Original Research Article

CORRELATION OF RESULT OF BLOOD CULTURE AND C REACTIVE PROTEIN TEST IN NEONATAL SEPTICEMIA.

ABSTRACT:

INTRODUCTION:Neonatal septicemia is a major cause of morbidity and mortality in newborn . As the clinical manifestations are vague and nonspecific, it is pertinent that an early diagnosis is made to prevent serious morbidity and mortality. So, an attempt was made to establish correlation between C reactive protein (CRP) & blood culture in neonate presenting with features of sepsis to accelerate the diagnostic process.

AIM: To study CRP as an early indicator of sepsis and its statistical association with blood culture (considered as gold standard) in neonatal septicemia.

MATERIAL & METHODS: The study was conducted from July 2013 to December 2013 in tertiary care teaching Hospital, Ahmedabad . Total 300 Blood culture samples were collected from clinically suspected patients of sepsis from neonatal intensive care unit. Total 300 Blood culture samples were collected from clinically suspected patients of sepsis from Neonatal intensive care unit, and processed by BACT/ALERT 3D automated blood culture instrument. And their CRP test also performed.

We studied association between CRP & blood culture positivity in neonatal sepsis.

Results: In our study 143 out of 300 total samples had positive results for CRP test i.e. 47.6% sample. Out of the total 93 culture positive detected sample of neonatal septicemia 80 samples were CRP positive. It indicates that sensitivity of CRP test to detect neonatal septicemia is 86.02%. 144 samples were detected negative by CRP results out of the 207 culture negative sample. Thus, specificity was 69.5%. In our study CRP test shows lower specificity rate.

Conclusion: A statistically significant association between blood culture positivity and CRP levels was found in the present study. Hence estimation of

UNDER PEER REVIEW

CRP levels and the interpretation in the light of clinical picture can serve as a useful tool for the early diagnosis of neonatal sepsis.

Key Words:- Neonatal septicemia , C reactive protein

INTRODUCTION:

Neonatal septicemia describes any systemic bacterial infection in neonates documented by positive blood culture. It is an important cause of morbidity and mortality among neonates generally. [1]

Neonatal septicemia may have subtle, diverse and non-specific clinical signs. Therefore early diagnosisand treatment of the neonate with suspected sepsis are essential to prevent severe and life-threatening complications. [2]

The gold standard for diagnosis of septicemia is the isolation of the microorganismsfrom the blood culture which takes 48 hours to 7 days to confirm diagnosis. It is important to have regular surveillance of neonatal units to assess the prevailing. Pathogens and antibiotics susceptibility for guidance of clinicians and to identify and control the outbreaks due to cross infection.[3]

C reactive protein test (CRP) [4]:This is an abnormal β-globulin produced by liver during; any inflammatory process, bacterial infections, malignancies and even in tissue destruction by the liver as a result of stimulation by interleukin. CRP level takes atleast 10-12 hours to rise after the onset of infection and are therefore unhelpful in early diagnosis of early onset disease. But 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 capillary precipitation of patients sera with antiserum prepared in rabbits against purified CRP or by passive agglutination method using latex particles

UNDER PEER REVIEW

coated with anti CRP antibody (Commercially available kits). Accurate measurement of CRP can be made by RIA, ELISA, laser nephlometry single radial immuno diffusion assay.

CRP may be used as a parameter to identify the time period when antibiotics therapy can safely be discontinued in case of suspected neonatal septicemia, which was the aim of the present study.

MATERIALS AND METHODS:

The study was conducted from July 2013 to December 2013 in tertiary care teaching Hospital, Ahmedabad. Total 300 Blood culture samples were collected from clinically suspected patients of sepsis from Neonatal intensive care unit

A detailed history was taken and Performa was filled for each Patient documenting age, sex , socioeconomic status, address, duration of illness along with artificial intervention, birth weight and any resuscitative procedures done. Venous blood was collected aseptically before initiation of antibiotic therapy. [5]

Blood samples were collected with sterile syringe and needle after thorough cleaning of the venous site with 70% alcohol and subsequently followed by povidone iodine. And again with 70% alcohol then the rubber cap of the BacT/ALERT culture bottle were immediately cleaned with 70% alcohol. Then used needle was replaced with a new needle and then, the venous blood was injected into this bottle containing brain heart Infusion broths in the ratio of one part of blood to five parts of the broth. The blood culture broths were immediately sent to the laboratory, where they were incubated at 37°C for 7 days .

The bottle loaded in Bact /ALERT Instruments which is automated systems that incubate, shake and monitor culture bottles for signs of microbial growth, where they were incubated at 37°C for 7 days.[6]

Processing of specimen for bacterial pathogen:

UNDER PEER REVIEW

If microbial growth appear then instrument give signal positive and if microbial growth not appear than after 7 days the sample declare negative if signal positive than unload bottle and make smear and gram staining and subculture on MacConkey, Blood and Chocolate agar media and incubated in appropriate temperature and atmospheres according to standard guidelines .[6]

Second Day Follow Up:

All inoculated plates were observed next day and the colony characteristics were identified by using the standard microbiological procedures like Gram staining , wet preparation for motility and Biochemical reactions as described in Practical Microbiology of Mackie MacCartney 14th volume.[7] After the isolation of bacteria, antibiotic sensitivity testing was done by Kirby-Bauer disc diffusion method on Muller Hinton (MH) agar as per CLSI recommendations .[8] And resistance pattern identify like ESBL by phenotypic combine disk method and Metallo beta lactamase by phenotypic combine disk method. we also identify Amplified cephalosporinase by Modified Three-Dimensional Test (MTDT)

CRP Test is also performed using latex agglutination

CRP was measured by latex agglutination method (SPAN Diagnostics Ltd.). A value of more than 6 mg% was taken as abnormal. CRP was measured again 48 hours after initiation of therapy. If it was less than 6 mg%, antibiotics were stopped.

RESULT:

The study was conducted at department of Microbiology in Tertiary care hospital Ahmedabad. The Blood for CRP and blood culture specimen in BacT/Alert Bottles were received of suspected neonatal septicemia cases from July 2013 to December 2013. Results and observations made from study are described below.

Blood Culture positivity rate:

Out of 300 suspected cases 93 (31%) was culture positive.

UNDER PEER REVIEW

Of the 93 isolated organisms, Of the 93 isolated organisms, 42(45.1%) were Gram positive organisms that include - *Coagulase negative staphylococcus aureus* [*CONS*] 38(40.86%), *Staphylococcus aureus*3(3.2%), *Enterococcus Fecalis*1(1.07%) ; isolates of *Candida* species were 3(3.23%) and Gram negative organisms 48(51.61%) which includes - *Klebsiella pneumonia* 26(27.9%), *E.coli* 14(15.05%), *Acinetobacterbaumannii* 2(2.15%), *Pseudomonas*aeruginosa 4(4.3%), *Proteus mirabilis* 2(2.15%).

CORRELATION OF RESULT OF BLOOD CULTURE AND CRP TEST

In our study 143 out of 300 total samples had positive results for CRP test i.e. 47.6% sample. Out of the total 93 culture positive detected sample of neonatal septicemia 80 samples were CRP positive. It indicates that sensitivity of CRP test to detect neonatal septicemia 86.02%. 144 samples were detected negative by CRP results out of the 207 culture negative sample. Thus, specificity was 69.5%. In our study CRP test shows lower specificity rate.

Result – Table 1

	BloodCulture	**CRP**
Total	**300**	**300**
Positive	93	143
Negative	207	157

	Total Culture Positive	**Total CRP positive**	**Culture positive + CRP positive**	**Culture positive + CRP negative**	**Culture negative + CRP positive**	**Culture negative + CRP negative**
No. Of cases	93	143	80	13	63	144
Percentage of total sample size	31%	47.6%	26.6%	4.33%	21%	48%

UNDER PEER REVIEW

DISCUSSION

In our study 143 out of 300 total samples had positive results for CRP test i.e. 47.6% sample. Out of the total 93 culture positive detected sample of neonatal septicemia 80 samples were CRP positive. It indicates that sensitivity of CRP test to detect neonatal septicemia is 86.02%. 144 samples were detected negative by CRP results out of the 207 culture negative sample. Thus, specificity was 69.5%. In our study CRP test shows lower specificity rate.

This results were similar to the results obtained by study conducted by Rajendraprasad et al [9] in 2012 with sensitivity of 87.37% and specificity of 71.43%.Mannan et al [10] in 2005 also had similar results with sensitivity of 92.86% and specificity of 36.11%Thus, CRP can be viewed as having higher sensitivity rate and can be used in cases suspected of having neonatal septicemia as it is rapid comparative to culture though chances of false negative results are high.

Table -2

	Our study	**Rajendraprasad et al [9]**	**Mannan et al [10]**
Sensitivity	86.02%	87.37%	92.86%
Specificity	69.5%	71.43%	36.11%
Positive predictive value	55.9%	73.45%	-

UNDER PEER REVIEW

Negative predictive value	91.72%	86.21%	-

CONCLUSION:

Systemic bacterial infection in the newborn creates a significant burden due to its impact on neonatal mortality and long-term morbidity. In spite of ongoing efforts in early diagnosis, treatment, and prevention, neonatal sepsis still remains an enigmatic area for neonatologists due to changes in epidemiology and the lack of ideal diagnostic markers. The need for a biomarker with high 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 conclude that serum CRP is simple method for diagnosis of neonatal septicemia. These tests are also 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.

COMPETING INTEREST:

"Authors have declared that no competing interest exist ."

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