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ASSESSMENT OF THE ROLE OF CRP AND PLATELET COUNT IN EARLY NEONATAL SEPSIS

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Abstract

Material and Methods: A Prospective study was performed in the department of Pediatrics in territory care institute for the duration of 8 months. Forty newborns were included in the study group to satisfy including criteria. Before antibiotic treatment, neonates CRP and platelet count were assessed. Data were analyzed by SPSS software.

Results: Out of the 40 cases, 22 were male babies, and the rest 18 were female. Blood culture was positive in 19 out of the 40 cases, CRP was positive in 21 cases, and thrombocytopenia was observed in 16 cases. Klebsiella is the commonest gram organism causing sepsis in the Neonatal Intensive Care Unit. The Gram-positive organisms grown are Coagulase Positive and Coagulase-negative Staphylococci, Group B Beta Hemolytic Streptococcus, and Enterococcus. Out of 16 thrombocytopenia neonatal, 15 shows Gram-negative and 1 shows gram-positive blood culture.

Conclusion: Qualitative analysis of C-reactive protein can be used as an early marker of sepsis, especially in resource-limited settings. Although thrombocytopenia occurs predominantly in gram-negative sepsis, there is insufficient evidence to support the use of platelet count to differentiate between gram-positive and gram-negative sepsis.

Keywords: CRP, Platelet count,blood cultures, sepsis.

Introduction

Due to the advances in the intensive care of the neonatal patients it has lead to an decrease in mortality and morbidity of the patients. However, infectious episodes in the early postnatal period still remain serious and potentially life-threatening events with a mortality rate of up to 50% in very premature infants.[1,2] In various developed countries the incident rate of sepsis in neonatal varies from 1 to 4 cases per 1000 birth. In the developing countries this rate increases to 11 – 30 cases per 1000 births.[3-6] Today also sepsis remains the most common diseases in the period of neonatal. It is still considered as major casue of morbidity and mortality.[7,8] As per the World health organization the mortality rate in the children at the age below 5 years is mostly due to infection and the perinatal causes.[9-12] Because of high vulnerability of neonates to infections, it is mandatory to diagnose and treat neonatal sepsis at early stages. Blood culture is the gold standard for definite diagnosis but it takes at least 72 hours by which time the infection may have progressed.[14,15] Due to nonspecific clinical features of sepsis and also because of non-availability of blood culture results within 48 hours, the early diagnosis of neonatal sepsis is still a major problem.[16,17]

The newborn infant is susceptible to infection due to immaturity of both natural and acquired immune systems. Sepsis is considered a strong possibility for any clinical deterioration in a neonatal state. It is either early-onset (7 days), and it is considered as one of the important leading factors for neonatal mortality and

morbidity.[18] Consequently, early diagnosis is very important as it helps in beginning antibiotic therapy early, thereby reducing neonatal mortality.[19] Blood culture remains the gold standard in identifying the infecting organism and provides vital information regarding the antibiotic sensitivity pattern so that proper usage of drugs can be made. However, blood culture generally takes at least 48 to 72 hours to detect bacterial growth, which causes a considerable time lag in initiating appropriate treatment. In addition, it has its disadvantages in CRP is an acute-phase protein synthesized in the liver in response to infection or inflammation. CRP is a biomarker and is elevated in sepsis.[20,21] Normal CRP concentration in healthy neonates is usually lower than 6 mg/L. Values more than this are considered CRP Positive. To solve this challenging problem the physicians are always in need of advance method of early prediction and detection, diagnosis of the neonatal sepsis so that early therapy can be initiated and it can be helpful in reducing the mortality rate and also helps in improvement of over al health of children. This way we can reduce the hospital stay and can also be finical help to the family. The need of the hour is to identify a test to confirm the presence of sepsis earlier and find out a parameter that reliably distinguishes between gram-positive and gramnegative sepsis, which may help in choosing the appropriate antibiotic without having to rely on the empirical coverage.

Present study was done with an aim to evaluate the role of CRP and platelet count in early neonatal sepsis

Material and Methods

A Prospective study was performed in the department of Pediatrics in territory care institute for the duration of 8 months. Informed consent from the parents was obtained. Forty newborns were included in the study group to satisfy including criteria. Newborns belonging to both sexes were admitted to this study. Only newborns within seven days of life were included in the study population.

Inclusion criteria were: Temperature instability – hypothermia or fever, lethargy, poor cry, refusal of feeds, vomiting, ileus, abdominal distension, poor peripheral perfusion, neonatal convulsions, irritability, hypotonia, altered sensorium.

Before antibiotic treatment, neonates CRP and platelet count were assessed.

Statistical analysis

The recorded data was collected and entered in a spreadsheet computer program (Microsoft Excel 2007) & exported to data of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). For all tests, confidence level and level of significance were set at 95% and 5% respectively.

Results

Forty newborns that fulfilled the inclusion criteria were included in the study. Out of the 40 cases, 22 were male babies, and the rest 18 were female. On categorizing the newborns based on birth weight, 4 babies were of low birth weight, 34 newborns were of normal birth weight, and 2 babies were overweight, as depicted. Blood culture was positive in 19 out of the 40 cases, CRP was positive in 21 cases, and thrombocytopenia was observed in 16 cases. CRP was found to be positive in more number of blood culture-positive cases than blood culture-negative cases, as depicted.

In our study, thrombocytopenia was observed in 16 cases, out of which 15 were of culture-positive sepsis and in 1 case of culture-negative sepsis. Apart from this, the normal platelet count was observed in 24 patients, out of whom 3 were culture-positive, and 21 were of the culture-negative group.

Klebsiella is the commonest gram organism causing sepsis in the Neonatal Intensive Care Unit. The other gramnegative organisms encountered are Escherichia Coli,

Pseudomonas, Enterobacter, and Acinetobacter. The Gram-positive organisms grown are Coagulase Positive and Coagulase-negative Staphylococci, Group B Beta Hemolytic Streptococcus, and Enterococcus. Out of 16 thrombocytopenia neonatal, 15 shows Gram-negative and 1 shows gram-positive blood culture.

Table 1: Distribution of study participants according to Gender

Gender	Number	Percentage
Male	22	55
Female	18	45
Total	40	100

Table 2: Cross-tabulation of CRP and Culture test

Variable	Positive	Negative	Total
CRP	21	19	40
Culture	19	21	40

Discussion

Neonatal Sepsis is one of the major causes of neonatal mortality in developing countries. contributing to 15% deaths.[22] In Pakistan the neonatal mortality rate is 54/1000 live births which is very high.[23] The early signs and symptoms of sepsis in neonates are often non-specific and make it difficult to establish an early clinical diagnosis. Blood culture is a reliable investigation with a yield of up to 75% but it is time consuming and demands a well equipped laboratory setting.

Out of the 40 babies under evaluation, 22 were male babies, and the rest 18 were female. Blood culture was positive in 19 out of the 40 cases, CRP was positive in 21 cases, and thrombocytopenia was observed in 16 cases. Our study's rate of culture positivity was 47.5%, which correlates with Al-Musawi et al, whose study revealed a 45% growth in culture. This is also in accordance with the study by Shyamala et al., which showed a culture-positive rate of 51.3%. [24,25] Similarly, Sriram et al reported a 50.4% on culture positivity in a study group of 115 neonates.[26] It correlates with the study of Shyamala et al.[25] In a study by Sherazi et al the main organisms found on blood culture were acinetobacter (35%), Klebsiella pneumoniae (25%), Staphylococcus aureus (19%), E-coli (12%), Pseudomonas (2%) and Proteus vulgaris in 4% of the patients which are comparable with blood culture results of our study.[27]

The diagnostic strength of C- reactive protein has been thoroughly studied in neonatal sepsis.[28] The overall prevalence of thrombocytopenia in our study group is 81.8%, according to the study done by Torkaman et al.[29]It also correlates with the study done by Shyamala et al, which showed a 69.9% prevalence of thrombocytopenia.[25] Manzoni et al had reciprocated our analysis, concluding that thrombocytopenia is not an organism-specific marker of sepsis.[30] On the other hand, the analysis by Scheifele et al is in contrast with our study and states that the endotoxinemia in necrotizing enterocolitis with gram-negative organisms leads to thrombocytopenia.[31]

Early diagnosis of neonatal sepsis is very difficult when it is based only on clinical signs. The clinical profile is neither uniform nor specific and could mislead the health care professionals. Keeping in mind the mortality caused by neonatal sepsis, empirical treatment should not be delayed but again this can result in unnecessary and prolonged exposure to antibiotics in this early age group. Cost

effective and rapid diagnostic tool is one way to tackle this issue. CRP and leukocyte count should be considered to decrease neonatal mortality rate in the country.

Conclusion

Qualitative analysis of C-reactive protein can be used as an early marker of sepsis, especially in resource-limited settings. Although thrombocytopenia occurs predominantly in gram-negative sepsis, there is insufficient evidence to support the use of platelet count to differentiate between gram-positive and gram-negative sepsis.

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