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ORIGINAL ARTICLE

Diagnostic Value of Neutrophil CD11b in Early-onset Neonatal Sepsis

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ABSTRACT

Background: Neonatal sepsis is a major contributor to newborn morbidity and mortality. To find the best diagnostic and prognostic parameter that can overcome the numerous drawbacks and confusing features of the available laboratory diagnostic tools, a challenge including a large number of sepsis biomarkers was developed. One cell surface marker that is currently being studied and may be helpful in the diagnosis of sepsis is neutrophil CD11b (nCD11b). Therefore, our goal was to assess how nCD11b functions in the diagnosis and prognosis of newborn sepsis with an early onset.

Methods: This case-control study was carried out at Neonatal Intensive Care Unit, Pediatrics and Clinical Pathology Departments, Zagazig University Hospital on sixty neonates divided into two groups; 30 sepsis group as patient group and 30 controls without sepsis. All neonates were subjected to full history taking, full clinical examination and investigations including (CBC, CRP, serum electrolytes, liver function tests, renal function tests, blood culture, and nCD11b). Neutrophil CD11b percentage and Mean Fluorescence Intensity (MFI) was assessed by flowcytometry, baseline for both case and control groups, and a second sample for case group after five days of the first one.

Results: There was a statistically significant difference between the studied groups regarding neutrophil CD 11b % at baseline and after treatment (significantly higher among case group) while there was no significant difference regarding neutrophil CD11b MFI at baseline and after treatment.

Conclusion: Neutrophil CD11b emerges as a promising diagnostic and monitoring tool for neonatal sepsis.

Keywords: Neutrophil; CD11b; Early-onset Neonatal Sepsis.

INTRODUCTION

In high-income countries, neonatal sepsis affects 1 to 4 out of every 1000 live newborns, making it a major cause for morbidity and mortality, whereas its prevalence is considerably higher in low- and middle-income nations. Absence of specific clinical symptoms and signs of sepsis like (lethargy, feeding intolerance, respiratory distress, bradycardia, and apnoea) will delay its diagnosis [1, 2].

Although blood culture remains the gold standard for diagnosis, it is limited by delayed results and a high false-negative rate [3,4]. For fear of increasing mortality and complications as necrotizing enterocolitis, empirical antibiotic therapy is frequently initiated, yet contributes significantly to the development of antimicrobial resistance and disruption of the neonatal microbiota [2].

Recent research has examined several novel serum biomarkers, such as cytokines and cell surface proteins, in order to assess their diagnostic value in neonatal sepsis; because the conventional tests like (CRP, and procalcitonin) cannot highly predict sepsis in neonates [5, 6].

Therefore, finding distinct and reliable biomarkers for the early detection of sepsis in newborns is essential.

The β-integrin adhesion protein, known as neutrophil CD11b (nCD11b), is crucial for the movement of neutrophils and monocytes to areas of inflammation or infection [7]. On the surface of the non-activated neutrophils, nCD11b "an FC receptor" is present in trace amounts, and increases in response to sepsis [8]. Thus, it could therefore be used as a diagnostic marker for newborn sepsis in its early stages.

METHODS

Between March 2023 and November 2023, this case-control study was carried out in the pediatrics department of Zagazig University Hospital's Neonatal Intensive Care Unit (NICU). and Clinical Pathology Department. 60 neonates were recruited for the study, and they were split up into Group I: Thirty neonates with risk factors for neonatal sepsis who were born ≥28 weeks gestational age (range: 28 weeks to 39 weeks), along with 2 clinical and 2 laboratory criteria, were included in the patients group. There were sixteen females and fourteen males. Sepsis was deemed severe if it was accompanied by disseminated intravascular coagulation (DIC) and hemodynamic instability [9]. Group II: (Control group) comprised 30 infants without any sepsis-related symptoms or indicators. There were ten boys and twenty females, and their gestational ages ranged from 32 to 40 weeks.

The Ethics Review Committee of Zagazig University's Faculty of Medicine authorized the study after all parents provided written, informed consent to take part (IRB number 9668-21-9-2022).

Inclusion criteria:

1. The study included both male and female neonates.
2. Neonates born at least 28 weeks gestation and with maternal risk factors (such as chorioamnionitis, meconium aspiration, prolonged labour, or more than eighteen hours of protracted premature rupture of the membrane (PROM). were included in the case group, maternal intrapartum fever, and maternal urinary tract infection).

Along with two clinical and two laboratory needs, the clinical data were [10]:

I. Pulse oximeter readings of ≤85%, a breathing pause of at least 20 seconds or a respiratory rate of more than 60 breaths per minute, occurring at least twice each hour.
II. Pallor, hypotension, or a heart rate below 100 beats per minute.
III. Metabolic acidosis (pH < 7:25), Hypothermia (rectal temperature <36°C), The patient may have glucose instability (blood glucose level <45 mg/dL or >125 mg/dL), feeding intolerance (increased gastric residuals of >50% of milk volume in ≥2 feedings within 24 hours), or body temperature >38°C.
IV. Poor or decline in activity.

Whereas laboratory criteria were [11]:

I. Immature to total neutrophil (I:T) ratio > 0.2,
II. platelet count < 100 × 109 /L,
III. CRP > 10 mg/L,
IV. white blood cell (WBC) count <5 or >20 × 109 cells/L are the first four criteria.

3. The control group consisted of newborns born at or after 28 weeks gestation and without any sepsis-related symptoms, indicators, or risk factors.

Exclusion criteria:

1. Chromosomal abnormalities.
2. The existence of congenital defects, such as those related to the heart (congenital heart disorders), brain (meningocele, hydrocephalus, etc.), gastrointestinal system (omphalocele, intestinal atresia, etc.), kidneys, and/or adrenal glands.
3. Infants born before 28 weeks of pregnancy.
4. Treatment with antibiotics upon admission.
5. Not getting permission from parents.

A thorough medical history, physical examination, and standard laboratory tests, including CBC, liver and kidney function tests, C-reactive protein (CRP), and serum electrolytes, were performed on each research participant. (Na, K,

Ca), blood culture and special laboratory investigation including neutrophil CD11b percentage and Mean Fluorescence Intensity (MFI) By flowcytometry, baseline for both case and control groups, and a second sample for case group after five days of the first one.

Statistical Analysis

Version 27 of SPSS (Statistical Package for the Social Sciences) was used to analyze the data. The Wilcoxon signed rank test, independent sample t test, Mann Whitney test, ROC curve, Spearman rank correlation coefficient, Monte Carlo testing, and chi square test were all employed.

RESULTS

The groups under investigation are significantly different regarding body weight (significantly lower in the case group), maternal risk factors (a higher percentage of the control group had no maternal risk factors, whereas 73.3% of those in the case group had PROM), APGAR at 1 and 5 minutes, and gestational age (significantly lower in the case group). However, gender, mode of delivery, gestation type, and APGAR at 10 minutes are statistically non-significant differences between the groups (Table 1).

There is a statistically significant difference in the studied groups regarding these signs (bradycardia (HR<100 b/m), hypotension, lethargy, newborn jaundice, tachypnea, acidosis, and cyanosis). The groups under investigation do not differ statistically significantly in terms of other clinical indications. The case group's survival rate was 46.7%, while all of the control group's patients survived, indicating a statistically significant difference in the groups' outcomes **(Table 1 supplementary).**

Platelet count, CRP (significantly higher in the case group), ALT (notably lower in the case group), and blood culture (26.7% in the case group had a positive culture for Klebsiella) all showed statistically significant differences between the groups under inquiry. The groups under study did not vary statistically in terms of TLC, BUN, creatinine, AST, serum albumin, sodium, potassium, or calcium **(Table 2 supplementary).**

Regarding neutrophil CD 11b% at baseline and after therapy, the groups under investigation differed statistically significantly (the case group's was significantly higher). Neutrophil CD11b MFI levels in the study groups before and after therapy did not differ statistically significantly. (Table 2).

Of the thirty cases in the group, regarding the initial CD11b sampling, twenty-four had a positive CD11b%, five had a negative CD11b%, and one sample was hemolyzed. Six patients in the control group (30 cases) had CD11b% positive results, whereas 24 patients had negative results. (Table 3).

The APGAR score, maternal risk factors, gestational type, and delivery method did not significantly correlate with the case group patients' outcomes. The weight and gestational age of the patients in the case group were statistically strongly correlated, with both being significantly lower among non-survivors **(Table 3 supplementary).**

The outcome of patients in the case group and neutrophil CD 11 b percentage at the initial assessment, after five days, or the percentage of a drop in it, did not significantly differ. The percentage of neutrophil CD 11b had significantly decreased after treatment among survivors. The outcome of patients in the case group and nCD11b MFI at baseline, after five days, or the percentage of a drop in it, did not significantly differ. Neutrophil CD11b MFI decreased non-significantly within each group (Table 4).

The severity of sepsis within the case group did not statistically significantly correlate to the baseline nCD11b percentage, after five days, or the percentage of reduction in it. Neutrophil CD 11b% significantly decreased in severe instances. The degree of sepsis in patients in the case group and neutrophil CD11b MFI at baseline, after five days, or the percentage of a reduction in it, did not statistically significantly correlate. Neutrophil CD11b MFI decreased non-significantly within each group (Table 5).

With an area under the curve of 0.853, sensitivity of 82.8%, specificity of 80%, positive predictive value of 80%, negative predictive value of 82.8%, overall accuracy of 81.4%, positive likelihood ratio of 4.14, and negative likelihood ratio of 0.22 (p<0.001), the optimal cutoff of neutrophil CD11b in the diagnosis of sepsis was ≥98% (Table 6, Figure 1).

Table (1): Comparison between the studied groups regarding fetal and maternal risk factors.

	Sepsis-positive	Sepsis-negative		P
	N=30%	N=30%		
Maternal risk factors				
NAD **Preterm labor** **PROM** **Recurrent UTI** **Meconium-stained**	0 (0%) 2 (6.7%) 22 (73.3%) 5 (16.7%) 1 (3.3%)	25 (83.3%) 5 (16.7%) 0 (0%) 0 (0%) 0 (0%)	MC	<0.001**
	Mean ± SD	**Mean ± SD**	**t**	**P**
APGAR 1 minute	5.43 ± 1.48	7.0 ± 0.91	-4.944	<0.001**
APGAR 5 minutes	7.87 ± 1.01	8.8 ± 0.41	-4.703	<0.001**
APGAR 10 minutes	8.9 ± 0.4	9.0 ± 0	-1.361	0.092
Gestational age (weeks)	33.13 ± 3.2	36.2 ± 2.31	-4.253	<0.001**
	Median (IQR)	**Median (IQR)**	**Z**	**P**
Weight (kg)	1.8(1.35 – 2.23)	2.32 (1.9 – 3.25)	-3.235	<0.001**

MC Monte Carlo test, t independent sample t test, Z Mann Whitney test, **p≤0.001 is statistically highly significant, SD standard deviation, IQR inter quartile range, NAD no abnormality detected, PROM premature rupture of membranes, UTI urinary tract infection

Table (2): Comparison between the studied groups regarding neutrophil CD11b percentage and Mean Fluorescence Intensity (MFI).

	Sepsis-positive	Sepsis-negative	Z	P
	Median (IQR)	Median (IQR)		
Neutrophil CD11b %				
Baseline (within 72 hours of age)	99.1(98.2 – 99.4)	97.5(96.2 – 97.9)	-4.671	<0.001**
After 5 days of treatment	98.3(97.15 – 99)		2.187	0.029*
Neutrophil CD11b MFI				
Baseline (within 72 hours of age)	5.48(4.37 – 7.42)	5.52(4.3 – 6.26)	-0.728	0.466
After 5 days of treatment	5.63(4.11 – 7.09)		-0.091	0.927

Z Mann Whitney test, **p≤0.001 is statistically highly significant, *P<0.05 is statistically significant, IQR inter quartile range

Table (3): Performance of neutrophil CD 11b% in prediction of sepsis as confirmed by 2 clinical and 2 laboratory findings, regarding the initial samples.

Neutrophil CD11b%	sepsis-positive	sepsis-negative	
CD11b% positive	24 (TP)	6 (FP)	30
CD11b% negative	5 (FN)	24 (TN)	29

TP true positive, FP false positive, FN false negative, TN true negative

Table (4): Relation between outcome of case group and Neutrophil CD 11b.

	Non-survivors (N-16)	Survivors (N=14)	Z	p
	Median (IQR)	Median (IQR)		
Neutrophil CD11b%				
Baseline (within 72 hours of age)	99(98.1 – 99.2)	99.1(98.28 – 99.5)	-0.92	0.358
After 5 days of treatment	97.8(97.2 – 99)	98.45(96.58 – 99.05)	-0.393	0.694
p (Wx)	0.201	0.028*		
% decrease	0.61(-0.71 – 1.61)	0.81(0.48 – 1.92)	-0.786	0.432
Neutrophil CD11b MFI				
Baseline	5.48(4.46 – 7.42)	5.84(4.18 – 7.92)	-0.218	0.827
After 5 days	4.88(3.99 – 6.39)	6.28(4.27 – 7.9)	-1.266	0.206
p (Wx)	0.156	0.73		
% decrease	6.39(-9.34 – 38.68)	7.49(-32.77 – 27.09)	-0.567	0.57

Wx Wilcoxon signed rank test, Z Mann Whitney test, **p≤0.001 is statistically highly significant, IQR inter quartile range, MFI mean fluorescence intensity

Table (5): Relation between severity of sepsis of case group and Neutrophil CD11b % and MFI.

	Non-severe (N=17)	Severe (N=13)	Z	p
	Median (IQR)	Median (IQR)		
Neutrophil CD11b%				
Baseline (within 72 hours of age)	99.1(98.25 – 99.58)	98.8(98.05 – 99.15)	-1.518	0.132
After 5 days of treatment	98.45(96.1 – 99.1)	97.2(96.1 – 99.1)	-1.273	0.203
p (Wx)	0.201	0.028*		
% decrease	0.81(0.5 – 1.09)	0.4(-0.71 – 2.73)	-0.132	0.895
Neutrophil CD11b MFI				
Baseline (within 72 hours of age)	5.4(3.85 – 7.75)	6.27(4.6 – 7.33)	-0.219	0.826
After 5 days of treatment	5.93(4.59 – 7.16)	4.88(3.67 – 7.15)	-0.987	0.324
p (Wx)	0.156	0.73		
% decrease	7.21(-57.04 – 31.24)	6.96(-7.4 – 40.06)	-0.745	0.5456

Wx Wilcoxon signed rank test Z Mann Whitney test **p≤0.001 is statistically highly significant

Table (6): Performance of CD11b% at a Cutoff ≥98 as a diagnostic tool for neonatal sepsis.

Cutoff	AUC	Sensitivity	Specificity	PPV	NPV	Accuracy	+LR	-LR	P
≥98%	0.853	82.8%	80%	80%	82.8%	81.4%	4.14	0.22	<0.001**

AUC area under curve, PPV positive predictive value, NPV negative predictive value, +LR positive likelihood ratio, -LR negative likelihood ratio, **p≤0.001 is statistically highly significant

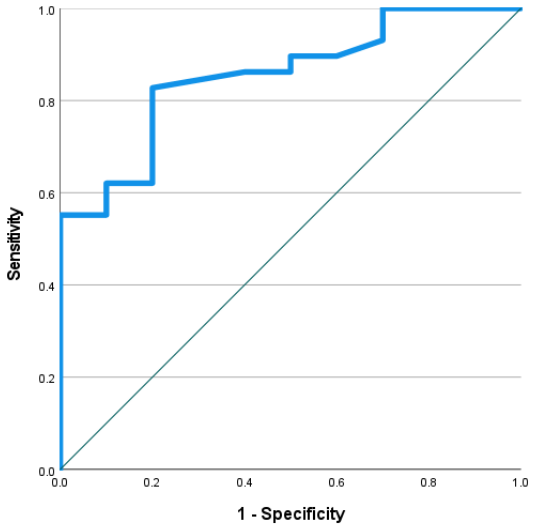

Figure (1): ROC curve showing performance of neutrophil CD 11b% in prediction of sepsis.

Table (1 supplementary) Comparison between the studied groups regarding clinical data and outcome.

	Case group N=30 (%)	Control group N=30 (%)	χ^2	p
Clinical presentation				
Apnea	3 (10%)	0 (0%)	Fisher	0.237
HR<100	5 (16.7%)	0 (0%)	5.455	0.02*
Hypotension	8 (26.7%)	0 (0%)	9.231	0.002*
Hypoglycemia	1 (3.3%)	0 (0%)	Fisher	>0.999
Hypothermia	1 (3.3%)	0 (0%)	Fisher	>0.999
Lethargy	8 (26.7%)	0 (0%)	9.231	0.002*
Neonatal Jaundice	0 (0%)	7 (23.3%)	7.925	0.005*
Pallor	4 (13.3%)	0 (0%)	Fisher	0.112
Tachypnea	12 (40%)	3 (10%)	Fisher	0.015*
Metabolic acidosis	5 (16.7%)	0 (0%)	5.455	0.02*
Cyanosis	5 (16.7%)	0 (0%)	5.455	0.02*
Cephalohematoma	0 (0%)	3 (10%)	Fisher	0.237
Outcome				
Died	16 (53.3%)	0 (0%)	21.818	<0.001*
Discharged	14 (46.7%)	30 (100%)		*

χ^2Chi square test *p<0.05 is statistically significant **p≤0.001 is statistically highly significant

Table (2 supplementary) Comparison between the studied groups regarding laboratory data.

	Case group N=30 **Median (IQR)**	Control group N=30 **Median (IQR)**	Z	p
TLC (x10^3/mm^3)	20(5.6 – 24.08)	10.3(9 – 12.6)	-1.458	0.145
Platelet count (x10^3/mm^3)	126(78.25 – 274.75)	244.5(232 – 353)	-3.595	<0.001**
CRP (mg/L)	13(10.35 – 21.25)	3(0 – 14.73)	-5.979	<0.001**
BUN (mg/dl)	17.5(12.9 – 32.25)	21(14 – 29)	-0.526	0.599
Creatinine (mg/dl)	0.6(0.48 – 0.73)	0.5(0.38 – 0.8)	-0.822	0.411
	Mean ± SD	**Mean ± SD**	t	p
Serum albumin (g/dl)	3.24 ± 0.36	3.26 ±0.29	-0.224	0.823
Sodium (mmol/l)	136.3 ± 5.08	137.27 ± 2.77	-0.915	0.364
Potassium (mmol/l)	4.47 ± 0.75	4.29 ± 0.95	0.798	0.428

Calcium (mg/dl)	8.35 ± 0.71	8.64 ± 0.79	-1.052	0.139
Blood culture				
No growth E coli Klebsiella Staph hemolyticus Staph aureus	17 (56.7%) 2 (6.7%) 8 (26.7%) 1 (3.3%) 2 (6.7%)	30 (100%) 0 (0%) 0 (0%) 0 (0%) 0 (0%)	MC¥	<0.001**

¥Chi square test MC Monte Carlo test t independent sample t test Z Mann Whitney test
**p≤0.001 is statistically highly significant

Table (3 supplementary) Relation between outcome of case group and perinatal history:

	Non-survivors	Survivors	χ^2	p
	N=16 (%)	**N=14 (%)**		
Maternal risk factors				
Preterm labor PROM Recurrent UTI Meconium stained	2 (12.5%) 11 (68.8%) 3 (18.8%) 0 (0%)	0 (0%) 11 (78.6%) 2 (14.3%) 1 (7.1%)	MC	0.667
	Mean ± SD	**Mean ± SD**	t	p
Gestational age (week)	31.63 ± 2.16	34.86 ± 3.39	-3.063	0.006*
APGAR 1 minute	5.13 ± 1.2	5.79 ± 1.72	-1.204	0.241
APGAR 5 minutes	7.69 ± 0.95	8.07 ± 1.07	-1.042	0.306
APGAR 10 minutes	8.94 ± 0.25	8.86 ± 0.54	0.539	0.594
	Median (IQR)	**Median (IQR)**	Z	p
Weight (kg)	1.5(1.2 – 1.8)	2.18(1.78 – 2.59)	-3.043	0.002*

χ^2Chi square test ¥Chi square for trend test MC Monte Carlo test t independent sample t test Z Mann Whitney test **p≤0.001 is statistically highly significant

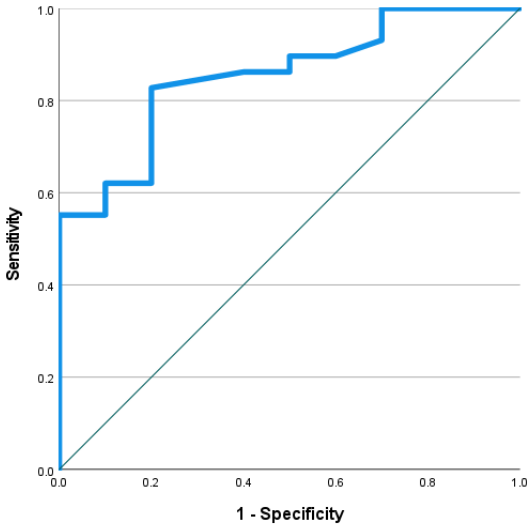

Figure (1 supplementary) ROC curve showing performance of neutrophil CD 11b% in prediction of sepsis.

DISCUSSION

One of the leading causes of infant morbidity and mortality is neonatal sepsis, a potentially fatal illness. Making a conclusive diagnosis of newborn sepsis is challenging, particularly in its early phases [8].

The presence of an early marker would help starting antibiotics soon and prevent the negative outcome of sepsis [12].

Therefore, assessing the involvement of nCD11b in the diagnosis and prognosis of early-onset newborn sepsis was the goal of the current investigation in order to facilitate the early detection of this condition.

Our study showed a statistically significant difference in maternal risk variables between the groups under study (p value <0.001). A higher percentage of the control group had no maternal risk factors, whereas 73.3% of the case group had PROM.

This was consistent with Salem et al. [13], which discovered that chorioamnionitis with PROM was linked to early newborn sepsis in 14 out of 50 (28%) neonates with early onset sepsis; whereas only 122/736 (16.6%) neonates without early onset sepsis, their mothers were affected.

The median birth weight of the control group was 2.32 (1.9-3.25), while that of the case group was 1.8 (1.35-2.23). There was a statistically significant difference (p <0.001).

We found that 136 infants with early neonatal sepsis were included in a retrospective cross-sectional study by Jovičić et al. [14], Of whom 62.5% survived (controls) and 37.5% died (cases). The findings demonstrated that the neonates that died had birth weights and Apgar score values in the first minute that were statistically significantly lower than those of the control group.

The current study revealed that the case group's median platelet count was 126 (78.25–274.75), whereas the control group's was 244.5 (232–353). Additionally, the case group's median CRP was 13 (10.35–21.25) compared to 3 (0–14.73) for the group under control. Furthermore, these changes were statistically significant, as shown by P <0.001. The groups under investigation differed statistically significantly in terms of ALT; the median for the case group was 9 (7–13.5), whereas the median for the control group was 13 (12–23) (P value 0.006).

In the same way, Du et al. [15] concurred with our findings for the CRP, neutrophil count, and white blood cell count. When compared to the comparable levels of controls, they were considerably higher in neonates with suspected sepsis (P = 0.018, 0.007, and 0.003, respectively). However, they didn't agree with our findings about the platelet count of the newborns who were suspected of having sepsis. There was no discernible difference between them and the controls (P>0.01).

The majority of blood cultures in our study were negative (56.7%), while the most prevalent organisms in the positive cultures were Klebsiella (26.7%), E. Coli (6.7%), Staph. Aureus (6.7%), and Staph. Hemolyticus (3.3%). However, the blood cultures of all control babies were negative. Additionally, the statistical significance of this difference was considerable (p value <0.001).

These results are in line with those of prior Egyptian investigations that discovered that the most prevalent organisms recovered from sepsis newborns were coagulase-negative Staphylococci (CONS) and Klebsiella spp. [16].

The current investigation revealed a statistically significant difference in neutrophil CD 11b percentage between the groups under investigation. With a p value <0.001, its median was 99.1 (98.2 – 99.4) for the case group and 97.5 (96.2 – 97.9) for the control group. With an optimal cutoff of neutrophil CD11b% in the diagnosis of sepsis ≥98%, with an overall accuracy of 81.4%, a positive likelihood ratio of 4.14, a negative likelihood ratio of 0.22, sensitivity of 82.8%, specificity of 80%, positive predictive value of 80%, and negative predictive value of 82.8% (p<0.001), as well as an area under the curve of 0.853.

In agreement with our results Hahem et al. [17] found that the best cutoff of nCD11b% is 98.7%, with a sensitivity of 31.8%, specificity of 73.6%, positive predictive value of 42.7%, and negative predictive value of 63.1%, as well as an area under the curve of 0.405.

Sheneef et al. [18] found that neutrophil CD11b expression levels were significantly higher in cases (57.1±2.5) compared to controls (11.8±7.2) (P<0.001), which is consistent with our findings. CD11b exhibited a 95% sensitivity, 95% specificity, 94.1% positive predictive value, and 95.9% negative predictive value when used to diagnose early-onset sepsis.

Furthermore, ELMeneza et al. [12] The proportion of neutrophils expressing CD11b

was significantly higher in the sepsis and suspected sepsis groups than in the controls, leading to the recent conclusion that CD11b is a sensitive marker for sepsis in full-term newborns that may be incorporated into regular daily duties. The sepsis group in their study had greater CD11b levels than the suspected sepsis group.

The utility of estimating neutrophil expression of CD64 and CD11b in bacterial neonatal sepsis was assessed by Yousif et al. [19]. Their research demonstrated that CD11b has a sensitivity of over 97% and a specificity of 98% when used to predict patients with positive blood cultures.

These findings are in good agreement with those of Umlauf et al. [20], who found that CD11b has a high sensitivity (96%) for detecting newborn sepsis. According to that study, only 5% of CD11b is expressed on the cell surface, with the remaining 95% of the resting neutrophils' CD11b content existing as intracellular storage vehicles. These secretory vesicles are exocytosed when neutrophils are stimulated, which results in increased CD11b expression.

However, a study by Mokuda et al. [21] Study looked at over 10 leukocyte surface markers was unable to validate CD11b's diagnostic utility in detecting infection in preterm newborns.

Fitrolaki et al. [22] assessed the diagnostic validity of nCD11b in newborn septicemia and found no discernible difference in levels between healthy controls and sepsis neonates.

Likewise, there was no discernible difference in nCD11b% between sepsis patients and both healthy and ill controls. There was no discernible difference between the diseased and healthy controls (P = 0.435). Specificity was 94.0%, sensitivity was 50.0%, PPV was 87.2%, NPV was 69.6%, effectiveness was 74.2%, and AUC was 0.798 for nCD11b% at cutoff 99%. El-Madbouly et al. [23].

This disparity between our results and these observations could be due to variations in the blood collection timing relative to the infection phase.

Conclusion

We discovered that neutrophil CD11b is a promising diagnostic marker for neonatal sepsis. The necessity of early detection and suitable treatment of low-birth-weight infants with sepsis is further highlighted by the correlation between birth weight and death risk.

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Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interest.

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