Can neutrophil to lymphocyte ratio predict late-onset sepsis in preterm infants?

Senem Alkan Ozdemir*, Esra Arun Ozer**, Ozkan Ilhan***, Sumer Sutcuoglu***

*Behcet Uz Children’s Hospital, Izmir, Turkey

**Celal Bayar University School of Medicine Department of Pediatrics Division of Neonatology, Manisa, Turkey

*** Tepecik Education and Research Hospital, Izmir, Turkey

BACKGROUND:

The neutrophil to lymphocyte ratio (NLR) is an easily accessible biomarker that has been reported to represent disease severity in adult trials. The aim of this study was to evaluate the relationship between culture positiveness and NLR in cases where the reason of sepsis was considered, and to foresight an idea about the active agents.

METHODS:

Preterm infants with birth weights ≤1500 g and/or ≤32 gestational weeks were eligible for this study. The postnatal age of all included infants was more than 3 days with clinical and laboratory signs of sepsis. According to the results of blood cultures, all enrolled infants were classified into 2 groups: the culture-proven septic infants and suspected septic infants. The NLR was calculated as the ratio of neutrophil count to lymphocyte count. Initial laboratory investigations included WBC count, platelet count (PLT), C-reactive protein (CRP), and blood cultures.

RESULTS:

A total of 127 infants were involved: 57 culture-proven sepsis and 75 suspected sepsis. There were no significant differences between groups regarding gestational age, gender, birth weight, delivery mode, and postnatal age. Receiver operating curve analysis for NLR and CRP was calculated. The area under the curve corresponded to 0.78 ± 0.04 (NLR) vs 0.55 ± 0.05 (CRP). Using a cutoff point of 1.77 for NLR, the sensitivity was 0.73, the specificity was 0.78, and accuracy rate was 0.76.

DISCUSSION:

The prediction of NLR, an easy, inexpensive, and rapid method, along with CRP in the neonatal period for diagnosis of sepsis, will be more effective in detecting culture-proven sepsis and in decreasing unnecessary antibiotherapy.

Table 1. Characteristics of the infants

	Culture proven sepsis (n=52)	Suspected sepsis (n=75)	p
Gestational age (week)*	27.5 ± 2.5	28.3 ± 3.0	0.96
Birth weight (g)*	1037.8 ± 303	1167.8 ± 313	0.54
Male gender	31 (59)	40 (53)	0.23
Delivery mode (NVD/C&S)	17/35	39/36	0.03
Postnatal age (day)*	22.2 ± 16.3	19.2 ± 14.3	0.67
Maternal age (year)*	28.3 ± 7.4	29.2 ± 5.9	0.41

Table 2. Comparison of laboratory findings

	Culture proven sepsis (n=52)	Suspected sepsis (n=75)	p
WBC (x10 ⁹ /L)*	13.7 ± 7.0	1198 ± 5.2	0.09
PLT (x10 ⁹ /L)*	261 ± 147	280 ± 154	0.47
CRP (mg/L)*	30.9 ± 41.5	23.8 ± 25.2	0.23
NLR *	3.69 ± 3.0	1.56 ± 1.83	<0.001

Table 3. ROC Analysis of groups

	Groups	Graphic	Cut-Off	Sensitivity	Specificity	Accuracy	AUC±SE	P
						rate		Value
NLR	Culture proven / Suspected	A	1.77	73.1%	78.7%	76.4%	0.782±0.042	<0.001
	Gram (+) / (-)	B	2.14	85.7%	46.7%	21.3%	0.575±0.116	0.529
	Gram (-) / Suspected	C	2.22	85.7%	82.7%	53.5%	0.822±0.098	0.005
	Gram (+) / Suspected	D	1.77	71.1%	78.7%	71.7%	0.776±0.044	<0.001
CRP	Culture proven / Suspected	E	7.10	96.0%	24.0%	52.8%	0.558±0.056	0.273