were examined during a study period and the criteria were as outlined below.

Inclusion criteria

1. Clinically suspected cases of neonatal septicaemia.

Exclusion criteria

1. Neonates clinically suspected of septicaemia but had received antibiotics were excluded from the study.

1-2mL of blood was collected from the peripheral veins following all standard aseptic precautions as per CLSI guidelines. The collected blood specimen was immediately inoculated onto 5mL (when 1mL was obtained) or 10mL (when 2mL was obtained) of liquid broth (BHI broth with SPS) culture medium and mixed gently immediately.

Results

Table 1: Age and sex distribution of 122 neonatal septicaemia cases studied

Age (Days)	Male No (%) of cases	Female No(%) of cases	Total No(%) of cases
1	40(32.79)	37(30.32)	77(63.11)
2	03(2.45)	06(4.91)	09(7.37)
3	07(5.73)	05(4.10)	12(9.83)
4	07(5.73)	00(00)	07(5.73)
6	00(00)	03(2.45)	03(2.45)
7	00(00)	01(0.81)	01(0.81)
8	00(00)	01(0.81)	01(0.81)
10	02(1.63)	01(0.81)	03(2.45)
12	01(0.81)	00(00)	01(0.81)
14	00(00)	02(1.63)	02(1.63)
15	00(00)	01(0.81)	01(0.81)
21	00(00)	01(0.81)	01(0.81)
24	00(00)	01(0.81)	01(0.81)
26	00(00)	02(1.63)	02(1.63)
27	00(00)	01(0.81)	01(0.81)
Total	60(49.19)	62(50.81)	122(100)

Age of neonates was from 1day to 27days, the mean age of patients being 2.77 days with SD4.44 days. Out of the 122 neonates with clinical suspicion of septicaemia studied, 109 (89.3%) belonged to EOS and 13 (5.7%) to LOS. Among 122 neonates, females were 62 (50.81%), while males were 60 (49.19%). Among females, mean age observed was 3.44 days with SD 5.49 days, similarly in males, mean age was 2.08 days SD being 2.8 days.

Table 2: Depicting gestational age of 122 neonatal septicaemia cases studied

Gestational age	No(%) of cases
Preterm	41(33.60)
Term	80(65.59)
Post term	01(0.81)
Total	122

Among 122 suspected cases of neonatal septicaemia, 41(33.30%) were preterm babies, 80 (65.59%) were term babies and 1(0.81%) neonate was found to be post term.

Table 3: Distribution of 122 neonatal septicaemia cases studied according to the place of birth

Place of birth	No(%) of cases
Inborn(BIMS Hospital)	106(86.88)
Outborn(16(13.12)	
Hospital	14(11.48)
Ambulance	2(1.63)
Total	122

The distribution of 122 suspected cases of neonatal septicemia studied according place of birth was, 106 (86.88%) babies were inborn (BIMS, Hospital) followed by 16(13.12%) outworn babies. Of 16 outworn, 14 (11.48 %) neonates were born in the hospital and 2(1.63%) babies had born in ambulance.

Table 4: Distribution of 122 neonatal septicaemic cases studied according to the mode of their birth.

Mode of birth	No(%) of cases
Spontaneous vaginal	100(81.97)
Assisted vaginal	1(0.81)
Cesarean section	21(17.22)
Total	122

Among 122 suspected cases of neonatal septicaemia studied, 100(81.97) neonates took birth by spontaneous vaginal followed by by cesarean section in 21(17.22%) and birth by assisted vaginal was seen in 1(0.81%) case.

Table 5: Distribution of birth weight recorded in 122 neonatal septicaemic cases studied

Birth weight	No(%) of cases
Normal weight (2.5 kg-4 kg)	59(48.36)
Low birth weight (1.5 kg- ≤2.4 kg)	53(43.44)
Very low birth weight (1 kg- ≤ 1.4kg)	9(7.37)
Extremely low birth weight (Less than 1 kg)	1(0.81)
Total	122

Among 122 cases, 59 (48.36%) neonates had normal weight while 53 (43.44%) patients had LBW followed by 9 (7.37%) cases with very low birth weight and 1 (0.81%) case exhibited extremely low birth weight.

Table 6: Distribution of maternal risk factors seen among 37 mothers (122 neonatal septicaemic cases studied)

Risk factors	No(%) of cases
Prolonged rupture of membranes	04(10.81)
Premature rupture of membranes	03(8.10)
Foul smelling / meconium stained liquor	06(16.21)
Multiple pregnancies	12(32.43)
Pregnancy induced hypertension	08(21.62)
Others(04)	
1. Hypertensive	01 (2.70)
2. Prolonged labour	03 (8.10)

A total of 37 (3.01%) neonates with septicaemia had maternal risk factors. Multiple pregnancies was the predominant risk factor in 12 (32.43%) cases. However, pregnancy induced hypertension was seen in 8 (21.62%) followed by foul smelling / meconium stained liquor in 6 (16.21%), prolonged rupture of membranes in 4 (10.81%), PROM in 3(8.10%)cases and other factors, for instance, previously diagnosed as hypertensive and prolonged labour was seen in 1 (2.70%) and 3 (8.10%) patients respectively.

Table 7: Distribution of clinical presentation noticed in 122 neonatal septicaemic cases studied

Clinical presentation	No [in various combinations] (%) of cases
Hyperthermia/hypothermia	2(1.63)
Tachypnoea/apnoea	82(67.21)
Pathological jaundice	1(0.81)
Refusal for feeds	43(35.24)
Loss of activity	45(36.88)
Seizures	11(9.01)

Among 122 neonatal septicemic cases studied, tachypnoea/apnoea was predominant clinical symptom which was documented in 82 (67.21%) neonates, 45 (36.88%) cases had loss of activity followed by refusal for feeds in 43 (35.24%) patients. However, seizures were determined in 11 (9.01%) cases, hyperthermia/hypothermia and pathological jaundice was seen in 2 (1.63%) and 1 (0.81%) neonates respectively.

Discussion

The present study conducted on 122 neonatal septicemic cases, EOS comprised of large number of cases that was seen 98 (89.34%) neonates which is similar to other studies carried out elsewhere. Naher and Khamael [9] documented EOS in 29(58%) neonates of 50 cases studied. Raha *et al.* [5] recorded EOS in 45(70.3%) of the total 55 cases studied. Tallur *et al* [10] reported incidence of EOS in 202 (83.47%) among 242 cases studied. Incidence of EOS which was observed more commonly in our study can be attributed to vertical transmission during birth, immature immune responses and can also be explained by the maternal risk factors such as PROMS, multiple pregnancies.

Our study showed lesser incidence of septicaemia in preterm neonates accounting to 41(33.60%) babies compared to term 80 (65.59%) babies during the study period. LBW was noted in 53 (43.44%) neonates which is a common neonatal risk factor observed in numerous studies [11]. In a study conducted by Raha *et al.* [11], preterm was reported in 71.88% whereas LBW was seen in 65.63% of total neonates suspected for septicaemia. Tallur *et al* [10] recorded preterm in 96 (39.67%) and LBW in 132 (54.55%) babies among total neonatal septicaemic cases studied and stated that the prematurity and LBW as the most important predisposing factors in neonatal septicaemia because of the immature immune system development. Our study almost correlates with the study carried out by Tallur *et al.*

[10] but there is significant difference seen when compared with the observations of Raha *et al.* [11] in their study, Number of preterm labour and LBW babies is directly proportional to the frequency of maternal risk factors observed. Lower incidence of preterm birth and LBW babies could be due to less number of maternal risk factors found in the present study.

In a study conducted by Tallur *et al.* [10], most common maternal risk factors observed were prolonged/ obstructed labour in 46(19.01%) mothers, prolonged rupture of membranes in 34 (14.05%) and PROM in 25 (10.33%) mothers. Camacho-Gonzalez and colleagues [8] in the recent review enlisted maternal risk factors like group B streptococci colonization, **chorioamnionitis**, prolonged rupture of membranes, multiple pregnancies for neonatal septicaemia and also emphasized the role of maternal risk factors in neonatal infection. However, in our study multiple pregnancy was most common maternal risk factor which was seen in 12 (32.43%) mothers followed by PIH in 8 (21.62%) and Foul smelling / meconium stained liquor in 6 (16.21%) mothers.

Tallur *et al.* [10] although observed diverse clinical manifestations. Jaundice in 64(26.5%) and apnoea in 54 (22.3%) neonates were noticed as main features in their study conducted for 242 newborns with septicaemia. In the present study, tachypnoea/apnoea was most common clinical symptom which was documented in 82 (67.21%) neonates, 45 (36.88%) cases had loss of activity. Tallur *et al.* [10] reported a total of 35 (14.5%) neonates suspected for septicaemia with foci of infection like umbilical sepsis, pyoderma, abscess and conjunctivitis.

Conclusion

However, interestingly there were no foci of infection found in any of the neonates in our study which could be because of clean, safe deliveries and other aseptic precautions taken during labour.

Table 8: Shows neonatal risk factors detected in different studies among neonatal septicaemic cases studied.

Authors and reference	Preterm No (%) of cases	Low birth weight No (%) of cases
Raha <i>et al</i> 11	46(71.88)	42(65.63)
Tallur <i>et al</i> 10	96(39.67)	132(54.55)
Present study	41(33.60)	53(43.44)

In the present study, among 122 cases, 41(33.30%) were preterm babies, 80 (65.59%) were term babies and 1(0.81%) neonate was found to be post term.

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