



A STUDY ON CORRELATION BETWEEN BLOOD CULTURE AND C-REACTIVE PROTEIN TEST IN NEONATAL SEPTICEMIA IN TERTIARY CARE HOSPITAL.

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ABSTRACT **Introduction:** Neonatal Septicemia is the major problem for Morbidity and mortality in the Neonatal Intensive Care Unit (NICU). Neonatal septicemia is a blood stream infection that occur in infant as the clinical manifestation are nonspecific, it require early detection to reduce morbidity and mortality in neonates. So Correlation between Blood Culture and C-reactive protein in neonates is early and effective diagnostic Method. **Aim:** To determine the C-reactive protein as an early indicator of infection and Correlation between Blood culture in Suspected case of neonatal Septicemia. **Material and Methods:** This study was conducted from July 2018 to December 2018 in the Department of Microbiology, M.L.B. Medical College, Jhansi. Total 300 Blood samples were received from clinically suspected patients of neonatal septicemia from neonatal intensive care unit, and processed by BACT/ALERT 3D automated blood culture instrument and CRP was determined in the same. **Results:** In our study, out of 300 samples, One hundred fifty One (50.33%) samples gives positive result for CRP. Total 96 culture positive samples detected in neonatal septicemia. Eighty two samples were CRP positive out of 96 that were positive in blood culture. It concludes that 14 samples gives false positive result. **Conclusion:** Serum CRP is simple method for diagnosis of neonatal septicemia. These tests are helpful to rule out neonatal infection and their treatment can be started by clinician as soon as possible

KEYWORDS : C-reactive protein (CRP), Neonatal intensive Care Unit (NICU)

Introduction

A bacterial infection of the blood in neonates is documented by positive blood culture. It is potential fatal issue affecting newborns and important cause of morbidity and mortality among neonates [1].

Neonatal sepsis cases are more common in premature babies. The disease can be classified as: congenital, early-onset and late-onset. Congenital neonatal sepsis is when the child is infected during pregnancy i.e. before birth. Neonatal septicemia may have subtle, diverse or non-specific clinical signs. The early diagnosis and treatment of the neonates are mandatory to prevent severe and life-threatening complications [2].

The gold standard method for detection of septicemia is the isolation of the microorganisms by the blood culture method (incubation time remains 24 to 48 hours till 5 days for confirm diagnosis). It is important to have regular surveillance of neonatal units to assess the infection rate in the NICU. It helps in the treatment of bacterial infection for Clinicians and it Prevents drug resistance among bacteria[3].

C-reactive protein is an abnormal β -globulin produced by liver during any inflammatory. Inflammation may be bacterial, malignancies and tissue destruction. During onset of infection CRP level increases after 10-12 hours and this is the marker of bacterial infection. After 24 hours CRP value is very helpful and this test also has prognostic value as the levels strongly fall when patient is responding to treatment. The test can be performed by passive agglutination method in which latex particles coated with anti-CRP antibody (Commercially available kits). Other methods of detection of CRP accurately is measured by Turbilateral, ELISA, Nephelometry [4].

II. Material And Methods

The study was conducted in the Department of Microbiology, M.L.B. Medical college and Hospital, Jhansi from July 2018 to December 2018. A total of 300 Blood samples were received in the Microbiology Department from clinically suspected patients of sepsis in Neonatal intensive care unit. A detailed history was taken filled for each Patient age, sex, socioeconomic status, duration of illness, birth weight. Venous blood was collected aseptically before initiation of antibiotic therapy [5].

C-reactive protein test: CRP was measured by turbilateral semiautomated method (Turbilateral CRP by Coral Clinical System

Ltd.). A value of more than 6 mg/Lit is considered as CRP test positive . After the initiation of antibiotic treatment, After 48 hours again Performed the CRP test, if the CRP value less than 6 mg/L. It is considered CRP test negative and antibiotics have to be stopped [10].

Blood Culture: After thorough cleaning of the vein puncture site with 70% alcohol. Blood samples were collected with sterile syringe and immediate cleaning of the rubber cap of the BacT/ALERT culture bottle with Aseptically transfer the blood sample into the BacT/ALERT bottle containing brain heart infusion broths in the ratio of one part of blood to five parts of the broth. The bottles were incubated at 37°C for 5 days.

The bottles were loaded in Bact /ALERT system which incubates, shakes and monitors culture bottles for signs of microbial growth on the display in the form of graff, where they were incubated at 37°C for 5 days of Aerobic incubation [6].

Processing of Sample for Bacterial culture:

If aerobic microbial growth was not observed till 5 days of incubation, the sample is negative. If aerobic microbial growth is observed the automated system gives signal as positive then, from the positive bottle gram staining is performed and subculture on Blood, MacConkey and Chocolate agar and plates were incubated at 37° for 24 hrs. [7].

Second day observation:

From the inoculated plates, colony characteristics, Gram staining, wet preparation for motility and other Biochemical reactions were performed[8]. Antibiotic sensitivity testing was performed by Kirby Bauer disc diffusion Method on Muller Hinton (MHA) agar as per CLSI guideline 2016 [9]. The resistance patterns were observed, like ESBL by phenotypic combine double disk diffusion method.

III: Result

The blood for CRP and Culture specimens of suspected cases of neonatal septicemia were received during July 2018 to December 2018. The following observation were made:

Blood Culture Positive :

Out of 300 suspected cases, 96 samples (32%) were culture positive. Among 96 culture positive isolates Coagulase negative staphylococcus 41(42.70%), Staphylococcus aureus 5(5.2%), Enterococcus fecalis 3 (3.12%), Candida albicans 8(8.33%) and

among Gram negative bacteria *Klebsiella pneumoniae* 25(26.04%), *E.coli* 16(16.66%), *Acinetobacter baumannii* 4(4.16%), *Pseudomonas aeruginosa* 6 (6.25%) and *Proteus mirabilis* 3(3.12%) were isolated.

Table-1.1 Distribution of organisms in blood culture positive

Organisms	Percentage(%)
Gram positive cocci	
Coagulase negative staphylococcus (CONS).	37(42.70%)
<i>Staphylococcus aureus</i> .	5(5.2%)
<i>Enterococcus fecalis</i> .	3(3.12%)
<i>Candida albicans</i> .	2 (8.33%)
Gram Negative Bacilli	
<i>Klebsiella pneumoniae</i> .	25(26.04%)
<i>Escherichia coli</i>	14(16.66%)
<i>Acinetobacter baumannii</i>	4(4.16%)
<i>Pseudomonas aeruginosa</i>	6(6.25%)
<i>Proteus mirabilis</i>	3(3.12%)
Mixed Growth	
Coagulase negative staphylococc (CONS)+ <i>Candida albicans</i>	4
<i>Candida albicans</i> + <i>Escherichia coli</i>	2
Total	96

Correlation of Result of Blood Culture and CRP Test :

In this study, out of 300 samples. One hundred fifty One (50.33%) samples gives positive result for CRP. Whereas, total 96 culture positive samples were detected in neonatal septicemia. 82 samples were CRP positive out of 96 positive blood culture. It concludes that 14 samples gives false positive result and 55 samples were false positive test by CRP.

Table-1.2 co-relation of blood culture with CRP

Total sample(n=300)	Positive	Negative
Blood culture	96	204
CRP	151	149

Table 1.2 shows a total of 300 sample suspected neonatal septicemia. Out of 300 samples, 96 were culture positive, One hundred fifty one samples were CRP positive out of 300 sample suspected neonatal septicemia . It concludes that 55 samples gives false positive result and Eighty two samples were CRP positive out of 96 culture positive samples. It concludes that 14 samples gives false negative results.

IV. Discussion and Conclusion

The C-reactive protein is an inflammatory marker released by host in response to inflammatory injury. Its level may be measured easily in blood even in small laboratories both qualitatively and quantitatively. The C-reactive protein (CRP) test is a [blood test](#) that measures the level of CRP in the blood. CRP is an [inflammatory marker](#) a substance that the body releases in response to inflammation. High levels of CRP in the blood mean that there is inflammation somewhere in the body. Other tests are needed to determine the cause and location of the inflammation.

In the recent study, One hundred fifty One (50.33%) out of 300 samples were CRP test positive. Out of 96 samples culture positive isolates 82 samples were CRP test positive. It conclude that 14 samples gives false negative result. 4 samples were found both Coagulase negative staphylococc (CONS)+ *Candida albicans* to be detected. And 2 samples were also found both *Candida albicans*+ *E. coli* to be detected. These results were similar to the results obtained by study conducted by Rajendraprasad et al. in 2012.[9] In 2018 according to Gandhi Purvi et al. also had similar results ^[10]. Thus in this study CRP can be viewed as having higher sensitivity rate and can be used in cases suspected of having neonatal septicemia as it is rapid test comparative to culture though chances of false positive results are high in CRP test.

The necessity of biomarker with good diagnostic accuracy and reliability is paramount as a guiding tool for physicians to assess the risk of infection and need for antibiotic therapy. Our study concludes that serum CRP is simple method for diagnosis of neonatal septicemia. These tests are helpful to rule out neonatal infection and their treatment can be started by clinician as soon as possible within one hour, which is not only in tertiary care centers but also in remote area primary health care centers, unlike conventional methods that take upto seven days for blood culture for diagnosis of infection and septicemia. The present study depicts a significant correlation between blood culture positivity and CRP levels. Thus, estimation of CRP levels and its interpretation in

the light of clinical treatment can aid as a tool for the early diagnosis of neonatal infections.

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