International Journal Dental and Medical Sciences Research
Volume 5, Issue 2, Mar - Apr 2023 pp 1014-1018 www.ijdmsrjournal.com ISSN: 2582-6018

Predictors of positive blood culture and death among neonates with early onset sepsis in an inborn ICU of a tertiary care hospital.

Dr.Harismon M[1], Dr. Sujith Nath choudhury[2]
[1]*Post Graduate Trainee,* [2] *Professor*
Department Of Paediatrics, Silchar Medical College & Hospital

Date of Submission: 25-04-2023 Date of Acceptance: 05-05-2023

ABSTRACT
Background: In developing countries, sepsis and associated mortality rates in neonatal patients is a serious concern. Early recognition of serious infections in neonates are mandatory because of poor immunity neonates cannot localize the pathogens, which can easily spread to multiple organs. As resources are scarce and receiving a culture positivity report might take up to 48 hours in a developing nation like India, the combination of risk factors and their association with culture positivity and outcome can help with early intervention.
Objective: To find out the predictors of positive blood culture and death among neonates with early onset sepsis in an inborn ICU of a tertiary care hospital.
Methodology: A hospital based observational study was conducted in the Department of Paediatrics, Silchar Medical College & Hospital from June 2021 to May 2022. A total of 100 sepsis screen positive cases included in this study. Standard data collection form was used to collect all maternal and neonatal risk factors associated. Blood sample was collected aseptically and send for blood culture. The neonates were followed for their outcome until their discharge from the hospital.Chi-square test was applied to test the association between categorical variables
Results: - 100 neonates with sepsis screen positive early onset sepsis enrolled in this study (57 male and 43 female).11 cases were culture proven sepsis. Most common organism isolated were klebsiella. Mortality rate was 5%. Prolonged rupture of membrane in mother ($p<0.05$), meconium-stained amniotic liquor ($p <0.001$), prematurity($p<0.001$) and low birth weight ($p<0.05$) were significantly associated with blood culture positivity. There were statistically significant association between prematurity($P=0.035$), prolonged rupture of membrane($P=0.011$) and birth asphyxia($P=0.028$) with mortality of neonates.
Conclusion: -Our finding suggests that prolonged rupture of membrane, meconium-stained amniotic liquor, prematurity and low birth weights are the predictors of blood culture positivity. Prematurity, birth asphyxia and prolonged rupture of membrane can predict mortality.
Keywords: Death, Neonatal sepsis, Predictors, Positive blood culture

I. INTRODUCTION

Approximately, 1 million deaths per year are caused by infection occurring in the neonatal period (0-28 days), accounting for over 25% of global neonatal deaths. 99% of these deaths occur in developing countries [(1,2)]. Most infection-related deaths in the neonatal period occur in low- and middle-income countries due to poor hygiene & suboptimal practices for infection control. Neonatal sepsis is a clinical syndrome characterized by signs & symptoms of infection with or without accompanying bacteremia in the first month of life [(3)].

Neonatal sepsis is classified into [(4)]:

1. **Early onset neonatal Sepsis (EOS):**
2. **Late onset neonatal Sepsis (LOS)**

The mainstay investigations for sepsis include a sepsis screen, blood culture, and CSF examination (If clinically indicating). Blood culture should do in all cases of suspected sepsis before starting antibiotics with enough amount of blood which collected through an aseptic method. Because resources are scarce and receiving a culture positivity report might take up to 48 hours in a developing nation like India, the combination of risk factors and clinical indications can help with therapy [(5,6,7)]. Hence, I pursued this study on the risk factors of early onset neonatal sepsis and thereby helps in avoidance of risk factors, early diagnosis of neonatal sepsis and its management.

The present study is being conducted in SILCHAR MEDICAL COLLEGE AND HOSPITAL which is located in Cachar district,

International Journal Dental and Medical Sciences Research
Volume 5, Issue 2, Mar - Apr 2023 pp 1014-1018 www.ijdmsrjournal.com ISSN: 2582-6018

Assam and functioning asthe tertiary referral hospital for the entire Barak valley, Dima Hasao district of Assam and neighboring states like Manipur, Tripura, Mizoram, Meghalaya due to the paucity of such studies in this part of the country

II. METHEDOLOGY

SOURCE OF DATA: All neonates admitted to the inborn neonatal intensive care unit of silchar medical college, cacharduring the study period of 1 year.

- STUDY PERIOD- from 2021 June to 2022 May.
- STUDY DESIGN: Hospital based observational study.
- SAMPLE SIZE -100

All neonates fulfilling the inclusion criteria were included as study subjects. An informed consent was obtained from the mothers or any other caretaker if mother was unable to give consent for any reason. Aim, objective and methodology were clearly explained in their own native language. Parents were also assured that treatment will not be denied if they did not give consent.

Mother's details obtained from obstetric case sheets and/or by interviewing the mothers. Baby details collected from the delivery note in obstetric case sheets, from neonatal case sheets and by examination of neonates. From these details risk factors for early onset sepsis in mother and neonate noted and recorded. With proper aseptic precaution 1 ml of blood sent for culture. All babies enrolled in this study and they were treated according to the institutional protocol for sepsis. All babies were followed up for their outcome.

The frequency occurrence of each risk factor analyzed and their relation with blood culture positivity and outcome studied.

1. Inclusion criteria:All neonates of age less than 72 hours who admitted in inborn ICU of Silchar medical college hospital during the study period with suspected sepsis, based on the presence of clinical features that were consistent with bacterial infections [(3)] and having a positive sepsis screen.

2. Exclusion criteria:

Babies with
1. Unstable cardiovascular status
2. With congenital anomaly

III. RESULT

100 babies admitted in inborn neonatal ICU of Silchar medical college and hospital during the study period with suspected sepsis, based on the presence of clinical features that were consistent with bacterial infections and having a positive sepsis screen with in the first three days of life. Majority of babies enrolled in this study were males (57%). Male to female ratio was 1.3:1.

96% of the babies enrolled in this study had at least one risk factors for early onset sepsis. Majority (70%) had maternal factors as a risk factor for sepsis.

Majority of the mothers of neonates in this study were in the age group of 21-30 years.15% were aged less than 21 years. 10% were aged more than 30 years. Out of 100 babies enrolled 59 babies born to primipara mothers.16 babies born to second gravida mothers and 21 babies born to third gravida mothers.4 babies were born to mothers with gravida more than 3. onset of labor was spontaneous in majority of the cases (80%).

16% of mothers had febrile illness with evidence of bacterial infection within 2 weeks prior to delivery. Out of 100 babies 17% were born through meconium-stained liquor. In 4% of cases there were abnormal smell of liquor as perceived by attending obstetrician or paediatric resident. In 24% of babies delivered after 24 hours of rupture of amniotic membrane. 13% of the mothers had Single unclean or 3 or more sterile vaginal examination during labor for obstetric indications.

63% of babies presented between 24 to 48 hours of life. 22% presented in first 24 hour of life.

28 babies out of 100 were with a birth weight less than 2.5 kg. Whereas majority (69%) of babies had a birth weight between 2.5kg to 4 kg. 3 babies had weight more than 4 kg. 25% of the neonates were small for gestational age, while 72% were appropriate for gestational age. Large for gestational age babies consist of 3% of neonates.

22% of babies delivered before 37 weeks of gestation. Whereas majority were born as term babies (74%). 4 out of 100 babies were born after completion of 42 weeks of gestation.

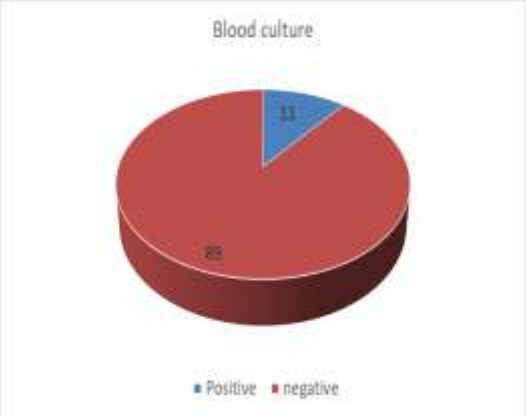
APGAR score of 21 babies were less than 7 at 5 minutes after birth. Whereas APGAR score of remaining 79 babies were more than 7 at 5 minutes.

96% of the neonates in this study had at least one risk factor for early onset sepsis. In 4% cases there was no identifiable risk factor for development of early onset sepsis.

36% of the neonates in our study had more than one risk factors for early onset sepsis.

International Journal Dental and Medical Sciences Research
Volume 5, Issue 2, Mar - Apr 2023 pp 1014-1018 www.ijdmsrjournal.com ISSN: 2582-6018

24% mothers had prolonged rupture of membrane which was the commonest among maternal risk factors noted in this study.48% of the neonates in this study have at least one of the neonatal risk factor for early onset sepsis. Whereas no neonatal factors noted in remaining 52% of babies.
Low Birth wight was the most common neonatal risk factor noted which was present in 28% of babies, followed by prematurity which noticed in 22% of babies.Out of the 100-sepsis screen positive cases studied only 11 were culture proven sepsis. In 89 cases failed to isolate any organism in blood culture.



The most common organism isolated from blood culture was Klebsiella (45.4%). Among neonates enrolled in this study 95% were discharged from the hospital as healthy neonates and a fatal outcome was observed in 5% neonates.

Association between risk factors & outcome

- Prolonged rupture of membrane (P<0.011),
- Prematurity(P=0.035)
- birth asphyxia (P=0.028)

were significantly associated with outcome.
Association between risk factors & outcome

- Prolonged rupture of membrane (P<0.011),
- Prematurity(P=0.035)
- birth asphyxia (P=0.028)

were significantly associated with outcome.

IV. DISCUSSION

This study was conducted among 100 neonates admitted in inborn ICU of Silchar medical college and hospital who fulfilled the inclusion criteria over the period of one year. All enrolled babies were followed up till discharge or death. There was no loss to follow up and no exclusion from the study group.

Out of the 100 babies studied majority was male babies (57%) with a male to female ratio of 1.3:1. In their study Schuchat et al [(8)], M Soman et al [(9)] also observed that Sepsis is more likely to develop in male infants than in females for reasons that are not clear.

The blood culture yield in this study was 11 %. A yield of about 20% was observed by Baltimore et al (10) and d Haens et al [(11)]. Much higher culture positive rates of 28.8% and 47% was reported by Ramesh Bhat et al [(12)]and NeemaKayange et al [(13)]respectively.

Out of the 11 culture positive cases most common organism isolated was Klebsiella (5 out of 11) which was similar to the findings of Ramesh Bhat et al [(12)], Anitha Sethi et al [(14)],.

Risk factor	P value in this study	What other studies shows
Prolonged rupture of membrane	P<0.011 Significantly associated with blood culture positivity	NeemaKayange et al [(13)] and Amare Gebrehiwot et al [(15)] A similar result ($p \leq 0.001$). in a study conducted by Heena Rihan Hassan et al [(16)]
Meconium-stained amniotic liquor	P<0.001 Significantly associated with blood culture positivity	NeemaKayange et al [(13)] and Amare Gebrehiwot et al [(15)] a similar result in their study ($p \leq 0.001$). Contrast - in a study conducted by Hongmin et al [(17)] (P =0.25).

Risk factor	P value in this study	What other studies shows: -
Low birth weight	0.005Significantly associated with blood culture positivity	Similar to present study NeemaKayange et al [13]
Prematurity	<0.001Significantly associated with blood culture positivity	Prematurity was found to influence rate of positive blood culture in the study of Heena Rihan Hassan et al [16]. Whereas blood culture was not influenced by prematurity as per Amare Gebrehiwot et al [15] and NeemaKayange et al [13].

V. CONCLUSION

Prolonged rupture of membrane (P<0.001), meconium-stained amniotic liquor (P=<0.001), prematurity(P=<0.001), low birth (P= 0.005) weight were significantly associated with blood culture positivity.Prolonged rupture of membrane (P<0.011), Prematurity(P=0.035), and birth asphyxia (P=0.028) were significantly association with outcome.Early recognition, diagnosis, and treatment of these risk factors will reduce morbidity and mortality in neonates due to sepsis.

REFERENCE

[1]. Black RE, Cousens S, Johnson HL, Lawn JE, Rudan I, Bassani DG, et al. Global, regional, and national causes of child mortality in 2008: A systematic analysis. Lancet 2010;375:1969-87. 2.

[2]. Newton O, English M. Young infant sepsis: Aetiology, antibiotic susceptibility and clinical signs. Trans R Soc Trop Med Hyg2007;101:959-66.

[3]. AIIMS Protocols in Neonatology Volume 1. 2nd ed., vol. 1, delhi, delhi, Noble, 2019, pp. 304–06.

[4]. Singh M, Narang A, Bhakoo ON. Predictive perinatal score in the diagnosis of neonatal sepsis. J Trop Pediatr. 1994 Dec;40(6):365-8

[5]. Aggarwal R, Sarkar N, Deorari AK, Paul VK. Sepsis in the newborn. Indian J Pediatr.2001;68(12):1143–1147.https://doi.org/ 10.1007/ bf02722932 PMID:11838570 19

[6]. National Neonatology Forum India. Evidence based clinical practice guidelines. 2010

[7]. Sankar MJ, Agarwal R, Deorari AK, Paul VK. Sepsis in the newborn. Ind J Pediatr. 2008; 75(3):261–266. https://doi.org/ 10.1007/s12098-008-0056-z

[8]. Schuchat A, Oxtoby M, Cochi S, Sikes RK, Hightower A, Plikaytis B, Broome CV. Population-based risk factors for neonatal group B streptococcal disease: results of a cohort study in metropolitan Atlanta. Journal of Infectious Diseases. 1990 Sep 1;162(3):672-7.

[9]. SOMAN M, GREEN B, DALING J. Risk factors for early neonatal sepsis. American journal of epidemiology. 1985 May 1;121(5):712-9.

[10]. Leal YA, Álvarez-Nemegyei J, Velázquez JR, Rosado-Quiab U, Diego-Rodríguez N, Paz-Baeza E, Dávila-Velázquez J. Risk factors and prognosis for neonatal sepsis in southeastern Mexico: analysis of a four-year historic cohort follow-up. BMC pregnancy and childbirth. 2012 Dec;

[11]. d'Haens EJ, Roell-Schorer EAM, van-Elzakker EPM, de-Beaufort AJ, Sprij AJ. Clinical availability of neonatal blood culture results at 48 hours. Journal of Neonatal-Perinatal Medicine 2009; 2:109-13

[12]. Bhat YR, Baby LP. Early onset of neonatal sepsis: Analysis of the risk factors and the bacterial isolates by using the BacT alert system. Journal of Clinical and Diagnostic Research. 2011 Nov 30;5(7):1385-8

[13]. Kayange N, Kamugisha E, Mwizamholya DL, Jeremiah S, Mshana SE. Predictors of positive blood culture and deaths among neonates with suspected neonatal sepsis in a tertiary hospital, Mwanza-Tanzania. BMC pediatrics. 2010 Dec;10(1):1-9.

[14]. Sethi AB, Srigade V, Dharmateja G. Neonatal sepsis: Risk factors, clinical and bacteriological profile, and antibiotic

sensitivity. Indian J Child Health. 2018; 5(6):432-437.

[15]. Gebrehiwot A, Lakew W, Moges F, Moges B, Anagaw B, Unakal C, Kassu A. Predictors of positive blood culture and death among neonates with suspected neonatal sepsis in Gondar University Hospital, Northwest Ethiopia. European Journal of Experimental Biology. 2012;2(6):2212-8

[16]. Hassan HR, Gohil JR, Desai R, Mehta RR, Chaudhary VP. Correlation of blood culture results with the sepsis score and sepsis screen in the diagnosis of early-onset neonatal septicemia. Journal of Clinical Neonatology. 2016 Jul 1;5(3):193

[17]. An H, Zheng W, Zhu Q, Chai Y. A retrospective study of risk factors for early-onset neonatal sepsis with intrapartum maternal fever. PeerJ. 2022 Aug 12;10:e13834.