ISSN- O: 2458 - 868X, ISSN –P: 2458 - 8687

International Journal of Medical Science and Innovative Research (IJMSIR)

IJMSIR : A Medical Publication Hub

Available Online at: www.ijmsir.com

Volume – 2, Issue – 4, July - August - 2017, Page No. : 09 - 12

Role of C- Reactive Protein in Sepsis in Neonates in A Tertiary Care Hospital

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Conflicts of interest: None to Declare

Abstract

Background: Sepsis is one of the most common causes of morbidity and mortality in neonates. Early diagnosis and treatment is vital to improve outcome.

Aim: Early diagnosis of sepsis in the neonate is difficult because symptom and signs are usually non-specific. This study was conducted to evaluate C- reactive protein (CRP) as a screening tool for neonatal sepsis.

Material and methods: This studywas conducted in the department of Pediatric at Govt medical college, Srinagar from june 2014 to june 2015.

Results: Over a study period of one year, total 60 neonates admitted who were suspected as sepsis. Among these 60 neonates, 38 (63 %) were found CRP positive and 45(75%) were culture positive.

Conclusion: CRP is one of the most widely available and most used laboratory tests for neonatal bacterial infection and despite the continuing emergence of new infection markers, it still plays central role in the diagnosis of early onset sepsis of the neonates.

Keywords: Neonatal sepsis, CRP, morbidity, mortality.

Introduction

Neonatal sepsis is defined as invasive bacterial infection occurring in first 4 weeks of life (1). The incidence of neonatal sepsis is lower in developed countries (2.7/1000 live birth) compared to developing countries (10-15/1000 live birth) (1). The incidence of neonatal sepsis varies from 11-23.5/1000 live births in India (2). Blood culture is the gold standard for definitive diagnosis but it takes atleast 48 hrsby which time the infection may have progressed with important consequences on the morbidity and mortality of the neonates (3), especially if antibiotic treatment is not initiated immediately (4). Therefore, CRP is the most useful marker at that time.

C- reactive protein is an acute phase protein which may be useful in early diagnosis of neonatal sepsis as it rises as much as a thousand fold within 4to 6 hours of an inflammatory process(5,6). CRP is a protein made by liver and sent into the blood stream. Blood levels may be higher when you have swelling or inflammation. Because CRP levels often go up before you have symptoms of pain or fever and drop down as the patient recover, the CRP test is especially useful for tracking infection. CRP as a part of an acute phase response, a physiological and metabolic reaction to an acute tissue injury of different etiologies (trauma, surgery, infection, acute inflammation etc) which aims to neutralize the inflammatory agent and to promote the healing of injured tissue (7). After a trauma or the invasion of microorganisms, an acute inflammatory reaction is initiated by activation of resident cells which promote the recruitment and activation of further inflammatory cells including fibroblast, leukocytes and

endothelial cells. Once activated, they release proinflammatory cytokines including IL-1, TNF-α, and IL-6. These cytokines induce the production of proteins in liver(7,8).

Neonatal sepsis may present with the following symptoms :Refusal to feed, vomiting , lethargy, abdominal distension, fever, hypothermia, icterus, cyanosis, apnea, pallor, umbilical discharge, seizures, diarrhea and tachypnea. Neonates with ≥3 of these signs and symptoms were suspected to have neonatal sepsis. So monitoring serial CRP level may help in early diagnosis and management of neonatal sepsis, initiation and adjustment of antibiotic therapy, thereby reducing the length and cost of hospital stay as well as the parental anxiety.

Material and Methods:

This cross-sectional study was conducted in the neonatal unit, department of Pediatric at Govt medical college, Srinagar from June 2014 to June 2015. Neonates with suspected sepsis whose parents/guardians gave consent were enrolled in the study. A total of 60 of neonatal cases having birth weight >1500g constituted the study population. Blood samples were drawn prior to administration of antibiotic therapy for blood culture by trained staff with all aseptic precautions in blood culture bottle and the growth of bacteria was observed for five days after they were reported. Investigation for CRP in new born was sent after 12 hour If neonate was admitted on day 1 and it was performed by immunometric assay.

Exclusion Criteria include:

1. Age at the time of admission >4weeks
2. Neonates who received antibiotic dose prior to septic workup
3. Neonates diagnosed to have congenital malformation.

Results:

A total of 60 neonatal sepsis cases were evaluated. Of 60 cases, 40(66%) were male and 20 (33%) were females.Out of these 60, 38 (63%) shows CRP positive. And 30 i.e 50% neonates shows culture positive.

The clinical presentations were as follows:

1. Refusal to suck (76%)
2. Lethargy (76%)
3. Tachypnea (50%)
4. Fever (60%)
5. Poor cry (40%)
6. Excessive cry (30%)
7. Icterus (30%)
8. Abdominal distension (25%)
9. Chest indrawing (25%)
10. Poor weight gain (20%)
11. Vomiting (25%)
12. Poor reflexes (10%)
13. Apnea (10%)
14. Hypothermia (10%)
15. Altered sensorium (10%)
16. Seizure (10%)

Table 1.Microorganism grown in blood culture:

S. NO	Organism	Number	Percentage (%)
1.	Methicillin resistant staph aureus (MRSA)	**9**	30
2.	Klebsiella	**6**	20
3.	E.coli	**5**	16.6
4.	Pseudomonas	**4**	13.3
5.	Enterobacteria	**3**	10

6.	S.viridian	**3**	10
Total		**30**	100

Table 1: Depicts that MRSA was the most common offending organism in this study constituting next in order is klebsiella followed by E.coli, Pseudomonas, Enterobacteria, s.viridian.

Table 2:

Gest. Age	No. Of Cases	No. Of CRP Positive	CRP Negative	CRP Range In Mg/Ml
<37 weeks	35	30	5	12 to 24
>37 weeks	25	8	17	6 to 12
Total	60	38	22	

Table 2. shows that total 60 cases of suspected neonatal sepsis CRP is done out of which , less than 37 weeks gestation were 35 were studied and out which 30 were found to positive in the range of 12 to 24µg/ml and remaining 5 cases found negative. In more than 37 weeks of gestation 25 cases were studied , out of which 8 found positive in the range of 6 to 12µ g/ml and remaining 17 found negative.

Discussion:

Of the 60 neonates included in present study , 40 (66%) cases were males and 20 (33%) were females. This preponderance of males over females have been shown in various studies (9,10). This may suggest the possibility of a sex linked factor in host susceptibility. The common clinical symptoms were refusal to suck, lethargy, fever, tachypnea, poor cry, abdominal distension and icterus. Out of which most neonates present with refusal to suck and lethargic.

In present study blood culture was positive in 30(50%) neonates. This is almost comparable to other studies (11,12).In the era of multiresistant microorganisms, it isvery important to avoid the unnecessary use of antibiotics in sepsis negative neonates. CRP can be assayed quantitatively or qualitatively. The quantitative method is more widely used in developed countries(13). It provides rapid, highly sensitive and specific results but requires more time (15 to 30 mints.) and is more complex and expensive to perform(8,13) . The test kits may also not be readily available in some health centresin developing countries. The qualitative method provide rapid result within 15 minutes. However, it is less specific but has the advantage of being simple and easier to perform and interpret and as such can be performed at side laboratory(7,8). It is also less expensive and requires less skills. The qualitative method may therefore, be more feasible in resource poor centres.

The present study has following limitations: Sample size small, lack of specificity and can not be used for purpose of diagnosis of sepsis alone.

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