Detection and Utility of CRP in Neonatal Patients as an Early Marker

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Abstracts: Background &Objectives:1) Detection of CRP in neonatal patients.2**)** Analyzing and utility of CRP as an early marker to decrease the mortality and morbidity among neonates.Methods: This is retrospective study spanning from 01.05.2016 to 31.08.2016. Serum sample of neonates with clinical features of tachypnoea, tachycardia, hypotonia, oliguria and poor responsiveness etc. were sent to the laboratory for CRP testing by the clinicians. A total of 5870 serum samples of neonates were tested for CRP by using RECKON DIAGNOSTIC KIT based on latex agglutination, those which tested positive were subjected to determination of titre. RESULT:A total 5870 neonatal samples were received out of which 4340 (73.93%) tested positive. Titre of positive samples ranged from 0.6 mg/dl to 19.2mg/dl. Interpretation&Conclusion: CRP has high sensitivity and specificity for establishing the diagnosis of neonatal diseases and can be taken as an early marker. It is preferable to other markers viz, IL-2, IL-6, INF Gamma, TNF-alfa, and Cytokines because of its low-cost benefit, easy availability and convenient testing methods. It is also better than culture methods like blood culture because of early result availability. Therefore it can be used commonly for early detection of neonatal conditions.[Sarita NJIRM 2017; 8(2):59-61]

Key Words: CRP, Early detection, Neonates.

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Introduction: C-REACTIVEProtein is a normal glycoprotein produced by theliver. It is a component of the innate immune system; an acute phase reactant.

Increased level are observed within 24-48 hours in response to severe bacterial infection like neonatal sepsis and many other pathological and physiological conditions.

Routine diagnosis of these conditions is done by blood culture. Other available markers are CRP, TLC, ESR,INF Alfa , INTERLEUKIN, cytokines etc .Among all these markers CRP is preferable because of easy availability ,low-cost benefit, and convenient testing method.

Although culture method is thegold standard for diagnosis. But it has thelimitation that culture report may take 2 to 10 days to obtain culture result and may yield false negative report in case of shock, and contamination rate is also high due to atechnical problem. On other hand sensitivity of culture also impaired by exposure to intrapartum antibiotics, which are administrated to themother during labor.

One more drawback is that antibiotic have to be started immediately to save the life of the patients and so we cannot wait for culture report to start anantibiotic.

Hence measurement of CRP in neonates is an early indicator as compared to blood culture and helps in effective management of the patients. Regular measurement of CRP can be used as a good prognostic marker to assess the progress of treatment.

Methods: This study was conducted at B.J. Medical College , AHMEDABAD in microbiology department laboratory , duration of 4 months of duration from May 2016 to September 2016 . Total 5870 neonatal samples were received for testing.

All neonates of having aseptic infection with features of tachycardia, hypotonia, poor responsiveness etc and other pathological conditions were included.

History of important aspects like age, gender, weight, place of thedelivery duration of illness, andhistory of antibiotic administration was taken.

Extremely premature less than 32 weeks of gestation and who already had taken the antibiotic were excluded from thestudy.

Blood samples from neonates with afeature of sepsis and other inflammatory conditions were received for blood culture and CRP marker in themicrobiology laboratory.

CRP was carried out by using RECKON DIAGNOSTIC KIT based on LATEX AGGLUTINATION method. Value 0.6mg/ dl or above has been taken as positive . Those

which tested positive were subjected to determination of titre. Titre ranged from 0.6mg/dl to 19.5mg/dl.

Laboratory Methods to Measure CRP: The 3 clinical laboratory methods use to measure CRP levels are as follow:

- Qualitative
- Semiquantitative
- Quantitative

All 3 tests based on the ability of CRP to bind to avariety of biologic ligands forming CRP-Ligand complex. When a reagent containing anti-human CRP antibodies added to a serumsample containing CRP , CRP bind to the antibodies forming aninsoluble CRP-Ligand complex thatclump and precipitate , which can then visualized and measured provides a comparison of these methods.

Result: A total 5870 neonatal sample were received out of which 4340(73.93%) sample with CRP range 0.6 mg/dl or above were taken as a positive. And titre ranged from 0.6mg/dl to 19.5mg/dl. 5 to 7% neonates have titre above 4.8mg/dl.

Male were 65% and female were 45%. Neonatal age was divided into two categories , one is more than 15 days and second is less than 15 days. Age less than 15 days were female and more than 15 days were equal to male and female.

In our study, it is found that CRP level and culture positive result are more in Age of more than 15 days as compared to those < 15 days. And blood culture was found to be more in Weight >3 kg as compared to those with <3 kg. Similarly, CRP was found to be elevated more in >3 kg as compared to those with < 3kg.

CRP turned out to be more positive near about 70-75% out of total sepsis and Other inflammatory conditions .While culture reports were positive 30-35%. Neonates have titre in the following order:

Titre	Percentage Of Neonates
0.6mg/dl	45% of Neonates
1.2mg/dl	30% of Neonates
2.4mg/dl	15% of Neonates
4.8mg/dl	5-7% of Neonates
9.6mg/dl	3-4% of Neonates
19.2mg/dl	<2% of neonates

Discussion: Deterioration in the condition of neonates can occur in many conditions. Of variouscauses, bacterial infection is usually at the top. Among infection and other pathological inflammatoryconditions, Neonatal sepsis is most common causes of mortality and morbidity. This incidence ishigher in the developing countries. Early diagnosis and effective treatment is the best way to reducemortality and morbidity. The delayin diagnosis and initiating therapy are the main reason for highmortality. Bloodcultureis thegold standard fordiagnosis, butother inflammatory markers viz CRP, INTERLEUKIN,INF Gamma, TNF-alfa, ESR Are also important inearly diagnosis. A total 5870 neonatal samples were received out of which 4340 patients with CRP ranged were>0.6mg/dl taken as positive. Among 5870 samples 70-75% of patients have CRP > 0.6 mg/dl andculture sensitivity was 30 to 35%. Thus CRP has more sensitivity than culture for assessment anddiagnosis of thepatient. Neonatal infections have a number of limitations. It may take 2 to 10 days to obtain culture reports.The sensitivity of blood culture may be impaired by exposure to intrapartum antibiotics. And also contamination rate is also high due to atechnical error ,and aseptic precautions.

There is some important factor which affects the value of CRP.

Age: When the effect of age was noted in the study population it was found that age group <15 days, there were more females (55.8%) than male(44.7%). While in age group >15 days there were analmost equal number of males and females. Blood culture and CRP turned out to be more positive in age group >15 days

Weight: Blood cultures were found to be positive more frequently in those with weight > 3 kg patients as compared to those with <3 kg. Similarly, CRP was found to be elevated more in weight >3kg as compared to those with <3 kg.

CRP Has Limitations In Following Conditions.

In extremely premature <32 weeks of gestation are not able to produce CRP in response toinfections and any inflammatory conditions.
Very low birth weight <1500 grams
A neonate who had suffered asphyxia.
A neonate who already had taken antibiotics.

We conclude that periodic measurement of CRP allow rapid identification of infected neonates andalso help in assessment and prognosis of patents. Hence CRP can be used as a good prognostic marker.

Conclusion: C-REACTIVE PROTEIN has high sensitivity and specificity for establishing the diagnosis of neonatal sepsis and other inflammatory conditions which are comparable to that of blood culture results. With added benefit of early test result availability, it is highly recommendable that it should be used routinely in the evaluation of neonates with any features suggestive of sepsis and other pathological condition to include or exclude the diagnosis.

Although blood culture is a gold standard for diagnosis of infection but it has disadvantages like it is time-consuming, may take 2-10 days to yield aresult, contamination rate is also high due to thetechnical difficulty of obtaining asterile sample from neonates, insufficient samples may also be problematic.

Pro-inflammatory cytokines (IL-2, IL-6,INF-Gamma,and tissue necrotic factor alpha) and anti-inflammatory cytokines (IL-4,IL-10) are increased in infected patients compare to those without infections.However, these cytokines are not routinely measured because of their high cost of testing , not easily available, and more time-consuming.

CRP used routinely because of easy availability, cost effective, less time consuming and more convenient method of testing. Hence CRP can be used as the earliest marker to assess and monitor the severity of inflammatory response and also to assess the prognosis of patients to save the life of neonates.

Hence CRP should be used as the earliest marker without waiting for culture report and start antibiotics as soon as, for saving the life of neonates.

Acknowledgment: We extend our gratitude Medical Superintendent , Civil Hospital Ahmedabad ,Dean of B. J. Medical College, Ahmedabad and Director, Post Graduate, Studies and Research, B. J. Medical College, Ahmedabad for their kind support in this study.

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Conflict of interest: None

Funding: None

Cite this Article asSarita, Minesh Vadsmiya, Praveg G, M.M. Vegad , Kinnari s, Priyadarshini. Detection and Utility of CRP in Neonatal Patients as an Early Marker. Natl J Integr Res Med 2017; 8(2):59-61