



CLINICAL PROFILE OF NEONATES ADMITTED IN A TERTIARY CARE NEONATAL INTENSIVE CARE UNIT

Neonatology

Dr Isha Deshmukh*

Assistant Professor Pediatrics, GGMC Mumbai. *Corresponding Author

Dr Fouziya Sultana Senior Resident In Pediatrics, GGMC, Mumbai

Dr Nishigandha Sonawane Senior Resident In Pediatrics, GGMC, Mumbai

Dr Sushant Mane Associate Professor in Pediatrics, GGMC, Mumbai

ABSTRACT

After birth the smooth transition to the extra-uterine environment is essential to help newborns survive the most critical period of life with good outcomes. We conducted a retrospective review of all neonates admitted in NICU during 24 months study period in GGMC and JJ NICU. Clinical determinants of neonatal sepsis in mother along with demographic clinical profile with laboratory co-relation was the main purpose of the study conducted. A single centre retrospective study for the correlation of C reactive protein with blood culture in evaluation and treatment of neonatal sepsis in a tertiary care neonatal intensive care unit.

KEYWORDS

INTRODUCTION:

Neonatal sepsis is a systemic infection occurring in infants at 0 to 28 days of life and is an important cause of morbidity and mortality of newborns.¹ Early-onset neonatal sepsis (EOS) has been variably defined based on the age at onset, with bacteraemia or bacterial meningitis occurring at 72 h in infants hospitalized in the neonatal intensive care unit (NICU), versus 7 days in term infants⁽²⁻⁴⁾. In preterm infants, EOS is most consistently defined as occurring in the first 3 days of life and is caused by bacterial pathogens transmitted vertically from mother to infant before or during delivery⁽³⁾. Late-onset sepsis (LOS) is sepsis occurring after 72 h in NICU infants and 7 days of life in term infants, has been variably defined as occurring up to the age of 90 or 120 days, and may be caused by vertically or horizontally acquired pathogens^(2,3,5-7).

The primary threatening signs and symptoms of neonatal sepsis are mostly nonspecific and can easily be mixed up with the non-infective causes. Nonspecific signs/symptoms make it very challenging to formulate a timely clinical diagnosis.⁽⁸⁾ C-reactive protein (CRP) is the most extensively acute phase reactant studied so far and despite the ongoing rise (and fall) of new infection markers it still remains the preferred index in many neonatal intensive care units.⁽⁹⁾

MATERIALS AND METHODS:

The study was conducted in Neonatal Intensive Care Unit of a tertiary care centre, Grant Medical College, Mumbai. All neonates born within January 2019 to December 2020 were enrolled in the study. The presenting clinical features of admitted neonates with suspected sepsis and values of CRP and blood culture report were recorded and results formulated. This study indicated that raised CRP could be used a marker for sepsis due to its high sensitivity, specificity, positive predictive value and negative predictive value.

RESULTS:

Neonatal intensive care unit of GGMC, Mumbai is the main referral centre in the region that provided access to healthcare services for the suburban population. A 25 bedded level one nursery and NICU cares for all high risk preterm and term infants. A list of all newborns who were admitted to the NICU during the study period was obtained from the hospital electronic database. Data was extracted from the electronic medical records after a comprehensive review of the admission notes, daily progress notes, consultation notes, discharge summaries, problem lists, medication sheets and laboratory investigations. Demographic characteristics, risk factors in mother, indications for NICU admission, morbidities and outcomes were reported as documented by the admission doctor. Data collection was conducted by well trained pediatric resident and interns using pre-tested variables and documented in an excel spreadsheet.

In our unit, definitions of neonatal pathologies and outcomes are based on clinical presentation and supportive laboratory investigations

utilizing the standard international criteria as applicable. Total NICU Admissions in JJ NICU over a period of 24 months were 972 from Jan 2019 to Dec 2020.

Birth weight was classified using the WHO weight classification system and categorized into low birth weight (LBW: Birth weight less than 2500 grams; very low birth weight (VLBW: birth weight less than 1500 grams) and extremely low birth weight (ELBW: Birth weight less than 1000 grams). (Table 1)

Table 1:

WHO classification for weight	Number (n= out of 972)	Percentage (%)
Birth weight >2500 grams	323	33.23
LBW	111	11.41
VLBW	440	45.26
ELBW	98	10.08

Risk factors present in mother during antenatal period were classified based upon clinical maternal determinants for admission of newborns in neonatal intensive care unit. (Table 2)

Table 2:

Clinical Determinants during antenatal period	Number of cases (n= out of 972)	Percentage (%)
1. Maternal Febrile Illness	Absent 869 Present 103	89.4 10.6
2. History of Leaking per vaginum	Absent 622 Present 350	63.99 36.00
3. Maternal Urosepsis	Absent 966 Present 6	99.3 0.7
4. Meconium Stained Liquor	Present 255 Absent 717	26.2 73.7
5. Chorioamnionitis	Absent 798 Present 174	82 18
6. History of Pregnancy Induced Hypertension in mother	Present 375 Absent 597	38.5 61.4
7. History of maternal Diabetes Mellitus	Present 250 Absent 722	25.7 74.2

Laboratory determinants were categorized based upon the laboratory values of investigations performed in neonates admitted in NICU. (Table no. 3)

Table 3.

Laboratory Parameters in neonates	Number of cases (n= out of 972)	Percentage (%)
1. Haemoglobin Level	Anemia 235 Normal value 737	24.1 75.9

2. WBC Count	Leukocytosis	224	23.04
	Leucopenia	259	26.64
	Normal values	489	50.32
3. Platelet Count	Thrombocytopenia (Platelet count <1 L)	94	9.67
	Normal Platelet Count	878	90.33
4. Blood sugar level	Hypoglycemia	154	15.84
	Normoglycemia	818	84.16

Clinical characteristics of neonates admitted in NICU were segregated depending upon the clinical features present at birth during the stipulated study period. (Table 4)

Table 4:

Clinical diagnosis in neonates	Number of cases (n= out of 972)	Percentage (%)
1. Neonatal Hypothermia	Present	152
	Absent	820
2. Perinatal Asphyxia	Present	196
	Absent	776
3. Respiratory Distress Syndrome in newborns	Present	500
	Absent	472
4. Lethargy	Present	395
	Absent	577
5. Neonatal Seizures	Present	398
	Absent	574
6. Cyanosis	Present	120
	Absent	852
7. Oliguria	Present	148
	Absent	824
7. Peripheral perfusion	Normal	674
	Abnormal	298
8. Hydration	Normal	663
	Abnormal	309
9. Sclerema	Present	24
	Absent	948
10. Distension of abdomen	Present	28
	Absent	944
11. Blood in stools	Present	20
	Absent	952
12. Neonatal hyperbilirubinemia	Present	150
	Absent	822

Significant data analysis suggested the following results based upon clinical correlation between CRP and blood culture values. (Table 5) In present study, the sensitivity and specificity of CRP against blood culture was 85.11% and 43.40% respectively. The positive and negative predictive value was 57.14% and 76.67% respectively. The diagnostic accuracy of CRP against blood culture in detecting neonatal septicemia was 63%. The neonates were detected to have neonatal sepsis on admission and clinical diagnosis and relevant investigations done for neonatal septicemia.

Table 5: Clinical Co-relation Between CRP And Blood Culture Values All Blood Culture Positive Cases Had Positive CRP Value.

CRP (+)	Percentage	CRP negative (-)	Percentage	Blood culture Positive	Percentage	Blood culture negative	Percentage
434	44.6	538	55.4	20	2.05	952	97.95

Table 6: Variations in Haemoglobin content among neonates

Haemoglobin range	Number of neonates (n= out of 972)	Percentage %
<12 gm/dl	117	13
12 to 15 gm/dl	270	27.7
15 to 18 gm/dl	490	50.4
>18 gm/dl	95	8.9

Table 7: Variations in total leukocyte count amongst neonates admitted in NICU

Values of TLC	Number of neonates (n= out of 972)	Percentage %
<4000 /cumm	29	2.98
4000 to 11,000 /cumm	626	64.40
>11,000 /cumm	317	32.62

Table 8: Variations in platelet values.

Values of platelet count (Per cumm)	Number of neonates (n= out of 972)	Percentage %
< 10,000	5	0.53
10,000 TO 50,000	14	1.44
50,000 TO 1 LAKH	75	7.71
>1 LAKH	878	90.32

Table 9: Variation in outcomes of neonates amongst neonates admitted in NICU

	Number of cases (n= out of 972)	Percentage %
Discharged Neonates	674	69.3
Neonatal Deaths	298	30.7

CONCLUSION:

Neonatal septicemia is an important cause of neonatal morbidity and mortality. Neonatal sepsis is an important cause of hospital admission in the neonatal intensive care unit of our hospital. This study highlights the sensitivity and negative predictive value but lower specificity and positive predictive value of CRP and blood culture. The present study depicts a significant co-relation between culture positivity and CRP values. Blood culture is the gold standard for diagnosing septicemia. Several laboratory and clinical correlates are available to identify neonatal septicemia amongst NICU admitted neonates, hence this study classifies various determinants of neonatal diagnosis and associated maternal risk factors responsible for neonatal sepsis.

Ethical clearance: Ethical permission was granted by Ethics Committee at GGMC, Mumbai Conflict of Interest: None

Funding for the study: None required since retrospective data.

Acknowledgements: This retrospective study was collectively conducted by residents and interns in NICU at JJ Hospital, Mumbai. I express my gratitude to the Head of the Pediatrics Department, Dr Nita Sutay and The Dean sir as well as supportive faculty members and staff involved in managing tertiary care level NICU at GGMC and JJ hospital, Mumbai.

REFERENCES:

- Edwards MS, Baker CJ. 2004. Sepsis in the newborn, p 545–561. *In* Gershon AA, Hotez PJ, Katz SL (ed), *Krugman's infectious diseases of children*, 11th ed. Mosby, Philadelphia, PA.
- Schuchat A. 2000. Neonatal group B streptococcal disease—screening and prevention. *N. Engl. J. Med.* 343:209–210. <http://dx.doi.org/10.1056/NEJM200007203430310>.
- Hornik CP, Fort P, Clark RH, Watt K, Benjamin DK, Jr, Smith PB, Manzoni P, Jacqz-Aigrain E, Kagueidou F, Cohen-Wolkowicz M. 2012. Early and late onset sepsis in very-low-birth-weight infants from a large group of neonatal intensive care units. *Early Hum. Dev.* 88:S69–S74. [http://dx.doi.org/10.1016/S0378-3782\(12\)70019-1](http://dx.doi.org/10.1016/S0378-3782(12)70019-1).
- Edwards MS, Gonik B. 28 November 2012. Preventing the broad spectrum of perinatal morbidity and mortality through group B streptococcal vaccination. *Vaccine* [Epub ahead of print]. <http://dx.doi.org/10.1016/j.vaccine.2012.11.046>.
- Franciosi RA, Knostman JD, Zimmerman RA. 1973. Group B streptococcal neonatal and infant infections. *J. Pediatr.* 82:707–718. [http://dx.doi.org/10.1016/S0022-3476\(73\)80604-3](http://dx.doi.org/10.1016/S0022-3476(73)80604-3).
- Bauserman MS, Laughon MM, Hornik CP, Smith PB, Benjamin DK, Jr, Clark RH, Engmann C, Cohen-Wolkowicz M. 2013. Group B Streptococcus and Escherichia coli infections in the intensive care nursery in the era of intrapartum antibiotic prophylaxis. *Pediatr. Infect. Dis. J.* 32:208–212.
- Guilbert J, Levy C, Cohen R, Bacterial Meningitis Group, Delacourt C, Renolleau S, Flamant C. 2010. Late and ultra late onset Streptococcus B meningitis: clinical and bacteriological data over 6 years in France. *Acta Paediatr.* 99:47–51 <http://dx.doi.org/10.1111/j.16512227.2010.02035.x>.
- Shirazi H, Riaz S, Tahir R. Role of the Haematological Profile in Early Diagnosis of Neonatal Sepsis. *Ann Pak Inst Med Sci.* 2010; 6:152-156.
- Mehrotra G. *Int J Contemp Pediatr.* 2017 May; 4(3):890-895 Study of C - reactive protein in neonatal sepsis. <http://dx.doi.org/10.18203/2349-3291.ijcp20171693>