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ORIGINAL ARTICLE

Salivary C-reactive protein, mean platelet volume and neutrophil lymphocyte ratio as diagnostic markers for neonatal sepsis☆

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Q2 KEYWORDS
Neonatal sepsis;
Salivary CRP;
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Abstract

Objective: To assess the applicability of salivary C-reactive protein (CRP), mean platelet volume (MPV), neutrophil–lymphocyte ratio (NLR), and platelet lymphocyte ratio (PLR) in the diagnosis of neonatal sepsis.

Methods: Prospective case-control study of 70 full-term neonates, 35 with sepsis (20 with proven sepsis and 15 with clinical sepsis) and 35 healthy controls. Serum and salivary CRP concentrations were measured by ELISA while MPV, NLR, and PLR were measured by automated blood cell counter.

Results: This study showed statistically significant difference of mean salivary CRP between septic neonates and controls (12.0 ± 4.6 ng/L *vs.* 2.8 ± 1.2 ng/L) respectively. At a cut-off point of 3.48 ng/L, salivary CRP showed 94.3% sensitivity and 80% specificity. Salivary CRP also showed good predictive accuracy for predicting elevated serum CRP values in septic neonates. MPV and NLR showed significant difference between septic neonates and controls (10.2 ± 1.2 fL *vs.* 8.0 ± 0.5 fL; 2.9 ± 1.7 *vs.* 1.6 ± 0.4, respectively). At a cut-off point of 10.2 fL, MPV presented 80% sensitivity and specificity. At a cut-off point of 2.7, NLR presented 80% sensitivity and 57.1% specificity.

Conclusion: This study provides support for further studies on the usefulness of salivary CPR, MPV, and NLR as diagnostic markers for neonatal sepsis.

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PALAVRAS-CHAVE
Sepse neonatal;
PCR salivar;
Volume médio de plaquetas;
Proporção de neutrófilos/linfócitos;
Proporção de plaquetas/linfócitos

Proteína C reativa salivar, volume médio de plaquetas e proporção de neutrófilos/linfócitos como marcadores de diagnóstico de sepse neonatal

Resumo

Objetivo: Avaliar a aplicabilidade da proteína C reativa (PCR) salivar, do volume médio de plaquetas (VMP), a proporção de neutrófilos-linfócitos (PNL) e a proporção de plaquetas/linfócitos (PPL) no diagnóstico de sepse neonatal.

Métodos: Estudo caso-controle prospectivo de 70 neonatos a termo, 35 com sepse (20 com sepse comprovada e 15 com sepse clínica) e 35 controles saudáveis. As concentrações de PCR no soro e salivar foram medidas por ensaio imunossorvente ligado a enzima (ELISA), ao passo que o VMP, PNL e PPL foram medidos por contador de células sanguíneas automatizado.

Resultados: Este estudo mostrou uma diferença estatisticamente significativa da média de PCR salivar entre os neonatos com sepse e os controles ($12{,}0 \pm 4{,}6$ ng/L em comparação a $2{,}8 \pm 1{,}2$ ng/L), respectivamente. Um ponto de corte 3,48 ng/L na PCR salivar mostrou sensibilidade de 94,3% e especificidade de 80%. A PCR salivar mostrou, ainda, boa precisão preditiva para prever altos valores de PCR no soro em neonatos com sepse. O VMP e a PNL mostraram diferença significativa entre os neonatos com sepse e os controles ($10{,}2 \pm 1{,}2$ fL em comparação a $8{,}0 \pm 0{,}5$ fL), ($2{,}9 \pm 1{,}7$ em comparação a $1{,}6 \pm 0{,}4$), respectivamente. O VMP no ponto de corte 10,2 fL apresentou 80% de sensibilidade e especificidade. A PNL no ponto de corte 2,7 fL apresentou 80% de sensibilidade e 57,1% de especificidade.

Conclusão: : Este estudo fornece uma base para outros estudos na utilidade da PCR salivar, VMP e PNL como marcadores de diagnóstico de sepse neonatal.

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Introduction

Sepsis is a serious life-threatening condition and a leading cause of morbidity and mortality in full and pre-term infants, especially in the developing countries. It is broadly defined as a systemic inflammatory response occurring in the first 28 days of life as a result of a suspected or proven infection.[1]

There is an urgent call for detecting reliable biomarkers to differentiate between infected and non-infected neonates. Blood culture has been considered as the gold standard for diagnosis, but this analysis is still slow and limited by false negative results.

C-reactive protein (CRP), a major acute phase protein, is a member of the pentraxin family and plays a central role in innate and adaptive immunity.[2] Despite the development of new biomarkers, to date CRP is one of the most studied and most used laboratory tests for diagnosis of neonatal sepsis.[3] CRP takes 10–12 h to significantly rise after the onset of infection.[4] As CRP shows an increase in several conditions, it is preferably used in combination with other biomarkers.[3] A relevant problem in the current clinical approach for sick neonates is the limited availability of simple, safe, noninvasive diagnostic tools with high diagnostic accuracy. Neonatal saliva overcomes many of the hurdles associated with neonatal research and offers investigators a new, exciting, and non-invasive sample source for exploring neonatal biology. CRP is detectable in neonatal saliva and can predict abnormal serum CRP thresholds.[5]

Recently, certain parameters of complete blood count (CBC) were used as markers of inflammation and infections. Mean platelet volume (MPV) has been used in diagnosis, follow-up, and prediction of neonatal sepsis severity in term and preterm neonates.[6–8] The neutrophil–lymphocyte ratio (NLR) is a simple biomarker of inflammation.[9] In addition, platelet lymphocyte ratio (PLR) is also a useful marker of systemic inflammation.[9,10]

The present study aimed to assess the applicability of salivary CRP, MPV, NLR, and PLR as diagnostic markers in full-term neonates with neonatal sepsis.

Methods

The present study was conducted at the neonatal intensive care unit (NICU) of the Suez Canal University Hospital, Ismailia, Egypt between January 2016 and June 2016. During these six months, 320 neonates were admitted to the unit. Thirty-five neonates with either early or late onset neonatal sepsis and 35 healthy control neonates were enrolled.

Full term infants of both genders from birth to the 28th day of life who were admitted to the Suez Canal University NICU with clinical features of either early- or late-onset neonatal sepsis were enrolled in this study. The diagnosis of clinical sepsis was made by history, clinical findings, laboratory findings, and blood culture. The clinical findings included the presence of three or more of the following: (1) temperature instability (hypothermia, hyperthermia); (2) respiratory alterations (grunting, intercostal retractions, apnea, tachypnea, cyanosis); (3) cardiovascular alterations (bradycardia, tachycardia, poor perfusion, hypotension); (4) neurologic alterations (hypotonia, lethargy, seizures); and

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