Original Research Article

Role of C-reactive protein in deciding duration of antibiotics therapy in neonatal bacterial infection in Telangana

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Abstract

Background: Neonatal bacterial infection remains a significant cause of neonatal morbidity and mortality. CRP parameter can be the indicator to use the proper antibiotic with certain duration. **Method:** 60 Neonates < 28 days having/suspicious of bacterial infection (septicaemia) were studied. Blood and Urine culture and sensitivity, routine blood examination, chest x-ray, CRP (serum), were studied. Neonates were classified as per the levels of CRP levels <6 as group 1 and > 6 as group 2. **Results:** Clinical features: 48 (80%) born by vaginal delivery, 4 (66%) had maternal fever >100.4 F, 6 (10%) PROM, 23 (38.3%) refusal to feeds, 20 (33.3%) were lethargic, 12 (20%) had poor cry, 7 (11.6%) had jaundice, 8 (13.3%) had conjunctivitis, 7 (11.6%) had vomiting, 4 (6.6%) had excessive cry, 3 (5%) abdominal distension, 3 (5%) hypothermia, 1 (1.6%) had fever, 2 (3.3%) diarrhoea,1 (1.6%) umbilical Sepsis. The Gram Negative organisms seen in 20 (33.3%). In Group A-28 neonates had CRP value <6 and duration of therapy was <3 days. In group B-32 neonates had CRP value >6 , 2 neonates treated for 5 days, 17 for 7 days, 13 for 11 days and 26 neonates had positive blood culture. **Conclusion:** CRP levels plays vital role to evaluate the duration of antibiotic therapy in neonates of suspected bacterial infection.
Keywords: Sepsis, PROM, C - reactive protein, neonates, antibiotic therapy

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INTRODUCTION

Neonatal bacterial infection (septicaemia) remains a significant cause of neonatal morbidity and mortality globally. The incidences of neonatal sepsis vary between 11 to 25 per thousand live births in India[1]. Its clinical manifestations vary from being specific to subtle, testing the skills of a paediatrician. The inability to be certain of infection coupled with non-specific signs of the life threatening illness in neonates have resulted in wide spread use of antibiotics[2], aggravating the problem of antibiotics resistance. There is an increasing need for careful evaluation of indications and duration of treatment which in turn would shorten the length and cost of hospital stay and diminish the trauma and side effects of antibiotics[3]. C-reactive protein (CRP) an acute phase reactant is synthesized in liver in response to inflammatory cytokines and may rise more than 1000 times during acute phase responses. It falls quickly after efficient elimination of microbial stimulus, due to its short half of life of 19 hours[4]. Thus CRP may be used as parameter for the time period when antibiotic therapy can safely be discontinued in case of suspected neonatal septicaemia, which was the aim of present study in neonates <28 days

MATERIAL AND METHOD

60 (sixty) neonates admitted at paediatric ward of Mediciti Institute of Medical Sciences hospital Ghanpur Medchal – 501401, Telangana were studied.

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Inclusive Criteria: Neonates <28 days of life having birth weight more than 1500 grams with suspected septicaemia were included in the study.

Exclusion Criteria: Neonates undergone surgery due to wound infection Neonates diagnosed as meningitis (because it requires longer treatment of antibiotics) were excluded from study.

Method: After admission blood culture and sensitivity, Routine blood investigations, urine culture and sensitivity, chest x-ray, CRP were done. CRP was estimated within 24-48 hours of admission. Then neonates were classified as per the levels of CRP serum levels. Neonates were kept up to 48 hours after stopping the antibiotics to observe the recurrence of clinical features of septicaemia. If there is no recurrence of symptoms of septicaemia within four weeks of discharge or the baby required antibiotics for different diagnosis other than septicaemia. In the case of relapse the baby needed another course of antibiotics for suspected or proved septicaemia within 4 weeks after discharge. To estimate the value of CRP as a parameter for guiding the duration of antibiotic therapy, the negative predictive value with respect to further treatment was determined. The duration of study was about two years (July 2015 to August 2018).

Statistical analysis: Different clinical features, CRP levels, micro organisms were classified with percentage. The statistical analysis was made in SPSS software. The ratio of male and female were 2:1.

This research work was approved by Ethical committee of Mediciti Institute of Medical Sciences Ghanpur Medchal-501401. Telangana.

OBSERVATION AND RESULTS

Table 1: Clinical features of infected neonates – 48 (80%) born by vaginal delivery 4 (6.6%) had history of maternal fever, 6 (10%) had history of PROM, 23 (38.3%) refusal of feeds, 20 (33.3%) lethargy, 12 (20%) poor cry, 12 (20%) Tachypnea, 7 (11.6%) Jaundice, 8 (13.3%) Conjunctivitis, 7 (11.6%) vomiting, 4 (6.6%) excessive cry, 2 (3.3%) pyoderma, 3 (5%) abdominal distension, 3 (5%) Hypothermia, 1 (1.6%) fever, 2 (3.3%) diarrhoea, 1 (1.6%) umbilical sepsis.

Table 2: Study of organism observed in 26 (43.3%). In the gram negative 20 (33.3%) neonates : 07 (11.6%) klebesiella, 06 (10%) E Coli, 05 (8.33%0 pseudomonas, 02 (3.33%) Acinetobacter. 6 (10%) neonates had gram positive bacilli – 4 (6.66%) staphylococcus aureus, 1 (1.66%) Coagulase Negative Staphylococci (CoNS), 01 (1.66%) had Haemolytic streptococci.

Table 3: CRP guided distribution of treatment, relapse rate in two groups and correlation with blood culture. In group A (28) had CRP value was <6 -duration of therapy was <3 days and No. bacilli, No relapse was observed. In group B CRP value was >6 in 32 neonates, 2 patients treated for 5 days, 17 patients for 7 days and 13 patients for 11 days. Blood culture was positive for 14 neonates with 7 days therapy , for 12 neonates with 11 days duration therapy and no relapse was observed.

Table 4: overall duration of treatment for <7 days observed in group I were 28, and group II were 2 and total number were 30. Duration of > 7 days therapy observed in group 1 were 17 and group 2 were 13 and total number were 30.

Table 1: Clinical features of suspected infected neonates

Sl. No	Particular	No. of neonates	Percentage
1	Vaginal delivery	48	80
2	Material fever >100.4 F	4	6.6
3	PROM > 18 hrs (premature Rapture of Membrane)	6	10
4	Refusal feeds	23	38.3
5	Lethargy	20	33.3
6	Poor Cry	12	20
7	Tachypnea	12	20
8	Jaundice	7	11.6
9	Conjunctivitis	8	13.3
10	Vomiting	7	11.6
11	Excessive Cry	4	6.6
12	Pyoderma	2	3.3
13	Abdominal distension	3	5
14	Hypothermia	3	5
15	Fever	1	1.6
16	Diarrhoea	2	3.3
17	Umbilical sepsis	1	1.6

Table 2: Study of Micro Organism No of patients (26)

Particular	Organism	No. of cases	Percentage
Gram Negative (n=20) (33.3%)	Kelbesiella	07	11.6
	E. Coli	06	10
	Pseudomonas	05	8.33
	Acinetobacter	02	3.33
Gram	Staphylococcus	04	6.66
Positive (n=6) (10%)	Aurous	01	1.66
	CONS and	01	1.66
	α Hemolytic streptococci		

Table 3: CRP guided distribution of treatment relapse rate in two groups and correlation with blood culture results

CRP Value	Groups	Duration of therapy No of cases	Blood culture +ve	Relapse	Nagative predicative value (%)
<6	Group A (28) 46.6	<3 days	Nil	Nil	100
>6	Group B	5 days (2) (3.3%)	Nil	Nil	100
	(32)	7 days (17) (28.3%)	14	Nil	100
	(53.3)	> 11 days (13) (21.6%)	12	Nil	100

Table 4: Over all durations of treatment with CRP guided treatment

Group	Duration of treatment	
+	< 7 days	> 7 days
Group 1	28	17
Group 2	2	13
Total	**30**	**30**

DISCUSSION

In the present study the role of CRP in deciding duration of antibiotic therapy in neonatal bacterial infection in Telangana region. The clinical features were 48 (80%) born by vaginal delivery, 4 (6.6%) had history of maternal fever > 100.4 F, 6 (10%) had history of Premature rupture of membranes (PROM) >18 hrs, 23 (38.3) with refusal feeds, 20 (33.3%) were lethargic, 12 (20%) had poor cry, 12 (20%) had tachypnea , 7 (11.6%) had jaundice, 8 (13.3%) had conjunctivitis, 7 (11.6%) had vomiting, 4 (6.6%) had excessive cry, 2 (3.3%) had pyoderma, 3 (5%) had abdominal distension, 3 (5%) had Hypothermia, 2 (3.3%) had diarrhoea, 1 (1.6%) had fever, 1 (1.6%) had umbilical sepsis (Table-1). In the study of organism 20 neonates (33.3%) had gram negative and 6 (10%) had gram positive organisms (Table-2). In CRP guided distribution of treatment In CRP value >6 group-1 had 28 (46.6%) neonates duration of therapy was < 3 days No positively of blood culture and no relapse was observed. In CRP level >6 32 (53.3%) neonates were observed. Duration of therapy was 5 days for 2 (3.3%) neonates and 7 days for 17 (28.3%) and 11 days 13 (21.6%) neonates (Table-3). The overall duration of treatment for <7 days observed in group I were 28, and group II were 2 and total number were 30. Duration of > 7 days therapy observed in group 1 were 17 and group 2 were 13 and total number were 30 (Table-4). These findings were more or less in agreement with previous studies[5,6,7]. As Bacterial infections stimulate the hepatocytes to produce CRP a non-specific immune response, which is useful clinical marker for the individual host-pathogen interaction. Since the half life of CRP is less than 3 days a rapid fall is seen with successful antibiotic therapy[8]. The diagnosis of neonatal septicaemia is difficult to establish based on the clinical criteria alone because of its subtle, variable and non-specific signs and symptoms. The use of safe and effective antibiotics has significantly contributed to decrease neonatal mortality[9]. However, the fear of missing a case of neonatal septicaemia, with its serious outcome had led to overuse of antibiotics in this age group of neonates. It is also reported any bacterial infection may ultimately turned to septicaemia, if the mother was infected during pregnancy or before delivery[10]. Hence CRP plays vital role in duration of treatment.

SUMMARY AND CONCLUSION

The role of CRP is significant in deciding the duration of antibiotics therapy in neonates. It is safer as compared to other, but still further study is required for other marker

because CRP cannot influence gestation age infections, non-infectious confounders. Moreover exact mechanism of elevation and decrease of CRP values during infections is still unclear.

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