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ANALYSIS OF C - REACTIVE PROTEIN IN NEONATAL SEPSIS

Pediatrics

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ABSTRACT

Introduction: Sepsis is one of the most common causes of morbidity and mortality in the newborn. Early diagnosis and treatment is vital to improve outcome. Neonatal sepsis in newborn is characterized by paucity of signs and symptoms and is due to invasion and spread through the body of non-pathogenic/ pathogenic & Gram positive / negative organism. The present study was therefore carried out to evaluate the diagnostic accuracy of CRP in neonate. **Methods:** Neonates with clinical suspicion of sepsis were prospectively studied out From september 2019 to June 2020. Blood was obtained from each subject recruited for the qualitative estimation of CRP. Blood culture was used as gold standard for diagnosis of NNS. This study included 50 cases in which 44% were culture proven septicemia. Investigations for infection included CBC, CRP, blood culture and urine culture.

Results: out Of 50 neonates studied, 32 (64%) had positive CRP while 22 (44%) had positive blood culture. **Conclusions:** The C-reactive protein help in the early detection of neonatal sepsis while awaiting blood culture results. CRP may also be invaluable in the management of neonatal sepsis.

KEYWORDS

C-reactive protein (CRP), Neonatal sepsis

INTRODUCTION

C-reactive protein (CRP) is a part of a protein group called acute phase reactants that is produced by the liver and is considered as an inflammatory marker [1, 2]. In many cases such as cardiovascular disease, cancer, autoimmune diseases and infections the CRP levels increases [3]. Thus, CRP levels reach more than 1 mg/dl throughout the body in case of inflammation. Although the usefulness of CRP remains important to determine and monitor the inflammation levels in the body, however, it cannot locate the location or the cause of the inflammation [3-6]. Neonatal period is essentially that period during which the baby is physiologically adjusting from an intrauterine to extra uterine environment. Neonatal septicemia remains an important cause of morbidity & mortality specially in developing countries (7). Neonatal septicemia refers to systemic bacterial infection in association with positive blood culture in first 30 days of life. Its incidence is 1-8/1000 live births with mortality of about 25%. It is one of the leading causes of death and over 80% of late neonatal deaths in hospitals are caused by septicemia. In developing countries-because of prevailing MCH services, unhygienic delivery practices, social customs & taboos, illiteracy, poverty, false believes & prejudices there are higher chances of infection in neonatal period. Neonatal septicemia is a disease that starts with usually minimal & nonspecific symptoms & poses a high risk of morbidity & mortality due to its fulminant course. The early and efficient diagnosis of neonatal bacterial sepsis still remains a difficult task. A number of laboratory tests have been used in attempts to facilitate the early diagnosis of septicemia. However there is not a single laboratory test that will identify with certainty about sepsis, nor is there any one technique that excludes bacterial disease. C–Reactive protein is simple rapid and easily available technique and is recommended for routine screening of all clinically suspected cases of neonatal septicemia. Moreover, CRP along with other hematological tests included in sepsis screen like total count, ANC, I: T ratio, platelets can help in definitive diagnosis of septicemia. The present study was therefore carried out to evaluate the diagnostic accuracy of CRP in neonate.

Neonatal septicemia is a clinical syndrome characterized by systemic signs of infection and accompanied by bacteremia in the first month of life (8). The term neonatal sepsis encompasses diagnosis of septicemia, meningitis and pneumonia in newborn. According to national neonatal perinatal database, in India, the incidence of neonatal sepsis is 3.9% of all intramural births, out of which 20-30% develop meningitis (9) .Septicemia/meningitis, are primary cause of neonatal death in 19.3% of all neonatal admissions in NICU.

METHODS

The present study was conducted at Department of pediatrics, sri krishna medical college, muzaffarpur. This study included 50 cases in which 44% were culture proven septicemia. From september 2019 to June 2020, neonates between the ages 0-28 days admitted to Department of pediatrics, sri krishna medical college, muzaffarpur were included in the study. After taking a detailed history, a thorough clinical examination was done. The findings were recorded on proforma, specially designed for the study. Sepsis was suspected in the presence of clinical features like fever, respiratory distress, poor feeding, jaundice, hypothermia, convulsion, vomiting, irritability, lethargy and abdominal distension. Risk factors for sepsis included out born delivery, perinatal asphyxia, and preterm delivery, prolonged rupture of membranes (PROM), maternal peripartum pyrexia and foul smelling amniotic fluid.

C-reactive protein was estimated qualitatively using the CRP latex kit. The specific performance characteristics of the CRP latex reagent were standardized to detect serum CRP levels at or above 6 mg/l, which is considered the lowest concentration of clinical significance. Visible agglutination of latex particles constituted a positive result which indicated a level of CRP > 6 mg/l while negative result was the reverse. Blood culture was done for all neonates before the commencement of antibiotics.

The results of laboratory investigations and other relevant data such as age, sex, birth weight and gestational age as well as symptoms present and risk factors for sepsis of recruited babies were recorded in a proforma. The results were analysed.

RESULTS

In our study 28, i.e. 56% of the total cases studied were male and 22, i.e. 44% were female. Incidence of neonatal sepsis is highest amongst neonates below 2000 gm that is 58% as compared to the incidence amongst these above 2000 gm weight which is 42%. Incidence of neonatal sepsis is highest in neonate less than 37 weeks of gestation than in the neonate more than 37 weeks, i.e. 56% and 44% respectively. 50 of the total cases studied, 22 cases, i.e. 44% shows positive blood culture.

Table 1: Association of CRP value with gestational age

Gestation	No. of Cases	positive CRP	negative CRP
< 37 weeks	28	20	8
> 37 weeks	22	12	10
Total	50	32	18

Table 2: Association of risk factor with CRP levels and blood culture.

Risk factor	No. of Cases with CRP positive	CRP (neonatal blood onadmission < 6 µg/ml > 12 µg/ml	Blood C/S Positive
PROM			

< 12 hours	5	0 5	3
> 12 hours	15	6 9	8
> 24 hours	30	10 20	20
Labour > 12 hours	40	6 34	19
Maternal fever	5	- 5	5
Foul smelling liquor	17	8 9	13
Postpartum infection	7	3 4	5
Gestation < 37 weeks	20	8 14	22

DISCUSSION

The incidence of neonatal sepsis is more in male than female. The special source of vulnerability to females by virtue of her possession of to 'X'-chromosomes in contrast to the single 'X' of the male. Hence it is genetic locus on the 'X' Chromosomes involve with synthesis of immunoglobulin's responsible for the sex difference as per Thomas C. Washburn et al(10).

As per study done by Hengst JM et al, RNC, MSN, ARNP, in 2003 Low-birth-weight (LBW) infants are at the highest risk for both early- and late-onset neonatal sepsis (11). This is caused, in Dart by an immature inexperienced immune system; a fragile cutaneous barrier; and a prolonged hospital stay with increased exposure to the neonatal intensive care unit (NICU) environment, including various invasive devices and procedures. In the current study the incidence of Neonatal sepsis is More in Neonates weighing less than 2000 gms i.e. 58% as compare whose weight is > than 2000gms i.e. 42%. Among the risk factors for neonatal sepsis, CRP was highest in neonates born to mothers with foul smelling amniotic fluid, followed by peri-partum pyrexia. This is similar to findings by Mathai et al. in Tamil Nadu who reported a significant association between maternal peri-partum pyrexia and neonatal positive CRP levels (12). Unlike the present study however, they found no significant association between foul smelling amniotic fluid and positive CRP levels .The prevalence of blood culture proven sepsis in the present study was 44%. This is similar to the 41.7% reported by Chako and Sohi, 42% by Mustafa et al. and 47.5% by Roy et al (13-15).

CONCLUSIONS

The C-reactive protein help in the early detection of neonatal sepsis while awaiting blood culture results. CRP may also be invaluable in the management of neonatal sepsis.

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