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IDENTIFICATION OF RISK FACTORS IN NEONATAL SEPSIS: A CROSS-SECTIONAL STUDY IN CENTRAL INDIA

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ABSTRACT:

INTRODUCTION: India has the highest incidence of clinical sepsis i.e.17,000/ 1,00,000 live births. In Neonatal sepsis septicaemia, pneumonia, meningitis, osteomyelitis, arthritis and urinary tract infections can be included. Mortality in the neonatal period each year account for 41% (3.6 million) of all deaths in children under 5 years and most of these deaths occur in low income countries and about one million of these deaths are due to infectious causes including neonatal sepsis, meningitis, and pneumonia. In early onset neonatal sepsis (EOS) Clinical features are non-specific and are inefficient for identifying neonates with early-onset sepsis. Culture results take up to 48 hours and may give false-positive or low-yield results because of the antenatal antibiotic exposure. Reviews of risk factors has been used globally to guide the development of management guidelines for neonatal sepsis, and it is similarly recommended that such evidence be used to inform guideline development for management of neonatal sepsis. MATERIAL AND METHODS: This study was carried out using institution based cross section study at Department of Neonatology, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences(DU), Sawangi(M), Wardha . The total number neonates admitted in the hospital in given study period were 644, of which 234 were diagnosed for neonatal sepsis by the treating pediatrician based on the signs and symptoms during admission. The data was collected: Sociodemographic characteristics; maternal information; and neonatal information for neonatal sepsis like neonatal age on admission, sex, gestational age, birth weight, crying immediately at birth, and resuscitation at birth. RESULTS: Out of 644 neonates admitted 234 (36.34%) were diagnosed for neonatal sepsis by the paediatrician based on the signs and symptoms during admission. Of the 234 neonates, 189 (80.77%) infants were in the age range of 0 to 7 days (Early onset sepsis) while 45 (19.23%) were aged between 8 and 28 days (Late onset sepsis). Male to female ratio in our study was 53.8% and 46% respectively. Out of total 126 male neonates 91(72.2%) were having early onset sepsis while 35 (27.8%) were late onset type. Out of total 108 female neonates 89(82.4%) were having early onset sepsis while 19 (17.6%) were late onset type. Maternal risk factors were identified in 103(57.2%) of early onset sepsis cases while in late onset sepsis cases were 11(20.4%). Foul smelling liquor in early onset sepsis and in late onset sepsis was 10(5.56%) and 2 (3.70%) respectively. In early onset sepsis cases maternal UTI, Meconium stained amniotic fluid, Multipara and Premature rupture of membrane was seen in 21(11.67%), 19 (10.56%), 20(11.11%) and 33 (18.33%) cases respectively. In late onset sepsis cases maternal UTI, Meconium stained amniotic fluid, Multipara and Premature rupture of membrane was seen in 2 (3.70%), 1(1.85%), 3 (5.56%) and 3 (5.56%) cases respectively. CONCLUSION: Maternal risk identification may help in the early identification and empirical antibiotic treatment in neonatal sepsis and thus mortality and morbidity can be reduced.

Introduction:

About one quarter of neonatal deaths are due to neonatal sepsis, pneumonia and meningitis[i] . India has the highest incidence of clinical sepsis i.e.17,000/ 1,00,000 live births[ii]. In Neonatal sepsis septicaemia, pneumonia, meningitis, osteomyelitis, arthritis and urinary tract infections can be included[iii]. Neonatal sepsis contributes significantly to mortality and morbidity among very-low-birth-weight (VLBW, birth weight less than1500 gm) infants in Neonatal Intensive Care Units (NICU)[iv].

Mortality in the neonatal period each year account for 41% (3.6 million) of all deaths in children under 5 years and most of these deaths occur in low income countries and about one million of these deaths are due to infectious causes including neonatal sepsis, meningitis, and pneumonia[v].

The third Sustainable Development Goal for child health (United Nations 2015), having aim to end preventable deaths of neonates and children under five years of age by 2030, may not be met without substantial reduction of neonatal sepsis-specific mortality in the developing countries like India[vi].

Neonates delivered by cesarean section are probably at risk for laceration from sharp instruments during the cesarean procedure.

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Laceration occurs in about 0.1% to 3.1% of cesarean deliveries and this can be a possible route of entry of microorganisms leading to neonatal sepsis[vii]. In early onset neonatal sepsis (EOS) Clinical features are non-specific and are inefficient for identifying neonates with early-onset sepsis[viii]. Culture results take up to 48 hours and may give false-positive or low-yield results because of the antenatal antibiotic exposure.[ix]

Respiratory distress with tachypnea, nasal flaring, grunting and retraction of respiratory muscles can be the signs of neonatal sepsis with or without pneumonia and this can be confused with transient tachypnea of newborn. Neonatal sepsis can be complicated by foci of infection, disseminated intravascular coagulation, congestive heart failure and sometimes shock[x]. Based on the timing of the infection neonatal sepsis has been classified into early-onset sepsis (EOS) and late-onset sepsis (LOS)[xi].

Reviews of risk factors has been used globally to guide the development of management guidelines for neonatal sepsis, and it is similarly recommended that such evidence be used to inform guideline development for management of neonatal sepsis[xii].

Material and Methods

This study was conducted in the Department of Neonatology, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences (DU), Sawangi(M), Wardha. This study was carried out using institution based cross section study. The total number neonate admitted in the hospital in given study period was 644, of which 234 were diagnosed for neonatal sepsis by the treating pediatrician based on the signs and symptoms during admission.

The data was collected: Sociodemographic characteristics; maternal information; and neonatal information for neonatal sepsis like neonatal age on admission, sex, gestational age, birth weight, crying immediately at birth, and resuscitation at birth.

Data was collected and questionnaires were reviewed and organized by investigators. Research assistants were recruited and trained by the principal investigator about the main aim of the study and how to extract information from neonatal medical records in the study checklist. The data were entered after defining variables and analyzed using SPSS v. 20.0 statistical software. Statistical significance was shown if p value less than 0.05 for multivariable and 0.25 for bivariate logistic regressions. Finally, the result was presented using tables and texts.

Results

Out of 644 neonates admitted 234 (36.34%) were diagnosed for neonatal sepsis by the paediatrician based on the signs and symptoms during admission. Of the 234 neonates, 189 (80.77%) infants were in the age range of 0 to 7 days (Early onset sepsis) while 45 (19.23%) were aged between 8 and 28 days (Late onset sepsis). Statistically significant difference was observed between early onset and late onset sepsis patients.

Table 1: Onset of neonatal sepsis

Age	Number n=234 (%)	P value
0 to 7 days	189 (80.77%)	P < 0.0001
8 to 28 days	45 (19.23%)	
Total	234	

Table 2: Gender wise distribution in early and late onset sepsis

Gender	Early onset sepsis	%	late onset sepsis	%	Total	%
Male	91	72.2%	35	27.8%	126	53.8%
Female	89	82.4%	19	17.6%	108	46.2%
Total	180	76.9%	54	23.1%	234	

Male to female ratio in our study was 53.8% and 46% respectively. Out of total 126 male neonates 91(72.2%) were having early onset sepsis while 35 (27.8%) were late onset type. Out of total 108 female neonates 89(82.4%) were having early onset sepsis while 19 (17.6%) were late onset type.

Maternal risk factors for neonatal sepsis were identified in the study. Maternal factors included were Foul smelling liquor, Maternal UTI, Multipara, Premature rupture of membrane and Meconium stained amniotic fluid.

Table 3: Maternal risk factors in neonatal sepsis

Risk factors	Early onset sepsis (n=180)	%	Late onset sepsis (n=54)	%
Foul smelling liquor	10	5.56%	2	3.70%
Maternal UTI	21	11.67%	2	3.70%
Meconium stained amniotic fluid	19	10.56%	1	1.85%
Multipara	20	11.11%	3	5.56%
Premature rupture of membrane	33	18.33%	3	5.56%
Total	103	57.2%	11	20.37%

Maternal risk factors were identified in 103(57.2%) of early onset sepsis cases while in late onset sepsis cases were 11(20.4%). Foul smelling liquor in early onset sepsis and in late onset sepsis was 10(5.56%) and 2 (3.70%) respectively. In early onset sepsis cases maternal UTI, Meconium stained amniotic fluid, Multipara and Premature rupture of membrane was seen in 21(11.67%), 19 (10.56%), 20(11.11%) and 33 (18.33%) cases respectively. In late onset sepsis cases maternal UTI, Meconium stained amniotic fluid, Multipara and Premature rupture of membrane was seen in 2 (3.70%), 1(1.85%), 3 (5.56%) and 3 (5.56%) cases respectively.

In early onset sepsis there were 22 (12.22%) culture positive neonates while in late onset 2(3.70%) were culture positive. Total culture positive were 24 (10.25%)

Discussion:

The case fatality rate of sepsis among neonates in India is between 25% to 65% [xiii]. The application of a risk-factor based approach has been shown to be one of the highly effective approaches for reducing neonatal early-onset sepsis (EOS)-based mortality in High Income Countries. So it is advised in in resource-limited settings and developing countries with a high neonatal mortality rate, such as in India, a combination of risk factors and clinical signs should guide the intrapartum and neonatal management[xiv].

In our study Out of total 126 male neonates, 91(72.2%) were having early onset sepsis while 35 (27.8%) were late onset type. Out of total 108 female neonates 89(82.4%) were having early onset sepsis while 19 (17.6%) were late onset type. Male to female percentage in our study was 53.8% and 46% respectively. Based on the male disadvantage hypothesis incidences of sepsis in male was higher shown in other studies[xv],[xvi].

In a study by Peter Adatara et al observed that early onset of neonatal sepsis (EONS) was high among cases (82.1%). Birth weight, Apgar score in the first and fifth minute, passing out meconium, and duration of stay at the facility were strongly related to the risk of developing early neonatal sepsis which was in accordance with our study. Neonates who had birth weight below 1.5Kg were almost 4 times more likely to have early onset as compared to those with normal birth weight >2.5Kg[xvii]. Siakwa et al. found that infants who were resuscitated at birth to be 5.72 times more likely to develop neonatal sepsis compared to those who were not resuscitated[xviii]. In some studies maternal factors in neonatal early-onset sepsis (EOS) was individually focuced[1].

In our study culture positivity was in early onset sepsis there were 22 (12.22%) culture positive neonates while in late onset 2(3.70%), in other studies culture positive cases ranges from 25% to 45%[xix].

Conclusion

Maternal risk identification may help in the early identification and empirical antibiotic treatment in neonatal sepsis and thus mortality and morbidity can be reduced. And diagnosis of neonatal sepsis should be bases on culture-independent diagnostics and risk factor-based scoring systems however more studies in the area is required to confirm the findings.

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