



NEONATAL SEPSIS AND IDENTIFICATION OF RISK FACTORS: STUDY IN KMMC AND HOSPITAL MATHURA

Dr. Amarjeet Singh¹, Dr. Ashok Kumar Garg²

¹Assistant Professor Dept. of Paediatrics K.M. Medical College and Hospital, Mathura (UP).

²Assistant Professor Dept. of Paediatrics K.M. Medical College and Hospital, Mathura (UP).

Article Info: Received 22 October 2018; Accepted 08 December. 2018

Cite this article as: Singh, Dr. A., & Garg, Dr. A. K. (2019). NEONATAL SEPSIS AND IDENTIFICATION OF RISK FACTORS: STUDY IN KMMC AND HOSPITAL MATHURA. *International Journal of Medical and Biomedical Studies*, 3(1).

DOI: <https://doi.org/10.32553/ijmbs.v3i1.609>

Address for Correspondence: Dr. Ashok Kumar, Assistant Professor Dept. of Paediatrics, K.M. Medical College and Hospital, Mathura (UP).

Conflict of interest: No conflict of interest.

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. The total number neonates 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.

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 meningitisⁱ. India has the highest incidence of clinical sepsis i.e.17,000/ 1,00,000 live birthsⁱⁱ. In Neonatal sepsis septicaemia, pneumonia, meningitis, osteomyelitis, arthritis and urinary tract infections can be includedⁱⁱⁱ. Neonatal sepsis contributes significantly to mortality and morbidity among very-low-birth-weight (VLBW, birth weight less than 1500 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. 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 Paediatrics at K.M. Medical College and Hospital, Mathura (UP). 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 paediatrician 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 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 focused¹.

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 based on culture-independent diagnostics and risk factor-based scoring systems however more studies in the area is required to confirm the findings.

REFERENCES

1. Chan GJ, Lee AC, Baqui AH, Tan J, Black RE. Risk of early-onset neonatal infection with maternal infection or colonization: a global systematic review and meta-analysis. *PLoS Med.* 2013 Aug; 10(8):e1001502.
2. Fleischmann-Struzek C, Goldfarb DM, Schlattmann P, Schlapbach LJ, Reinhart K, Kissoon N. The global burden of paediatric and neonatal sepsis: a systematic review. *Lancet Respir Med.* 2018 Mar; 6(3):223-230
3. Aggarwal R, Sarkar N, Deorari AK, Paul VK. Sepsis in the newborn. *Indian J Pediatr.* 2001 Dec; 68(12):1143-7.
4. Hornik CP, Fort P, Clark RH, Watt K, Benjamin DK Jr, Smith PB, Manzoni P, Jacqz-Aigrain E, Kaguelidou F, Cohen-Wolkowicz M. Early and late onset sepsis in very-low-birth-weight infants from a large group of neonatal intensive care units. *Early Hum Dev.* 2012 May; 88 Suppl 2():S69-74.
5. A. K. M. Zaidi, H. A. Ganatra, S. Syed et al., "Effect of case management on neonatal mortality due to sepsis and pneumonia," *BMC Public Health*, vol. 11, no. 3, article no. S13, 2011.
6. S. L. Ranjeva, B. C. Warf, and S. J. Schiff, "Economic burden of neonatal sepsis in sub-Saharan Africa," *BMJ Global Health*, vol. 3, no. 1, p. e000347, 2018.
7. J. M. Okaro and S. E. Anya, "Accidental incision of the fetus at caesarian section.," *Nigerian journal of medicine : journal of the National Association of*

-
- Resident Doctors of Nigeria, vol. 13, no. 1, pp. 56–58, 2004.
8. Benitz WE, Wynn JL, Polin RA. Reappraisal of guidelines for management of neonates with suspected early-onset sepsis. *J Pediatr.* 2015 Apr; 166(4):1070-4.
 9. Tewari VV, Jain N. Monotherapy with amikacin or piperacillin-tazobactam empirically in neonates at risk for early-onset sepsis: a randomized controlled trial. *J Trop Pediatr.* 2014 Aug; 60(4):297-302.
 10. Martin RJ, Fanaroff AA, Walsh MC. Fanaroff and Martin's neonatal-perinatal medicine: diseases of the fetus and infant. Philadelphia: Saunders/Elsevier, 2011.
 11. Bizzarro MJ, Raskind C, Baltimore RS, Gallagher PG. Seventy-five years of neonatal sepsis at Yale: 1928-2003. *Pediatrics.* 2005 Sep; 116(3):595-602.
 12. National Neonatology Forum India. Evidence based clinical practice guidelines. 2010.
 13. Bangi V, Devi S. Neonatal sepsis: A risk approach. *J Dr NTR University Health Sci.* 2014;3(4):254–258.
 14. Newman TB, Puopolo KM, Wi S, Draper D, Escobar GJ. Interpreting complete blood counts soon after birth in newborns at risk for sepsis. *Pediatrics.* 2010;126(5):903–909. pmid:20974782
 15. Cortese F, Scicchitano P, Gesualdo M, Filaninno A, De Giorgi E, Schettini F, et al. Early and late infections in newborns: where do we stand? A review. *Pediatr Neonat.* 2016;57(4):265–273.
 16. Roy P, Kumar A, Kaur IR, Faridi MMA. Gender differences in outcomes of low birth weight and preterm neonates: the male disadvantage. *J Trop Pediatr.* 2014;60(6):480–481.
 17. Peter Adatara, Agani Afaya, Solomon Mohammed Salia, et al., “Risk Factors for Neonatal Sepsis: A Retrospective Case-Control Study among Neonates Who Were Delivered by Caesarean Section at the Trauma and Specialist Hospital, Winneba, Ghana,” *BioMed Research International*, vol. 2018,
 18. M. Siakwa, D. Kpikpitse, and S. S. Mohamed, “Neonatal sepsis in rural Ghana: A case control study of risk factors in a birth cohort,” *IJRMHS*, vol. 4, no. 5, pp. 77–88, 2014.
 19. Kartik R. Evaluation of screening of neonatal sepsis. *Int J Contemp Pediatrics.* 2006;5(2):580–583
-