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Serum Soluble Triggering Receptor Expressed on Myeloid Cells-1 As a Diagnostic and Prognostic Marker in Neonatal Sepsis

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Abstract

Background: Neonatal sepsis is considered to be a systemic inflammatory response syndrome (SIRS) induced by bacteria, viruses, or fungi (yeast) infections. Neonatal sepsis is a major disease threatening the life of newborns, which is also one of the major challenges facing global public health.

Aim of Study: To assess the ability of serum soluble form of triggering receptor expressed on myeloid cells-1 (sTREM-1) in predicting the diagnosis and prognosis of early and late onset neonatal sepsis in full term neonates.

Patients and Methods: This cross sectional study that was conducted from 1/6/2022 to 1/1/2023 included 60 full term neonates in sepsis divided into 2 groups, group at day 1 of infection, and group at day 4 of infection.

Results: In our study serum soluble form of triggering receptor expressed on myeloid cells-1 marker decreased at day 4 after antibiotics therapy and this is matched with GIBOT study. GIBOT study suggests that Post-therapy sTREM-1 levels were significantly decreased 48h after antibiotic intake in septic neonates compared to baseline levels. Thus, decreased sTREM-1 denotes favorable response and indicates that infection has been controlled. This implies a role of sTREM- 1 in monitoring response to therapy before getting culture results In our study sTREM marker was high in negative and positive blood cultures but higher in negative cultures. Our study shows that there was no statistically significant difference found in the level of total leucocytic count (TLC), hemoglobin and C-reactive protein (CRP) from day 1 to day 4 respectively and also statistically significant decrease in the level of alanine aminotransferase (ALT) in sepsis group than non sepsis group.

Conclusion: sTREM marker was high in proved sepsis patients by blood culture positive and suspected sepsis patients even blood culture negative than improved in the proven sepsis and suspected sepsis patients. Initial level of sTREM marker was higher than based level >5pg/mL. Used for follow-up at day 4 of infection. It was decreased at day 4 infection.

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Key Words: *Systemic inflammatory response syndrome — Serum 16 soluble triggering receptor expressed on myeloid cells -1.*

Introduction

NEONATAL sepsis defines the systemic condition that arises from the bacterial, viral or fungal origin, associated with hemodynamic changes and clinical findings and causing severe morbidity and mortality. The clinical manifestations range from subclinical infection to severe focal or systemic disease. While the infectious agent may arise from intrauterine or maternal flora, it may also be hospital or community acquired [1].

Neonatal sepsis is classified as early-onset and late-onset neonatal sepsis according to the time of onset of the findings. While early onset neonatal sepsis describes cases where clinical manifestations occur in the first three days of life, while late-onset neonatal sepsis describes cases diagnosed on 4th-30th days of life or cases diagnosed after the first seven day [2].

Systemic inflammatory response syndrome (SIRS) and sepsis are common causes of morbidity among children. Early diagnosis and immediate initiation of proper treatment have a major impact on improving the prognosis in these patients [3].

New markers of acute inflammation, which would be a useful prognostic tool in neonates with clinical suspicion of SIRS and sepsis, are being studied. These include the soluble form of TREM-1 (sTREM-1) which is being released from the activated phagocytes and can be detected in body flu-

ids, such as plasma, pleural fluid, bronchoalveolar lavage fluid, urine, and cerebrospinal fluid. Thus, sTREM-1 may act as a potential biomarker of bacterial infection **[4].**

Aim of the work:

To assess the ability of serum sTREM-1 in predicting the diagnosis and prognosis of early and late onset neonatal sepsis in full term neonates.

Patients and Methods

This cross sectional study included 60 full term neonates in sepsis divided into 2 groups, group at day 1 of infection, and group at day 4 of infection.

This study will be conducted after approval of the Research Ethics Committee, Faculty of Medicine, Ain Shams University, and informed consent will be obtained from the parents or caregivers of participants of Ain Shams University neonatal intensive care unit Department from June 2022 to January 2023.

Inclusion criteria:

Age: Full term infants (gestational age >37 weeks).

Diagnosis of sepsis will be based on: Modified sick neonatal score (MSNS) **[5].**

Parameter	Score 0	Score 1	Score 2
Respiratory effort	Apnea or grunt	Tachypnea (respiratory rate >60/ min) with or without retractions	Normal (respiratory rate 40-60/min)
Heart rate	Bradycardia or asystole	Tachycardia (>160/min)	Normal (100-160/min)
Axillary temperature (°C)	<36	36-36.5	36.5-37.5
Capillary refilling time (s)	>5	3-5	<3
Random blood sugar (mg/dl)	<40	40-60	>60
Sp02 (in room air)	<85	85-92	>92
Gestational age (in weeks)	<32 weeks	32to36 weeks + 6/7 days	37 weeks and above
Birth weight (kg)	<1.5	1.5-2.49	2.5 or above
Total	Maximum 16		

CRP >6 with or without positive culture.

Exclusion criteria:

Congenital infections: Chromosomal abnormalities. Prior use of intravenous immunoglobulins Packed red blood cells (RBCs) transfusion.

All patients enrolled in the study were subjected to the following:

Detailed clinical examination: Complete examination including chest, heart, abdominal and neurological examination. Monitoring of temperature, heart rate, respiratory rate and blood pressure.

Laboratory investigations:

All the following investigations were done to all neonates involved in the study:

Complete blood picture (CBC) at day 1 and day 2: For the measurement of haemoglobin, total leucocytic count (TLC) and platelets levels, was analysed on XN-1000 SYSMEX (Sysmex Europe GmbH., Bornbarch 1, 22848 Norderstedt, Germany).

Blood culture at day 1 of infection: By using (BACTEC Peds PlusTM /F, Becton Dickinson, Europe, meylan, France).

Human soluble Triggering Receptor Expresses on Myeloid Cells-1: Samples were centrifugated for 20 minutes at speed of 2000-3000 R.P.M, then serum samples were stored at 80°c till the time of analysis, using quantitative human Enzyme-Linked Immunosorbent Assay (ELISA): Human soluble Triggering Receptor Expresses on Myeloid Cells -1 (sTREM) ELISA kit, (Cat. No:E0310Hu) (Shanghai Sunred Biological Technology Co., Ltd., No.6497, hutai Road, Baoshan District, Shanghai).

Statistical analysis:

Recorded data were analyzed using the statistical package for social sciences, version 23.0 (Released 2015. IBM SPSS Statistics for Windows, Armonk, New York: IBM Corporation). Quantitative data were expressed as mean ± standard deviation (SD) and ranges when parametric and median with inter-quartile range (IQR) when non parametric. Qualitative data were expressed as frequency and percentage. Chi-square (x^2) test of significance was used in order to compare proportions between two groups. Also, the comparison between two groups regarding quantitative parameters with normal distribution was done by using Independent t-test while with non parametric distribution was done by using Mann-Whitney test. Also, the comparison between

two paired groups regarding quantitative parameters with normal distribution was done by using Paired t-test while with non parametric distribution was done by using Wilcoxon Rank test. Spearman correlation coefficients were used to assess the correlation between two quantitative parameters in the same group. Univariate and multivariate logistic regression analysis was used to assess the independent predictors of sepsis and outcome of patients with sepsis with its odds ratio (OR) and 95% confidence interval (CI) The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following:

- p-value >0.05 was considered non significant (NS).
- p-value <0.05 was considered significant (S).
- p-value <0.01 was considered as highly significant (HS).

Results

This prospective cohort study was conducted in NICU Department at El Demerdash Paediatric hospital, Faculty of Medicine, Ain Shams University in a period of 6 months starting from June 2022 till January 2023 on 60 full term neonates with neonatal sepsis; they were 22 females (36.7%) and 38 males (63.3%) with age ranged from 6-26 days and with median (IQR) of 12 (9-15) days.

Table (1): Comparison between laboratory data at day 1 and day 4 among the studied patients

	Day 1	Day 4	Difference	Test value	*P*-value	Sig.
			Mean ± SD			
TLC WBC/mic 1:						
Median (IQR)	9 (7 — 13)	8 (6 — 12)	0.60±7.79	—0.111#	0.912	NS
Range	5 — 33	5 — 39				
HB gldl:						
Mean ± SD	12.32±1.27	12.72±1.29	0.40±2.00	1.548•	0.127	NS
Range	10 — 15	11 — 16				
PLT plateletslmicl:						
Mean ± SD	161.33±54.48	203.13±75.94	41.80±95.18	3.402•	0.001	HS
Range	106 — 310	110 — 352				
CRP mg/1:						
Median (IQR)	11 (9 — 15)	5 (2 — 30)	8.45±31.02	—0.531#	0.596	NS
Range	7 — 50	0.1 — 133				
sTREM pglml:						
Median (IQR)	533.3 (386.3 — 1451)	109.6 (94.12 — 134.4)	—770.77±640.71	—6.737#	<0.001	HS
Range	152.5 — 2380	62.89 — 271.4				

p-value >0.05: Non significant.
p-value <0.05: Significant.
p-value <0.01: Highly significant.
• : Paired t-test.
*: Wilcoxon Ranks test.

The previous table shows that there was no statistically significant difference found in the level of TLC, hemoglobin and CRP from day 1 to day 4 with p-value = 0.912, 0.127 and 0.596; respectively while there was statistically significant increase in the level of platelets and decrease in the level of sTREM at day 4 than day 1 with p-value = 0.001 and <0.001; respectively.

The previous table shows that there was statistically significant increase in the median TLC at day 4 and CRP at day 1 and at day 4 in sepsis group than non sepsis group with p-value 0.001, 0.012 and <0.001; respectively and also statistically significant decrease in the level of ALT in sepsis group than non sepsis group with p-value = 0.005 while no statistically significant difference found between both groups regarding the other studied parameters.

The previous table shows that there was statistically significant increase in the percentage of patients not improved, patients need inotropes and died patients in sepsis group than non sepsis group with p-value <0.001, <0.001 and <0.001; respectively. Also, the table shows that there was statistically significant increase in the median duration of NICU (days) in sepsis group than non sepsis group with p-value <0.001.

The previous table shows that there was no statistically significant difference found in the level of TLC, hemoglobin and platelets from day 1 to day 4

with p-value = 0.161, 0.357 and 0.060; respectively while there was statistically significant decrease in the levels of CRP and sTREM at day 4 than day 1 with p-value <0.001 and <0.001; respectively in non sepsis group.

The previous table shows that there was no statistically significant difference found in the level of TLC from day 1 to day 4 with p-value = 0.051 while there was statistically significant increase in the levels of hemoglobin, platelets and CRP at day 4 than at day 1 with p-value = 0.024, 0.001 and <0.001; respectively and also statistically significant decrease in the level of sTREM at day 4 than at day 1 with p-value <0.001 in sepsis group.

Table (2): Relation between proved sepsis and suspected sepsis and laboratory data.

	Suspected sepsis	Proved Sepsis	Test value	p-value	Sig.
	No. = 42	No. = 18			
TLC WBC/mic 1 day 1:					
Median (IQR)	9 (7 - 12)	10 (7 - 22)	-0.487#	0.626	NS
Range	6 -19	5-33			
HB g/dlday 1:					
Mean ± SD	1236±1.46	12.22±0.65	0376•	0.709	NS
Range	10 -15	11- 13			
PLT plateletlmicl day 1:					
Mean ± SD	162.67±50.59	15822±64.14	0287•	0.775	NS
Range	106 - 310	113 - 310			
TLC WBC/mic 1 day 4:					
Median (IQR)	8 (6 - 9)	10 (9 - 30)	-3.479#	0.001	HS
Range	5 - 22	5-39			
HB gldl day 4:					
Mean ± SD	12.69±138	12.78±1.09	-0238•	0.813	NS
Range	11 - 16	11- 14.5			
PLT plateletlmicl day 4:					
Mean ± SD	192.52±75.65	227.89±72.70	-1.678.	0.099	NS
Range	110 - 352	110 - 302			
ALT mg/dl:					
Median (IQR)	42 (32 - 60)	31 (26 - 40)	-2.812#	0.005	HS
Range	20 - 101	11- 61			
AST mg/dl:					
Median (IQR)	60 (50 - 70)	40 (21 - 66)	-1.842#	0.065	NS
Range	14 - 160	7 - 154			
Albumin gldl:					
Median (IQR)	3.2 (3.1 - 3.4)	3.1 (2.1- 3.3)	-1.434#	0.152	NS
Range	2.1- 3.5	2 - 43.5			
Great. mg/dl:					
Median (IQR)	0.2 (0.1 - 0.2)	02 *(O.1* - 0.4)	-1.647#	0.100	NS
Range	0.01- 1.1	0.1- 2.1			
CRP mgll day 1:					
Median (IQR)	10 (8 -13)	13 (10 - 20)	-2.502#	0.012	S
Range	7 - 18	8-50			
CRP mgll day 4:					
Median (IQR)	3 (1 - 5)	49 (29 -103)	-5.381#	0.000	HS
Range	0.1- 41	5 - 133			
sTREM pglml day 1:					
Median (IQR)	6973 (421.4 - 1349)	445.7 (360.3 -1451)	-1.259#	0208	NS
Range	152.5 - 2380	180 -1691			
sTREM pglml day 4:					
Median (IQR)	108.8 (95.48 - 122.1)	128.2 (94.12 - 145.3)	-0.871#	0384	NS
Range	62.89 - 251	66.56 - 271.4			

p-value >0.05: Non significant.
p-value <0.05: Significant.
p-value <0.01: Highly significant.
• : Independent t-test.
*: Mann-Whitney test.

Table (3): Relation between presence of sepsis and outcome.

	Suspected sepsis	Proved Sepsis	Test value	p-value	Sig.
	No. = 42	No. = 18			
Improvement:					
Improved	42 (100.0%)	2 (11.1%)	50.909*	0.000	HS
Not improved	0 (0.0%)	16 (88.9%)			
Inotropes:					
No	42 (100.0%)	2 (11.1%)	50.909*	0.000	HS
Yes	0 (0.0%)	16 (88.9%)			
Duration of NICU (days):					
Median (IQR)	15 (10 - 25)	25 (25 - 60)	-3.961#	0.000	HS
Range	7 - 60	17 - 90			
Mortality:					
Alive	42 (100.0%)	2 (11.1%)	50.909*	0.000	HS
Death	0 (0.0%)	16 (88.9%)			

p-value >0.05: Non significant. p-value <0.05: Significant. p-value <0.01: Highly significant. •: Chi-square test. *: Mann-Whitney test.

Table (4): Comparison between laboratory data at day 1 and at day 4 among sepsis cases.

	Suspected Sepsis		Difference	Test value	P^{-} value	Sig.
	Day 1	Day 4				
TLC WBC/micl:						
Median (IQR)	9 (7 - 12)	8 (6 - 9)	-1.14±5.28	-1.401#	0.161	NS
Range	6 - 19	5 - 22				
HB gldl:						
Mean ± SD	12.36±1.46	12.69±1.38	0.33±2.32	-0.932.	0.357	NS
Range	10 - 15	11 - 16				
PLT plateledmicl:						
Mean ± SD	162.67±50.59	192.52±75.65	29.86±100.18	-1.931.	0.060	NS
Range	106 - 310	110 - 352				
CRP mgll:						
Median (IQR)	10 (8 -13)	3 (1 - 5)	-4.84±9.49	-3.595#	<0.001	HS
Range	7 - 18	0.1 - 41				
sTREM pglml:						
Median (IQR)	697.3 (421.4 - 1349)	108.8 (95.48 - 122.1)	-830.78±653.26	-5.647#	<0.001	HS
Range	152.5 - 2380	62.89 - 251				

p-value >0.05: Non significant. p-value <0.05: Significant. p-value <0.01: Highly significant. •: Independent t-test. *: Mann-Whitney test.

Table (5): Comparison between laboratory data at day 1 and at day 4 among sepsis cases.

	Sepsis		Difference	Test value	value	Sig.
	Day 1	Day 4				
TLC WBC/micl:						
Median (IQR)	10 (7 - 22)	10 (9 - 30)	4.67±10.88	-1.947#	0.051	NS
Range	5 - 33	5 - 39				
HB gldl:						
Mean ± SD	12.22±0.65	12.78±1.09	0.56±0.95	-2.473.	0.024	S
Range	11 - 13	11 - 14.5				
PLT plateledmicl:						
Mean ± SD	158.22±64.14	227.89±72.70	69.67±77.84	-3.797.	0.001	NS
Range	113 - 310	110 - 302				
CRP mgll:						
Median (IQR)	13 (10 - 20)	49 (29 - 103)	39.44±40.85	-3.600#	<0.001	HS
Range	8 - 50	5 - 133				
sTREM pglml:						
Median (IQR)	445.7 (360.3 - 1451)	128.2 (94.12 - 145.3)	-630.76±604.87	-3.728#	<0.001	HS
Range	180 - 1691	66.56 - 271.4				

p-value >0.05: Non significant. p-value <0.05: Significant. p-value <0.01: Highly significant. •: Independent t-test. *: Mann-Whitney test.

Table (6): Relation between improvement and laboratory data.

	Improved	Not improved	Test value	p-value	Sig.
	No. = 44	No. = 16			
TLC WBC/mic 1 day 1:					
Median (IQR)	9 (7 -12)	9 (6.5 - 26)	-0.303#	0.762	NS
Range	6-19	5-33			
HB g/dlday 1:					
Mean ± SD	1234±1.43	1225±0.68	0.244•	0.808	NS
Range	10 - 15	11 - 13			
PLT plateletlmicl day 1:					
Mean ± SD	162.09±49.47	159 25±68 21	0.177•	0.860	NS
Range	106 - 310	113 - 310			
TLC WBC/mic 1 day 4:					
Median (IQR)	8 (6 - 9)	20 (9.5 - 31.5)	-3.672#	0.000	HS
Range	5-22	5-39			
HB gldl day 4:					
Mean ± SD	12.66±1.36	12.88±1.12	-0.569•	0.572	NS
Range	11- 16	11 - 14.5			
PLT plateletlmicl day 4:					
Mean ± SD	188.77±75.89	242.63±62.49	-2.539.	0.014	S
Range	110 - 352	130 - 302			
ALT mg/dl:					
Median (IQR)	41.5 (31- 60)	31.5 (23.5 - 45)	-2.479#	0.013	S
Range	20 - 101	11 - 61			
AST mg/dl:					
Median (IQR)	60 (41- 70)	38.5 (21 - 68.5)	-1.474#	0.141	NS
Range	14 - 160	7 - 154			
Albumin gldl:					
Median (IQR)	3.2 (3.1 - 3.4)	2.9 (2.1 - 3.4)	-1.519#	0.129	NS
Range	2.1- 3.5	2 - 43.5			
Great. mg/dl:					
Median (IQR)	0.2 (0.1 - 0.2)	025 (0.1 - 0.8)	-1.602#	0.109	NS
Range	0.01- 1.1	0.1- 2.1			
CRP mgll day 1:					
Median (IQR)	10.5 (8 - 13)	12.5 (9.5 - 30)	-1.818#	0.069	NS
Range	7 - 19	8-50			
CRP mgll day 4:					
Median (IQR)	3 (1 - 6)	51 (26 - 105.5)	-5.005#	0.000	HS
Range	0.1- 41	5 -133			
sTREM pglml day 1:					
Median (IQR)	62635 (421.4 -1349)	457.5 (278.4 -1532)	-1.003#	0316	NS
Range	152.5 - 2380	180 -1691			
sTREM pglml day 4:					
Median (IQR)	109.6 (95.48 - 1282)	117.85 (88.9 -148)	-0.535#	0.593	NS
Range	62.89 - 251	66.56 - 271.4			

p-value >0.05: Non significant.
p-value <0.05: Significant.
p-value <0.01: Highly significant.
•: Independent t-test.
*: Mann-Whitney test.

The previous table shows that there was statistically significant increase in the median TLC at day 4, platelets at day 4, and CRP at day 4 in non-improved group than improved group with p-value <0.001, 0.014 and <0.001; respectively and also statistically significant decrease in median ALT in non improved group than improved group with p-value = 0.013 while no statistically significant difference found between both groups regarding the other studied parameters.

Table (7): Relation between sTREM (day 1 and day 4) and the other studied parameters.

	sTREM day 1			sTREM day 4		
	Median (IQR)	Test value	*p*-value	Median (IQR)	Test value	*p*-value
Gender:						
Female	445.7 (340.2 - 846.8)	-2.241.	0.025	112.8 (101.3 - 130.2)	-0.890•	0.373
Male	981.7 (425.6 - 1691)			102.5 (83.67 - 145)		
Heart:						
Normal	533.3 (403.85 -1532)	-0.712.	0.477	105.9 (90.75 - 132.3)	-1.304.	0.192
PDA	603.55 (360.3 - 846.8)			129.05 (112.8 - 145.3)		
Abdomin:						
Lax	626.35 (360.3 -1451)	-0.268.	0.789	109.6 (94.12 - 130.2)	-0.067•	0.947
Distended	476.4 (423.5 - 1392.5)			110.1 (91.47 - 139.7)		
Blood culture:						
No growth	697.3 (421.4 - 1349)	3.431#	0.488	108.8 (95.48 - 122.1)	4.257#	0.372
Staphcoagulase negative	435.65 (311.05 - 1068.35)			111.16 (80.34 - 139.45)		
Klebseilla MDR	1451 (180 - 1613)			101.3 (83.67 - 271.4)		
Candida	360.3 (360.3 - 360.3)			145.3 (145.3 - 145.3)		
Accintobacter	489.4 (489.4 - 489.4)			134.4 (134.4 - 134.4)		
Blood culture:						
No sepsis	697.3 (421.4 - 1349)	-1.259.	0.208	108.8 (95.48 - 122.1)	-0.871.	0.384
Sepsis	445.7 (360.3 -1451)			128.2 (94.12 - 145.3)		
Improvement:						
Improved	626.35 (421.4 - 1349)	-1.003.	0.316	109.6 (95.48 - 128.2)	-0.535.	0.593
Not improved	457.5 (278.4 - 1532)			117.85 (88.9 - 148)		
Inotropes:						
No	626.35 (421.4 - 1349)	-1.003.	0.316	109.6 (95.48 - 128.2)	-0.535.	0.593
Yes	457.5 (278.4 - 1532)			117.85 (88.9 - 148)		
Mortality:						
Alive	626.35 (421.4 - 1349)	-1.003.	0.316	109.6 (95.48 - 128.2)	-0.535.	0.593
Death	457.5 (278.4 - 1532)			117.85 (88.9 - 148)		

p-value >0.05: Non significant. Mann-Whitney test.
p-value <0.05: Significant. #: Kruskal-Wallis test.
p-value <0.01: Highly significant.

Discussion

Neonatal sepsis is the third most common cause of neonatal death, which is also one of the major factors leading to neonatal disability **[6].**

sTREM-1 is a soluble form of TREM-1 and is upregulated when exposed to infectious diseases m.

Consequently, this study was conducted and aimed to investigate the diagnostic and prognostic value of sTREM marker in neonatal sepsis in full term neonates.

This study was conducted at NICU in Ain Shams Pediatrics University Hospital from February 2022 until February 2023.

During this study, 60 infants were enrolled and divided into two groups; group 1 included the 60 infants at day 1 of infection, group 2 included the same patients at Day 4 of infection. Evidences of infections were included clinically and laboratory.

In that case, early diagnosis and treatment are essential to reduce mortality and disability rate. Currently, in view of the limitations of blood culture, clinical symptoms and signs, and laboratory indicators in the diagnosis of neonatal sepsis, there are no recommended biomarkers for the diagnosis of neonatal sepsis. The exploration of convenient and effective biomarkers for neonatal sepsis has become a research hotspot. The purpose of this study is to investigate the role of TREM-1 as a biomarker in the diagnosis and prognosis of neonatal sepsis.

The results of our meta-analysis including that sTREM marker increase in early onset sepsis so it can be a diagnostic value and decrease in Day 4 of sepsis so it can be a prognostic value.

In the study of Ghonai et al., found that TREM-1 mRNA had a moderate ability (AUC: 0.708) to diagnose neonatal sepsis. While, compared with the diagnosis of neonatal sepsis, TREM-1 mRNA had higher accuracy (AUC: 0.902 vs. 0.708) in predicting the mortality of neonatal sepsis **[8].**

In our study sTREM marker was high in proved septic patients with negative blood culture so it is a sensitive marker.

In study of Reier-Nilsen et al., samples were withdrawn early on admission from all neonates and sTREM-1 was higher in culture-proven and culture-negative septic neonates than controls. Positive blood culture confirms the diagnosis of sepsis, but neonatal sepsis cannot be ruled out solely on the basis of a negative blood culture result **[9].**

These findings support the role of sTREM1 as a potential early reliable marker in neonatal sepsis, before obtaining culture results or in neonates who have clinical and laboratory evidence of sepsis but negative blood cultures.

In our study sTREM marker decreased at Day 4 after antibiotics therapy and this is matched with GIBOT study.

Gibot study suggests that Post-therapy sTREM-1 levels were significantly decreased 48h after antibiotic intake in septic neonates compared to baseline levels. Thus, decreased sTREM-1 denotes favorable response and indicates that infection has been controlled. This implies a role of sTREM- 1 in monitoring response to therapy before getting culture results [7].

Our study showed no growth 70% of patients, klebseilla 10%, staph coagulase negative 13.3%, candida 3.3%, Accinobacter 3.3%.

Waliullah study showed Positive blood culture represents 42.9% and no growth in 57.1% of patients. Klebsiella (73.3%) was the most common organism isolated from septic neonates blood cultures. This was followed by coagulase negative staph (CONS) (20%) and candida (6.7%). These results were comparable to those reported by Waliullah et al. [10] who found that the predominant organisms were gram-negative including klebsiella (60%), serratia (20%) and a cintobacter (13.3%).

Our study included full term neonates only not preterm neonates.

In Moreno et al. [11] study, the incidence of early onset sepsis was higher in preterm neonates as most of premature neonates included in this study had pre mature rapture of membrane which made them at increased risk of ascending infection.

In contrast, Waliullah et al. **[10]** studied 100 septic neonates subdivided into early onset sepsis (EOS) and late onset sepsis (LOS) groups and found that most neonates with EOS were term infants, while preterm infants accounted for the majority of cases of LOS. The predominance of LOS in these prematuer infants is not unexpected as by virtue of their immaturity they are more likely to have an extended hospital stay placing them at prolonged risk for infection [11].

Our study shows that there was no statistically significant difference found in the level of TLC, hemoglobin and CRP from day 1 to day 4 with p-value = 0.912, 0.127 and 0.596; respectively while there was statistically significant increase in the level of platelets.

respectively and also statistically significant decrease in the level of ALT in sepsis group than non sepsis group with p-value = 0.005 while no statistically significant difference found between both groups regarding the other studied parameters.

Wickramashinghe **[12]** study showed that Laboratory assessment of the study groups revealed a significant increase of WBC & the absolute neutrophil count in culture positive cases than culture negative cases. This is explained by the increased levels of activated complement products, G-CSF, and pro-inflammatory cytokines (TNF-(x, IL- 1 and IL-6) during bacterial infection promote migration of neutrophil & band cell from maturation-storage pool of the bone marrow to the circulation Wickramashinghe **[12],** this study not included ALT level.

A significant decrease of haemoglobin in culture positive cases than culture negative cases is mediated by cytokines TNF (x and IL-1 that increase during infection. These cytokines lead to shortened red cell survival, impaired iron mobilization and utilization & decreased sensitivity of erythrone to erythropoietin. Other causes of anaemia in infection include immune haemolysis, microangiopathic haemolysis & haemophagocytosis.

Conclusion:

sTREM marker was high in proved sepsis patients by blood culture positive and suspected sepsis patients even blood culture negative than improved in the proven sepsis and suspected sepsis patients. Initial level of sTREM marker was higher than based level >5ng/mL. Used for follow-up at day 4 of infection. It was decreased at day 4 infection.

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مستقبلات تحفيز مصل قابلة للذوبان معبر عنها فى الخلايا النخاعية -١ كعلامة تشخيصية وتنبؤيه فى الإنتان الوليدى

يعتبر تعفن الدم الوليدى من متلازمة الاستجابة الالتهابية الجهازية (SIRS) التى تحدثها العدوى البكتيرية أو الفيروسات أو الفطريات (الخميرة). الإنتان الوليدى هو مرض خطير يهدد حياة الأطفال حديثى الولادة، وهو أيضاً أحد التحديات الرئيسية التى تواجه الصحة العامة العالمية.

الهدف: تقييم قدرة الشكل القابل للذوبان فى المصل من المستقبلات المحفزة المعبر عنها في الخلايا النخاعية ١ (sTREM-١) في التنبؤ بالتشخيص والتنبؤ بالإنتان الوليدى المبكر والمتأخر عند حديثى الولادة على المدى الكامل.

المرضى والطرق: هذه الدراسة المقطعية التى أجريت فى الفترة من ٢٠٢٢/٦/١ إلى ٢٠٢٣/١/١ شملت ٦٠ من حديثى الولادة ذوى المدة الكاملة فى تعفن الدم مقسمين إلى مجموعتين، المجموعة في اليوم الأول من الإصابة، والمجموعة فى اليوم الرابع من الإصابة.

النتائج: فى دراستنا، انخفض الشكل القابل للذوبان فى المصل لمستقبلات التحفيز المعبر عنها فى الخلايا النخاعية -١ فى اليوم الرابع بعد العلاج بالمضادات الحيوية وهذا يتوافق مع دراسة GIBOT. تشير دراسة GIBOT إلى أن مستويات sTREM-١ بعد العلاج قد انخفضت بشكل ملحوظ بعد ٤٨ ساعة من تناول المضادات الحيوية فى حديثى الولادة الإنتان مقارنة بمستويات خط الأساس. وبالتالى، يشير انخفاض sTREM- ١ إلى استجابة مواتية ويشير إلى أنه تم السيطرة على العدوى. يشير هذا إلى دور sTREM- ١ فى مراقبة الاستجابة للعلاج قبل الحصول على نتائج الثقافة فى دراستنا، كانت علامة sTREM عالية في ثقافات الدم السلبية والإيجابية ولكنها أعلى فى الثقافات السلبية. تظهر دراستنا أنه لا يوجد فرق معتد به إحصائيًا في مستوى إجمالى عدد الكريات البيض (TLC) والهيموجلوبين والبروتين التفاعلى (CRP) C من اليوم الأول إلى اليوم الرابع على التوالى وأيضًا انخفاض معتد به إحصائيًا في مستوى (Alanine aminotransferase ALT) في مجموعة الإنتان مقارنة بمجموعة غير الإنتان.

الخلاصة: كانت علامة sTREM عالية في مرضى الإنتان المثبت عن طريق ثقافة الدم الإيجابية ومرضى الإنتان المشتبه بهم حتى سلبية مزرعة الدم مقارنة بالتحسن في مرضى الإنتان المشتبه فيهم والمرضى المشتبه بهم. كان المستوى الأولى لعلامة sTREM أعلى من المستوى الأساسى > ٥ بيكوغرام / مل. يستخدم للمتابعة فى اليوم الرابع من الإصابة. تم تقليله فى اليوم الرابع من الإصابة.