ASIAN JOURNAL OF PHARMACEUTICAL AND CLINICAL RESEARCH

INNOVARE ACADEMIC SCIENCES
Knowledge to Innovation

Vol 7, Issue 2, 2014

ISSN - 0974-2441

Research Article

COMPARISON OF HIGH SENSITIVE C-REACTIVE PROTEIN LEVELS IN NEONATES DELIVERED BY DIFFERENT MODES OF DELIVERY

K.SOWMYA*, C.M.PRABU KUMAR*

***Department of Biochemistry,Sri Ramachandra medical college & Research institute,Chennai.Email:** sowmyasathyan@yahoo.co.in

Received: 28 November 2013, Revised and Accepted: 28 January 2014

ABSTRACT

Objective: C-reactive protein (CRP) is a well-known indicator of inflammation, infection, and stress. Acute hypoxia that develops a short time before birth due to fetal distress may cause an elevation in the hs CRP levels. Hence this study was taken up to compare the hs CRP levels in neonates delivered by different modes of delivery and to determine if there are any changes due to fetal distress

Materials and Methods: The present study included 34 full term neonates, delivered by vaginal route (10), elective caesarean (12) and emergency caesarean (12) sections in the

Obstetrics Unit of Sri Ramachandra Medical College & Research Institute, Chennai. High sensitive CRP concentrations were measured in the venous cord blood of these neonates and analyzed in Dade Behring RXL Dimension clinical chemistry auto analyzer. Neonatal characteristics like gestational age, birth weight, Apgar scores, length and head circumference were also recorded. Statistical analysis was performed using the SPSS for Windows15.0 statistical program. The mean rank values were calculated and differences between mean values of the groups were analyzed by Kruskal Wallis Test and p values <0.05 were considered to be statistically significant. Pearson correlation analysis was used to determine the relationships between CRP levels and neonatal variables.

Result: Statistically significant difference was observed in hs CRP levels in neonates delivered by different modes. No significant correlation was observed between CRP levels and other neonatal variables

Conclusion: The babies delivered by elective cesarean section had significantly lower levels of hs CRP levels compared to babies delivered by other modes. Fetal distress in emergency cesarean section and vaginal delivery has lead to increased hs CRP levels. Thus increase in hs CRP levels reflects the intensity of stress on baby during delivery in the immediate postnatal period and does not necessarily indicate an infected status.

Keywords: hs CRP, delivery, fetal distress

INTRODUCTION

C-reactive protein (CRP) an acute phase protein is synthesized by hepatocytes. CRP is produced due to a physiological and metabolic reaction to an acute tissue injury of different etiology (trauma, surgery, infection, acute inflammation, etc) which aims to neutralize the inflammatory agent and to promote the healing of the injured tissue (1,2). In neonates, non infection associated elevation of CRP was described by several authors in conditions of maternal and perinatal distress, neonatal hypoxia, and tissue damage(3,4). Advances in laboratory technology have enabled its quantification at lower concentrations by an automated analyzer (5,6).When measured with a high sensitivity analytic method, CRP may have diagnostic value in neonatal age groups because newborns are unable to produce sufficient amounts of this acute-phase protein compared to the adults.

The level of CRP varies in newborns within the first few days after birth. During delivery, the fetus is exposed to an abrupt transition from the protective environment of the uterus to the outside world. The new born must undergo extreme physiologic changes to survive this transition.Therefore many physiologic and metabolic processes change constantly during the first few days of life. Hence this study was taken up to measure and compare hs-CRP concentration in the venous cord blood of the neonates delivered by different modes in order to know if acute hypoxia that develops short time before birth due to fetal distress could alter the levels of hs-CRP.

MATERIALS & METHODS

The present study included 34 full term neonates, delivered by different modes in the Unit of Obstetrics at Sri Ramachandra Medical College & Research Institute, Chennai. High sensitive CRP concentrations were measured in the venous cord blood of these neonates. The neonates were divided into 3 groups ,the first group comprised of 10 neonates delivered by vaginal mode ; the second group consisted of 12 neonates who were delivered by elective cesarean section and the third group consisted of 12 neonates who developed fetal distress during labor and have under-gone emergency cesarean section delivery.Signs and symptoms of fetal distress were accepted as decreased fetal movement felt by the mother. Elective caesarean delivery indications included prior caesarean section, placenta previa and those with major anomalies were not included in the study. Any maternal chronic inflammatory conditions like diabetes were excluded. All newborns were delivered at term. Venous cord blood samples were collected immediately after delivery from babies whose parents were informed by their baby's pediatrician and who gave consent to the study. Samples for which the pediatricians had ordered routine CRP measurements were analyzed based on a particle enhanced turbidimetric immunoassay technique (PETIA) in Dade Behring RXL Dimension clinical chemistry auto analyzer. Neonatal characteristics like gestational age, birth weight, Apgar scores, length and head circumference were also recorded. Statistical analysis was performed using the SPSS for Windows15.0 statistical program. The mean rank values were calculated and differences between mean values of the groups were analyzed by Kruskal Wallis Test and p values <0.05 were considered to be statistically significant. Pearson correlation analysis was used to determine the relationships between CRP levels and neonatal variables.

RESULTS

Characteristics of neonates delivered by vaginal, elective LSCS, emergency LSCS are shown in table: 1. There was no significant difference in gestational age, birth length and head circumference of the neonates between the three groups. A significant difference was seen in birth weight (p=<0.001) and Apgar score (p=<0.006) of the

neonates between the three groups. Hs-CRP levels were found to be low in babies delivered by elective LSCS among the three groups and the hs-CRP levels were high in babies delivered by emergency LSCS due to fetal distress compared to babies delivered by other modes. The differences in mean values of hs-CRP among the groups were analyzed by Kruskal Wallis Test and it was found to be statistically significant (p = <0.000).

Table 1: Characteristics of neonates delivered by different modes

S.No	Parameters	Vaginal delivery (12) Mean (SD)	Elective LSCS (10) Mean (SD)	Emergency LSCS (10) Mean (SD)	p-Value
1	Gestational age (wks)	38.2 ± 0.72	39.1± 0.83	38.5 ± 1.49	0.130
2	Birth weight (gms)	3.06 ± 0.32	3.68 ± 0.26	3.15 ± 0.531	0.001*
3	Birth Length (cms)	47.25 ± 2.77	48.6 ± 1.2	46.9 ± 4.1	0.658
4	Birth Head circumference (cms)	32.83 ± 1.77	33.1 ± o.83	33.9 ± 0.95	0.075
5	APGAR score at 5'min	8.41 ± 0.64	9.1 ± 0.53	8.09 ± 0.759	0.006*
6	Hs CRP (mg/dl)	0.141 ± 0.07	0.024 ± 0.01	0.96 ± 1.96	0.000*

***p value <0.05 is considered statistically significant.**

Table 2: Pearson correlation between hs CRP levels and neonatal characteristics

S.No	Hs CRP	Vaginal delivery		Elective LSCS		Emergency LSCS	
		r	p	r	p	r	p
1	Gestational age (wks)	- 0.271	0.395	- 0.132	0.717	- 0.281	0.376
2	Birth weight (gms)	- 0.038	0.906	0.041	0.911	- 0.218	0.496
3	Birth Length (cms)	-0.413	0.182	- 0.634	0.049	- 0.468	0.125
4	Birth Head circumference (cms)	- 0.004	0.990	0.056	0.877	- 0.321	0.308
5	APGAR score at 5'min	- 0.113	0.727	0.087	0.811	- 0.002	0.996

***p value <0.05 is considered statistically significant.**

The correlation between the neonatal characteristics and cord blood serum hs-CRP concentrations are shown in Table 2. In vaginal delivery and emergency LSCS groups a moderately negative correlation was observed between neonatal characteristics and hs-CRP. A positive correlation was seen between birth weight, head circumference, Apgar score and hs-CRP in the neonates of elective LSCS group however the correlation was not significant.

DISCUSSION

Many studies have proved hs CRP as a sensitive marker for infection(7,8,9). CRP is synthesized in the liver in response to IL-1 and IL-6 (10). Loukovaara M et al.,(11) in his study have demonstrated effect of fetal hypoxia on cord blood CRP levels in newborns. Few investigations were performed on the association of CRP with non infectious conditions in healthy neonates(12,13). Chiesa et al.(14) evaluated conditions that influences the level of normal CRP in healthy neonates. In their analysis on 148 healthy term or near term neonates they identified low 5-minute Apgar score an indicator of fetal distress being significantly associated with higher level of CRP at birth supporting our study findings.

As there are not many studies on the influence of different delivery modes and acute fetal distress on hs-CRP levels this study was taken up. The present study compares the level of hs-CRP concentrations in venous cord blood according to different types of deliveries (vaginal delivery, elective and emergency cesarean section). In our study hsCRP values differed greatly among babies born by different modes of delivery. The cesarean section babies had significantly lower hsCRP concentrations than the babies delivered vaginally, which implies the physical stress on babies during vaginal delivery. The increases in hsCRP levels may be related to the magnitude of stress on the baby. In fact, the significance was much greater when babies born by elective cesarean section were compared with babies delivered by emergency LSCS due to decreased fetal movements, proving that hs-CRP concentrations in cord blood is affected due to acute fetal distress. However there was no correlation between the neonatal characteristics and hs-CRP among the three groups of delivery which may be because of smaller sample size.

Thus our data on a small group of newborns suggest that the fetus responds to acute fetal hypoxia and distress that occurs short time before birth by elevation of cord blood hs-CRP concentrations. Accordingly, increases in hsCRP concentrations do not necessarily indicate an infected status in the immediate postnatal period. Thus starting empirical antibiotic therapy in all neonates based on elevated hs-CRP levels taken immediately after birth may results in their exposure to adverse drug effects, nosocomial complications, and in the emergence of resistant strains. Moreover serial measurements of hs-CRP rather than a single assessment at one time with a certain cutoff value can be used for the diagnosis of neonatal infection.

REFERENCE

1. Rifai N, Ridker PM. High-sensitivity C-reactive protein: a novel and promising marker of coronary heart disease. Clin Chem 2001; 47:403–11.
2. Danesh J, Whincup P, Walker M, Lennon L, Thomson A, Appleby P, et al. Low grade inflammation and coronary heart disease: prospective study and updated meta-analyses. BMJ 2000;321:199–204.
3. Ainbender E, Cabatu EE, Guzman DM, Sweet AY. Serum C-reactive protein and problems of newborn infants. The Journal of Pediatrics. 1982;101(3):438-40.
4. Dyck RF, Bingham W, Tan L, Rogers SL. Serum levels of C-reactive protein in neonatal respiratory distress syndrome. Clinical Pediatrics. 1984; 23(7):381-3.
5. Ishibashi M, Takemura Y, Ishida H, Watanabe K, Kawai T. C-reactive protein kinetics in newborns: application of a high-sensitivity analytic method in its determination. Clinical Chemistry. 2002;48(7):1103-6.
6. Rifai N, Tracy RP, Ridker PM. Clinical efficacy of an automated highsensitivity C-reactive protein assay. Clin Chem 1999;45:2136–41.
7. Kawamura M, Nishida H. The usefulness of serial C-reactive protein measurement in managing neonatal infection. Acta Paediatr 1995;84:10–3
8. Benitz WE, Han MY, Madan A, Ramachandra P. Serial serum C-reactive protein levels in the diagnosis of neonatal infection. Pediatrics 1998;102: E41.
9. Pourcyrous M, Bada HS, Korones SB, Baselski V, Wong-SP. Significance of serial C-reactive protein responses in neonatal infection and other disorders. Pediatrics 1993;92:431–5.
10. Ng PC. Diagnostic markers of infection in neonates. Archives of Disease in Childhood Fetal and Neonatal Edition. 2004;89(3):F229-35-F-35.
11. Loukovaara M. Leinonen P. Teramo K. Alfthan H. Stenman UH. Andersson S (2004). Fetal hypoxia is associated with elevated cord serum C-reactive protein levels in diabetic pregnancies. Biol. Neonate. 854:237-242.
12. Hofer N, Müller W, Resch B. Non-infectious conditions and gestational age influence Creactive protein values in newborns during the first 3 days of life. Clinical Chemistry and Laboratory Medicine: CCLM / FESCC. 2011;49(2):297-302.

13. Mathai E, Christopher U, Mathai M, Jana AK, Rose D, Bergstrom S. Is C-reactive protein level useful in differentiating infected from uninfected neonates among those at risk of infection? Indian Pediatrics. 2004; 41(9):895-900.
14. Chiesa C, Signore F, Assumma M, Buffone E, Tramontozzi P, Osborn JF, et al. Serial measurements of C-reactive protein and interleukin-6 in the immediate postnatal period: reference intervals and analysis of maternal and perinatal confounders. Clinical Chemistry. 2001;47(6):1016-22.