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# Inflammation Indexes PLR, SII, AISI, MLR, and MCVL in Peripartum Treated Thrombophilia Peripartum Patients Undergoing Cesarean Section at Term

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Article

# Inflammation Indexes PLR, SII, AISI, MLR, and MCVL in Peripartum Treated Thrombophilia Patients Undergoing Cesarean Section at Term

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**Abstract:** (1) Background: Thrombophilia is a tendency towards hypercoagulability, and it is increased by pregnancy, peaking around delivery. (2) Methods: Eighty thrombophilia patients admitted for delivery between 1/10/2017 and 1/12/2021 were prospectively studied, together with eighty age- and para-matched control patients. Patients were admitted for delivery at term by means of cesarean section. The inflammation indexes from the complete blood count values analysis during both the 24 hours before and after labor—extracted from the hospital's medical records—were calculated and then correlated with uterine involution. (3) Results: In pregnant patients treated for thrombophilia, patients who did not manage to have their uterine cavity closed within the first 24–48 hours had significantly higher SII and AISI inflammation indexes than those who did manage to have their uterine cavity closed. In pregnant patients treated for thrombophilia, MLR is higher in patients without the Rh factor than in those with the Rh factor. In non-thrombophilia patients, PLR was significantly higher compared to treated thrombophilia patients. In non-thrombophilia patients, MCVL increased with age and before labor, while SII and AISI increased with age postpartum. (4) Conclusions: There may be an underlying inflammation state that persisted despite treatment in some pregnant thrombophilia patients.

**Keywords:** thrombophilia; pregnancy; postpartum uterine ultrasonographic scale; SII; AISI; MLR; PLR; MCVL; Rh factor; age

## 1. Introduction

Thrombophilia is a tendency towards hypercoagulability, and it is caused by genetic or acquired hemostasis conditions [1]. Pregnancy by itself favors hypercoagulability [2], which accelerates during pregnancy and reaches its highest point peripartum [3]. Thrombophilia alters pregnancy outcomes due to hypercoagulability, stasis, and placental modifications [4]. Intrauterine growth restriction can complicate thrombophilic pregnancies [5]. Recurrent pregnancy losses are also frequent, and they even trigger the diagnosis of thrombophilia [6]. In pregnancy losses in Romania, the factors involved were factor V Leiden homozygosity and antiphospholipid syndrome antibodies in first-trimester pregnancy losses, while protein C deficiency and glycoprotein Ia polymorphism were involved in the second-trimester group [6]. In western Romania, the most frequent thrombophilic genetic markers were MTHFR gene mutation C677T, A1298C, and then the PAI-1 4G/5G gene mutation [7]. In southern Romania, the type of thrombophilic mutation most commonly found was the MTHFR mutation (25.7%), which was followed by the mutation of the prothrombin gene (20.9%) and the mutation of Leiden factor V (15.7%) [8].

The administration of low-molecular-weight heparin (LMWH) is adapted to each pregnant patient. The treatment stops when labor pain occurs or 6 hours before the planned cesarean section, and it restarts after delivery [9].

There were few thromboses and insignificant bleeding in the case of preventive LMWH therapy during pregnancy, with fewer cases of recurrent venous thromboembolisms than without it [10]. They report a protective effect of LMWH on miscarriage in patients with a history of unexpected recurrent pregnancy losses due to thrombophilia [11]. Thrombophilia treatment during pregnancy significantly reduced the risk of preterm birth by 2.44 times [12]. In thrombophilia patients undergoing in vitro fertilization, LMWH treatment increased the number of live births with respect to ongoing pregnancies [13].

One meta-analysis demonstrated that LMWH might not generate an outstanding increase in live births, but the involved studies were not homogenous at all [14]. LMWH did not increase the number of live births in multiple gestation thrombophilic pregnant patients [15]. Still, healthcare professionals recommend the prophylactic administration of LMWH in women with recurrent pregnancy losses [16]. High-dose thromboprophylaxis did prevent thrombosis antepartum; still, neonatal outcomes were worse among mothers with thrombophilia [17].

The recent COVID-19 pandemic accentuated the risk of thrombosis in pregnant patients [18–21], especially in those with thrombophilia; therefore, thromboprophylaxis is necessary. Still, the benefit of LMWH introduced in first-trimester thrombophilia patients is still debated [18].

In a previous article [22], we demonstrated that postpartum uterine involution was not significantly different between treated thrombophilia patients and non-thrombophilia patients. Moreover, the maternal and fetal outcomes were not different. Uterine involution only correlated with postpartum neutrophil and postpartum platelet counts. Therefore, we considered that there may be an underlying inflammatory state that persisted despite treatment, and we further analyzed it within the same group of patients. The inflammation indexes studied were the neutrophil–lymphocyte ratio, derived neutrophil–lymphocyte ratio, monocyte–lymphocyte ratio, platelet–lymphocyte ratio, systemic inflammatory index, systemic inflammatory response index, aggregate index of systemic inflammation, mean corpuscular volume–lymphocyte ratio, and cumulative inflammatory index.

## 2. Materials and Methods

We studied 160 pregnant patients. There were 80 pregnant treated thrombophilia patients in the study group, and we chose another 80 patients who had similar age and parity. Patients were referred to our hospital for delivery at term by means of cesarean section between 1/10/2017 and 1/12/2021. This was a prospective study. All thrombophilia patients already had their diagnosis established. Treatment with low-molecular-weight heparin is ongoing. Our hospital cannot supply thrombophilia screening tests; thus, the control group had their blood sent for screening to specialized laboratories, yielding negative results. The exclusion criteria are as follows: patients suffering from

thrombocytopenia (n=2), patients with deep vein thrombosis (n=0), and patients with cerebral thrombosis (n=0) [22].

Every patient received a sonogram during the first 1-2 days after cesarean section, and the uterine evaluation was interpreted with the use of the PUUS scale (Postpartum Uterine Ultrasonographic Scale). This scale [23,24] counts the quarters of missing uterine vacuum lines, which could be due to blood or debris presence, as follows:

In grade 0, the uterine cavity is completely empty.

In grade 1, there is a small amount of blood or debris occupying less than one-quarter of the vacuum line.

In grade 2, there is a slightly larger amount of blood or debris occupying less than two-quarters of the vacuum line.

In grade 3, there is a large amount of blood or debris occupying less than three-quarters of the vacuum line.

In grade 4, there is a large amount of blood or debris occupying more than three-quarters of the vacuum line [23,24].

The values and characteristics of the patients' blood following analysis were extracted from the hospital's medical records. For this study, the complete blood count values—the first count is obtained postpartum and the last count is obtained antepartum—were considered. Hospital policy requires blood analyses both 24 hours before and after labor [22]. From these values, we calculated inflammation indexes NLR, dNLR, MLR, PLR, SII, SIRI, AISI, MCVL, and IIC as follows:

NLR= number of neutrophils/number of lymphocytes. MLR= number of monocytes/number of lymphocytes. PLR= number of platelets/number of lymphocytes. dNLR= number of neutrophils/difference between the number of white blood cells and number of neutrophils. SII= number of neutrophils x number of platelets/number of lymphocytes. SIRI= number of neutrophils x number of monocytes/number of lymphocytes. AISI= number of neutrophils x number of monocytes x number of platelets/number of lymphocytes. MCVL= mean corpuscular volume/number of lymphocytes. IIC= mean corpuscular volume x width of erythrocyte distribution x number of neutrophils/one thousand times the number of lymphocytes.[25]

We performed the blood analysis using MAN-HEMATO Laboratory Equipment.

We performed the data analysis via SPSS version 18 (PASW Statistics for Windows, Chicago: SPSS Inc., Chicago, IL, USA). We determined mean and median values, standard deviations, and quartiles. We also used the nonparametric Mann-Whitney U test and Spearman's correlation. We considered  $p < 0.05$  as significant [22].

### 3. Results

One patient with thrombophilia had incomplete data; thus, she was removed from this study, leaving 79 patients with thrombophilia and 80 patients without thrombophilia; all pregnant patients were at term.

#### 3.1. Inflammation indexes in pregnant patients and the postpartum period

The PLR index is significantly higher in healthy, non-thrombophilia patients compared to treated thrombophilia patients. The other inflammatory indexes are not significantly different between the two groups of pregnant patients.

**Table 1.** Inflammation indexes: mean numbers in the first row and median numbers in the second row. In brackets: standard deviation in the first row and quartiles 1 and 3 in the second row of every index for pregnant treated thrombophilia patients at term compared to pregnant non-thrombophilia patients at term.

Inflammation indexes and median (mean) values	Pregnant Treated thrombophilia patients at term n=79	Pregnant Non-thrombophilia patients at term n=80	Significance, P
NLR	2.23 ( $\pm$ .98) 2.08 (1.62 , 2.85)	2.34 ( $\pm$ .93) 2.35 (1.69 , 2.78)	.375
dNLR	1.3 ( $\pm$ .69) 1.23 (.83 , 1.68)	1.31 ( $\pm$ .59) 1.23 (.94 , 1.63)	.623
MLR	.87 ( $\pm$ .46) .73 (.59 , 1.06)	.95 ( $\pm$ .72) .75 (.50 , 1.15)	.762
PLR	100.9 ( $\pm$ 35.61) 96.36 (78.66 , 117.08)	109.27 ( $\pm$ 29.66) 103.64 (89.42 , 130.85)	.031
SII	571.61 ( $\pm$ 289.67) 518.65 (360.40 , 777.72)	620.24 ( $\pm$ 276.87) 598.64 (429.60 , 735.26)	.224
SIRI	4.53 ( $\pm$ 2.47) 3.98 (3.01 , 5.31)	4.98 ( $\pm$ 4.11) 4.00 (2.74 , 5.92)	.888
AISI	1152.24 ( $\pm$ 748.28) 990.62 (684.06 , 1399.34)	1321.89 ( $\pm$ 1103.44) 1017.99 (618.54 , 1517.14)	.586
MCVL	33.53 ( $\pm$ 8.64) 32.23 (26.70 , 36.95)	34.81 ( $\pm$ 10.9) 33.77 (27.81 , 40.67)	.507
IIC	2.534 ( $\pm$ 1.018) 2.372 (1.9 , 3.238)	2.645 ( $\pm$ 1.056) 2.623 (1.968 , 3.055)	.446

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index.

**Table 2.** Postpartum inflammation indexes: mean numbers in the first row and median numbers in the second row. In brackets: standard deviation in the first row and quartiles 1 and 3 in the second row of every index for treated thrombophilia patients compared to non-thrombophilia patients.

Inflammation indexes and median (mean) values	Treated thrombophilia patients	Non-thrombophilia patients	Significance, P
P NLR	3.50 ( $\pm$ 2.16) 2.91 (2.17 , 4.13)	3.25 ( $\pm$ 1.46) 2.96 (2.13 , 4.19)	.894
P dNLR	1.81 ( $\pm$ .93) 1.66 (1.20 , 2.22)	1.72 ( $\pm$ .78) 1.71 (1.14 , 2.18)	.721
P MLR	.98 ( $\pm$ .51) .87 (.60 , 1.16)	.95 ( $\pm$ .58) .84 (.57 , 1.09)	.404
P PLR	96.57 ( $\pm$ 37.54) 92.77 (70.63 , 111.58)	99.37 ( $\pm$ 32.29) 92.15 (80.22 , 114.97)	.446
P SII	776.68 ( $\pm$ 546.28) 631.34 (448.23 , 903.34)	789.98 ( $\pm$ 431.23) 736.45 (466.27 , 1004.78)	.405
P SIRI	7.28 ( $\pm$ 4.90) 6.23 (3.59 , 9.36)	7.46 ( $\pm$ 5.77) 5.74 (4.08 , 8.82)	.918
P AISI	1619.13 ( $\pm$ 1290.83) 1190.43 (842.76 , 1975.12)	1835.74 ( $\pm$ 1501.34) 1262.49 (846.34 , 2116.79)	.392
P MCVL	36.84 ( $\pm$ 14.16) 34.49 (27.54 , 42.06)	35.37 ( $\pm$ 11.29) 34.21 (28.01 , 38.88)	.716

P IIC	3.959 ( $\pm$ 2.459) 3.502 (2.470 , 4.534)	3.726 ( $\pm$ 1.644) 3.405 (2.446 , 4.917)	.914
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P NLR: Postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

There were no significant differences between the postpartum inflammatory indices in the two groups of patients. Still, some patients managed to have their uterine cavity closed within the first 24 hours postpartum, while others did not. We further analyzed the situation via the postpartum uterine ultrasonographic scale (PUUS).

### 3.2. Inflammation indexes in different PUUS categories of patients

In thrombophilia patients, because there are only 14 thrombophilia patients with a PUUS of 1-4 and 65 patients with PUUS 0, we divided the patients into two groups: PUUS=0 (with the uterine cavity closed) and PUUS  $\geq$ 1 (with the uterine cavity still open, in various degrees). Moreover, we compared the inflammation indexes among them. The same was carried out for non-thrombophilia patients. Because there were only 11 non-thrombophilia patients with a PUUS of 1-4 and 69 patients with PUUS 0, we divided the patients into two groups: PUUS=0 (with the uterine cavity closed) and PUUS  $\geq$ 1 (with the uterine cavity still open, in various degrees).

**Table 3.** Inflammation indexes: mean numbers in the first row and median numbers in the second row. In brackets: standard deviation in the first row and quartiles 1 and 3 in the second row of every index for **pregnant** treated **thrombophilia** patients at term whose uterine cavity was closed (PUUS=0) or not closed (PUUS $\geq$ 1).

Inflammation indexes and median (mean) values	PUUS $\geq$ 1	PUUS=0	Significance, P
NLR	2.52 ( $\pm$ .73) 2.54 (1.93 , 3.11)	2.17 ( $\pm$ 1.02) 2.07 (1.589 , 2.81)	.103
dNLR	1.42 ( $\pm$ .48) 1.38 (.94 , 1.80)	1.27 ( $\pm$ .73) 1.20 (.78 , 1.68)	.180
MLR	.79 ( $\pm$ .25) .79 (.59 , 1.00)	.88 ( $\pm$ .49) .73 (.60 , 1.18)	.964
PLR	112.49 ( $\pm$ 29.51) 107.91 (85.97 , 125.83)	98.40 ( $\pm$ 36.51) 92.93 (78.30 , 111.73)	.070
SII	716.47 ( $\pm$ 280.34) 680.79 (480.61 , 861.16)	540.41 ( $\pm$ 284.12) 488.82 (346.65 , 719.35)	.036
SIRI	5.39 ( $\pm$ 2.47) 5.03 (3.61 , 6.12)	4.34 ( $\pm$ 2.45) 3.88 (2.97 , 4.83)	.074
AISI	1388.84 ( $\pm$ 595.12) 1382.85 (903.55 , 1593.69)	1101.28 ( $\pm$ 771.74) 913.78 (645.32 , 1274.79)	.025
MCVL	34.51 ( $\pm$ 11.94) 31.51 (25.46 , 43.86)	33.32 ( $\pm$ 7.85) 32.23 (28.14 , 36.85)	.748
IIC	2.923 ( $\pm$ .846) 2.987 (2.152 , 3.604)	2.450 ( $\pm$ 1.038) 2.244 (1.831 , 3.116)	.081

NLR: neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index.

In pregnant treated thrombophilia patients, the patients who did not manage to have their uterine cavity closed within the first 24-48 hours (PUUS $\geq$ 1) had significantly higher SII and AISI inflammation indexes than those who did manage to have their uterine cavity closed (PUUS=0).

**Table 4.** Inflammation indexes: mean numbers in the first row and median numbers in the second row. In brackets: standard deviation in the first row and quartiles 1 and 3 in the second row of every index for postpartum treated thrombophilia patients whose uterine cavity was closed (PUUS=0) or was not closed (PUUS $\geq$ 1).

Inflammation indexes and median (mean) values	PUUS $\geq$ 1	PUUS=0	Significance, P
P NLR	4.22 ( $\pm$ 3.16) 3.43 (2.64 , 4.36)	3.33 ( $\pm$ 1.85) 2.74 (2.10 , 4.01)	.286
P dNLR	2.02 ( $\pm$ .82) 1.90 (1.32 , 2.41)	1.76 ( $\pm$ .95) 1.63 (1.18 , 2.16)	.259
P MLR	.95 ( $\pm$ .55) .89 (.54 , 1.05)	.99 ( $\pm$ .50) .87 (.63 , 1.18)	.554
P PLR	114.67 ( $\pm$ 57.87) 93.73 (81.36 , 125.34)	92.41 ( $\pm$ 30.3) 92.77 (68.55 , 106.81)	.216
P SII	1037.69 ( $\pm$ 805.52) 887.59 (540.46 , 1170.70)	716.77 ( $\pm$ 455.98) 606.78 (442.24 , 833.00)	.062
P SIRI	8.45 ( $\pm$ 6.93) 7.06 (5.32 , 9.36)	7.01 ( $\pm$ 4.34) 5.66 (3.59 , 8.60)	.377
P AISI	2080.97 ( $\pm$ 1753.76) 1883.55 (1255.64 , 2377.92)	1513.13 ( $\pm$ 1152.15) 1057.91 (842.76 , 1777.35)	.082
P MCVL	40.13 ( $\pm$ 20.88) 34.53 (25.36 , 49.75)	36.08 ( $\pm$ 12.24) 34.49 (28.00 , 41.46)	.967
P IIC	4.866 ( $\pm$ 3.675) 3.908 (3.132 , 5.032)	3.751 ( $\pm$ 2.073) 3.355 (2.406 , 4.469)	.231

P NLR: Postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

In postpartum treated thrombophilia patients, there was no significant difference in the postpartum inflammation indexes of patients who did not manage to have their uterine cavity closed within the first 24-48 hours (PUUS $\geq$ 1) compared to those who did manage to have their uterine cavity closed (PUUS=0).

**Table 5.** Inflammation indexes: mean numbers in the first row and median numbers in the second row. In brackets: standard deviation in the first row and quartiles 1 and 3 in the second row of every index for pregnant non-thrombophilia patients at term whose uterine cavity was closed (PUUS=0) or was not closed (PUUS $\geq$ 1).

Inflammation indexes and median (mean) values	PUUS $\geq$ 1	PUUS=0	Significance, P
NLR	2.60 ( $\pm$ 1.22) 2.47 (1.68 , 2.82)	2.29 ( $\pm$ .88) 2.35 (1.70 , 2.78)	.650
dNLR	1.35 ( $\pm$ .36) 1.28 (1.12 , 1.55)	1.31 ( $\pm$ .62) 1.22 (.91 , 1.64)	.716
MLR	1.00 ( $\pm$ 1.10) .62 (.47 , .81)	.94 ( $\pm$ .64) .77 (.50 , 1.15)	.507

PLR	110.58 ( $\pm$ 47.34)	109.60 ( $\pm$ 26.30)	.753
	98.28 (83.16 , 139.76)	104.20 (90.43 , 130.55)	
SII	689.02 ( $\pm$ 322.60)	609.28 ( $\pm$ 269.94)	.610
	591.21 (434.29 , 911.63)	598.65 (424.90 , 712.83)	
SIRI	6.48 ( $\pm$ 7.47)	4.74 ( $\pm$ 3.32)	.944
	3.76 (2.82 , 5.92)	4.09 (2.72 , 5.91)	
AISI	1722.22 ( $\pm$ 1787.84)	1258.07 ( $\pm$ 956.26)	.839
	1016.31 (565.57 , 2386.90)	1019.68 (639.60 , 1478.96)	
MCVL	37.57 ( $\pm$ 21.08)	34.37 ( $\pm$ 8.44)	.398
	28.65 (23.07 , 47.08)	34.06 (29.22 , 40.44)	
IIC	2.978 ( $\pm$ 1.459)	2.592 ( $\pm$ .980)	.581
	2.707 (1.927 , 3.066)	2.591 (1.979 , 3.021)	

NLR: Neutrophil-lymphocyte ratio; dNLR: derived neutrophil-lymphocyte ratio; MLR: monocyte-lymphocyte ratio; PLR: platelet-lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume-lymphocyte ratio; IIC: cumulative inflammatory index.

In pregnant non-thrombophilia patients, there was no significant difference between the inflammation indexes in patients who did not manage to have their uterine cavity closed within the first 24-48 hours (PUUS $\geq$ 1) compared to those who did manage to have their uterine cavity closed (PUUS=0).

**Table 6.** Inflammation indexes: Mean numbers in the first row and median numbers in the second row. In brackets: standard deviation in the first row and quartiles 1 and 3 in the second row of every index for postpartum non-thrombophilia patients whose uterine cavity was closed (PUUS=0) or was not closed (PUUS $\geq$ 1).

Inflammation indexes and median (mean) values	PUUS $\geq$ 1	PUUS=0	Significance, P
P NLR	3.71 ( $\pm$ 1.37)	3.17 ( $\pm$ 1.47)	.216
	3.88 (2.42 , 4.74)	2.90 (2.05 , 4.11)	
P dNLR	1.77 ( $\pm$ .73)	1.72 ( $\pm$ .80)	.827
	1.45 (1.12 , 2.55)	1.71 (1.16 , 2.16)	
P MLR	1.25 ( $\pm$ .98)	.89 ( $\pm$ .47)	.284
	.89 (.67 , 1.22)	.79 (.57 , 1.06)	
P PLR	112.95 ( $\pm$ 53.61)	96.93 ( $\pm$ 26.74)	.377
	110.55 (82.35 , 143.19)	90.94 (80.00 , 114.65)	
P SII	953.77 ( $\pm$ 535.37)	760.44 ( $\pm$ 408.01)	.320
	786.47 (556.41 , 1247.15)	725.34 (463.09 , 999.56)	
P SIRI	9.61 ( $\pm$ 5.29)	7.07 ( $\pm$ 5.80)	.058
	7.80 (5.03 , 14.64)	5.58 (3.90 , 7.71)	
P AISI	2592.95 ( $\pm$ 1892.15)	1699.19 ( $\pm$ 1395.16)	.143
	2058.45 (1030.08 , 4473.85)	1208.70 (836.37 , 2004.36)	
P MCVL	40.95 ( $\pm$ 22.63)	34.36 ( $\pm$ 7.66)	.956
	32.22 (21.99 , 58.09)	34.23 (28.78 , 38.77)	
P IIC	4.237 ( $\pm$ 1.539)	3.634 ( $\pm$ 1.657)	.237
	4.727 (2.779 , 5.423)	3.347 (2.436 , 4.735)	

P NLR: Postpartum neutrophil-lymphocyte ratio; P dNLR: postpartum derived neutrophil-lymphocyte ratio; P MLR: postpartum monocyte-lymphocyte ratio; P PLR: postpartum platelet-lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum

aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

In postpartum non-thrombophilia patients, there was no significant difference between the postpartum inflammation indexes in patients who did not manage to have their uterine cavity closed within the first 24–48 hours (PUUS $\geq$ 1) compared to those who did manage to have their uterine cavity closed (PUUS=0).

### 3.3. Correlations between inflammation indexes and age

There was no correlation between inflammation indexes and age before or after birth in treated thrombophilia patients.

**Table 7.** Nonparametric (Spearman's) correlation between inflammation indexes and age in pregnant treated thrombophilia patients at term and postpartum treated thrombophilia patients.

Inflammation indexes in pregnant treated thrombophilia patients	Significance (2-tailed)	Inflammation indexes in postpartum treated thrombophilia patients	Significance (2-tailed)
NLR	0.967	P NLR	0.333
dNLR	0.768	P dNLR	0.326
MLR	0.619	P MLR	0.360
PLR	0.510	P PLR	0.306
SII	0.458	P SII	0.932
SIRI	0.231	P SIRI	0.751
AISI	0.076	P AISI	0.700
MCVL	0.0009	P MCVL	0.025
IIC	0.728	P IIC	0.582

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

**Table 8.** Nonparametric (Spearman's) correlation between inflammation indexes and age in pregnant non-thrombophilia patients at term and postpartum non-thrombophilia patients.

Inflammation indexes in pregnant non-thrombophilia patients	Significance (2-tailed)	Inflammation indexes in postpartum non-thrombophilia patients	Significance (2-tailed)
NLR	0.409	P NLR	0.304
dNLR	0.552	P dNLR	0.221
MLR	0.942	P MLR	0.672
PLR	0.900	P PLR	0.177
SII	0.131	P SII	0.027
SIRI	0.391	P SIRI	0.116
AISI	0.054	P AISI	0.039
MCVL	0.0002	P MCVL	0.054
IIC	0.687	P IIC	0.259

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived

neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

In non-thrombophilia patients, there was a correlation in pregnant patients between MCVL and age. There was a correlation between P SII and age and also between P AISI and age in postpartum non-thrombophilia patients.

#### 3.4. Correlations between inflammation indexes and ABO blood groups

There was no correlation between inflammation indexes and ABO blood groups before or after birth in treated thrombophilia patients.

**Table 9.** Nonparametric (Kruskal–Wallis) correlation between inflammation indexes and the ABO blood group in pregnant treated thrombophilia patients at term and postpartum treated thrombophilia patients.

Inflammation indexes in pregnant treated thrombophilia patients	Asymp significance	Inflammation indexes in postpartum treated thrombophilia patients	Asymp significance
NLR	0.289	P NLR	0.863
dNLR	0.373	P dNLR	0.521
MLR	0.410	P MLR	0.096
PLR	0.287	P PLR	0.416
SII	0.154	P SII	0.527
SIRI	0.113	P SIRI	0.549
AISI	0.254	P AISI	0.658
MCVL	0.811	P MCVL	0.829
IIC	0.338	P IIC	0.863

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

**Table 10.** Nonparametric (Kruskal–Wallis) correlation between inflammation indexes and ABO blood group in pregnant non-thrombophilia patients at term and postpartum non-thrombophilia patients.

Inflammation indexes in pregnant non-thrombophilia patients	Asymp significance	Inflammation indexes in postpartum non-thrombophilia patients	Asymp significance
NLR	0.796	P NLR	0.570
dNLR	0.718	P dNLR	0.668
MLR	0.739	P MLR	0.440
PLR	0.566	P PLR	0.236
SII	0.278	P SII	0.220
SIRI	0.417	P SIRI	0.486
AISI	0.296	P AISI	0.342
MCVL	0.637	P MCVL	0.382
IIC	0.471	P IIC	0.553

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

There was no correlation between inflammation indexes and ABO blood groups before or after birth in non-thrombophilia patients.

### 3.5. Correlations between inflammation indexes and the Rh blood factor

In pregnant treated thrombophilia patients, MLR is higher in patients without Rh factor (Rh-negative patients) than in those with the Rh factor (Rh-positive patients): median (1.30 versus .72) and mean values (1.14 versus .83).

**Table 11.** Nonparametric (Spearman's) correlation between inflammation indexes and Rh blood factor in pregnant treated thrombophilia patients at term and postpartum treated thrombophilia patients.

Inflammation indexes in pregnant treated thrombophilia patients	Significance (2-tailed)	Inflammation indexes in postpartum treated thrombophilia patients	Significance (2-tailed)
NLR	0.740	P NLR	0.525
dNLR	0.413	P dNLR	0.925
MLR	0.049	P MLR	0.142
PLR	0.478	P PLR	0.680
SII	0.793	P SII	0.492
SIRI	0.284	P SIRI	0.057
AISI	0.700	P AISI	0.096
MCVL	0.459	P MCVL	0.959
IIC	0.988	P IIC	0.719

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

**Table 12.** Nonparametric (Spearman's) correlation between inflammation indexes and the Rh blood factor in pregnant non-thrombophilia patients at term and postpartum non-thrombophilia patients.

Inflammation indexes in pregnant non-thrombophilia patients	Significance (2-tailed)	Inflammation indexes in postpartum non-thrombophilia patients	Significance (2-tailed)
NLR	0.779	P NLR	0.986
dNLR	0.981	P dNLR	0.986
MLR	0.962	P MLR	0.823
PLR	0.822	P PLR	0.872
SII	0.470	P SII	0.858
SIRI	0.981	P SIRI	0.591

AISI	0.542	P AISI	0.667
MCVL	0.597	P MCVL	0.591
IIC	0.542	P IIC	0.914

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

There was no correlation between inflammation indexes and the Rh blood factor before or after birth in non-thrombophilia patients.

### 3.6. Correlations between inflammation indexes and maternal height

There was no correlation between inflammation indexes and maternal height before or after birth in treated thrombophilia patients.

**Table 13.** Nonparametric (Spearman's) correlation between inflammation indexes and maternal height in pregnant treated thrombophilia patients at term and postpartum treated thrombophilia patients.

Inflammation indexes in pregnant treated thrombophilia patients	Significance (2-tailed)	Inflammation indexes in postpartum treated thrombophilia patients	Significance (2-tailed)
NLR	0.314	P NLR	0.346
dNLR	0.306	P dNLR	0.144
MLR	0.320	P MLR	0.264
PLR	0.775	P PLR	0.589
SII	0.547	P SII	0.826
SIRI	0.921	P SIRI	0.669
AISI	0.730	P AISI	0.348
MCVL	0.441	P MCVL	0.726
IIC	0.386	P IIC	0.534

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

**Table 14.** Nonparametric (Spearman's) correlation between inflammation indexes and maternal height in pregnant non-thrombophilia patients at term and postpartum non-thrombophilia patients.

Inflammation indexes in pregnant non-thrombophilia patients	Significance (2-tailed)	Inflammation indexes in postpartum non-thrombophilia patients	Significance (2-tailed)
NLR	0.649	P NLR	0.449
dNLR	0.336	P dNLR	0.701
MLR	0.226	P MLR	0.254
PLR	0.417	P PLR	0.855

SII	0.551	P SII	0.898
SIRI	0.138	P SIRI	0.568
AISI	0.167	P AISI	0.646
MCVL	0.295	P MCVL	0.548
IIC	0.400	P IIC	0.581

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

There was no correlation between inflammation indexes and maternal height before or after birth in non-thrombophilia patients.

### 3.7. Correlations between inflammation indexes and maternal weight

There was no correlation between inflammation indexes and maternal weight before or after birth in treated thrombophilia patients.

**Table 15.** Nonparametric (Spearman's) correlation between inflammation indexes and maternal weight in pregnant treated thrombophilia patients at term and postpartum treated thrombophilia patients.

Inflammation indexes in pregnant treated thrombophilia patients	Significance (2-tailed)	Inflammation indexes in postpartum treated thrombophilia patients	Significance (2-tailed)
NLR	0.811	P NLR	0.318
dNLR	0.715	P dNLR	0.293
MLR	0.672	P MLR	0.590
PLR	0.736	P PLR	0.317
SII	0.547	P SII	0.159
SIRI	0.582	P SIRI	0.293
AISI	0.391	P AISI	0.281
MCVL	0.927	P MCVL	0.386
IIC	0.894	P IIC	0.409

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

**Table 16.** Nonparametric (Spearman's) correlation between inflammation indexes and maternal weight in pregnant non-thrombophilia patients at term and postpartum non-thrombophilia patients.

Inflammation indexes in pregnant non-thrombophilia patients	Significance (2-tailed)	Inflammation indexes in postpartum non-thrombophilia patients	Significance (2-tailed)
NLR	0.839	P NLR	0.204
dNLR	0.981	P dNLR	0.257
MLR	0.735	P MLR	0.620
PLR	0.403	P PLR	0.523
SII	0.638	P SII	0.492
SIRI	0.916	P SIRI	0.553
AISI	0.886	P AISI	0.571
MCVL	0.152	P MCVL	0.861
IIC	0.606	P IIC	0.234

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

There was no correlation between inflammation indexes and maternal weight before or after birth in non-thrombophilia patients.

### 3.8. Correlations between inflammation indexes and maternal BMI

There was no correlation between inflammation indexes and maternal BMI before or after birth in treated thrombophilia patients. Still, there was a close to significant ( $p=0.51$ ) correlation between postpartum dNLR and BMI.

**Table 17.** Nonparametric (Spearman's) correlation between inflammation indexes and maternal BMI in pregnant treated thrombophilia patients at term and postpartum treated thrombophilia patients.

Inflammation indexes in pregnant treated thrombophilia patients	Significance (2-tailed)	Inflammation indexes in postpartum treated thrombophilia patients	Significance (2-tailed)
NLR	0.496	P NLR	0.102
dNLR	0.410	P dNLR	0.051
MLR	0.944	P MLR	0.976
PLR	0.671	P PLR	0.451
SII	0.366	P SII	0.091
SIRI	0.692	P SIRI	0.307
AISI	0.496	P AISI	0.421
MCVL	0.993	P MCVL	0.351
IIC	0.659	P IIC	0.219

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–

lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

**Table 18.** Nonparametric (Spearman's) correlation between inflammation indexes and maternal BMI in **pregnant non-thrombophilia** patients at term **and postpartum non-thrombophilia** patients.

Inflammation indexes in pregnant non-thrombophilia patients	Significance (2-tailed)	Inflammation indexes in postpartum non-thrombophilia patients	Significance (2-tailed)
NLR	0.708	P NLR	0.609
dNLR	0.984	P dNLR	0.333
MLR	0.519	P MLR	0.241
PLR	0.887	P PLR	0.613
SII	0.712	P SII	0.654
SIRI	0.358	P SIRI	0.955
AISI	0.641	P AISI	0.823
MCVL	0.370	P MCVL	0.278
IIC	0.643	P IIC	0.593

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

There was no correlation between inflammation indexes and maternal BMI before or after birth in non-thrombophilia patients.

### 3.9. Correlations between inflammation indexes and fetal weight

There was no correlation between inflammation indexes and fetal weight before or after birth in treated thrombophilia patients.

**Table 19.** Nonparametric (Spearman's) correlation between inflammation indexes and fetal weight in **pregnant treated thrombophilia** patients at term **and postpartum treated thrombophilia** patients.

Inflammation indexes in pregnant treated thrombophilia patients	Significance (2-tailed)	Inflammation indexes in postpartum treated thrombophilia patients	Significance (2-tailed)
NLR	0.775	P NLR	0.520
dNLR	0.690	P dNLR	0.255
MLR	0.812	P MLR	0.492
PLR	0.722	P PLR	0.609
SII	0.371	P SII	0.329
SIRI	0.355	P SIRI	0.688
AISI	0.296	P AISI	0.667
MCVL	0.777	P MCVL	0.896
IIC	0.977	P IIC	0.531

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived

neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

**Table 20.** Nonparametric (Spearman's) correlation between inflammation indexes and fetal weight in pregnant non-thrombophilia patients at term and postpartum non-thrombophilia patients.

Inflammation indexes in pregnant non-thrombophilia patients	Significance (2-tailed)	Inflammation indexes in postpartum non-thrombophilia patients	Significance (2-tailed)
NLR	0.112	P NLR	0.226
dNLR	0.075	P dNLR	0.313
MLR	0.652	P MLR	0.809
PLR	0.355	P PLR	0.737
SII	0.356	P SII	0.237
SIRI	0.999	P SIRI	0.351
AISI	0.921	P AISI	0.228
MCVL	0.415	P MCVL	0.924
IIC	0.315	P IIC	0.248

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

There was no correlation between inflammation indexes and fetal weight before or after birth in non-thrombophilia patients.

### 3.10. Correlations between inflammation indexes and Apgar score

There was no correlation between inflammation indexes and the Apgar score before or after birth in treated thrombophilia patients.

**Table 21.** Nonparametric (Spearman's) correlation between inflammation indexes and the Apgar score in pregnant treated thrombophilia patients at term and postpartum treated thrombophilia patients.

Inflammation indexes in pregnant treated thrombophilia patients	Significance (2-tailed)	Inflammation indexes in postpartum treated thrombophilia patients	Significance (2-tailed)
NLR	0.997	P NLR	0.878
dNLR	0.659	P dNLR	0.954
MLR	0.695	P MLR	0.614
PLR	0.593	P PLR	0.423
SII	0.580	P SII	0.318
SIRI	0.717	P SIRI	0.606
AISI	0.476	P AISI	0.136
MCVL	0.439	P MCVL	0.206
IIC	0.971	P IIC	0.731

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response

index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

**Table 22.** Nonparametric (Spearman's) correlation between inflammation indexes and Apgar score in pregnant non-thrombophilia patients at term and postpartum non-thrombophilia patients.

Inflammation indexes in pregnant non-thrombophilia patients	Significance (2-tailed)	Inflammation indexes in postpartum non-thrombophilia patients	Significance (2-tailed)
NLR	0.836	P NLR	0.131
dNLR	0.991	P dNLR	0.269
MLR	0.833	P MLR	0.822
PLR	0.579	P PLR	0.405
SII	0.783	P SII	0.120
SIRI	0.983	P SIRI	0.628
AISI	0.680	P AISI	0.576
MCVL	0.647	P MCVL	0.340
IIC	0.843	P IIC	0.148

NLR: Neutrophil–lymphocyte ratio; dNLR: derived neutrophil–lymphocyte ratio; MLR: monocyte–lymphocyte ratio; PLR: platelet–lymphocyte ratio; SII: systemic inflammatory index; SIRI: systemic inflammatory response index; AISI: aggregate index of systemic inflammation; MCVL: mean corpuscular volume–lymphocyte ratio; IIC: cumulative inflammatory index. P NLR: postpartum neutrophil–lymphocyte ratio; P dNLR: postpartum derived neutrophil–lymphocyte ratio; P MLR: postpartum monocyte–lymphocyte ratio; P PLR: postpartum platelet–lymphocyte ratio; P SII: postpartum systemic inflammatory index; P SIRI: postpartum systemic inflammatory response index; P AISI: postpartum aggregate index of systemic inflammation; P MCVL: postpartum mean corpuscular volume–lymphocyte ratio; P IIC: postpartum cumulative inflammatory index.

There was no correlation between inflammation indexes and the Apgar score before or after birth in non-thrombophilia patients.

#### 4. Discussion

Although most inflammatory indexes are similar in the two groups of pregnant patients, the PLR index was significantly higher in healthy, non-thrombophilia patients compared to treated thrombophilia patients. This is in accordance with other authors who observed that patients with a non-immunological disease had an increased PLR baseline value [26].

There were similar values in the postpartum inflammatory indices in the two groups of patients. Still, some patients managed to have their uterine cavity closed postpartum within the first 24 hours, while others did not. We further analyzed the situation via the postpartum uterine ultrasonographic scale (PUUS). We split the patients into two groups: those with a closed uterine cavity (PUUS=0) and those with their uterine cavity still open in various degrees (PUUS≥1).

In pregnant treated thrombophilia patients, patients who did not have their uterine cavity closed within the first 24-48 hours (PUUS≥1) had significantly higher SII and AISI inflammation indexes than those with a closed uterine cavity (PUUS=0). SII and AISI increase relative to inflammation and infection according to many studies: SII and SIRI are more reliable biomarkers than other inflammation parameters in hidradenitis suppurativa patients [27]. The SII index showed high accuracies for the prediction of deep neck infection complications [28]. The SII value was significantly higher in non-survivors than that of survivors, and it was identified as an independent predictor of sepsis mortality [29]. In children presenting with abdominal pain, high SIRI and SII values alone support the diagnosis of acute appendicitis at a rate of 95% [30]. The systemic immune inflammation

index was significantly higher in the severe COVID-19 and pregnant patient group than in the mild COVID-19 and pregnant patient group [31]. SII proved to be a good predictor of inflammation and abortion in those with ongoing pregnancy [32,33]. An inflammatory state was observed in cases of late uterine involution [34]. This proved our working hypothesis: there is an underlying inflammatory state, which persisted despite treatment in some patients.

As for AISI, in patients with COVID-19, increased values upon admission predict severe or fatal evolution [35]; therefore, determining the AISI value upon admission can help triage the patients with a bad prognosis [36]. In patients with hemophagocytic lymphohistiocytosis, the aggregate index of systemic inflammation (AISI) was also an independent risk factor for 28-day mortality [37]. After aortic valve replacement, AISI was a statistically significant independent factor associated with in-hospital death [38]. This also proved our working hypothesis: there is an underlying inflammatory state, and it persisted despite treatment in some patients. Moreover, in adults with hypertension, elevated AISI levels are significantly associated with an increased risk of cardiovascular mortality [39]. This means that a cardiovascular factor may also be involved in the delay in uterine involution in treated thrombophilia patients.

In postpartum treated thrombophilia patients, there was no significant difference between the postpartum inflammation indexes in patients who did not have their uterine cavity closed within the first 24-48 hours ( $PUUS \geq 1$ ) compared to those who did manage to have their uterine cavity closed ( $PUUS=0$ ). This is reasonable because, as discovered in [40], only a few patients had severe complications after cesarean section, and delays in closing the uterine cavity are not a complication.

In pregnant and postpartum non-thrombophilia patients, there was no significant difference between the inflammation indexes in patients who did not manage to have their uterine cavity closed within the first 24-48 hours ( $PUUS \geq 1$ ) compared to those who did manage to have their uterine cavity closed ( $PUUS=0$ ). Other factors that may have been involved primarily include the following: number of gestations, number of parity, etc.

There was no correlation between inflammation indexes and age before or after birth in treated thrombophilia patients. In non-thrombophilia patients, there was a correlation between MCVL and age in pregnant patients. This correlation has not been reported before. There was also a correlation between postpartum SII and age and between postpartum AISI and age in postpartum non-thrombophilia patients. These findings have not been previously reported.

Patients with group O blood (a blood group with lower baseline levels of von Willebrand factor) have a lower risk of COVID-19 infection and disease severity compared to other ABO blood groups [41]; therefore, coagulation characteristics and early fibrinogenesis may vary between ABO groups [42]. There was no correlation between inflammation indexes and ABO blood groups before or after birth in treated thrombophilia patients or non-thrombophilia patients. This means that thrombophilia treatment was appropriate.

In pregnant treated thrombophilia patients, MLR is higher in patients without the Rh factor than in those with the Rh factor. There was no correlation between inflammation indexes and the Rh blood factor before or after birth in non-thrombophilia patients. MLR may serve as a potential indicator for predicting the progression of hematoma after cerebral contusion [43]. The MLR was significantly higher in the HELLP group than in the normal pregnant patient control group at the delivery time [44]. The monocyte value and monocyte/lymphocyte value (MLR) were significantly higher in the cesarean pregnancy group than in the control group [45]. There have been no reports of higher MLR values in pregnant Rh-negative treated thrombophilia patients so far.

There was no correlation between inflammation indexes and maternal height or maternal weight before or after birth in treated thrombophilia patients or non-thrombophilia patients.

There was no correlation between inflammation indexes and maternal BMI before or after birth in treated thrombophilia patients. Still, there was a close to significant ( $p=0.51$ ) correlation between postpartum dNLR and BMI. There was no correlation between inflammation indexes and maternal BMI before or after birth in non-thrombophilia patients.

There was no correlation between inflammation indexes and fetal weight or the Apgar score before or after birth in treated thrombophilia patients or non-thrombophilia patients.

## 5. Conclusions

In pregnant treated thrombophilia patients, patients who did not manage to have their uterine cavity closed within the first 24-48 hours ( $PUUS \geq 1$ ) had significantly higher SII and AISI inflammation indexes than those who did manage to have their uterine cavity closed ( $PUUS=0$ ). In pregnant treated thrombophilia patients, the MLR is higher in patients without the Rh factor than in those with the Rh factor.

The PLR index was significantly higher in healthy non-thrombophilia patients compared to treated thrombophilia patients. In non-thrombophilia patients, there was a correlation between MCVL and age in pregnant patients. There was also a correlation between postpartum SII and age and between postpartum AISI and age in postpartum non-thrombophilia patients.

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