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Research Article

Clinical Profile of Neonates Admitted in a Tertiary Care Neonatal Intensive Care Unit

Isha Deshmukh[1]*, Fouziya Sultana[2], Nishigandha Sonawane[2] and Sushant Mane[1]

[1]*Assistant Professor of Pediatrics, GGMC Mumbai, India*

[2]*Senior Resident in Pediatrics, GGMC, Mumbai, India*

***Corresponding Author:** Isha Deshmukh, Assistant Professor of Pediatrics, GGMC Mumbai, India.

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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: C Reactive Protein; Neonatal Sepsis; Tertiary Care Neonatal Intensive Care Unit

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 72h 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 72h 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 and Discussion

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 January 2019 to December 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).

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

Table 1

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).

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

Table 2

Laboratory determinants were categorized based upon the laboratory values of investigations performed in neonates admitted in NICU (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 Leucopoenia 259 Normal values 489	23.04 26.64 50.32
3. Platelet Count	Thrombocytopenia (Platelet count <1 L) 94 Normal Platelet Count 878	9.67 90.33
4. Blood sugar level	Hypoglycemia 154 Normoglycemia 818	15.84 84.16

Table 3

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

Clinical diagnosis in neonates	Number of cases (n= out of 972)	Percentage (%)
1. Neonatal Hypothermia	Present 152 Absent 820	15.6 84.4
2. Perinatal Asphyxia	Present 196 Absent 776	20.1 79.9
3. Respiratory Distress Syndrome in newborns	Present 500 Absent 472	51.4 48.6
4. Lethargy	Present 395 Absent 577	40.6 59.4
5. Neonatal Seizures	Present 398 Absent 574	40.9 59.1
6. Cyanosis	Present 120 Absent 852	12.3 87.7
7. Oliguria	Present 148 Absent 824	15.2 84.8

7. Peripheral perfusion	Normal 674 Abnormal 298	69.3 30.7
8. Hydration	Normal 663 Abnormal 309	68.2 31.8
9. Sclerema	Present 24 Absent 948	2.4 97.6
10. Distension of abdomen	Present 28 Absent 944	2.9 97.1
11. Blood in stools	Present 20 Absent 952	2.05 97.95
12. Neonatal hyperbilirubinemia	Present 150 Absent 822	15.4 84.6

Table 4

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.

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.

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 5: Clinical co-relation between CRP and blood culture values.

All blood culture positive cases had positive CRP value.

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 6: Variations in haemoglobin content among neonates.

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

Table 9: Variation in outcomes of neonates 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 7: Variations in total leukocyte count amongst neonates admitted in NICU.

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 8: Variations in platelet values.

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.

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